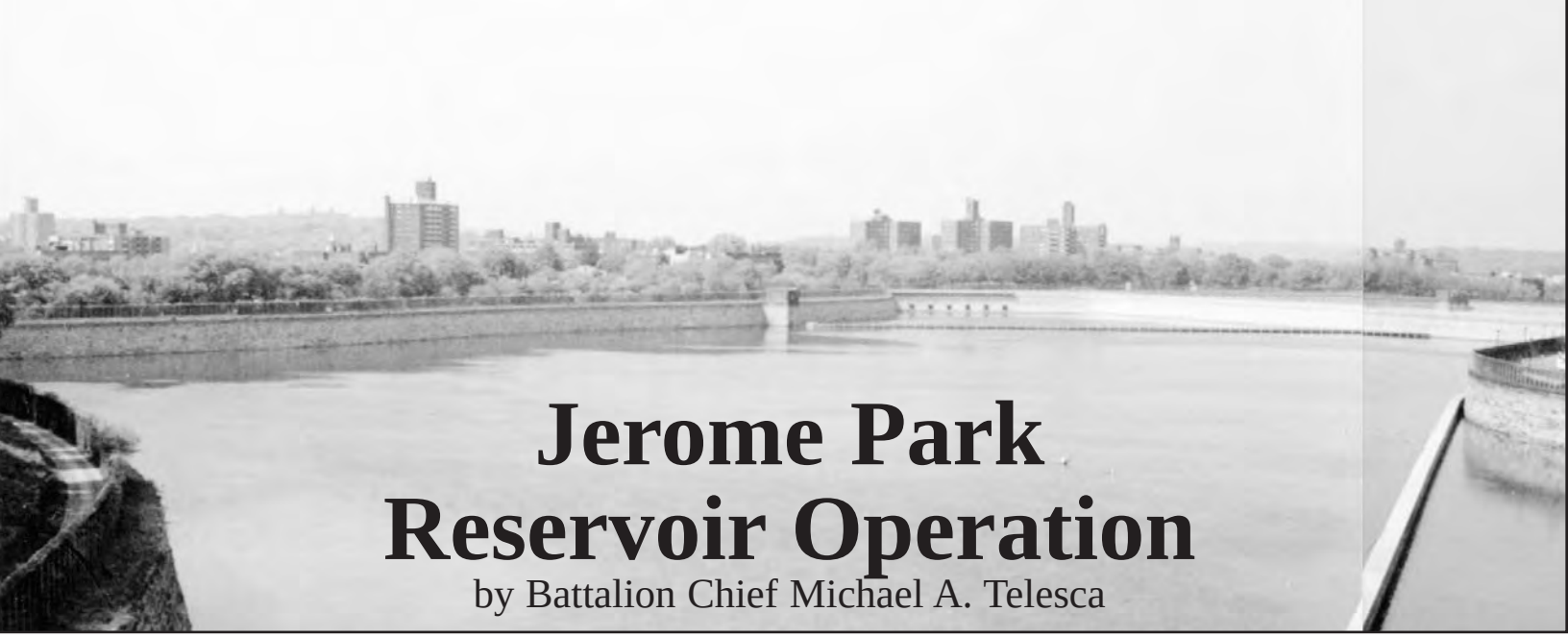


Jerome Park Reservoir Operation

by Battalion Chief Michael A. Telesca

photo courtesy of Battalion Chief Michael A. Telesca

New York City reservoirs

New York City has the most sophisticated water delivery system in the world. Part of this system includes large reservoirs. Until 30 years ago, there were four reservoirs throughout the City--Jerome Park reservoir in the north Bronx, Central Park reservoir in Manhattan, Ridgewood reservoir alongside the Jackie Robinson Parkway in Queens and Silver Lake reservoir in Staten Island. The Central Park reservoir is filled, but off-line indefinitely. The Ridgewood reservoir had one of its three basins filled until 1990. With larger mains installed in 1990, manning the reservoir and augmenting the system no longer were required, so the last basin was drained and sits empty today. The Silver Lake reservoir has not been in use since 1971 when two underground tanks containing 50 million gallons each were buried adjacent to the lake.

Jerome Park reservoir

The Jerome Park reservoir went into service in 1906. The entire reservoir is fenced in, with access at gatehouses 5, 6 and 7. Capacity is slightly less than one billion gallons. Normally, it is supplied by the Croton Aqueduct, but if necessary, it also can be supplied by either the Catskill or Delaware watersheds. (At this writing, all drinking water in New York City comes from the Catskill/Delaware systems through water tunnels 1, 2 and 3 for quality.)

There are three 17.5 million-gallon-per-day pumps located at gatehouse 7 that can maximize Croton water by pumping it into the Catskill/Delaware water mains. The water is chlorinated as it leaves Croton Lake and travels down through the aqueduct where it is fluorinated at the Dunwoodie Fluorination plant in Yonkers. Final chlorinating is performed by adding chlorine, as a gas, as the water leaves the reservoir. Additionally, sodium orthophosphate is added to the water to prevent corrosion of water mains caused by the acidity of the fluoride. It also places a lining on these mains to help lower lead levels.

As can be seen by the map, the reservoir is divided into two basins. In 1988-1989, a dividing wall was constructed in anticipation of building a water treatment plant where the north basin is located. When full, the north basin holds approximately 300 million gallons of water, while the south basin holds approximately 600 million gallons.

On the morning of the mishap, the water temperature of the flowing aqueduct was 37 degrees Fahrenheit. It would be safe to assume that the actual reservoir water temperature that day was several degrees warmer. First, the water in the south basin primarily was accumulated rainwater and water that leaks from the portal at the south end of gatehouse 5. Second, standing water was warmed by both air on the surface and radiant heat from the sun.

The Jerome Park reservoir has been off-line for more than a year for normal maintenance and cleaning. The north basin was completely dry, while the south basin contained a water level of approximately two feet. The south basin contains only one 30-inch floor drain, which is located in proximity to gatehouse 3. The floor drain normally is covered by a manhole cover that has a long rebar welded to it. This handle assists the Department of Environmental Protection (DEP) workers to place and remove the cover while also serving as a visual reference.

In 1997, a large, 30-inch valve was installed at this drain. It is controlled by a knife-gate valve that requires approximately 200 full turns clockwise to close. This valve is operated by a wheel attached to a threaded rod that pushes the disc over the opening about six feet away.

The March 2, 2001, mishap

The manhole cover was left off the drain so that water would drain out freely. The valve was in the open position to facilitate this. As water pulled toward the drain, so did debris (branches, rubbish, etc.), which accumulated in the reservoir. A couple of times a year, DEP workers clear the debris covering the drain opening. That morning, three workers entered the south basin of the reservoir with a rowboat and tools to clear the blockage. It is still uncertain how the accident occurred (final OSHA and PESH reports not completed), but the victim was sucked into the base of the drain. Another worker tried to hold onto him, but could not overcome the suction force created by the whirlpool. In essence, it was a large bathtub without a screen at the drain.

Size-up

The initial phone calls received by the Bronx Communications Office on March 2, 2001, stated that a male was in a trench filling with water. The dispatch assignment for a trench collapse is the same as any confined space response (see sidebar). At 0934 hours, Engines 79, 81 and 75, Ladders 37 and 46, Battalion 27, Rescues 3 and 4, Squad 61 and Ladder 27 (Rescue Support Truck) were assigned, along with Tactical Support 1, Field Communications Unit, Haz-Mat 1 and an Advanced Life Support ambulance. Battalion Chief Jack Spillane, Special Operations Battalion, was assigned a few minutes later, as was the 19th Battalion. Battalion Chief Michael A. Telesca of the 19th Battalion was assigned to the Box as a Safety Coordinator.

When Battalion Chief Thomas C. McCarthy Battalion 27,

arrived at East 205th Street and Goulden Avenue (gatehouse 5), he was informed that the best vantage point for rescue would be at Van Cortlandt Park West and Stevenson Place on the north side of the reservoir. This is the location of the drainage gallery (underground tunnel), which has a 48-inch open trough that heads to the Broadway sewer and then to the Randall's/Ward's Island treatment plant (adjacent to the FDNY Training Academy). This drainage gallery is alongside the street, so entry to the reservoir grounds above the surface is unnecessary. The gallery runs several hundred feet deep into the reservoir grounds and has four 20- to 30-inch intakes from both the north and south basins.

Chief McCarthy notified the dispatcher to have units respond to this location, where he set up the Command Post. Some units were flagged by a DEP worker at the southern end of the reservoir (gatehouse 6). These units, along with Rescue 3, entered the reservoir service road at this point. An unpaved, single-lane road surrounds the perimeter with an additional fence adjacent to the water. Once committed to this road, there are very few places to pass or turn around.

The DEP worker directed the units toward gatehouse 3 on the opposite side of the reservoir. The road quickly became congested with FDNY apparatus, NYPD cars, ESU rigs, ambulances, DEP cars, etc. Once in place, FDNY members were committed to that location. This factor proved to be a logistical support problem after the victim was located and proper tool size-up made.

At gatehouse 3, Ladder 37 placed a 35-foot portable ladder in the fully extended position down into the reservoir. Two untethered ESU members already had rappelled down ropes into the reservoir and were searching. Firefighters Foley and Regan of Rescue 3 proceeded down the portable ladder into the reservoir. These members had a retrieval system attached to them (4-1 mechanical advantage in the horizontal). To no avail, they used a 12-foot hook to poke into the drain for the victim.

Chief Telesca initially responded to the Command Post and was briefed by Chief McCarthy, the Incident Commander. Chief Telesca then went to the location of Rescue 3, whose members already were in the water. At this time, members were preparing to operate in the drainage gallery, where it was thought that the victim might wash out.

Battalion 15 was special-called to replace Battalion 19. At this point, units were operating at two locations, about 1/4 mile apart from each other. Handie-talkie communications between sites were very poor, an oddity since they were over water and flat land, with virtually no buildings to cause interference. Upon arrival at gatehouse 3, Lieutenant Murtha Rescue 3, informed Chief Telesca of actions in progress. Two distraught DEP workers who were with the victim at the time of the mishap were at the gatehouse. A quick interview proved they had no knowledge of the drain's run.

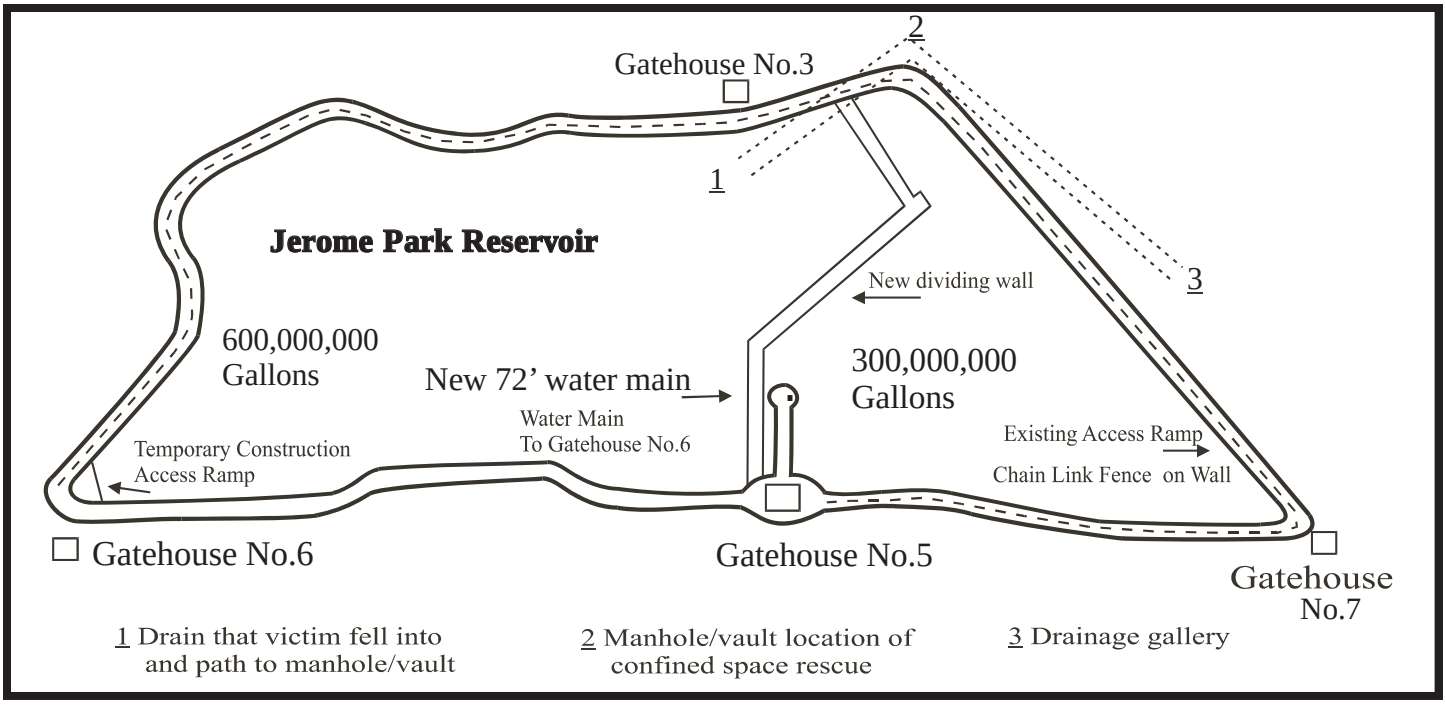
FDNY members now faced the compelling question: Where did the victim wash out to? Chief Telesca interviewed all DEP supervisors on the scene and still had no concrete answers. His initial thought was that it was fresh water and might possibly run out to the Hudson River.

Within minutes of Chief Telesca's arrival at gatehouse 3, reservoir chief Joseph Hadden of the DEP arrived. Chief Telesca asked if he knew the run of the drain outlet. Chief Hadden thought the drain ran into the Broadway sewer and then out to Randall's Island. He stated he already had called for the sewer maps and was awaiting their arrival. Chief Telesca then asked if there was any other access to the pipe between the drain the victim entered and the drainage gallery at the north end of the reservoir. He thought there was one manhole between the two points.

Lieutenant Murtha and one member of his company, equipped with a Halligan tool, followed Chief Telesca. Battalion FF Andrew Casucci arrived with the Battalion cell phone because members were operating at a distance from any apparatus and not monitoring the Department radio.

FF Casucci then joined the four men looking for the manhole cover along the run of the service road. FF Thomas Conroy's keen eye spotted the manhole, which hadn't been opened for years. This manhole was a couple of hundred yards north of gatehouse 3, where the reservoir bends. Weeds were grown over most of it. FF Conroy removed the cover with his Halligan tool and Lieutenant Murtha shined his flashlight down the 50-foot manhole. Something orange could be seen at the bottom of the hole. It was the color of the exposure suits worn by the other DEP workers. Positive identification required descent into the manhole.

At this point, Chief Telesca tried several times to contact Incident Commander, Division 7 Deputy Chief Michael



artwork by FF Christopher Callan

Confined Space

Defined as large enough and so configured that an employee can bodily enter and perform assigned work; and has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults and pits are spaces that may have limited means of entry); and is not designed for continuous employee or public occupancy.

FDNY Response Policy

- 3 Engine Companies
- 2 Ladder Companies (one Ladder Company to be Rescue Support Ladder Company)
- 1 Battalion Chief
- 1 Squad (assigned Squad for the Box transmitted)
- 2 Rescue Companies
- 1 each Tactical Support Unit, Safety Battalion, Special Operations Battalion, Field Comm Unit, Haz-Mat Unit and EMS ALS Unit

Upon initial or subsequent reports of vessel involvement, the following additional unit shall respond:

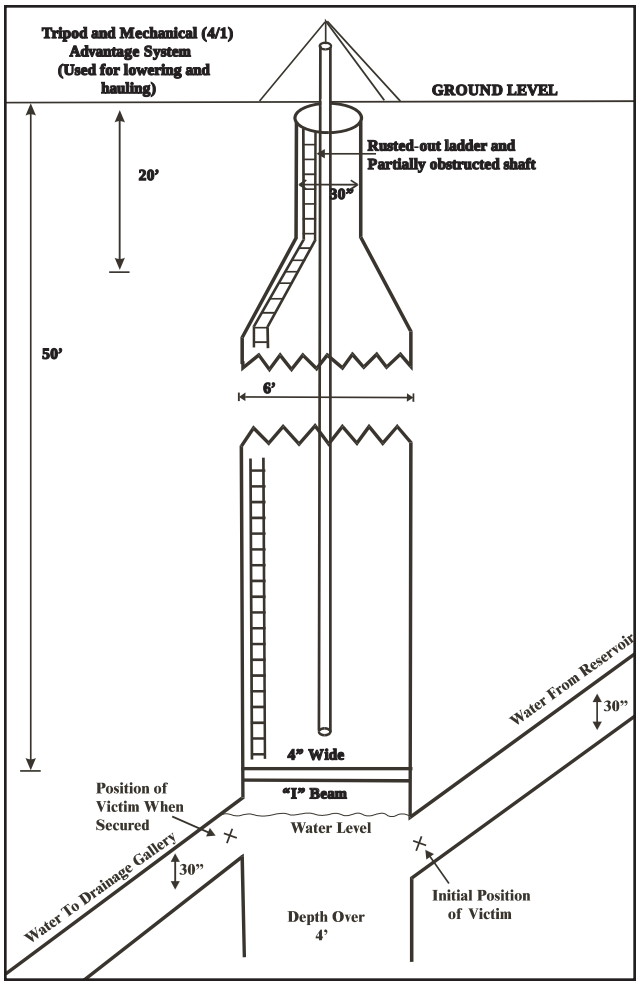
- 1 Marine Company

Notifications

- Nearest available Deputy Chief
- Bureau of EMS
- City-Wide Tour Commander
- Fire Department Operations Center
- Chief of Marine Operations (if incident involves a vessel)
- NYPD (if received from other than Police Communications or 911)
- *Unusual Occurrence* City-Wide Relay

Giovinazzo, by handie-talkie. Chief Giovinazzo was located at the Command Post by the drainage gallery. All attempts failed. Firefighter Casucci called the Bronx dispatcher on the cell phone and told the dispatcher to have Division 7 await his call. Communications between both sites relied on the cell phone until the Command Post was moved, upon confirmation of the victim at the base of the manhole.

All members of Rescue 3 were operating in the reservoir, working the retrieval system for the members in the water or preparing the manhole for a confined space entry. Logistical support came from the members of Squad 61, Engines 79 and 75 and Ladder 37. Firefighter Hickey Squad 41 (detailed) used the GX-91 multi-gas meter for air readings prior to entry. The reading



tube was lowered into the manhole and readings were monitored continuously by Lieutenant Genovese Squad 61 throughout the entire operation. SCBA was not required because all readings were negative and oxygen concentration was 21 percent. A tripod was raised over the manhole--as a high-point anchor--in preparation for the descent.

Chief Telesca ordered Lieutenant Murtha to enter the hole first because of his experience and knowledge of confined space rescue operations, the need for victim confirmation and vital sign assessment of the DEP worker and to assess the dangers to firefighters. Lieutenant Murtha donned a cold water exposure suit with a full body harness and was lowered by a 4/1 mechanical advantage with an additional safety line attached. He wore his handie-talkie on the outside. Battalion Chief John Keenan Battalion 15 arrived and started a log to record the names and times of members entering and exiting the manhole.

Manhole/vault entry

The manhole was approximately 100 years old. A rusted ladder followed one side down the 50-foot depth. This ladder made the first 15 to 20 feet of the 30-inch-wide manhole even more restrictive. Lieutenant Murtha was lowered the entire capacity of the mechanical advantage system until he was able to stand on a metal I-beam that spanned the vault, just above the drainage pipe where the worker was trapped. The worker's upper torso was still in the pipe with water gushing under heavy pressure around him. His legs were caught up by the I-beam, preventing him from washing out into the other 30-inch pipe that runs toward the drainage gallery. The noise of the rushing water was deafening. Verbal communication was very limited from Lieutenant Murtha up to members at the top of the manhole. They had to rely on handie-talkie communications.

Once victim confirmation was made, Chief Giovinazzo was requested to move the Command Post to this site. Chief Giovinazzo sent extra units for support to the manhole site. Additionally, SOC Chief Jack Spillane was repositioned to supervise the SOC operation. Fences had to be cut. Substantial objects were required for the additional entry of FF Conroy. More equipment was required to assist in victim removal, including three 4/1 mechanical advantages for the two firefighters and the victim, plus two safety lines for FDNY members.

Chief Telesca requested that Lieutenant Murtha change his handie-talkie to Channel 2. Channel 1 (primary tactical) had become congested with radio traffic due to the logistical support put into place. Lieutenant Murtha's cold water exposure suit was one piece with gloves attached directly to the sleeve. He was unable to switch channels due to minimal finger dexterity. With the need for communication to the base of the vault a priority, Chief Telesca had all units at the site (other than Rescue 3 and Squad 61) switch to Channel 2 to minimize traffic and ensure member safety.

Prior to and after moving the Command Post, Chief Giovinazzo had units at the drainage gallery operating under a confined space mode. Located at the drainage gallery were Rescue 4, Haz-Mat 1, Ladder 27, Tac-1, Ladder 46 and Engine 81 (designated as the CFR-D unit), under the command of Chief McCarthy. Haz-Mat 1 was monitoring the air. Tac-1 was used as a substantial object by Rescue 4 for their retrieval system into the gallery. Tac-1 set up portable lighting, essential in this tunnel. Portable ladders were set up in the trough as a makeshift screen to catch the victim if he flushed out from the vault.

Back in the vault, Lieutenant Murtha assessed equipment needs and relayed this to the top. He then assigned FFs Regan and Foley back into the reservoir to attempt to shut the valve, thereby diminishing the flow. These members turned the valve continu-

photo courtesy of Battalion Chief Michael A. Telesca

This knife-gate valve--which looks like a steering wheel--requires approximately 200 full turns to close.

ously, for a considerable amount of time, without any decrease in sound or water flow. They spotted the cover and slid it onto the manhole about halfway, until it was sucked down. Then, they used two Halligans to inch the cover over the rest of the way. Firefighter Conroy was being prepared for lowering to assist in the removal. For additional dexterity, members cut the fingertips off his exposure suit.

When FF Conroy arrived at the bottom of the vault, the two members were able to pull the worker the rest of the way out of the pipe. The water depth beneath the I-beam was more than four feet. As the victim was floating, they put a hasty harness around him and attached the 4/1 retrieval to both the hasty harness and the victim's exposure suit harness (two-point attachment). The victim then was removed vertically up through the manhole and into the awaiting ALS ambulance. The two members were raised individually to the surface.

Chief Giovinazzo relayed to Chief McCarthy that all operations in the manhole were complete and all members were to exit the drainage gallery. Although the victim was pronounced dead at Jacobi Medical Center, in no way did this diminish the coordinated efforts put forth by all FDNY units that morning. Lieutenant Murtha and FF Conroy were placed in a perilous position and operated in the finest FDNY traditions.

Lessons learned/reinforced

- FDNY is the Incident Commander at all confined space rescues. The NYPD ESU units offered their assistance and consulted with FDNY members throughout the operation. Due to the different levels of training between the two agencies, have the SOC Chief act as the inter-agency liaison.
- Carry several confined space checklists in the Battalion car. Two were used at this operation. It is almost impossible to fully memorize it and account for all necessary information.
- The Incident Commander--whether a Company or Chief Officer--must obtain as much reliable information as possible from the most knowledgeable workers on the scene. Interview techniques are a requisite. You control the interview, but you must be willing to yield to the most knowledgeable authority.
- At unfamiliar sites, a first-due firefighter must be posted to direct incoming units.
- Cell phones have proved themselves when it comes to augmenting FDNY's traditional communications systems.
- Moving the Command Post is justifiable when the new location is closer to the rescue operation.
- When operating at two different locations at the same incident, place a Chief Officer in command at each site. A second Safety Coordinator also is required so both sites are covered.
- Be ready to adapt to the situation. Risk versus reward always must be contemplated.
- When operations were completed, both handie-talkie and Department radio announcements were made to make sure units switched back to Channel 1 (primary tactical).
- A rescue team and SCBAs with ropes attached must be ready for immediate deployment should air readings change. With water flowing and the manhole cover removed, a venturi is created, drawing fresh air into the vault. When water flow is stopped, so, too, is the fresh air. The possibility of ground gases accumulating is increased.
- Standard operating procedure at any trench collapse, ground pads should be placed over the surface of old vaults to distribute the weight of tools, apparatus, members, etc., over a greater area.
- Regardless of the water depth, all members operating in or near flowing water *must* be tethered. Never underestimate the power of mother nature--especially water.

photo courtesy of Battalion Chief John Moran

A tripod was raised over the manhole--as a high point anchor--in preparation for the rescuer's descent.

- Logbooks are required to maintain overall control of the incident. They will help with fire/emergency report preparation and serve as legal proof that OSHA standards were followed for confined space operations. It is necessary that all company officers forward detailed, typed CD-15s to the respective Battalion for report preparation.
- Have CFR-D units at both sites of a multiple-point operation. Have EMS attend to distraught workers who are having a difficult time coping with the accident.
- Cold water operations should be treated as rescues (when reaching victim within an hour) or recoveries (victim spent more than one hour in the water). (See "Near-Drowning: Cold-Water Resuscitation" by Doctors Kerry Kelly, David Prezant and Neal Richmond on page 6 of this issue.)
- Just as a flooded roof can draw you toward the scupper when the blockage is cleared, so can street sewer manholes. Firefighter Robert Crawford, Safety Battalion aide, related an operation he had in the Hamilton Beach area of Queens during a severe storm. The rising tidal surge dislodged storm sewer covers that were not visible in the flooded streets. Members assisting in the evacuation of homeowners almost were sucked into the sewers as the tide reversed and water sucked into the open manholes. Always carry and use your tools.
- Numerous hazardous materials may be found on reservoir property. Careful inspections and CIDS information will help alert responding units to the hazards. In the summer months when the Jerome Park reservoir is on-line, members will be exposed to 16 150-lb. chlorine cylinders feeding shaft 21, which supplies Manhattan, and eight 150-lb. cylinders supplying the East Bronx gravity system. Additionally, there may be 150 chlorine cylinders in reserve. Sodium orthophosphate also will be present.

Author's Note: Special thanks to Kevin P. McElynn, Facilities Emergency Coordinator for the New York City DEP Bureau of Water and Sewer Operations, for his help.

About the Author:

Battalion Chief Michael A. Telesca is a 22-year veteran of the FDNY. Currently, he is working in the Safety Battalion. Previously, he served in Ladders 34, 59 and 47 and Battalion 19. He is a former instructor of Modern Fire Technology and Fire Command.