REPORT ON TRAIN DERAILMENT IN PITTSBURGH TUNNEL
WEDNESDAY OCTOBER 10, 2001

By Thomas Edward Fox

During the early morning hours of Wednesday, October 10, 2001, twelve "hopper" rail cars traveling on the Wheeling & Lake Erie Rail Company railroad derailed in a tunnel just outside the city of Pittsburgh, Pennsylvania.

Derailed Cars in Tunnel

There were no personal injuries, hazardous materials, or other emergencies involved – therefore, no emergency services (police, fire, etc.) were on the scene. The crew for the train was able to disconnect the locomotives and pull away from the wreckage leaving the tunnel safely. The railroad's concern at this point was clearing the railway as quickly as possible, making the necessary repairs, and opening the tracks to normal traffic.

Wheeling & Lake Erie officials immediately contracted with a "rail wreckage and service company". The service company, as part of their normal functions, then began to sub-contract with other private service providers to quickly get the needed professionals and equipment on the scene.

It was recognized that the nearly one mile long tunnel had no ventilation and, with the portals of the tunnels at the ends of three-quarter mile long "ravines" or cuts, there was very little – if any, natural wind-current ventilation though the tunnel. Considering the clean up crews would be using heavy equipment producing massive amounts of diesel exhaust fumes, the need for forced ventilation was evident. It was also apparent that unloading the 2.5 million pounds of grain corn from the hoppers of the derailed train cars would create very dusty and possibly explosive atmospheric conditions within the tunnel.

Recently, another division of the contracted service company had worked on a train derailment in Baltimore, Maryland where an “air boat” type wind fan powered by a gasoline engine attempted to provide fresh air in that project. The Pittsburgh project manager requested that a larger fan, similar to the Baltimore one, be brought to their work site in Pittsburgh.

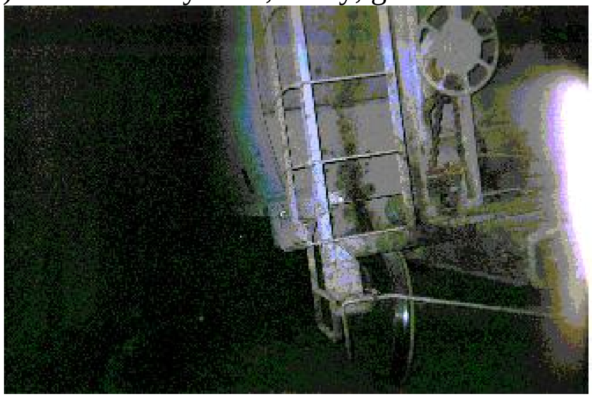
Tempest Technology Corporation, Inc., manufacturer of The MVU (Mobile Ventilation Unit), was contacted at approximately 2:00PM on October 10th by a sub-contractor and asked to bring the MVU to the Pittsburgh site. At the time of the request, the MVU was being demonstrated in Gaithersburg, Maryland to an international gathering of tunnel engineers and others concerned with tunnel construction, safety and fire suppression. The demonstrations were curtailed and at 3:45PM the MVU was on its way to Pittsburgh.

The particular MVU taken to the scene was the MVU-48, or a 48” diameter blower system. This size MVU is capable of over 70mph winds off the face of the blower and produces in excess of 80,000cfm air volume. The blower and the scissor-lift frame, which lifts to a height of 21’ 3” above the bed, are powered by a Cummings 126hp diesel engine with a 54gallon fuel tank. The blower has a vertical tilt, up and down, of 45 degrees with a lateral movement of 360 degrees. The MVU is controlled with wired-remote electric and electric over hydraulic controls.

After arriving on the scene in Pittsburgh at 8:45PM that evening, the MVU was not put in place at the portal of the tunnel until a gravel road had been constructed from the marshalling yard, down the side of the tracks, and to the tunnel opening (three-fourths of a mile). It was 2:00AM on October 11 before the MVU was in position and running.

A hand-held anemometer (wind velocity meter) was used to measure the air movement both outside the tunnel and inside the tunnel. There was no air movement in or around the tunnel prior to the MVU being positioned and cranked. Air quality in the tunnel was very poor and the air was “hot” as the work crews had already begun work in the tunnel since about 8:00AM that morning.

The tunnel is approximately three-quarter to one mile long, 20 feet wide and 30 feet high at the center. About one-half mile into the tunnel from the south entrance, the track begins to curve gradually to the left (west). There is very little, if any, grade to the tracks.



Derailed Cars in Tunnel

4708 N. Blythe Ave., Fresno, CA 93722
Tel: +559.277.7577 Fax: +559.277.7579
Email: response@tempest-edge.com Internet: www.tempest-edge.com

Twelve derailed hopper cars were left positioned in an “accordion” manner down the tracks in the tunnel and touching the tunnel walls. At least three of the cars were lying on their sides against the walls of the tunnel. Railroad officials decided that all cars should have the grain corn on the cars unloaded before any attempt would be made to right them or pull them out of the tunnel. This tactic of reducing the weight of the cars would hopefully prevent severe damage to the cars, the track bed, and the walls of the tunnel.

Huge, diesel powered “vacuum trucks”, with “high rail” set ups allowing them to be driven on the tracks as well as on the gravel road, and especially designed for rail-spill cleanup work, were trucked in from surrounding work sites. These were put into operation sucking the corn from the cars.

The “vac trucks”, when full, were driven out of the tunnel and the corn was dumped on to plastic film. Here it was scooped up by front-in loaders and placed in dump trucks. Crews continued this operation from both ends of the tunnel until all cars in the tunnel had been unloaded in this manner.

Hoses on the vac trucks would only effectively reach the first two cars at the end of the wreckage at each end of the tunnel. When the first two cars at one end were unloaded, specialized heavy equipment called “side winders” were sent in to right the cars and pull them out of the tunnel. Then the vac trucks were sent in again to unload two more cars.

All the while of these efforts the salvage equipment was spewing heavy, black diesel exhaust into the tunnel while gasoline powered generators for lighting in the tunnel added additional exhaust fumes.

The corn dust was also a concern for air quality management. The mixture of diesel fumes, gasoline fumes, and corn dust in a non-ventilated tunnel provided a “formula for disaster” and most certainly severe health concerns for the workers.

MVU Positioned in Front of Tunnel Portal

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Initial considerations for the placement of the MVU took into account any natural wind currents that might occur, the ease of getting the MVU positioned in front of either portal, and weather more work was going to be done closer to one end of the tunnel versus the other. It was decided that either end of the tunnel could be used however the south end of the tunnel was easier to access.

The MVU was then positioned approximately ninety (90) feet from the south portal of the tunnel. It was placed to the side of the tracks allowing the heavy equipment and other train cars to pass by on the track bed.

The MVU blower was elevated to about 12 feet above the track bed and turned approximately twenty degrees toward the portal. It was tilted downward toward the opening at approximately a fifteen-degree angle. An “air lock seal” was formed around the “mouth” of the tunnel, which prevented the pressurized air in the tunnel from escaping through the entry portal. (A note was made that had there been no space for the MVU along the side of the tracks - solid rock face for example, a “platform” could have been built on the ravine wall and the MVU could have been aimed downward from this greater angle to ventilate the tunnel opening.)

The initial readings of air movement at, and in, the tunnel were zero velocity. When the MVU was cranked and the engine accelerated to approximately 2400 RPM, the air velocity in the portal was measured at 18.1mph. This measurement was taken from the center of the track bed and eight feet above the ground (as high as the anemometer could be held in the hand above the head).

View From Inside Tunnel of MVU

At the same 8’ height and center of the track bed but at 40’ into the tunnel, the wind speed was measured at 11mph. Measurements at 60’ into the tunnel were recorded at 8.5mph, at 80’ wind speed was 7mph, and at 100’ the wind velocity was 5.6mph.

Wind speed measurements were then taken at the north (“discharge”) end of the tunnel where readings were 3.9mph in the portal and 3.4mph at 100 feet into the tunnel from the north end. It should be noted that the derailed hopper cars (twelve in all) were still in the tunnel and were blocking most of the tunnel from wall to wall. Only the space above the top of the cars was open to any great degree although obviously the undercarriages of the cars were not “airtight”.

Inside the south end of the tunnel (MVU entrance) and behind the last two derailed cars of the twelve, measurements were made beside the vac trucks that were sitting on the tracks behind the derailed cars. Readings on the left of the trucks (west side) were at 3.5mph and on the right side (east side) at 4.8mph.

From the top of the first derailed car closest to the south portal, which was approximately 12 to 14 feet off the track bed, the wind velocity was measured at 6.3mph. Note that the derailed cars were over 1000 feet into the tunnel from the MVU end and the wind speed here, over the top of the wrecked cars, was greater than the wind speed at 100' from the MVU into the opening of the tunnel and where there was no obstruction.

At approximately 2:00PM on Thursday afternoon a private company engaged by the railroad arrived on the scene to monitor air quality in the tunnel and other work areas. Air quality in the tunnel was never a question once the MVU was put in to operation and throughout the weekend as the salvage efforts continued. This was the case even though much more, and much heavier, diesel equipment was used in the tunnel in removing the final derailed cars. (The job site supervisor will furnish Tempest a copy of the air quality recordings when they are made available to him.)

The particular service company contracted here said they worked at least 25 to thirty tunnel derailments in the past year, which was "somewhat average". And, until the Baltimore tunnel incident, they had done their work in "hostile environments" without external ventilation. In some cases they were forced to wear SCBA equipment or, at a minimum, respirator masks.

Workers, who were interviewed and who had many hours of experience in working in tunnels for maintenance as well as derailments, expressed their opinions that the MVU greatly enhanced their ability to work safely and efficiently. In fact, one worker who was in the tunnel in the early morning hours said he had to put on a jacket because the tunnel winds made him "shiver" – a condition unknown until this experience with the MVU.

Also, comparisons, made by workers who had experienced the effects of both the "air boat" type fan and the MVU, praised the much more effective results of the MVU over the air boat design.

The service management company asked that Tempest have the MVU units in position, especially in the northeast, to rent or lease to them. Upper level management contact names and phone numbers were provided to Tempest with the recommendations by the on-site supervisors that these people be contacted and proposals made for the company to purchase one or more of the MVU's.

This unfortunate situation for Wheeling and Lake Erie Rail Company has provided valuable operation and marketing data for the Tempest MVU. Potential MVU customers, renters or buyers, should no longer doubt that the Mobile Ventilation Unit could do the job in tunnel derailment situations. They only need to justify the cost of purchasing such units based on worker safety and efficiency, potential property loss savings, and probable availability when and where needed.

Photos from the derailment area are a part of this report. More are available.

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