The incident command system's flexibility and Planning function

# Changing Focus

BY FRANK ROSS
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and
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Battalion Aide, Battalion 28

During the response to the fatal collapse at a 500-foot-deep water-tunnel shaft in Maspeth, Queens, last November 24, changing information about the life hazard altered the focus of our operations. The incident command system, in adapting to these changes through a modular structure and emphasis on operational planning, again proved its value for major nonfire emergencies.

Control of emergencies

An incident commander's primary objective upon arrival is to establish control. But control of major emergencies is complicated by the fact that such a huge variety of situations are possible. While general considerations may be covered in the FDNY "books," familiarization drills, and preincident planning, detailed procedures for every possible scenario may be impractical. So on-scene, the variables involved require a more intense period of information-gathering and assessment than most firefighting situations do before personnel are deployed.

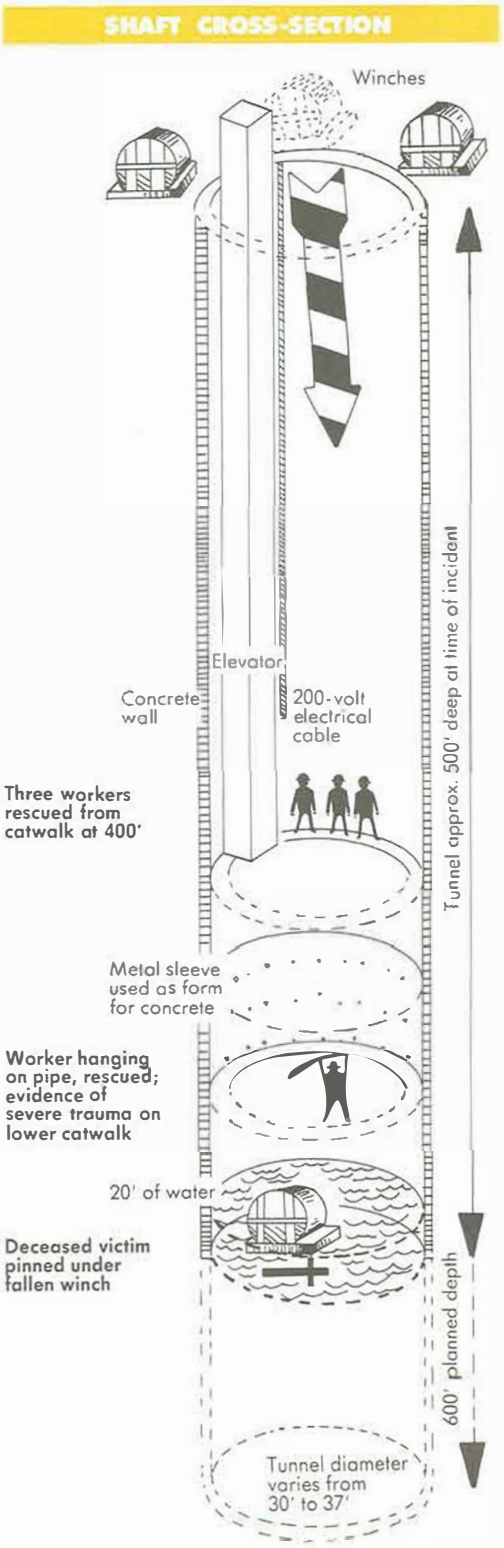
Variables

Another control factor, in a multiagency response, is that each agency is mandated to perform specific functions. Independent operation can be counterproductive, so early designation of a highly visible command post is important.

The first information we had about this incident seemed to point to a structural collapse, a more familiar situation than what we eventually faced. The alarm for a collapse at Queens box 4095, 52nd Street and Grand Avenue, was received at 1020 hours on the cool morning of the day before Thanksgiving. Over the years, the Fire Department has received a number of hoax calls reporting collapses in this industrial section of Queens, but as Battalion 28 began its response, the Queens Central Office informed us the dispatchers had received numerous calls,

Box 4095
1020 hours

**COLLAPSE JURISDICTION:** Department Order 65 of 1990 states that the ranking Fire Department officer at a scene has responsibility for operations at structural collapses, hazardous materials incidents, and utility emergencies. The Police Department has jurisdiction over water rescues, bomb threats, and vehicle extrications. At the time this article was prepared, *All Units Circular 276, "Joint Police—Fire Operations at Emergency Scenes,"* was being revised to reflect this delineation.



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### NEW QUARTERS

As part of a major reorganization of FDNY administrative functions, *WNYF* has moved to Fire Department Headquarters in Brooklyn. The current address and phone numbers for *WNYF*'s editorial and subscription departments appear in the masthead (the gray box at left).

We ask your continued forbearance as we make changes to improve service.

### DEPARTMENTS

helped responders adapt quickly to this major non-fire emergency.

# Changing Plans

indicating a serious situation.

We discussed the location in an attempt to recall what structures were there. Our only specific knowledge of the area was

Heavy industrial

that it was almost exclusively heavy industrial. Our thoughts turned to a mental checklist of information and assignments that would be required for a structural collapse.

One factor that would hamper operations actually aided in gaining control.

Limited access

Limited access prevented initial deployment of units into potentially hazardous positions. First-arriving units, lacking access to the deep shaft on site, began gathering information. As the battalion arrived, we were receiving information regarding the situation, the units on site, actions taken, and suggestions made.

We were directed to the 300-by-200-foot enclosure for Water Tunnel No. 3 of the New York City Water Tunnel Project.

Vertical shaft

At this site, a 30- to 37-foot-diameter vertical shaft, from which digging of the horizontal tunnel would proceed, was being blasted out of bedrock to a depth of more than 600 feet. Its present depth was approximately 500 feet, and water filled the bottom 20 feet of the shaft. Inside the surface enclosure were large mobile trailers and facilities for transporting the blasted rock away from the site.

The first-arriving units relayed to us a report that a construction elevator had plunged to the base of the shaft with several people on board. So far, we knew of no other access into the shaft, and it was uncertain yet whether there might be any hazardous materials within the shaft.

Haz Mat 1 arrival

The early arrival of Hazardous Materials Co. 1, just one minute after the battalion, was of great assistance. Both Haz Mat 1 and Rescue 4, which would arrive shortly, had previously visited the site for familiarization, at the invitation of the construction contractor, Skanska Tunneling Inc. From these visits, the companies knew about alternative means of access, electrical service in the shaft, the deep water at the bottom, and the fact that oxyacetylene and blasting caps are used in the shaft. Two Rescue 4 members

Previous visits

**THE BATTLESHIP**

Hanging from a crane near the top of the shaft, Rescue 2 members and others crowd a construction bucket known as "the battleship." Once lowered into the shaft, they worked from the bucket to rescue stranded workers. *Daily News news photo*

**BOX 4095**

| | |
|---|---|
| Bn.28 | L.124 |
| E.291 | R.1 |
| E.206 | R.3 |
| E.288 | R.4 |
| L.140 | RLU |

**S/C**

Haz Mat
TSU 1

***ENTRY INTO SHAFT***

Heavy equipment surrounds and crosses the gaping entry to the shaft, measuring approximately 35 feet in diameter. *Daily News news photo*

Former sand hogs

had actually been so-called "sand hogs," or tunnel workers, before joining the Fire Department; though not working at the time of this alarm, these members had shared their knowledge with the rest of the company.

Haz Mat's Lt. Robert Ingram performed a primary haz-mat assessment, in which he learned from Skanska personnel that there presently were no fuel or explosives in the shaft. He then worked with Ff. Mosiello to establish a command post, gathering Skanska employees there to provide technical assistance.

Risks and benefits

To form an operational plan, we had to analyze the risks and benefits. Weighing the unlikelihood of anyone surviving a fall in the elevator against the risk to rescuers, B.C. Ross's priority now that control had been assured was to gain access to the shaft for reconnaissance.

Civilian rescue team

Within a very few minutes after our arrival, a Skanska supervisor approached and informed us that a civilian rescue team consisting of three of the contractor's employees was with some victims on a catwalk approximately 400 feet below ground.

Communicating via an on-site walkie-talkie system, the team was requesting rescue and medical assistance. A crane had lowered the team in a basket known as the "squirrel cage," which was coming to the surface now with the rescue team and three of the victims on board. (A second crane-controlled apparatus, a scoop-type bucket known as the "battleship," was being readied by an NYPD Emergency Service Unit.)

Squirrel cage descent

Known life hazard

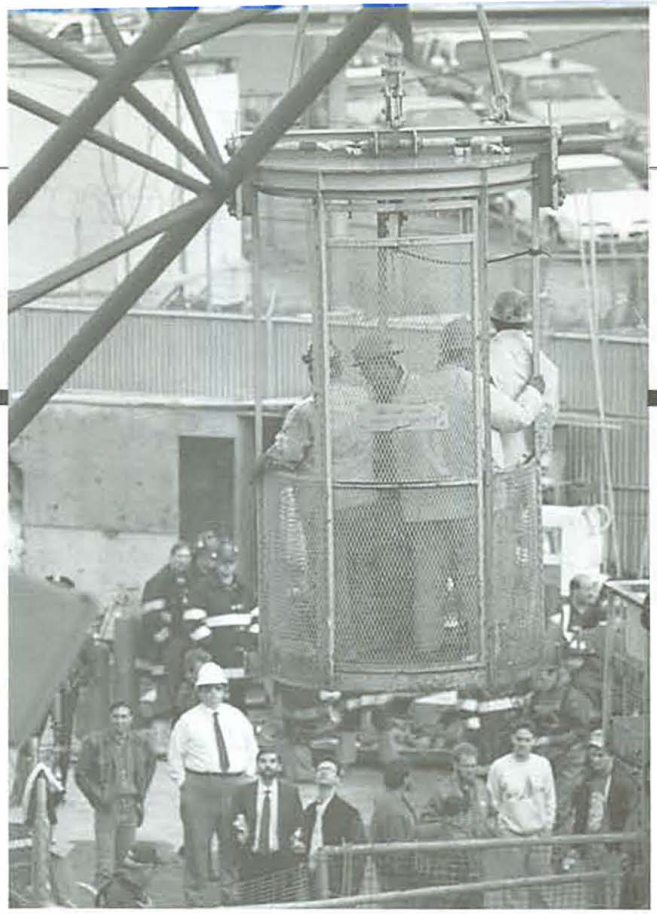
We were fortunate to have this information so quickly, and it changed the focus of our operation. Now the life hazard was known, not just potential, and we knew the atmosphere in the shaft was survivable. Our operational plan changed from reconnaissance to rescue, and the signal 10-60 was transmitted to bring a major emergency response.

10-60
1026 hours

SIGNAL 10-60:
*See sidebar, p.9.*

Six rescuers now climbed into the squirrel cage to be lowered into the shaft: Lt. Kenneth Memmen and Ff. Michael Milner of Rescue 4; P.O David Kayne of ESU Unit 8; two EMS paramedics; and a Skanska operating engineer familiar with the basket's movement. A rescue company dive team and backup dive team suited up in case they were needed.

A firefighter with a Handie-Talkie was posted with the crane operator lowering the basket. With both Handie-Talkies and



**THE SQUIRREL CAGE**

Before FDNY arrival, a civilian rescue team had entered the shaft in this wire cage. Soon afterward, Rescue 4 used the cage for its entries. *Daily News* news photo

the contractor's walkie-talkies in use there, at the command post, and in the entry basket, the on-site communications system became a backup to the FDNY's own communications.

On-site communications

Electrical lighting was still on for part of the rescuers' trip into the shaft. But fog—the result of heat released by the chemical reaction of curing cement—obscured their vision for part of the way. The basket slowly descended through a dark maze of twisted steel catwalks and electrical conduits damaged in the accident. At certain locations, the basket had to be maneuvered manually to pass obstructions. As it inched downward, the rescuers heard cries for help from several victims.

Fog and maze

The demeanor of the victims was exemplary. The first group encountered, one man with a broken leg and two workers with only minor injuries, was on the uppermost catwalk, nearly 400 feet deep into the shaft. They deferred rescue and directed the basket to those below. Proceeding downward, the team in the basket found a man hanging on, by his hands and feet, to a small-diameter, vertical water pipe on the sidewall of the shaft.

Upper catwalk

The tangled debris of a catwalk and a sheared-off, 220-volt electrical cable prevented the squirrel cage from being positioned next to the man's precarious position. Instead, the rescuers had to move below, exposing themselves to the danger of falling objects. Ff. Milnert ethered P.O. Kayne to the basket by a lifeline, and the officer proceeded cautiously out of the basket to rescue the exhausted worker.

Hanging on at lower catwalk

As this operation proceeded, Rescue 2 descended in the battleship to retrieve the three workers who had deferred rescue earlier. To fit them into the bucket, two Skanska employees who had been in the bucket now stayed behind on the catwalk.

Battleship descent

Above ground, by this time, D.C. Michael Hughes of Division 14, upon assuming command at 1038 hours, had enhanced control by directing units not operating to a staging area outside the 300-by-200-foot steel enclosure around the shaft. This minimized confusion at the command post and allowed needed equipment and personnel easier access to the shaft. Field commanders from other agencies were directed to the command post as they arrived.

Staging

Recognizing the potential for a long multiagency operation, Chief Hughes also activated additional positions in the incident command structure by assigning battalion chiefs as communications coordinator, victim tracking coordinator (documentation), public information officer, and staging area manager. B.C. Ross became the operations section chief.

ICS expansion

Rescue companies and rescue support ladder companies were directed to operate on a secondary tactical channel. Units not directly involved with mitigation were left on the primary tactical channel. As the scope of the incident grew, a command channel was established.

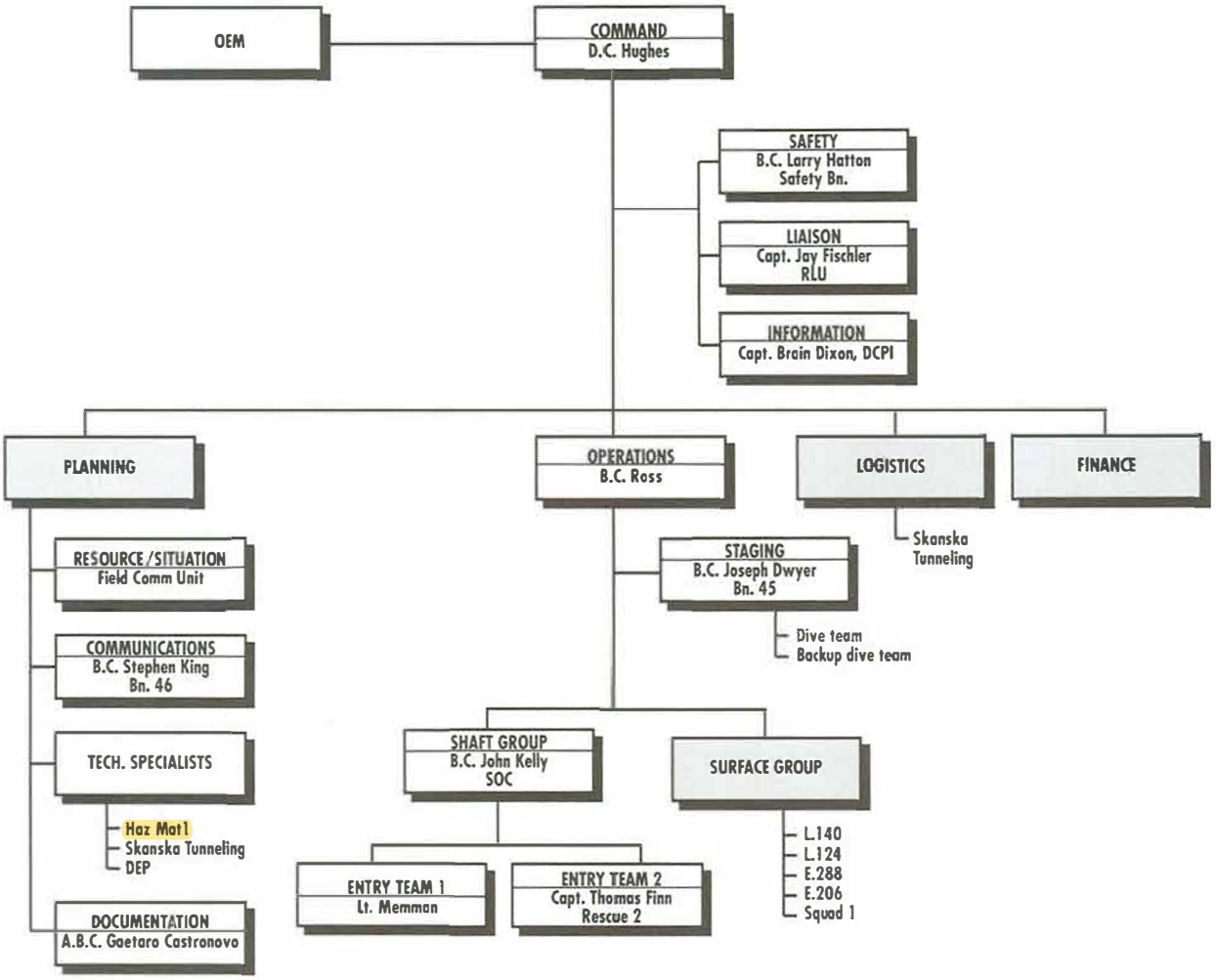
H/T channels

An additional communications network was set up among the various agencies represented. (Besides those already mentioned, these agencies included the Department of Environmental Protection, which oversees the water tunnel construction, the Queens district attorney's office, the mayor's office, and the state Public Employee Safety and Health department). A liaison from each agency present was equipped with an 800-megahertz Handie-Talkie furnished by the Office of Emergency Management's Command and Control Center.

**OEM:** See "Interagency Coordination," by John Cerato, p.49, and "The Office of Emergency Management," p.50, both in *WNYF*, 3rd/93.

A clearer picture of how the tragedy had occurred was being formed by interviewing Skanska employees, including those who came up out

## ICS STRUCTURE DURING SURVIVOR RESCUES




How the collapse occurred

of the shaft: The construction work below ground involved pouring a concrete wall for the shaft. The form for the concrete was a metal sleeve five feet less in diameter than the raw hole. This was lowered into place by three winches, each the size of a van and weighing about 16 tons, located around the perimeter of the shaft at grade level. It was one of these winches and its 12-by-20-foot steel decking that had collapsed into the hole, ricocheting off the sides of the shaft as it dropped. At the time of the collapse, eight workers were in the tunnel preparing the metal sleeve; three of them had quickly been removed by the civilian rescue team.

Winch and steel decking

Dead spot

The squirrel cage was lowered again, this time in darkness because the power had been shut off. After picking up the two uninjured men from the catwalk, the basket continued downward. At the badly twisted lower catwalk, there was evidence

Water's surface

Severe trauma

that one of the victims had suffered severe trauma. The rescuers proceeded farther into the shaft to continue searching.

Having established communications with the civilian rescue team early in the operation, we incorrectly assumed that no communications problems existed. Rescue 4 and the others in the squirrel cage, however, hit a communications dead spot when they were approaching the bottom of the shaft. Losing their ability to communicate with the crane operator to stop the basket, they went into a freefall for about 10 feet, causing some very anxious moments knowing they could be lowered into 20 feet of water. Fortunately, communications was restored in time for the crisis to be averted.

The surface of the water was littered with chunks of styrofoam that had been used to prevent newly poured concrete from adhering to the metal sleeve. No

| 10-60 | | S/C |
|---|---|---|
| Div.14 | Safety | Bn.49 |
| Bn.35 | Sq.1 + TRV | |
| Bn.43 | R.2 | |
| Bn.45 | FCU | |
| Bn.46 | | |

No sign of victim

sign of the remaining victim, Anthony Oddo, was visible from above the surface; he was now believed to be trapped in or under the submerged winch.

Then-Chief of Department Anthony L. Fusco had assumed command and now had the option of initiating a water rescue or draining the shaft. Given the evidence of severe trauma and the fact that the last victim had been submerged more than 45 minutes, Chief Fusco, consulting with the ranking EMS official at the scene, had Mr. Oddo pronounced dead.

Pronounced dead

At this point, a dewatering operation began. Skanska Tunneling had two of its own pumps, with 300-gpm and 200-gpm capability, delivered to the site from Connecticut via Kennedy Airport. They were coupled in series to pump the estimated 180,000 gallons of water from the bottom of the shaft.

Dewatering

This took more than 20 hours, during which a battalion chief, a rescue company, and a ladder company rotated three-hour shifts on watchline duty. Periodically, FDNY members descended into the shaft to check whether the water level had dropped sufficiently to reveal the remains of the last victim.

When the dewatering was complete, a new set of obstacles emerged. Early on Thanksgiving morning, Rescue 4, led by Lt. Terence Hatton, entered the drained shaft. The search was slowed by the layers of styrofoam chunks, which Skanska employees helped remove. In addition, some nearly-empty, previously submerged oxyacetylene cylinders were found and had to be drained.

Styrofoam

The victim's body was under or entangled in the winch and its steel decking, and a cutting operation was planned. This would require continual atmospheric monitoring. A water source was also needed in case the styrofoam ignited. Engine 206 stretched 500 feet of 2½-inch hose; at the bottom of the shaft, the butt was left open, since it was doubtful the couplings could support the weight of that column of water.

Cutting operation

EXOTHERMIC TORCH: *See sidebar, p.8.*

Using its "slice kit," an exothermic torch, Rescue 4 operated at the base of the shaft, cutting sections of decking until Mr. Oddo's body could be safely removed.

It's anticipated that the Department will be asked to assume an even greater role in the mitigation of major emergencies. The uniqueness of each incident can challenge even the most experienced incident commander. While it may seem at times that we're reinventing the wheel each time, we have many ways to prepare ourselves. There are many sources of knowledge on which to draw, both among our own ranks and outside the Department, for preincident planning. And a disciplined approach to the incident command system is one of our best tools for preparedness.

Each emergency unique

## LESSONS

*1. The incident command system.* The incident command system starts with the simplicity of a few units. Through its modular design, it has the flexibility to grow with an expanding situation.

Modular design

In addition, the logical growth of the incident command structure ensured that duties were clearly assigned. This resulted in a smoothly run interagency operation.

*2. The Planning function of ICS.* Guiding the incident command structure's growth, particularly where the system must adapt to unique situations that written procedures can't completely cover, is the Planning function. This function includes preparing alternative strategies and objectives to control the incident—as was necessary at the Maspeth site when the operational plan moved from control to reconnaissance to rescue to recovery.

**PLANNING FUNCTION:** See *Incident Command System*, Section 1.13.2.

(Note that, as provided for in ICS procedures, functions are carried out even in the early minutes of an incident when the command structure remains relatively small. The Planning section chief's position wasn't staffed until later in the incident; the Planning function was retained, and performed, in the early stages by the incident commander.)

As can be seen at this operation, planning is a fluid and ongoing process. Objectives are defined and prioritized, options are weighed, an operational plan is implemented, and contingency plans are made concurrently. An example of contingency planning here was the readying of dive teams—not only for possible

Fluid and ongoing


**ARCAIR SYSTEM**

Ff. John Weisheit of Rescue 4 demonstrotes the speed ond power of the Arcoir System, the exothermic torch carried by all rescue companies ond Squod 1's Technical Response Vehicle. *Photo by Chris Shand*

participation in the search for civilians, but in case some mishap should occur during the non-dive rescues.

*3. Preincident planning.* Even though it can't cover all possible scenarios of major emergencies, preincident planning is an extremely valuable tool. The fact that Haz Mat 1 and Rescue 4 had previously visited the site gave them information (about means of access, for example) that wasn't immediately available to others on arrival. The visits also may have alleviated the anxiety that comes with a dangerous operation, which could have been worse if the locale were completely unfamiliar.

Information vs. anxiety

The more generalized preplanning represented by written procedures also proved its worth. At this operation, we employed elements of the hazardous materials operations plan (the assessment portion) and the collapse rescue plan.

**WRITTEN PROCEDURES:** See *Emergency Response Plan: Hazardous Material; City Wide Drill 14,* "Basic Building Construction and Collapse"; and *AUC 291R,* "Collapse Operations."

*4. Information-gathering and control.* The same caveat often associated with hazardous-materials operations can be applied more broadly to major emergencies: For the sake of safety and effectiveness, firefighters' tendencies toward immediate action must be curtailed while the situation is evaluated and an operational plan formulated. Well intentioned "freelancing" is most likely to happen during this period, and it can create delays in doing the job right.

Curtail tendency to immediate action

*5. Command post.* At a major emergency, there may be no obvious location at which to locate the command post, as there usually is at a fire. In addition, large or complex sites may have many access points. Early establishment of a highly visible command post is critical, and its location must be communicated to arriving units of all agencies.

*6. Communications.* Communications was particularly important at this incident, where it actually determined our ability to enter the shaft:

■ As soon as practicable, a survey should be conducted to determine the presence of on-site communications equipment. If present, it may be useful as a backup to the Fire Department's Handie-Talkies or as a less-

**COMPATIBILITY:** See *Communications Manual,* Sec. 8.4.5, and *AUC 179R,* "Instruction for Utilization of Company Handie-Talkie," Addendum 6

## THE EXOTHERMIC TORCH

**BY TERENCE S. HATTON**
Lieutenant, Rescue Co. 4

The tool used to cut away ports of the winch and steel decking that hod trapped o tunnel worker underwater was the Arcoir Slice Cutting System, a torch carried by each of the FDNY's rescue companies and the Technical Response Vehicle assigned to Squad Co. 1. Chosen for the task because it con cut underwater, the Arcoir also cuts several times foster than the oxyacetylene torches carried by the same companies.

The Arcoir cuts material by use of a patented exothermic (heat-releasing) cutting rod and a flow of oxygen. The rod is ignited by a 12-volt battery carried within the unit's portable case. The torch can cut, burn, melt, or vaporize nearly any metallic, nonmetallic, or composite material.

At the water tunnel collapse in Mospeth, metal debris from the winch assembly that fell into the shoft was partially submerged, preventing o complete search. Even ofter the dewotering operation, ankle-deep water remained ot the bottom of the shaft. Ff. (now Lt.) Frederick Scholl of Rescue 4 operated the Arcair to cut free the debris so it could be removed by hand, allowing easier access for the search.

Rescue 4 has used the exothermic torch system to cut security locks, metal doors, and rolldowns with excellent results. This and other new tools ore at the incident commander's disposal when rescue companies are special-called to a fire or emergency.

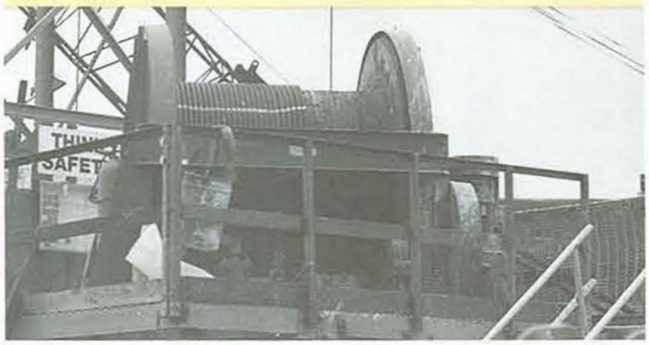
## Water Tunnel No. 3

Water Tunnel No. 3 is a decades-long construction project. Designed to increase delivery capacity and meet a growing demand in the eastern and southern portions of the city, the tunnel will run from reservoirs in Westchester County into the Bronx, Manhattan, Queens, and Brooklyn.

The tunnel was begun in 1970 and is being built in stages; the Maspeth site is port of the second stage. The third and fourth stages will continue into the next century.

Tunnel construction is dangerous work. Anthony Oddo, who died in the occident lost November, was the first fatality during stage 2 but the 20th person to die since the beginning of the project.

**SEE:**
**"City Water Tunnel No. 3," by Keith E. Cartica, *WNYF*, 1st/86, p.10.**



**WINCH**

One of the three 16-ton winches used in construction of the shaft sits on a metal platform at the top of a set of stairs. It was a winch like this that fell 500 feet into the hole. *Daily News news photo*

## Signal 10-60

To deal with the special demands of a major emergency, the signal 10-60 was introduced on Deportment Order 14 of 1993. Created in response to several airplane, railroad, and collapse emergencies, it would be appropriate in any situation where the potential for multiple casualties is present.

Signal 10-60 has the following response:

- 1 deputy chief;
- 4 battalion chiefs;
- 3 rescue companies (including Rescue 3's Collapse Unit);
- 1 tactical support unit;
- The Safety Operating Battalion;
- The Field Communications Unit;
- Haz Mat Co. 1; and
- Squad 1, with the Technical Response Vehicle.

The signal can be used in conjunction with a standard response request. For example, when used with a second alarm, the deputy chief dispatched on signal 10-60 will be in addition to the deputy dispatched on the second.

**SOURCE:**
***Communications Manual*, Section 8-12.**

critical support network. In all cases, Hazardous Materials Co. 1 should be consulted to verify that the communications equipment is compatible with the operational environment.

■ An option available to us, which was overlooked, was the use of the sound-powered phone system. While this hard-wired system may have created problems during descent, it would have provided the entry team with a secure network. Due to the lack of an ignition source, the sound-powered phone is safe in all environments.

**SOUND-POWERED PHONE:** See "Field Communications Unit," by Frank A. Cemuto and Michael Klimchak, *WNYF*, 1st/86, p.16.

■ At major emergencies, as with fire operations, the Handie-Talkie will be the primary communications network employed. Given the heavy response of supervisory personnel to the 10-60 signal, it's helpful to start using the command channel early in the operation; this will free up the tactical channel for critical operations.

**H/T CHANNELS:** See *AUC 179R*, Sec 8. .4

■ The assignment of a communications coordinator early in the operation is desirable due to the complexity of major emergencies and the need to maintain strict discipline on the tactical channel.

**COMCORD:** See *AUC 223R*, "Communications Coordinator."

■ Designation by function, rather than by unit, can clarify communication, especially in an expanding operation where the functions assigned to specific individuals will be changing. This is a part of FDNY procedure that needs more attention in order to be practiced consistently in the field.

**COMMON TERMINOLOGY:** See "The Riding List Writ Large," by Thomas Fitzpatrick, *WNYF*, 2nd/91, p.7

7. ***Technical specialists.*** This was an incident in which outside technical specialists—in this case, the contractor's own employees—played a central role. The operating engineers, "sand hogs," and their supervisors worked diligently alongside the army of emergency service personnel. Their assistance was both necessary and professional through each aspect of the operation.

Contractor's employees

8. ***Familiarity with specialized tools.*** Given the pace of technology, chiefs should periodically review the capabilities of our own Special Operations Command. Tools such as the exothermic torch can greatly speed the operation.

# 1993

# RUNS & WORKERS

## ENGINE COMPANIES

| ENG. | DIV. | RUNS |
|---|---|---|
| 1. 290 | 15 | 6533 |
| 2. 48 | 7 | 5971 |
| 3. 92 | 6 | 5477 |
| 4. 75 | 7 | 5358 |
| 5. 42 | 7 | 5189 |
| 6. 289 | 14 | 5004 |
| 7. 88 | 7 | 4783 |
| 8. 236 | 15 | 4727 |
| 9. 231 | 15 | 4644 |
| 10. 50 | 6 | 4552 |
| 11. 82 | 6 | 4546 |
| 12. 332 | 15 | 4470 |
| 13. 275 | 13 | 4459 |
| 14. 317 | 13 | 4451 |
| 15. 93 | 5 | 4449 |
| 16. 46 | 6 | 4358 |
| 17. 33 | 1 | 4308 |
| 18. 301 | 13 | 4303 |
| 19. 80 | 5 | 4292 |
| 20. 96 | 6 | 4291 |
| 21. 69 | 5 | 4284 |
| 22. 58 | 5 | 4250 |
| 23. 45 | 7 | 4230 |
| 24. 283 | 15 | 4221 |
| 25. 37 | 5 | 4206 |

| ENG. | DIV. | WORKERS |
|---|---|---|
| 1. 290 | 15 | 4172 |
| 2. 96 | 6 | 3647 |
| 3. 236 | 15 | 3572 |
| 4. 92 | 6 | 3532 |
| 5. 75 | 7 | 3513 |
| 6. 48 | 7 | 3454 |
| 7. 42 | 7 | 3371 |
| 8. 257 | 15 | 3197 |
| 9. 73 | 6 | 3168 |
| 10. 45 | 7 | 3079 |
| 11. 82 | 6 | 3076 |
| 12. 317 | 13 | 2981 |
| 13. 62 | 7 | 2919 |
| 14. 50 | 6 | 2907 |
| 15. 231 | 15 | 2851 |
| 16. 255 | 15 | 2846 |
| 17. 289 | 14 | 2815 |
| 18. 88 | 7 | 2792 |
| 19. 302 | 13 | 2775 |
| 20. 71 | 6 | 2745 |
| 21. 301 | 13 | 2689 |
| 22. 33 | 1 | 2686 |
| 23. 43 | 7 | 2658 |
| 24. 332 | 15 | 2642 |
| 25. 69 | 5 | 2553 |

| ENG. | DIV. | O.S.W.* |
|---|---|---|
| 1. 92 | 6 | 626 |
| 2. 290 | 15 | 624 |
| 3. 41 | 6 | 580 |
| 4. 50 | 6 | 575 |
| 5. 231 | 15 | 515 |
| 6. 69 | 5 | 503 |
| 7. 62 | 7 | 501 |
| 8. 42 | 7 | 486 |
| 9. 58 | 5 | 484 |
| 10. 234 | 15 | 464 |
| 11. 283 | 15 | 462 |
| 12. 59 | 5 | 456 |
| 13. 75 | 7 | 445 |
| 14. 96 | 6 | 434 |
| 15. 37 | 5 | 421 |
| 16. 80 | 5 | 413 |
| 17. 45 | 7 | 407 |
| 18. 53 | 3 | 404 |
| 19. 248 | 15 | 402 |
| 20. 235 | 11 | 401 |
| 21. 47 | 5 | 397 |
| 22. 249 | 15 | 396 |
| 23. 255 | 15 | 386 |
| 24. 48 | 7 | 379 |
| 25. 73 | 6 | 374 |

## LADDER COMPANIES

| LAD. | DIV. | RUNS |
|---|---|---|
| 1. 165 | 13 | 6260 |
| 2. 138 | 14 | 6084 |
| 3. 154 | 14 | 5229 |
| 4. 150 | 13 | 5175 |
| 5. 117 | 14 | 5035 |
| 6. 103 | 15 | 5014 |
| 7. 136 | 14 | 4844 |
| 8. 126 | 13 | 4724 |
| 9. 116 | 14 | 4678 |
| 10. 56 | 7 | 4650 |
| 11. 26 | 5 | 4621 |
| 12. 4 | 3 | 4378 |
| 13. 108 | 11 | 4361 |
| 14. 157 | 15 | 4340 |
| 15. 2 | 3 | 4330 |
| 16. 120 | 15 | 4316 |
| 17. 170 | 15 | 4306 |
| 18. 155 | 13 | 4261 |
| 19. 127 | 13 | 4246 |
| 20. 147 | 15 | 4216 |
| 21. 38 | 7 | 4175 |
| 22. 123 | 15 | 4146 |
| 23. 43 | 3 | 4048 |
| 24. 45 | 5 | 3994 |
| 25. 175 | 15 | 3969 |

| LAD. | DIV. | WORKERS |
|---|---|---|
| 1. 117 | 14 | 4314 |
| 2. 138 | 14 | 3951 |
| 3. 165 | 13 | 3834 |
| 4. 108 | 11 | 3595 |
| 5. 170 | 15 | 3576 |
| 6. 4 | 3 | 3457 |
| 7. 157 | 15 | 3430 |
| 8. 154 | 14 | 3364 |
| 9. 120 | 15 | 3214 |
| 10. 2 | 3 | 3150 |
| 11. 155 | 13 | 3018 |
| 12. 123 | 15 | 3014 |
| 13. 136 | 14 | 2987 |
| 14. 175 | 15 | 2981 |
| 15. 102 | 11 | 2884 |
| 16. 38 | 7 | 2876 |
| 17. 150 | 13 | 2871 |
| 18. 116 | 14 | 2836 |
| 19. 103 | 15 | 2813 |
| 20. 126 | 13 | 2805 |
| 21. 158 | 13 | 2799 |
| 22. 54 | 6 | 2789 |
| 23. 159 | 12 | 2751 |
| 24. 44 | 6 | 2749 |
| 25. 56 | 7 | 2743 |

| LAD. | DIV. | O.S.W.* |
|---|---|---|
| 1. 120 | 15 | 710 |
| 2. 157 | 15 | 689 |
| 3. 102 | 11 | 685 |
| 4. 26 | 5 | 640 |
| 5. 123 | 15 | 640 |
| 6. 103 | 15 | 594 |
| 7. 43 | 3 | 580 |
| 8. 27 | 6 | 571 |
| 9. 132 | 15 | 570 |
| 10. 40 | 5 | 560 |
| 11. 113 | 15 | 543 |
| 12. 44 | 6 | 531 |
| 13. 111 | 15 | 529 |
| 14. 55 | 6 | 511 |
| 15. 136 | 14 | 503 |
| 16. 112 | 15 | 490 |
| 17. 33 | 7 | 484 |
| 18. 28 | 5 | 484 |
| 19. 147 | 15 | 483 |
| 20. 19 | 6 | 473 |
| 21. 59 | 7 | 466 |
| 22. 30 | 5 | 465 |
| 23. 176 | 15 | 455 |
| 24. 45 | 5 | 454 |
| 25. 22 | 5 | 454 |

*Occupied Structural Workers

## SPEC. OPNS. CMND.

| HAZ-MAT | DIV. | RUNS |
|---|---|---|
| 1. 1 | 14 | 894 |

| HAZ-MAT | DIV. | WORKERS |
|---|---|---|
| 1. 1 | 14 | 595 |

| MARINE | LOC. | RUNS |
|---|---|---|
| 1. 6 | Bklyn. (Bklyn Navy Yard) | 969 |
| 2. 9 | S.I. (St. Geo. Ferry Term.) | 838 |
| 3. 1 | Man. (Little W.12th St.) | 622 |

| MARINE | LOC. | WORKERS |
|---|---|---|
| 1. 6 | Bklyn. (Bklyn Navy Yard) | 108 |
| 2. 1 | Man. (Little W. 12th St.) | 50 |
| 3. 9 | S.I. (St. Geo. Ferry Term.) | 42 |

| RES. | BORO | RUNS |
|---|---|---|
| 1. 4 | Qns. | 4073 |
| 2. 2 | Bklyn. | 3906 |
| 3. 1 | Man. | 3654 |
| 4. 3 | Bronx | 2361 |
| 5. 5 | S.I. | 1655 |

| RES. | BORO | WORKERS |
|---|---|---|
| 1. 2 | Bklyn. | 1299 |
| 2. 4 | Qns. | 1184 |
| 3. 3 | Bronx | 870 |
| 4. 1 | Man. | 606 |
| 5. 5 | S.I. | 537 |

| RES. | BORO | O.S.W.* |
|---|---|---|
| 1. 2 | Bklyn. | 712 |
| 2. 3 | Bronx | 539 |
| 3. 4 | Qns. | 446 |
| 4. 1 | Man. | 345 |
| 5. 5 | S.I. | 150 |

| SQUAD | BORO | RUNS |
|---|---|---|
| 1 | Bklyn. | 1920 |

| SQUAD | BORO | WORKERS |
|---|---|---|
| 1 | Bklyn. | 1114 |

| SQUAD | BORO | O.S.W.* |
|---|---|---|
| 1 | Bklyn. | 477 |

## BATTALIONS

| BN. | DIV. | RUNS |
|---|---|---|
| 1. 54 | 13 | 7028 |
| 2. 46 | 14 | 6751 |
| 3. 9 | 3 | 6122 |
| 4. 49 | 14 | 5997 |
| 5. 8 | 3 | 5860 |
| 6. 50 | 13 | 5219 |
| 7. 16 | 5 | 5012 |
| 8. 33 | 12 | 4912 |
| 9. 11 | 5 | 4752 |
| 10. 12 | 5 | 4615 |

| BN. | DIV. | S.W.† |
|---|---|---|
| 1. 46 | 14 | 3740 |
| 2. 11 | 5 | 2933 |
| 3. 1 | 1 | 2666 |
| 4. 16 | 5 | 2547 |
| 5. 9 | 3 | 2528 |
| 6. 54 | 13 | 2483 |
| 7. 49 | 14 | 2479 |
| 8. 8 | 3 | 2250 |
| 9. 12 | 5 | 2193 |
| 10. 50 | 13 | 2118 |

†Battalion workers expressed in hours of operational time.

## BFI

| BASE | RESPONSES |
|---|---|
| 1. Bklyn. | 6577 |
| 2. Bronx | 5148 |
| 3. Queens* | 1815 |

| BASE | INVESTIGATIONS |
|---|---|
| 1. Bklyn. | 3872 |
| 2. Bronx | 3035 |
| 3. Queens* | 896 |

*Queens Base was reestablished on 10/4/93