Fuel Oil Storage Tank Proves Deadly in the Bronx

by Battalion Chief Fred LaFemina

As the fall season approaches, many New York City residents strive to get their heating systems in proper working condition before the cooler weather arrives. What should have been a routine cleaning of a large fuel oil storage tank in a multiple dwelling quickly turned into a deadly and complex confined space operation.

On September 15, 2003, Bronx Box 2953 was transmitted at 1359 hours for an EMS-generated response for Engine 46 at 1876 Arthur Avenue, between East Tremont Avenue and 176th Street, for a report of two workers overcome in the basement. The building involved was a five-story, 200- by 60-foot, class 3 multiple dwelling. On arrival, Engine 46 members discovered a far more complicated situation: rescue versus recovery; crime scene protocols; medical examiner coordination; and decontamination procedures--all issues that normally are not addressed at routine operations, but came into play at this incident--when Engine 46 confirmed to the dispatcher that this would be a confined space event.

Engine 46, under the command of Lieutenant James Meara, conducted an investigation for a report of two men overcome in the basement at the reported address. Members donned their mask face pieces and entered the basement. They encountered two fuel oil service workers who were installing a new boiler. Two of their crew members had not been heard from since they entered the 4000-gallon fuel storage tank at 0930 hours to clean it. Lieutenant Meara looked into the tank through a 15-inch opening in the top and observed two workers unconscious inside. He immediately transmitted to the dispatcher that this was, indeed, a confined space incident and to dispatch the appropriate units.

A confined space incident calls for the response of a Battalion Chief, three Engines, two Trucks, a FAST unit, a SOC Support Ladder Company, two Rescue Companies, a Squad Company and Haz-Mat Co. 1, plus the SOC, Haz-Mat and Safety Battalions. Rescue 3, the first Rescue Company assigned, under the command of Lieutenant John Citarella, arrived on the scene and immediately gained access to the basement via an exterior door located on the exposure #2 side in a 10- by 40-foot courtyard depression. Inside the door to the basement was a hallway leading to a doorway that provided access to the enclosure of the tank. Through this opening, members of Rescue 3, Engine 46 and Ladder 27 gained access to the storage tank and discovered the two victims Engine 46 members had observed through the top of the tank.

Rescue 3 immediately used their atmospheric monitoring device to monitor conditions in the basement initially and then the tank. Readings inside the tank revealed a five percent oxygen (O_2) level, with an LEL (lower explosive limit) of 86 percent. (The meter is accurate concerning LELs only when the O_2 content is at least 15 percent, meaning that the LEL reading was inaccurate.) Additionally, members were informed that the workers had been inside the tank for approximately three hours. With the atmospheric readings being what they were, no human being could survive that amount of time in such an oxygen-deficient atmosphere. This information quickly resulted in a change of strategy from a rescue to a recovery operation by the Incident Commander, Acting Battalion Chief Stephen Newman, Battalion 18.

Simultaneously, searches were expanded to include the whole building, in addition to monitoring air on the floors above to determine if there were more victims. Rescue 4, led by Lieutenant James Schumeyer, and Squad 41, led by Captain William Walsh, arrived and Battalion 18 ordered them to use their monitoring equipment throughout the rest of the building while the Ladders 27 and 38 members completed the searches. The building eventually was evacuated of its more than 100 people, no additional victims were found and no hazardous meter readings were observed on the floors above for the duration of the operation.

Deputy Chief Thomas Dunne, Division 7, took command of the operation until Bronx Borough Commander and Assistant Chief Joseph Callan responded at approximately 1420 hours to assume the command function. Chief Callan was apprised of conditions by the Chief Officers on the scene, including Deputy Chief John Norman, Rescue Operations, and Battalion Chief Fred LaFemina, SOC Commander, and helped develop the strategy for the recovery of the victims.

Chiefs Callan, Dunne, Norman and LaFemina and Lieutenant Citarella conferred at the Command Post to determine the method of removing the victims. To provide fresh air to the area, the basement was vented by removing bricks from window openings that had been covered over and exhaust fans were placed at the openings to assist in removal of contaminants that might be present. This provided fresh air to the area and allowed FDNY members to work safely.

During a recovery operation, Commanders must ensure that no FDNY members are injured, overcome or killed. A much slower approach is taken, to make sure the scene is safe and secure prior to commencement of operations. Several options were discussed and it was decided the two workers would be removed from the tank by breaching

all photos by Deputy Chief John Norman

Units forced open a bricked-up cellar window to support the removal operation. Here, the ventilation duct and hydraulic hoses for the Stanley hydraulic blower, as well as electric lines and air monitor, are shown in the window opening.

down through the top of the cylindrical tank with a sawzall. The sawzall was used to reduce the potential of vapors igniting during the operation. Confined space-related equipment, such as rigging/removal equipment, would not be needed for the initial plan, but might be needed later in the operation if the original plan proved unsuccessful.

The alternate plan involved removing the workers through the top of the opening in the tank. It would be accomplished via the first-floor level of the building. This would be a slow and difficult operation because of the height limitations between the top of the tank and the ceiling above, the time it would take to break through the concrete basement ceiling and the condition of the bodies.

It was decided that Rescue 3, assisted by Rescue 4, Squad 41, Haz-Mat 1, Ladder 38 and Engines 46 and 88 would be used for the breaching operation of the tank, placement of a protection line and removal of the victims, as well as continued atmospheric monitoring. Each unit was assigned a specific function during the operation. Using a 24-volt, battery-operated sawzall with a nine-inch, bi-metal blade with 10 TPI (teeth per inch), Rescue 3 breached into the tank. Squad 41 assisted Rescue 4 and assembled the confined space rigging equipment and pavement breaker needed on the floor above for a breaching and rigging operation. Rescue 4 also provided forced air ventilation to the basement and tank. Engine 46 stretched the foam line and Engine 88, under the command of Lieutenant Timothy Klett, stretched and charged a precautionary line to the basement entrance to provide protection to the members performing the breach. Ladder 38 assisted Rescue 3 in the removal of the bodies and Battalion Chief John Spillane, SOC, assisted Battalion 18 as the Chiefs in charge of the breaching operation. Under the command of Haz-Mat Chief Peter Steube, Haz-Mat 1 monitored conditions in the area of operations, as well as the rest of the building.

The tank contained about 12 inches of #4 fuel oil in the tank. To reduce the potential for ignition, a layer of foam was applied through the fill pipe of the tank by Engine 46 members. Firefighters John O'Connell and Michael Davis of Rescue 3, designated the entry team, changed into splash-resistant suits to avoid being saturated with fuel oil and lessen the decontamination procedure upon their exit. They initiated a cut at the top of the tank through a two-inch vent pipe opening that was capped, the cap was removed and the cut was started at this point. It required four saw blades to complete the required cuts.

With a great degree of difficulty--since both bodies were immersed in the fuel oil--Firefighters O'Connell and Davis entered the tank and removed the two victims. The bodies were removed to the court area on the exposure #2 side of the building. This allowed the Police Department Crime Scene Unit to conduct their operation. When the Crime Scene Unit completed their work, the medical examiner requested both victims be decontaminated prior to removal, since they were both covered in fuel oil. Chief Dunne special-called Squad 61 to assist Haz-Mat 1 with the de-con of both victims, as well as FDNY personnel. The SOC Decontamination unit also was special-called to assist with decontamination and provide Companies with loaner gear for members whose bunker gear was contaminated with fuel oil.

The New York City Medical Examiner performed a preliminary examination of both the bodies, which then were placed into de-con pools in the courtyard of the building. The medical examiner assisted in the removal of the fuel oil from the bodies to complete the on-site examination. The medical examiner also donned a green splash-resistant suit and mask respirator face piece to avoid contamination during the investigation. Squad 61, led by Captain Steve Spall, assisted the medical examiner and removed all the fuel oil from the bodies prior to them being removed to the morgue. Simultaneously, FDNY members were decontaminated by Haz-Mat Co. 1 and Squad 61.

FFs John O'Connell (left) and Michael Davis of Rescue Company 3 prepare to remove the first of the overcome workers after entering the tank through an opening that had been created with a sawzall. Note use of disposable PVC Level D suits instead of bunker gear. The heavy #4 oil necessitated that any contaminated clothing be disposed. Flash point of this oil is 125 degrees.

Always expect the unexpected. Do not assume routine EMS calls are for medical emergencies only. Many technical rescue incidents have evolved from EMS-generated responses. The Companies involved operated according to FDNY guidelines and their training, which resulted in a successful operation without compounding an already tragic situation. Remember, safety of the rescuers is the first priority.

Lessons learned

- *Confined space incidents* (see *Training Bulletin--Confined Space*) are very complex and dangerous and should be undertaken only by trained personnel. The fact is, 60 percent of confined space victims are rescuers themselves. All the assigned personnel, including the first-alarm units, will be used initially at these kinds of incidents for size-up, search and to determine additional resources needed. There are many issues that must be addressed at these incidents, such as lock-out and tag-out procedures, entering and exiting the space, air monitoring, rigging and patient packaging. Safety of the rescuer is the most important point to consider. The risk versus reward factor changes the whole complexion of the operation.
- *Control of scene.* The Fire Department Incident Commander must establish perimeters to control the number of members involved in the operation. Many members have good intentions, but sometimes become part of the problem. Company Officers must maintain integrity and discipline of their units in carrying out assignments ordered by the Incident Commander. Maintaining control via Chief Officers reduces injuries and possible unforeseen contamination. Use fire line tape to define zones and delineate a staging area remote from operations and have uninvolved units remain there for possible assignment.
- *Expertise* of SOC units should be used at all complex rescue incidents. These members are trained as technicians in confined space rescue, as well as a variety of other disciplines. The SOC Battalion Chiefs are trained to the same or higher level as Rescue and Squad members in rescue disciplines. Untrained members should refrain from operating outside their expertise. This could lead to unnecessary injuries or fatalities. Incident Commanders should be aware of the capabilities and limitations of all units.

A view through the rescuer's access, showing the 16-inch-diameter manhole the workers used to enter.

- *Hazardous materials.* Many issues concerning hazardous materials were present at this operation. The danger of combustible liquid vapors in conjunction with deficient oxygen can lead to disaster. The expertise of the Haz-Mat Battalion Chief and the Haz-Mat Company Officer should be employed. At this incident, the Haz-Mat Chief supervised Haz-Mat in monitoring the air in the basement and tank for the duration of the operation. Decontamination had to be provided for both victims and Firefighters. The Haz-Mat personnel handled this component of the operation.
- *EMS/CFR-D-generated responses.* These can be Engine-only responses. Company Officers and members should begin their size-up when leaving quarters and while en route. The information on the response ticket indicated a possible atmospheric problem or an entrapment. Units must transmit the appropriate information to the dispatcher in their preliminary report. Information relayed by the Officer of Engine 46 resulted in the dispatch of an assignment for a confined space incident.
- *Proper protective equipment.* Rescue members donned green splash-resistant suits, which are carried by all SOC units, to avoid contact with the product. Rescue, Squad and Haz-Mat 1 used their monitoring equipment to assure the safety of the members operating, as well as the occupants inside the building. Rope, anchoring and rigging, air monitoring and patient-packaging equipment are carried by all Rescues and Squads.
- *Decontamination.* Squad 61 and the Decontamination unit were special-called, not only to decon FDNY members and equipment, but the two victims as well. Both workers were completely immersed in fuel oil that had to be removed prior to taking them to the City Morgue. The medical examiner was concerned with cross-contamination and possible contamination to personnel working at the morgue. The medical examiner assisted in the decontamination of the victims to observe any clues on the bodies that would assist in their investigation. This was an issue that usually is not addressed at these incidents.
- *SOC Support Ladder Companies.* They are assigned to all rescue-related incidents to assist in rescue or removal. Their training and limited equipment for confined space operations permit them to assist SOC units at these incidents. (See "SOC Support Ladder Company Training," by Lieutenants Joseph M. Jardin and William F. Ryan, in the 3rd/2003 issue of *WNYF*.)
- *Rescue vs. recovery* always must be addressed at technical rescue incidents because the complexities of the operations are dynamic. Some questions to ponder: Are the victims alive? How much risk should be taken to recover a dead body? There should be little or no risk to members at incidents that involve the removal of an expired victim. The scene should be made as safe as possible prior to the recovery operation commencing. Remember, time is on your side. On the other hand, when confronted with a viable victim, certain risks will have to be taken to rescue the victim. Members must not let down their guard; these incidents must be handled carefully. Air monitoring, lock-out/tag-out (procedure whereby head locks are placed on the valves to prevent further introduction of product--lock-out and a tag is placed advising others that an operation is taking place--tag-out) and rope rescue equipment may not be on the scene initially. First-alarm units will have to await the arrival of special units.
- *Outside agencies.* Police Department, Buildings Department, Con Ed, Occupational Safety and Health Administration (OSHA) and Department of Environmental Protection (DEP) were all present at the Command Post. The Police Crime Scene Unit had to complete its investigation, which consisted of observing and photographing the bodies. The Buildings Department responded because the incident involved the heating system of the building. Con Ed always responds with their emergency response supervisor when there is a possibility of a carbon monoxide problem. OSHA immediately responded and proceeded to document possible violations by the contractor concerning entries into confined spaces.

A view down the length of the 4000-gallon tank shows a rescuer surveying the scene. Note the minimal clearance (12 inches) between the concrete cellar ceiling and the lip of the manway the workers used to enter.

About the Author...

Battalion Chief Fred LaFemina, Special Operations Command, is an 18-year veteran of the FDNY. Fifteen of those years have been spent in SOC, including assignments with Squad 1, Rescue 4, Rescue 1 and Squad 270. He is the former Director of the FDNY Tech Rescue School. He is the NY-TF1 Urban Search & Rescue Task Force Leader. This is his first article for WNYF.