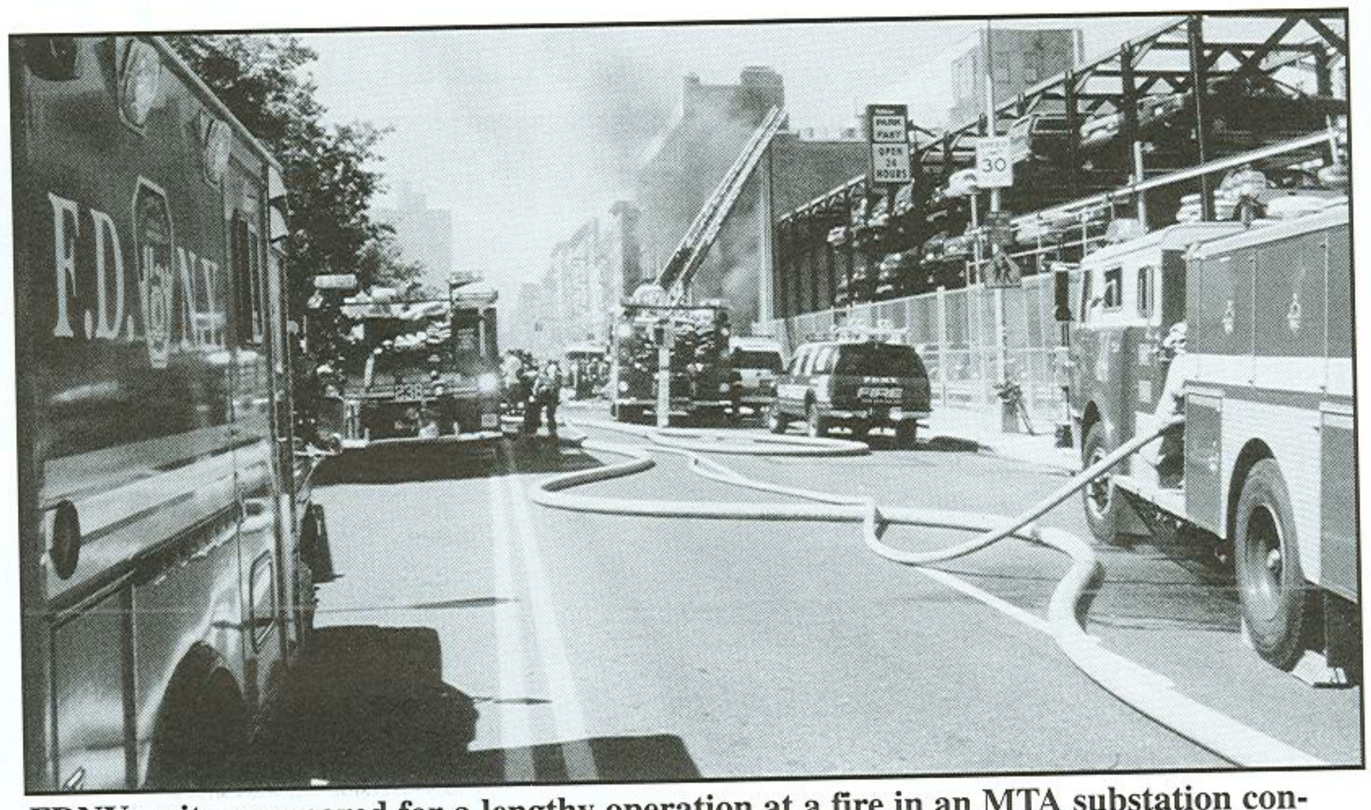
Essex Street Foam Operation

by Lieutenant Charles Hubbard, E-5



FDNY units are geared for a lengthy operation at a fire in an MTA substation containing PCB-contaminated transformers. *all photos by FF J. Miskanic*

Before the beginning of the July 7, 1999, day tour at 0833 hours, the Manhattan dispatcher directed units to Stanton and Essex Streets, on the Lower East Side, for a report of smoke in the area. FDNY units spent the next several hours employing special tools, strategies and tactics to extinguish a fire in a Metropolitan Transit Authority (MTA or TA) substation that contained polychlorinated biphenyls (PCB)-contaminated transformers. Extinguishing the fire in this unusual occupancy required a highly disciplined approach that combined creative fire tactics with appropriate caution. Apart from the PCB contaminants threat, live electrical equipment with tens of thousands of volts of electrical potential was present.

One-sixty-three Essex Street is an MTA facility designed to provide third rail current for a section of subway tracks serving the F, A and E lines. The structure is a two-story, fireproof, concrete structure. The building houses electrical equipment on the first floor and in the cellar. The second floor contains office space. This building is similar to 214 other facilities found near subway lines around the City.

In these sub-stations, the MTA receives high-voltage alternating current (up to 27,000 volts), provided by Con Edison and other New York State Power Authority providers. The MTA sub-stations transform the electricity into a lower voltage (usually 490 volts) and then rectify it into 650 volts direct current for use by subway trains. While the function of the 215 city-wide sub-stations is similar, their layout and current load vary. Consequently, a single fire plan or standard procedure for all sub-stations is not possible. Tactics must be formulated using careful size-up, combined with information gathered at the scene.

The two-story, 50- x 80-foot building at 163 Essex Street receives power from Con Edison via power cables. The cables enter the building below grade and the current flows into a switching unit designed to protect the MTA equipment from power surges and other potential supply problems. Current flows up to a bank of step-down transformers on the first floor. The step-down transformers reduce the voltage and then the current flows through a series of rectifiers that produce 650 volts of direct current. The final product is delivered to the third rail via non-insulated copper conductors connected to cables. The cables meet the third rail in the subway tunnel that runs perpendicular to the front cellar wall of the substation. The copper conductors are joined to the third rail cables in a vault under the sidewalk between the cellar wall and the tunnel wall.

Firefighters prepare to enter the substation with foam lines.

A manhole in the sidewalk in front of the building provides access to this intermediate vault. In addition to the exposed copper conductors, non-insulated shut-off switches exist on the sides of the rectifiers. While some newer designs have reduced the presence of exposed live equipment, dangerous electrocution hazards are abundant in these facilities.

The Transit Authority believes the fire most likely began as a result of an explosion in a Con Edison transformer. A transit official said the force of the explosion ripped cables attached to the ceiling from their cleats. According to the Transit Authority, Con Edison uses the MTA building on Essex Street to house a Con Ed network transformer that is not related to the MTA sub-station. Called a "tenant transformer" by an MTA official, this piece of equipment was in the cellar. Because the MTA sub-station does not use this appliance, it did not appear on their plans. This omission, combined with ambiguity in the details provided by Con Ed personnel, caused size-up problems. Early in the operation, transit workers told Fire Department chiefs there were no transformers in the cellar.

The New York City Transit Power Control Center at 53rd Street received a trouble signal for smoke at 0812 hours and dispatched a crew to investigate. Transit personnel did not arrive until after FDNY operations were well underway. At 0833 hours, the Manhattan fire dispatcher received a phone alarm for smoke at Essex and Stanton Streets and dispatched two Engines, two Trucks and a Battalion Chief. At 0840 hours--28 minutes after the first signs of trouble--the Department radio sounded the familiar tones of a 10-75 signal.

Initial size-up and strategy

First-arriving units forced entry, ascertained that the fire was in the cellar, initiated a primary search for life and attempted to locate the seat of the fire. To effect ventilation, Ladder Company personnel began raising the garage doors on the front of the building. The door mechanisms consisted of a chain pulley with a cord that must be pulled simultaneously, thus complicating an otherwise simple operation.

Heavy smoke and heat were issuing from the top of a spiral

stair in the front of the first floor on the exposure 2 side. The first floor housed the above-mentioned transformers and rectifiers that were occluded from vision by the worsening smoke. In the rear, a standard metal stair runs from the cellar to the first floor. While searching for fire, Lieutenant Bill Schillinger of Engine 28 found high heat and smoke at the top of the rear stairs and reported popping noises. He later commented: "It sounded like the Fourth of July."

While searching for the seat of the fire, Ladder Company 6 had arrived at the cellar by way of the spiral stairs. When Division 1 arrived, Lieutenant Jimmy O'Keefe, Ladder 6, reported to Deputy Chief Peter Hayden that he could see no visible fire in the cellar. The Incident Commander at this time, Chief Hayden ordered the evacuation of all fire personnel from the building.

Once personnel were out of the building, Chief Hayden's immediate concern was removing power and determining the type of equipment involved in the fire. New York City, along with the rest of the Northeast, recently had experienced temperatures of more than 100 degrees Fahrenheit, combined with high humidity. Consequently, Con Edison's resources were taxed greatly.

First-arriving personnel from the utility companies told the Incident Commander there were no transformers in the cellar--only switches and connectors. Chief Hayden ordered Engines 28 and 9 to position a 2 1/2-inch line in the street in front of the building. Engines 5 and 24 stretched a fluoroprotein foam line. Ladder 18 entered the second-floor office space through a window from a Tower Ladder to complete their search. Ladder 18 also evacuated exposure 2 because of smoke exposure. By the time Assistant Chief Steven DeRosa, the City-Wide Tour Commander arrived, Con Ed still had not effected power removal.

Using their thermal-imaging camera in an effort to confirm the location of the fire, Rescue 1 had begun a perimeter search. Rescue 1 entered a subway emergency exit, located in front of the fire building, and discovered an occupied "F" train stalled in the subway tunnel. Smoke was coming through conduit openings and a hatchway in the vault between the sub-station and the subway tunnel.

Battalion 8 supervised Engine 16 and Ladder 20 in the removal of 600 civilians from two stalled subway trains. Fire personnel escorted EMS medics down the emergency exit to treat one passenger complaining of chest pains. The school opposite the fire building now was subjected to the drifting smoke condition and evacuation was ordered.

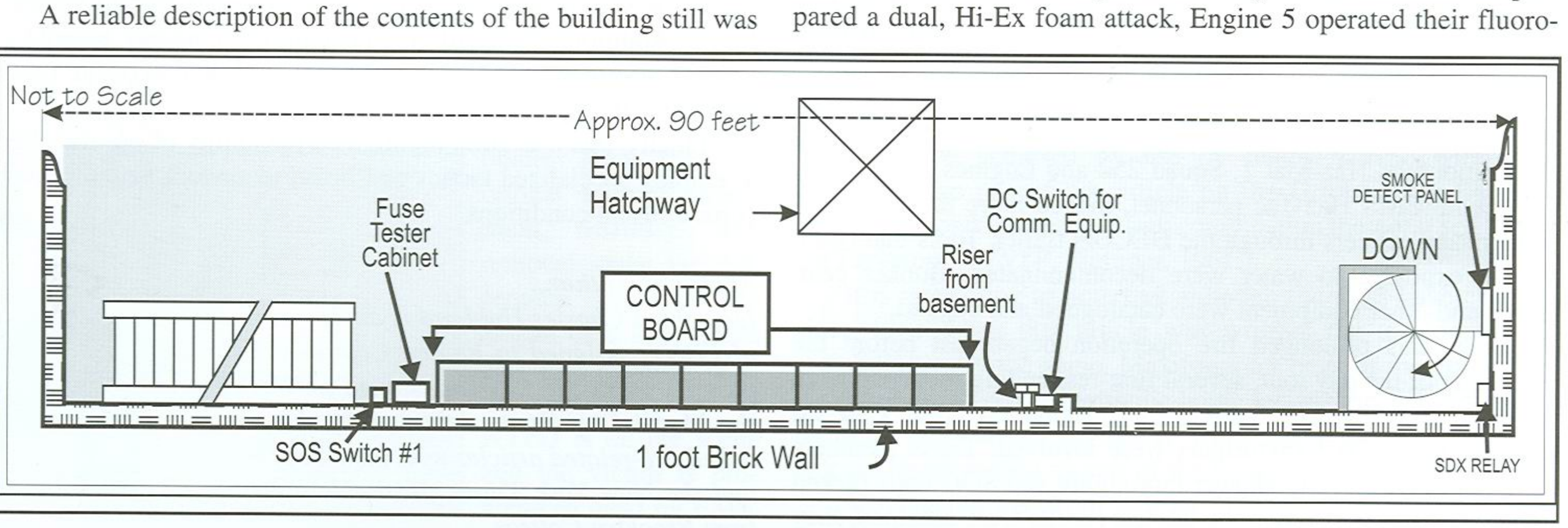
A reliable description of the contents of the building still was not available to the Incident Commander. Power was not confirmed off yet. The worsening smoke condition--combined with high heat conditions, revealed by the thermal-imaging survey--suggested that more than switches and connectors were burning. City-Wide Tour Commander Steven C. DeRosa ordered preparation for application of High-Expansion (Hi-Ex) foam into the cellar. Mayor Giuliani, Fire Commissioner Thomas Von Essen, then-Acting Chief of Department Peter J. Ganci, Jr., and officials from the Office of Emergency Management converged on the scene.

Portable foam concentrate reservoir is set up by firefighters.

The building survey showed two possible openings for high-expansion foam application. In addition to the spiral stairway near the front entrance, a two-piece metal plate covered an opening located about 25 feet into the building toward the exposure 2 side of the building. The opening is an equipment hatchway, normally used to move equipment in and out of the cellar. Made of hundreds of pounds of heavy steel about eight-inches thick, the cover usually was removed with a ceiling hoist, now obscured by the smoke.

Using heavy rigging techniques, Rescue 1 teamed up with Squad 18 and raised the plate from its frame with pinch bars and 6-x-6 wooden blocks. Once lifted, FF Angelini of Rescue 1 employed a Griphoist (see page 6 for article on the Griphoist by Battalion Chief Raymond Downey), secured to the front wall of the building, to move the plate away from the opening. Management personnel from Con Ed and the MTA arrived and on-scene confirmation was received that all power to the substation now was off.

As FDNY personnel attacked the fire with Hi-Ex foam, Con Ed supervisors confirmed the Department's suspicion: There were transformers in the cellar. Con Ed suggested that wires in a recession in the cellar floor might be burning. While Battalion 42 prepared a dual, Hi-Ex foam attack, Engine 5 operated their fluoro-



artwork by FF Bill Kristoff

Below, R-1 FF Angelini takes a break after Griphoist operation. At right, officers at Command Post confer on strategy and tactics to employ. Firefighters used a maxi-water manifold, two Spamco foam generators and a portable foam concentrate reservoir. In photos at far right, firefighters used more than 250 gallons of foam concentrate to extinguish the fire completely.

protein line into the spiral stairway. With fire suppression activity now in progress, chiefs and company officers tried to minimize possible toxic exposure to personnel. They were helped in their effort to move all personnel farther back from the building when an explosion occurred in the sidewalk vault, blowing a manhole cover about five feet into the air.

Battalion Chief Coyne, Battalion 42, acting as the foam coordinator, was directed to replace the fluoroprotein with a Hi-Ex foam attack. Engines 206, 207, 238, 221 and 212 teamed up to supply and operate two Hi-Ex foam generators. One generator operated into the spiral stairway, while the other introduced foam into the equipment hatchway opened by Special Operations Command (SOC) units. Employing the maxi-water manifold, two Spamco foam generators and a portable concentrate reservoir, the foam operation used more than 250 gallons of foam concentrate to extinguish the fire completely.

Decontamination

After a prolonged foam application, the fire was extinguished completely and Battalion Chief Murray, Battalion 4, entered the cellar with Engine 212. Engine 212 began washing down the foam so the area could be examined. Hazardous Materials Company 1 located the transformers believed to be the cause of the fire and took a sample of the runoff water to be tested for PCB levels. Lab results take time; therefore, all companies that had been involved with the fire attack were ordered to undergo decontamination.

Under the supervision of SOC and the Safety Operating Battalion, the chore of decontaminating personnel and equipment went smoothly. Haz-Mat 1, Squad 252 and Engines 288 and 83, along with EMS Haz-Tac personnel, moved more than 100 firefighters and officers through the DECON trailer. Tools that could sustain exposure to water were decontaminated. Bunker gear, radios and other equipment were catalogued and bagged.

Since this prolonged fire operation began just before the beginning of the day tour, several first-responding members were relieved at the scene. Subsequent information from Con Ed revealed that PCB transformers were involved. These members later were instructed to shower thoroughly and SOC units picked up their equipment. When the lab test results were obtained, they showed that the transformer oil contained 101 parts per million of PCBs, considered to be trace amounts.

FDNY considers any transformers that contain PCBs to be treated as contaminated and units shall operate as per AUC 266.

Lessons learned/reinforced

1. When dealing with fires in electrical equipment, consideration must be given to the presence of PCBs and other contaminants. When transformers are involved, tactics of the Hazardous Response Plan should be implemented.
2. The information we receive from utility representatives at the outset of an operation may not be accurate. Always proceed as if the area is contaminated and limit exposure to personnel and equipment.
3. Weather conditions will affect utility crew response times.
4. MTA electrical sub-stations contain office space. According to the TA, the space often is used as crew quarters for their maintenance personnel who work around the clock. Therefore, a life hazard may exist at any time--day or night. The office space always is separated from electrical equipment, often on separate floors. In the Essex Street Station, Ladder 18 was able to gain entry to the office space through the second-floor window.
5. This building was a concrete structure with no immediate fire exposure problems. A deliberate, methodical approach was possible once we were assured that no life hazard existed.

All officers must cooperate to contain the natural, aggressive approach we usually employ at fires. The construction of the building and the fairly unobstructed cellar made for an effective Hi-Ex foam operation. Units on Apparatus Field Inspection Duty should be sure the TA maintains these buildings free of obstructions. Additionally, details of the building contents entered in Critical Information Dispatch System (CIDS) will expedite future operations in this kind of occupancy.

Finally, this operation highlighted the ability of our members to employ specialized tactics and broad teamwork skills to overcome unusual conditions.

About the Author...

Lieutenant Charles Hubbard is an 18-year veteran of FDNY, assigned to Engine Company 5 for the past 10 years. He has contributed to WNYF *and the* Medal Day Book. *Additionally, he has published fire-related articles with* New York Newsday *and the* New York Times. *He holds a BA degree from Brooklyn College.*