

STATEN ISLAND TANKER TRUCK HAZ-MAT INCIDENT

by FF Tom Gardner, Haz-Mat 1

Chemicals are transported across the country in amazing numbers. The most recent estimate has the number of trucks carrying hazardous materials at 365,000. Each year, the Department of Transportation (DOT) reports an average of approximately 12,000 unintentional hazardous material releases on highways by cargo tank trucks. Six percent of these incidents occur in New York State. The property damage created by these incidents is close to \$20 million a year.

Accidents and releases are inevitable when dealing with this quantity of trucks on the road. The potential for disaster is apparent when looking at the numbers and the cargo they haul. The DOT considers nine classes of hazardous materials for transportation, with Class 8--corrosives--especially troublesome.

The tanker truck used to transport acid is a model MC312. Unlike other tankers, MC312 trailers generally have their discharge valves and piping located on the top of the tank. The location of the discharge valves is an indication of the extremely hazardous nature of the product. If the truck is involved in an accident in which a car has crashed into its undercarriage, positioning the valves on top prevents the acid from spilling over the car and onto the passengers. MC312s can be recognized by their narrow tank body and ribbed exterior, designed to support an acid that is generally a dense and heavy liquid.

Since all the piping is on top, a method of off-loading--other than gravity--must be employed. MC312 tankers have their own compressor that is generated by a power take-off. It is capable of pressurizing the tank to more than 20 psi. This pressure forces the acid up through the standpipe and outlet valves.

MC312 tankers can contain one tank per truck or sever-

al. If they contain more than one, the tanks are wrapped in steel with a small space between them. From the exterior, the number of tanks can be determined only by counting the number of domes and discharge outlets. Up to four or five separate tanks can be found on one truck; each may contain different products.

If an MC312 acid tanker is involved in an accident or rupture on a highway, the danger is clear. This was just the case on June 18th, 1998, in Staten Island.

A tanker truck carrying 4600 gallons of 20% hydrochloric acid was traveling on the Staten Island Expressway at approximately 10:30 a.m. on a weekday. The truck was an MC312 with two separate, full 2300-gallon tanks. For some unknown reason, the tank's outer shell had been compromised and split down the middle, between the two tanks. The truck's two tanks now were positioned similar to the two legs of a shallow "V." Since the manholes and flanges on the tankers are not completely leak-proof (the product never is permanently up against them in normal operation), they began to leak as the acid pressed against them due to the position of the liquid. The product had collected in the ends of the two tanks, toward the middle of the trailer. The valves of the rear tank were located above the product, on the rear of the tank (upper right leg of "V"), so the product was in no danger of leaking from that tank. The front tank's valves and flanges also were located in the rear of the tank, below the product level, but now the acid was concentrated against them (lower left leg of "V").

The acid had a steady drip of approximately five to 10 gallons an hour. It was dripping from the flanges, down the sides of the tank, into the cracked and broken area to the Expressway below. The potential was present for the leak to worsen as the acid attacked the gaskets and flanges. The



Rescue 5 members employed cribbing to support the front tank area. photos this page by Tom Ingram



The Haz-Mat 1 team used a Vetter low pressure-high lift air bag to support the rear tank.

first-arriving units (Engine 163 and Ladder 83) quickly recognized the severity of the situation and evacuated a local day-care center and one block in each direction from the Expressway. They also diked the nearby sewer, preventing any spilled product from contaminating the waterway. Hand-lines were stretched and manned from outside the hot zone as a precaution. They were to be used as a rapid decontamination or to suppress an acid cloud should the tank rupture. Deputy Chief Ted Goldfarb immediately ordered sand from the DOT to be used as a berm in the event of a rupture.

Upon arrival, Rescue 5's entry team, Lieutenant Dowdell and FFs Sykes and Droppa, donned level-B encapsulated protective gear and self-contained breathing apparatus (SCBA), while the back-up team, FFs Tarkenton and Cavalieri, stood fast in the warm zone for safety measures. Level-B unencapsulated gear also would have been appropriate for this outside operation, but was not available to R-5. R-5's resource man, FF Bini, was in constant communication with Hazardous Materials 1's resource man, FF Nouza, and Lieutenant Bacci.

The members and officer of R-5 made a preliminary entry into the hot zone to place another dike closer to the tanker. This dike prevented the runoff from spreading further onto the highway. Then, they evaluated the extent of the leak and condition of the tanker. R-5 made the initial evaluation of the leak and tried to determine the stability of the trailer's cargo tanks.

The Haz-Mat Unit arrived soon afterward and the decontamination team, FFs Ringle and Hermann from R-1, set up a decontamination site. The entry team, FFs Regan and Gardner, and back-up team, FFs Yank and Larocchia, directed and supervised by the Haz-Mat officer, suited up for an entry. The back-up team stood fast in the event of a rupture and need for assistance in evacuating the hot zone.

The entry team's first priority was to check the shipping papers to determine the accuracy of the driver's information. That completed, the engine was shut down and the entry team made a secondary search of the leak area and split tank. The outlet valves also were examined to determine the possibilities for off-loading. The entry team then exited the hot zone to confer with the Safety Chief, Deputy Chief, Rescue 5 officer and Haz-Mat officer.

The plan of action was to crib and support the truck to avoid further instability and potential for rupture. Rescue 5 was responsible for the front tank and the Haz-Mat Unit would support the rear tank. Rescue 5 used cribbing to support the front tank area and the Haz-Mat Unit used a Vetter low pressure-high lift air bag to support the rear tank. The entry team positioned and stabilized the Vetter bag as the back-up team inflated it from a short distance. After both teams were removed, the method of product removal had to be determined.

Two options were available to off-load the acid. The first option was to off-load the product conventionally, by pres-



Rescue 5 member spreads Speedi-Dri to help absorb some of the remaining spill.

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surizing the tank with a second truck's compressor to 15 to 20 psi. Using this process, the front tank would be emptied completely due to the pitch of the tank and position of the standpipe. The rear would be more difficult to empty because the standpipe was located on the high side of the tank. The remainder would have to be suctioned out of the rear tank, through the manhole. The hazards of this process were evident due to the precarious nature of the tanks. Pressurization could further damage an already weakened tank that might rupture, spilling 2300 gallons of hydrochloric acid onto the Expressway.

The second option considered was to drill into the tanks and suction the product out and into a second acid tanker. This was unfavorable because of the dangerous working conditions on top of the truck. Although cribbed and partially supported, the truck was unstable. It was thought to be too hazardous to allow Haz-Mat members on top of the truck for off-loading purposes. The construction of the truck posed another deterrent to that option. The tanker was a 3/16"-thick stainless steel tank. There may not have been sufficient drilling tools on the scene to drill through the tank. If the drilling option had failed, the tank would have been compromised at the drilled site and possibly could not be pressurized.

Both options were considered seriously. In the meantime, the berm was being built up around the tank. It was constructed by the DOT under the supervision of Division 8 and Haz-Mat 1. The berm was a three- to four-foot-high sand wall that surrounded the tanker on three and one-half sides, allowing room for the off-loading vehicles.

After much debate, it was decided that the tanks should be pressurized. This method was chosen after a visual inspection of the tank walls showed them to be structurally sound. Also, in the unlikely event that the tank did rupture, the berm would hold the acid while the clean-up company would start suctioning it immediately. This was the safest and most expedient course of action that could be taken. It is recommended by the chemical company's owner that all

off-loading of damaged tankers be done conventionally whenever possible, instead of drilling.

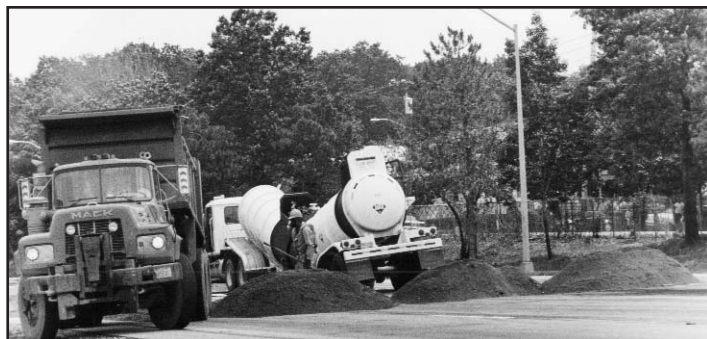
By now, there was a lag in the operation for several hours due to the delay of the second tanker for off-loading. That tanker was coming from New Jersey and had to make its way through the traffic jam caused by the incident.

R-5's entry and back-up team now had manned the hose-line inside the hot zone since they were protected with chemical protective clothing. One line was manned in the rear of the tank while the other was directed from the side.

The clean-up company, hired by the trucking company, arrived. They were responsible for the already-spilled acid. The second truck was ready to be loaded with the acid from the first truck. Shipping papers for this truck were examined to guarantee the compatibility of the acid with its tank. The driver of the second truck realized the incompatibility of the two truck connections and L-83 (after it was relieved), was dispatched to a local plumbing supply store to purchase the needed adapters to permit proper connections between the two trucks.

The fittings purchased, the receiving tanker pulled alongside the first. The tanker truck driver--the only one with expert knowledge of the valves and pumps of both trucks--directed the operation of the Haz-Mat entry team in removing, fitting and connecting the piping. Each maneuver required handling bolts, gaskets and wrenches with two sets of chemical protective gloves. During the operation, entry members were contaminated on their hands and front. This confirmed the need for the protective clothing, but also made the procedure difficult to perform.

Once the valves were connected, the entry team--directed by the driver--worked the compressor and valves of the pump. The timing of the pressurization and valve openings was crucial. Delayed opening of a valve upon the dri-



DOT personnel constructed the berm under the supervision of Division Eight and Haz-Mat 1 members.

ver's command could over-pressurize the tank and cause a rupture. The rear tank was emptied successfully, but some product remained due to the pitch of the tank. This would be suctioned off later, after the front tank was emptied.

Again, at the direction of the driver, the Haz-Mat entry team disconnected from one tank and reconnected to the other tank. The standpipe of the front tank already was inserted into the deepest part of the product due to the pitch. The product again was pumped out, using the same method of pressurization.

The accident had shut down both sides of the Staten Island Expressway and its service roads and partially closed the Verrazano Bridge. Traffic was backed up for miles into New Jersey in the middle of the evening rush hour. Division 8 was receiving reports of children passing out in un-air-conditioned school buses sitting in traffic. A thunderstorm with dangerous lightning over Staten Island created the need for on-scene units and traffic to open up for other emergency vehicles responding to the lightning strikes. Although the traffic nightmare that developed added stress and urgency to the situation, the safety of the on-scene units amid the potential for the exposure of the neighboring area were the primary considerations of everyone involved.

The temperature throughout the day was nearly 85 degrees and very humid. The operation had taken 10 hours so far. All of the on-scene units were taxed and exhausted. There was a fear that any one of the members might suffer from heat stress, the most common injury incurred with chemical protective clothing. Haz-Mat rotated several members into the hot zone with level-B protective clothing. The Recuperation and Care (RAC) Unit (see page 30 for article on this Unit) arrived and dispersed much-needed refreshments.

All that remained was acid in the rear tank. To suction this off, a third tanker had to be employed. The second tanker--which was supplied by the chemical company--was not equipped to suction off product; it was capable only of receiving product. The third tanker brought in by the clean-up company, unfortunately, was not quite appropriate for receiving acid. It was a steel-constructed tanker, a type that is incompatible with acid.

According to Title 49 of the Code of Federal Regulations (later reaffirmed by FF Nouza on resource), no metal tanker is allowed to transport an acid. This also was validated by the driver of the third tanker truck. The second tanker was



Emergency personnel inspect valve for off-loading.

lined with an acid-resistant lining. It was decided that the third tanker would receive the acid, but then it would be transferred quickly to the second, after which, the third would be filled with water to dilute any remaining acid in the tank.

Since most of the hazard had been mitigated by this time, the clean-up company had taken over the pumping procedure. As the remaining acid was being pumped into the second tanker from the third, the hose connection separated and hydrochloric acid began to pour onto the highway. Simultaneously, it began to rain heavily. Hydrochloric acid begins to fume when it comes in contact with water. The fumes can be extremely noxious and irritating. Upon exposure to even moderate amounts, the fumes can cause difficulty in breathing and choking. Approximately 200 gallons spilled before being stopped by the trucking company workers.

Rescue and Haz-Mat members immediately blocked and absorbed any acid they could. The spill was vacuumed quickly by the on-site clean-up company, whose employees were protected by air-purifying respirators. In spite of the acid release, there was minimal contamination of the Expressway. The first-due companies' dikes held any product from entering the sewer. The berm and R-5's dike held or absorbed most of the acid in a contained area, while the clean-up company suctioned the product from the Expressway into 55-gallon drums. The pumping resumed and the acid finally was emptied into the second tanker.

Lessons learned and reinforced

1. The Fire Department's role was dictated by their basic standard operating procedures (SOPs) and the operation went as well as could be expected. Much of the expertise of the truck pumps and valves was in the hands of the truck company operator, but even that had to be questioned and evaluated at certain times.
2. It is essential in off-loading operations to assure that the receiving tanker is compatible with the product to be accepted. The clean-up company that sent the third truck was not careful in avoiding incompatibility. Even if the tanker is empty, the last product that it hauled may be incompatible with the new product. The product could react with the old cargo remaining or the tank material itself, as with the acid and the steel. It is best to have a dedicated tanker, one that hauls only a particular product and that product only (as the second tanker was).
3. The traffic concerns of this incident became apparent as the situation developed. The Staten Island Expressway is the only major highway through Staten Island with no parallel road. Not only were both sides shut down but so, too, were both service roads. The lower level of the Verrazano Bridge, Brooklyn-bound, was turned into an emergency route for incoming and outgoing emergency vehicles. The traffic was backed up in New Jersey for miles as the Police Department diverted traffic away from the accident. For most of the commuters who travel on the Expressway, Staten Island is not the final destination. When redirected onto the streets of Staten Island, they were unfamiliar with the area and created enormous traffic difficulties.

The Police Department has an emergency plan in effect for major incidents that shut down particular roadways. Pre-determined rerouting systems are set up in preparation of similar incidents. Transcom--an organization consisting of various transportation and safety agencies for the tri-state area--is responsible for media notifications, overhead message sign warnings and other traffic diversion techniques. The traffic problems precipitated by the incident actually prolonged the operation due to the delay in arrival of additional tankers. As a result of this event, Transcom and its members are developing alternative roadways to bypass Staten Island completely should a similar incident occur.

4. It is important that the Incident Commander have an awareness of the extenuating circumstances that develop from an operation this large. The accident created delays in response to other Fire Department emergencies in the area. There were also health concerns for commuters stuck in traffic for hours on a hot and humid day with little or no resource for shade, refreshments or medical attention.

The incident also reaffirms the need for the Battalion and Deputy Chief to have adequate knowledge of their response area. Chief Goldfarb had sufficient knowledge of the area to be able to assign a Ladder Company to a local supply store and was familiar with the roads and the traffic difficulties the incident caused.

5. In retrospect, it would have been advantageous to special-call the Decontamination Unit. Haz-Mat 1 had the capability to decontaminate themselves and others who had entered the hot zone. The Decontamination Unit could have been available to use in case other responders and/or victims became contaminated.

6. Having several organizations represented at the scene presented a situation in which different priorities were expressed. Although all involved obviously were worried about an accidental release that could have caused tremendous exposure and evacuation problems, each representative had individual concerns.

The Office of Emergency Management (OEM) was the on-scene coordinator, while Division 8 directed the operation as the Incident Commander. The Coast Guard, on the scene the entire time, concentrated on avoiding an accidental spill of acid into the sewer system. The Police Department's concern was the enormous traffic difficulties created. Haz-Mat and fire officials were concerned with the overall safety of the neighborhood and on-scene units. The chemical company was worried about their trucks and product. Despite all these agencies with their varying priorities, the operation that transpired was one in which all concerns were addressed and expedited in the safest way possible.

About the Author...

FF Tom Gardner is a 14-year veteran of the FDNY with 11½ years in E-59 in Harlem and two and one-half years in Haz-Mat 1. He holds a BA degree in Biology from Queens College and is an adjunct instructor of Hazardous Materials at Jersey City University in Jersey City.

