

What We Learned

BY FRANK C. MONTAGNA

TRUCK EXTRICATION FROM A SINKHOLE



EARLY ONE MORNING, TWO sanitation workers were driving down a residential street in a 16-ton garbage truck. Although it had not rained the night before, there was a large puddle in the middle of the street. Without a second thought, the truck's driver proceeded through the puddle. This puddle, however, was actually an accumulation of water escaping from a broken underground water main. Unknown to the truck's occupants, the flowing water had already undermined the section of the street that they were about to drive over.

The water flowing from the underground main had severely undermined the street, but all that showed on the surface was a large "puddle." As the sanitation truck went through the puddle, the pavement collapsed under the weight of the truck, and the vehicle's front end suddenly dropped into the

water-filled void. The truck's cab sank up to the steering wheel as the panicked driver and passenger scrambled out of the vehicle, into the cold water, and finally onto the safety of the pavement. When the fire department arrived at about 6:30 a.m., the two sanitation workers were lying on the grass in front of a nearby house, being treated by EMS personnel. Badly shaken and bruised, they were removed to the hospital for medical treatment.

When I initially responded to this incident, I thought that it would be easily and quickly controlled. All we required, I thought, was for a wrecker to come and pull the truck out of the hole. I was wrong—the incident escalated. It would eventually involve water, gas, and electric utilities personnel; sanitation; haz-mat, and police response; and a private contractor to pro-



(1) The sanitation truck continued to sink into the hole as more and more of the pavement was undermined and collapsed. (Photos by author.) (2, 3) A large wrecker with a boom lifted the front of the truck while a smaller sanitation wrecker held the rear of the truck in place to prevent it from slipping into the hole. The boom operator then swung the cab onto stable ground.

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vide a large truck-mounted boom.

As more agencies became involved, scene control became more difficult. It became harder to control and direct the firefighters while consulting with the other agencies, developing a plan, and providing for the safety of all involved.

Realizing that I needed help with these tasks, I notified my immediate superior, the

deputy chief. He responded, took command of the operation, and assigned me to information-gathering tasks and direct supervision of the firefighters operating at the scene. This enabled him to direct his attention to maintaining control of the ever-expanding incident.

Prior to his arrival, I had unknowingly become overwhelmed with the details of the operation and was no longer able to satisfactorily manage the incident. The deputy chief, on the other hand, with my help, focused on the overall operation and picked up several safety concerns that I had not considered. With no other tasks to distract him, he was better able than I to coordinate the operation, which was eventually concluded safely.

INITIAL ASSESSMENT

We were faced with 16 tons of truck that was doing a credible imitation of the *Titanic* as the undermined section of the roadway slowly grew. The water was bubbling up like a hot tub, as the truck settled cab first into the growing sinkhole.

Initially, I called water utility personnel to the scene to shut off the water and gas utility personnel to handle potential gas leaks.

Members of a water department emergency crew responded quickly. They had to stem the flow of the water to stop the erosion of the roadbed. Shortly after their arrival, they located the valves to shut off the water supply to the damaged portion of the main and closed them. Later, the water company would have to excavate the area, expose the pipeline, find the break, and repair it. After the water was shut down, we could begin removing the truck from the hole. This would prove to be easier said than done.

Prior to the arrival of the gas company, I directed firefighters to enter the single-family homes lining the street adjacent to the sinkhole to check for flooding (which fortunately was not a problem) and the presence of natural gas. While waiting for the gas utility's arrival, we continued to monitor the buildings for the presence of gas using a combustible-gas detector. We could not rely on our sense of smell for gas detection. Gas escaping from a broken service line traveling underground through sandy soil can have its odorant, mercaptan, scrubbed out of it, rendering its presence detectable only by a gas detector.

The gas company personnel arrived a short time after the water department and took their own readings. They did not find leaking gas. They then consulted their grid maps to determine if any gas mains in the area were in danger of being undermined by the leaking water.

When a large water main breaks and the resulting flood washes away the ground around the break, gas lines and any other underground utilities in the vicinity could be affected. If the leaking water washes the soil from around a cast-iron gas pipe, the weight of the now unsupported pipe could cause it to break. Another concern was that the weight of the truck could be pressing down on an unsupported gas service line or main. This, too, could cause a break that would result in a gas leak. In such a case, the incident could escalate from just a water leak to a major gas main break. Fortunately, neither had yet occurred, but the volume of escaping water could easily undermine any gas main present.

Crowd and traffic control quickly became problems as rush-hour traffic commenced. The local residents, fascinated at the sight of this garbage truck sinking into a water-filled hole, kept inching closer to get a better look as cars and buses tried to get around the stranded sanitation truck. I called for police assistance for crowd and traffic control. The police had to keep the curious a good distance away from the edge of the sinkhole. While the pavement around the hole appeared to be intact, it had actually been undermined by the flowing water and posed a real hazard to anyone standing on it. All vehicular traffic was stopped in the immediate area of the water main break. Since there was no way of telling just how much of the roadway had been undermined, the street was shut down.

REMOVING THE TRUCK

Sanitation department personnel arrived on the scene early. Their emergency crew assessed the damage to their truck, and we discussed ways to remove it from the hole. They were familiar with the stranded vehicle and could advise us where to attach cables and chains to lift the truck properly and safely. Attaching them to the wrong point would cause the metal to tear or break; ultimately, the truck might be dropped as it was being lifted. They also requested the response of two of their heavy-duty wreckers.

As the incident progressed, an in-ground electrical transformer with feed lines going to the overhead wires was noted. It was not apparently involved; but, as a precaution, I requested electric utility response. In addition, there was concern that if heavy equipment had to be called to the scene, the service wires going from the poles to the homes were low enough to pose a hazard to the equipment operators. This could require cutting the power altogether or at least cutting a few of

the overhead service lines to provide safe access for this equipment. Fortunately, the in-ground transformer was not endangered and the overhead wires did not need to be cut.

Sanitation personnel proposed lifting the cab with one of their wreckers attached to the front of the truck and swinging it to the side onto solid pavement while at the same time using a second wrecker to hold the rear of the truck in place on the pavement. Without the second wrecker, the rear of the truck would be pulled into the hole as the front was lifted out.

Unfortunately, the sanitation department wreckers were not up to the task, and a private contractor with a monster wrecker was summoned. This larger wrecker had a long boom that allowed it to be set up well beyond the collapse area. A concern with the smaller wreckers was that they would have to get dangerously close to the widening hole to be effective. In addition, the larger wrecker's boom could swivel. This would allow the operator to lift the truck and then swing it onto solid ground. Our new plan was for the large wrecker to lift the front of the garbage truck while one of the sanitation wreckers, at a safe distance from the hole, held the rear of the truck in place and prevented it from slipping into the hole. The boom operator would then swing the cab onto stable ground while the sanitation wrecker, attached by cable to the rear of the truck, held it in place.

As our plan was being formulated and as we waited for the monster wrecker, the sanitation truck continued to slowly sink into the hole. This raised a new concern. The truck's diesel fuel tank was being crushed against the pavement. If it continued, diesel fuel could (and did) leak into the standing water and contaminate the water distribution lines. The hydraulic tank was also in danger of being ruptured if the truck sank much more. It was likely that we would face a diesel and possibly a hydraulic fluid spill. To prevent this, the deputy chief requested the response of one of our haz-mat-trained squad units to offload the diesel and hydraulic fluid. The diesel and hydraulic fluid were partially offloaded when the truck again started to settle into the hole, and the pavement around it was in danger of collapsing. The fluid removal operation ceased because of the hazard posed to the squad firefighters. The pavement around the truck might collapse and drop the firefighters into the hole. They also ran the risk of being crushed between the truck chassis and the pavement as the truck settled against the pavement. Some diesel fuel escaped into the sinkhole, but we did at least reduce the severity of the spill.

At one point, after the water was shut down, we had to pump the standing water out of the sinkhole so that we could determine how best to attach the lifting cables to the cab. When we did this, the water department expressed concerns about contamination. Some of the truck's diesel oil had leaked into the water and was floating on top.

As the water level dropped, the floating oil got closer to the rupture in the water main. If the oil entered the water main, a large section of the undamaged water main would have to be dug up and replaced to avoid water supply contamination. That would turn the repair job into a weeklong ordeal rather than a one-day patch job. Water department representatives wanted to open the valves and let water flow from the burst pipe to prevent the oil from entering the pipe, but the deputy chief was concerned that this would cause more erosion and possibly complicate the removal of the truck. Instead, we opted to flow water into the hole from an open butt hoseline attached to a hydrant. In this way, we could precisely control the amount of water in the hole and the rate at which it entered, thus minimizing erosion and preventing contam-

ination of the water main.

We concluded the incident at approximately 2:30 p.m., nine hours after my initial response.

LESSONS LEARNED

• *Coordinating various responders.* Identifying the various utilities needed, getting them to respond promptly and with the required personnel and equipment, and getting heavy equipment onto the scene took time. Typically, the utilities initially responded with a low-level employee who assessed the situation and then called for a superior to respond who would, in turn, request his superior. More time was required to get the appropriate level supervisor on the scene.

We needed definite information about the immediate and potential hazards; often, the first-responding utility workers did not have that information, so we had to wait for subsequent levels of supervisors to arrive. The leak occurred at 6:30 a.m.; by the time all of the equipment was en route from various distant locations, it was rush hour, which delayed our operation even more. While we waited, the roadbed gave way several times, and the truck settled deeper into the hole.

This continued to occur even after the water flow was stopped.

Each of the agencies represented at the scene had several levels of supervisors and a number of workers present. It became increasingly difficult to determine who was in charge of the various on-scene agencies and to get definite answers to questions.

For continuity at multiagency incidents, the City of New York maintains an Office of Emergency Management (OEM) that responds and can coordinate interaction between agencies. The agency is directly responsible to the mayor and can elicit cooperation from the most uncooperative officials on the scene. An OEM representative arrived about midway through the incident. He had been monitoring our department radio frequency and responded to offer his assistance. The OEM representative who responds to such emergencies has experience in the myriad types of emergencies that occur in the city and is often on a first-name basis with many of the agency representatives. He also knows which private resources can help us and what their capabilities are and can get them to respond quickly to an emergency. The OEM representative helped to get the appropriate wrecker on the scene in a short time.

• *Prepare for potential incident growth.* Often, incidents grow in size in small increments until, unexpectedly, you have a large scale incident. Having reserve firefighters standing by in case they are needed is a sound tactic for fires and other emergencies. These reserve firefighters are available to address any unexpected development before it adversely affects the operation.

In the same way, the chief should summon additional supervisory assistance when it might be needed. Do not wait for the situation to become unmanageable, because playing catch-up is difficult and often impossible. The presence of additional chief officers at the scene relieves the incident commander of many distracting tasks. This extra help allows the chief time to plan and evaluate instead of having to question or argue with agency representatives. It allows for greater safety and control.

An additional chief can closely supervise a hazardous operation or perform constant reconnaissance, reporting problems and progress back to the incident commander. Unfortunately, you may not realize that an incident is becoming unmanageable until after it is too late. Early notification of supervisors and regular progress reports allow them to independently evaluate the incident and to respond should they see the need. ■

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