Units Battle Fire and Heat Wave at Manhattan Sewage Treatment Plant

by Deputy Assistant Chief Joseph M. Woznica and Deputy Chief James Nichols

The City was experiencing a heat wave and July 20, 2010, was part of it. This day was exceptionally hot and humid, with no wind. At 1146 hours, a phone alarm was received at the Manhattan Communications Office, reporting an explosion in the engine room at the North River Sewage Treatment Plant, located at 725 West 135th Street, Manhattan. Box 1557 was transmitted, but due to the numerous phone calls, Engines 80, 69 and 59, Ladders 28 and 40, Battalion 16, Marine 1, Haz-Mat Battalion and Haz-Mat 1 also were assigned to respond.

Building description and potential hazards

The sewage treatment plant features Type 1A construction, measures 2500 by 500 feet and has five stories (two above ground and three below ground). Each story of the building is designated by the number of feet above or below sea level. (For example, the first story or level one is 28 feet above sea level; the second story or level two is five feet above sea level; story or level three is 15 feet below sea level; story or level four is 25 feet below sea level; and story or level five is 44 feet below sea level). See Figure #1.

There are 20-foot ceilings on levels 1 and 2 and Riverbank State Park is built on the roof; thus, vertical ventilation is not feasible. Additionally, since levels three through five are below sea level, neither vertical nor horizontal ventilation can be performed. Lower-level storage areas are 30,000 square feet per floor and contain a heavy fire load and no sprinklers, with large quantities of propane, acetylene and oxygen. There are 250,000 gallons of #2 fuel oil in vaulted tanks with no fire protection and chemical hazards, raw sewage, sodium hydroxide (lye) and sodium hypochlorite (bleach). High-voltage service enters at 13,000 volts and steps down to 600 volts throughout the plant. Confined spaces and open shafts are

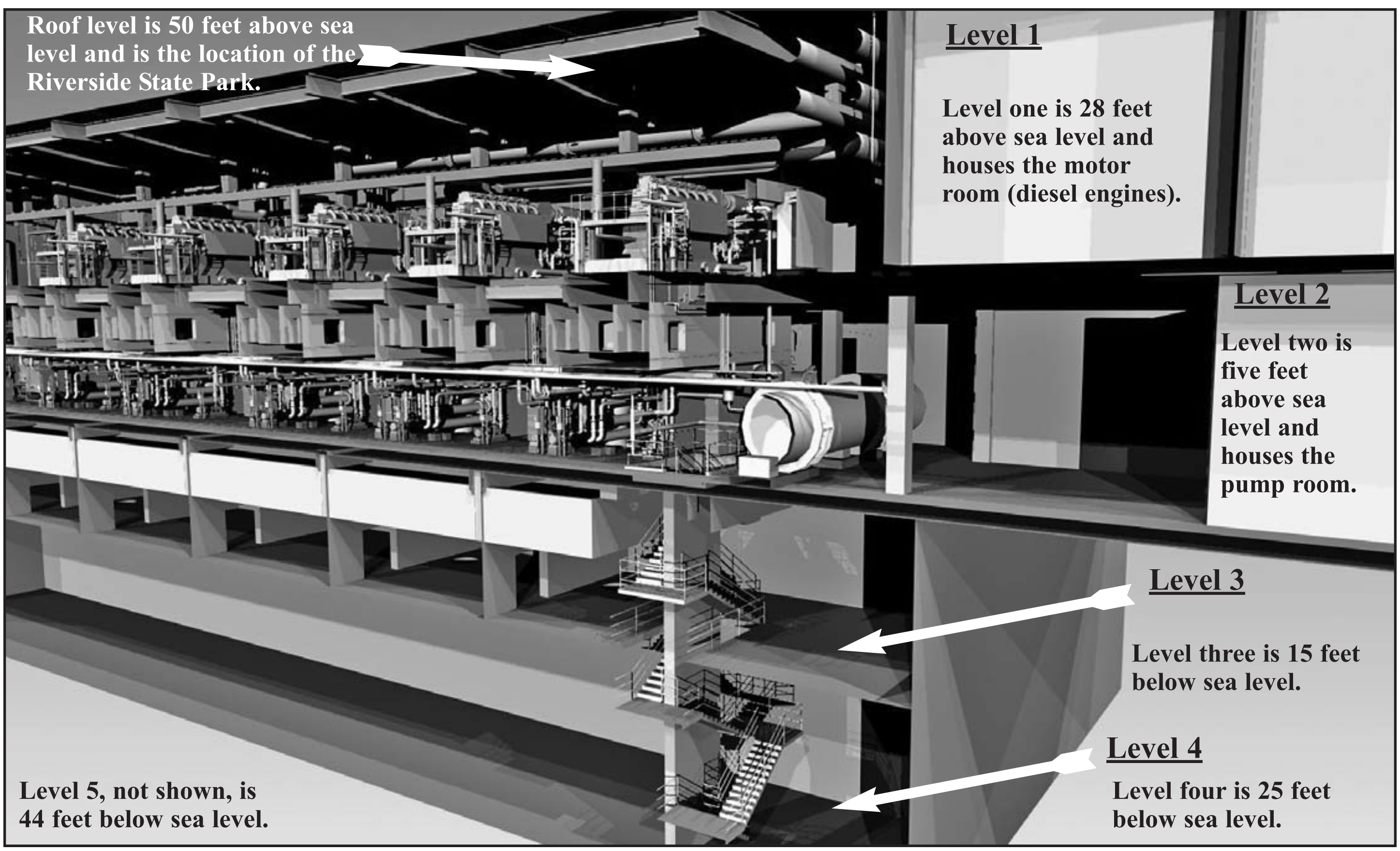


Figure #1--Cutaway view of the North River Sewage Treatment Plant, Manhattan Box 1557, 725 West 135th Street.

Drums similar to those that held the lube oil.

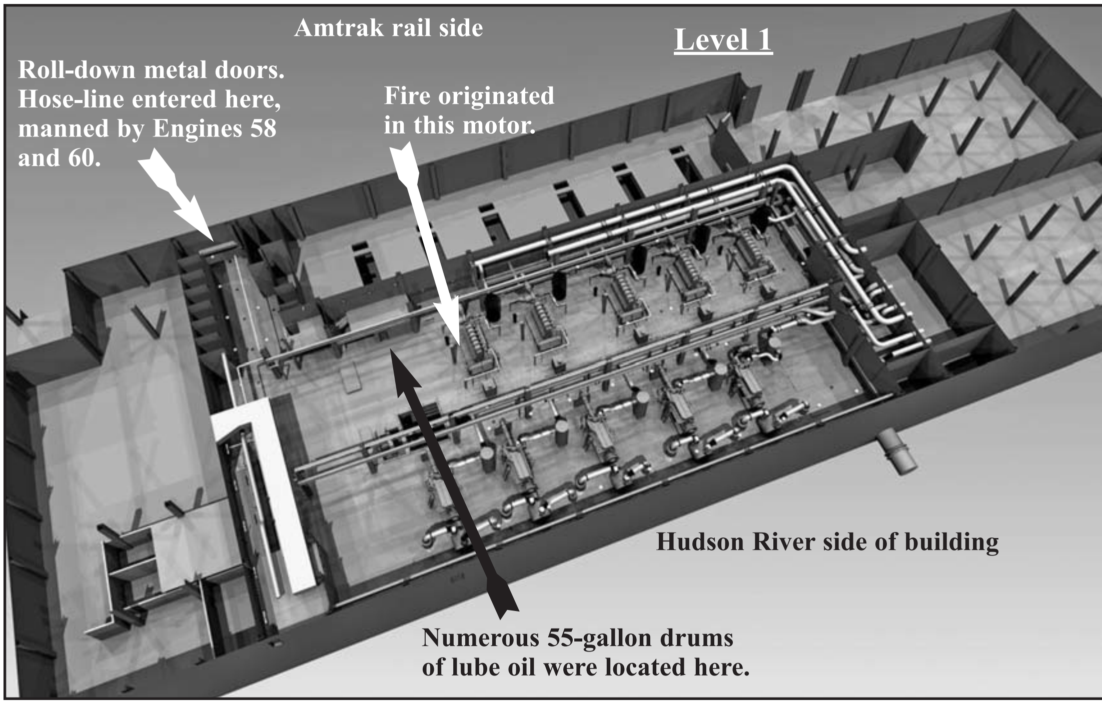


Figure #2--Overhead view of level where fire originated.

located in every part of the plant.

Description of fire area

The main body of fire was located in the level one engine room and specifically involved engine #1. The room is approximately 263 by 400 feet and contains 10 large diesel engines, five on each side. (These are the same kind of engines used to propel large tugboats.) Each engine has a turbo charger that operates at 900 degrees Fahrenheit, external temperature, and is supplied by an intake fan located five feet opposite the fuel line and fuel pump. Each engine is mounted on concrete pillars and the floor surrounding the engine contains metal grates opening directly to the level below. (See Figure #2.)

Directly below each engine and located on level one are 500-gallon vats that contain lubricating oil. The oil is automatically fed to the engine during operation. The vats are supplied with a cover, but the vat located below engine #1 did not have the cover on. As the burning fuel covered the floor around engine #1, it flowed through the grates and onto level two, as well as into the vat, igniting the lubricating oil. Not only was there a large, 500-gallon lubricating oil fire, but the flowing fuel oil caused extensive fire extension throughout level two and extended to levels three and four.

Initial alarm and response

Upon arrival of the first-due units, a heavy smoke condition was encountered at the northern end of the building. At 1154 hours, Battalion Chief Raymond Sessa, Battalion 16, transmitted a *10-75*. At 1205 hours, Chief Sessa transmitted a second alarm and a *10-86* (fluoroprotein foam incident) for a large amount of fuel oil in the area where the fire was located. Chief Sessa established the Command/Operations Post at the northeast corner of the building. Deputy Chief James Nichols, Division 6, assumed command on arrival at the scene and announced the location of the Command Post over the Department radio.

The plant superintendent, Stephen Askew, reported to the Command Post to assist the Incident Commander (IC). Mr. Askew immediately informed Chief Nichols that all plant personnel were evacuated and accounted for. Chief Nichols was reasonably certain that this was the case and the information was transmitted over the Department radio. The units on the scene were notified via handie-talkie transmission.

Mr. Askew also provided a floor plan of the facility. Several Department of Environmental Protection (DEP) workers offered information about the general location of the fire. The floor plan proved useful when shown to Ladder 28 and Squad 41 members as they proceeded into the plant with search ropes. A priority response by Con Ed was requested via Department radio to have electric power shut down to the plant. Mr. Askew informed Chief Nichols that he knew the location of the electric shut-off for the plant, so Chief Nichols assigned Captain John Kitchenman, Engine 44, to accompany Mr. Askew to locate and shut down electric to the entire facility, which occurred around 1245 hours.

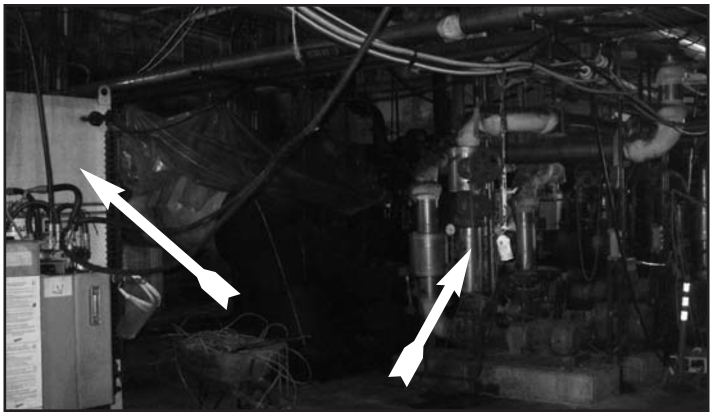
Members of Engines 80, 69 and 59 and Ladders 28 and 40 began the process of trying to find the fire. This proved to be a very difficult task because of the size of the building (2500 by 500 feet), a complex layout, five levels, heavy smoke and heat, absence of vertical ventilation (Riverbank State Park located on the roof) and the location of the fire, which eventually was found approximately 500 feet into the building. Ladder 28 and Squad 41 employed three search ropes to reach the seat of the fire. This was time-consuming and labor-intensive, requiring the assistance of all second-alarm units. Due to the distances encountered and the time needed to complete tasks, a Rebreather Unit was special-called by Chief Nichols at 1230 hours to assist in the search efforts.

At 1236 hours, Deputy Assistant Chief Joseph Woznica arrived on-scene. Reaching the Command Post, he observed numerous members from first-alarm units recuperating on the ground. They were suffering from exhaustion and the effects of the extreme heat. After an information transfer, Chief Woznica assumed command and designated Chief Nichols as the Operations Section Chief and placed him in command of the Operations Post, located on the northeast side of the building at the entrance to the access stairway for Levels 1 and 2.

Due to the punishing conditions suffered by FDNY members and the inability to locate the fire quickly, a third alarm was transmitted at 1248 hours by Chief Woznica. A Command channel was established and announced over the handie-talkies and Department radio. The Resource Unit Leader, Battalion Chief Richard Tarello, Battalion 10, was deployed to contact all Chief Officers to ensure they were operating on the correct handie-talkie channel.

Firefighting operations

The search for the main body of fire was arduous and punishing. This was a reflection of the extremely high temperatures within the enclosed concrete structure and compounded by the nearly 100 degrees and high humidity of the outside environment. An



Arrows show the control panel (left) and engine (right) where the fire originated.

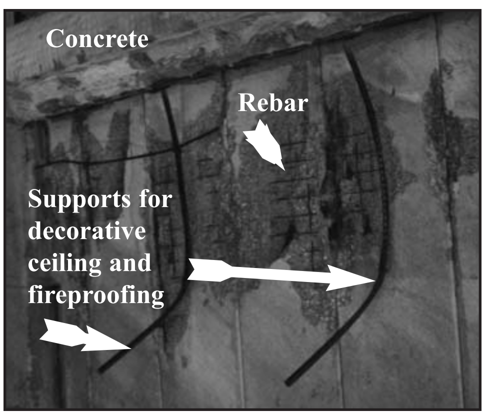
Pipes in the area melted and burned away. The turbo charger (arrow) operates at 900 degrees Fahrenheit.

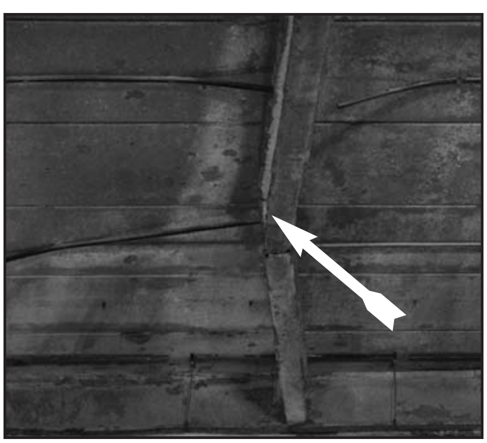
area near the Command Post was cleared and designated for the MERV and RAC Unit. The medical branch established their Command Post next to the Incident Command Post. On arrival, EMS Division 1 Chief Frances Pascale assumed command of the medical branch, established a triage area and ensured enough resources were available to treat the large number of Firefighters expected to be overcome by the demanding conditions.

Chief Nichols ordered Battalion Chief Steven Fitzgerald, Haz-Mat Battalion, to conduct a reconnaissance of the fire area from levels one to five and determine if hazardous materials--specifically chlorine--were involved. Chief Fitzgerald reported that no hazardous materials were involved and the chlorine was stored at the other end of the building and not an issue.

During the search for the main body of fire, several large areas of fire were found on numerous levels of the facility, due to fuel leaking and flowing through grates to all lower levels from a diesel engine located on Level 1. This necessitated stretching several lines to various locations within the facility. At 1308 hours, the main body of fire still had not been found and Chief Woznica transmitted a fourth alarm. At 1326 hours, units began to attack the fire extension, but the main body of fire was still unknown.

The main body of fire subsequently was found on the first level in the engine room by Lieutenant Mickey Conboy, Squad 41. He reported that fuel under pressure was escaping from one of the large engines and presented a blowtorch fire 30 to 40 feet in height. A foam line was requested immediately. Also reported was that numerous 55-gallon steel drums were exposed to the fire. Several drums were boiling and deformed, while others were compromised and emitting steam.





(Top) Photo reveals ceiling above the motor that caught fire. The park is located on top of this ceiling. Note spalling of concrete and rebar. (Bottom) Although encased in concrete, the supporting I-beam still heated up to its failing point and warped (arrow).

A $2^1/2$-inch foam line was stretched to the seat of the fire by Engines 58 and 60, under the supervision of Battalion Chiefs Robert Alfieri, Battalion 11, and Steven San Filippo, Foam Group Supervisor. Haz-Mat 1, commanded by Lieutenant Paul Rogers, was immediately deployed to the location of the suspect drums for reconnaissance and identification of the product contained within.

The foam line was put into operation to cool the drums and prevent a possible BLEVE (Boiling Liquid Expanding Vapor Explosion). Fuel was still leaking under pressure. At 1333 hours, the power to the facility was removed. This immediately stopped the fuel pump from operating, eliminating the pressurized plume of fire and allowing the foam line to advance and extinguish the pooled burning diesel fuel and combustible surroundings.

Once the fire was extinguished and Haz-Mat 1 could approach the drums, Lieutenant Rogers ordered his members to use the specialized meters and sampling devices to determine the contents of the drums. The drums involved in the fire contained waste lubricating oil and did not present a further hazard.

At 1341 hours, Ladder 30, assigned as the FAST unit, was put to work and immediately was replaced by Ladder 22 as the FAST unit. Ladder 30 reported to the first-level engine room and removed two Engine 58 members who suffered extreme heat exhaustion during the cooling of the drums and extinguishment of the fuel fire. Simultaneously, Chief Woznica put the Rebreather Unit into operation to conduct the secondary searches of the involved areas of the building.

Smoke and heat were still a problem due to a lack of vertical ventilation because the Riverbank State Park was located on the roof of the structure. Horizontal ventilation was the only option and a gradual process. The heat from the fire was intense enough to cause twisting of steel I-beams and spalling of the pre-stressed concrete slab roof system, exposing the tensioned steel rods. Positive pressure ventilation fans were deployed at various points, but had minimal effect on efforts. Ventilation proved to be a very time-consuming process.

At 1431 hours, with the main body of fire and all fire extension knocked down and a report of the primary search complete and negative, Chief Woznica declared the fire *Probably Will Hold*. At 1502 hours, Chief Woznica received a report that secondary searches were still in progress, but all fire was extinguished and he placed the fire *Under Control*.

Lessons learned/reinforced

Pre-incident guidelines--Chief Nichols consulted the pre-incident guideline while responding to the Box. This gave him advance knowledge regarding the particulars of the building and hazards involved; i.e., 10-86, Haz-Mat unit, etc. Information on the guideline indicated that this would be a complex fire. (See building description and hazards on page 7.) Not all buildings have a pre-incident guideline. Chief Officers should be familiar with the buildings that do have one and the guide should be readily accessible on the rig.

Establishment of a Command channel--According to the *Communications Manual*, implementation of a Command channel shall be established at third or greater alarms. Each Chief was notified by the IC that the Command channel (channel 2) was to be implemented. Whenever the Command channel is established, the IC shall announce its activation over the Tactical channel and the Borough Dispatcher shall be notified. When switching to a Command channel, it is essential that all Chief Officers have their aides or a designated handie-talkie-equipped member with them at all times.

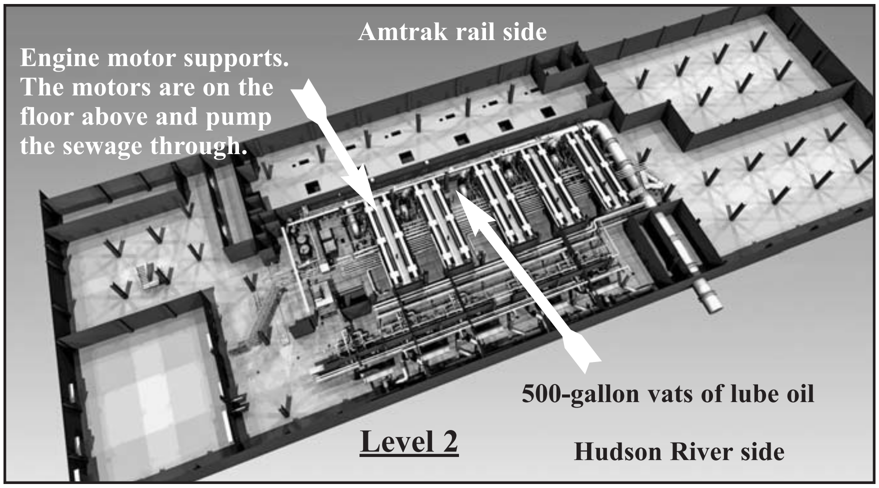


Figure #3--Overhead view of level two. Burning fuel around engine #1 flowed through the grates and onto level one, plus the vat, igniting the lubricating oil.

The Sector Chiefs will operate on the Tactical channel to maintain control of the ongoing operations under their supervision, facilitating continuity of communication with the units they are commanding. The Sector Chief's aide or designated handie-talkie-equipped Firefighter will monitor and maintain communications on the Command channel. All communications between Chief Officers now will take place on the designated Command channel. The IC will operate on the Command channel and a designated Firefighter will monitor the designated Tactical channel. The Staging Area Chief also will operate on the Command channel with a designated Firefighter monitoring the Tactical channel. A second FAST radio should be obtained by the FAST unit and monitored on the Command channel. Transition to the Command channel at this fire was rapid and orderly.

Utilization of specialized units--Specialized units can be a tremendous asset during difficult and demanding operations. Before putting a unit to work, know the conditions members will be operating in and their capabilities. The Rebreather Unit is able to operate for extended periods of time and, under normal conditions, a good choice for secondary searches. Unfortunately, due to the extremely high temperature inside the building, Rebreather personnel were quickly overcome and unable to complete their tasks. Rebreathers are designed to be used in a normal ambient temperature environment. Rebreathers are not recommended for high heat situations.

Utilization of plant personnel and floor plans--Use plant personnel and floor plans to supply crucial information. Floor plans proved to be extremely useful. All DEP wastewater treatment plants designate the level of each floor based on its position above or below sea level. Because a Firefighter would not be familiar with the terminology, a member using the level indicator marked within the stairway as a reference point could cause confusion and possibly delay the arrival of needed equipment or assistance. The IC and Officer of the FAST unit should immediately consult the facility floor plans and determine the level designations. The plant personnel, in conjunction with the use of floor plans, were able to pinpoint the location of the fire and best way to make entry.

They also provided information on the amount and location of hazardous materials. The plant employees can be an invaluable resource. Personnel are familiar with the location and use of building systems. They can assist in operations, as was witnessed by the plant superintendent's knowledge of the various systems. He knew the remote fuel shut-off was inaccessible, but if the electric to the plant was turned off, the fuel pump would immediately stop, eliminating the source of the fire. With his knowledge of the location of the electrical systems, he was immediately tasked with removal of power.

Know your personnel--Chief and company Officers must be familiar with their subordinates. Fire Officers and Firefighters arrive with different sets of skills and abilities. At this operation, three search ropes were deployed to find the fire, an inherently dangerous undertaking. The decision to continue this tactic was dictated by the two company Officers carrying out the operation (Lieutenants Conboy, Squad 41, and Kevin Flanagan, Ladder 28). Chief Nichols has known these individuals for years and was confident in their experience and abilities to complete this operation safely and successfully.

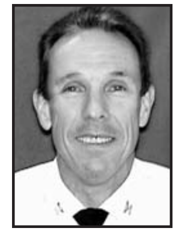
Training is one of the most important components of a fire department. Safe and successful operations at difficult fires such as this are a product of the training received by FDNY members. Training pays huge dividends whether it's done at Randall's Island or Fort Totten or simple company drills or multi-unit drills (MUD). *Keep training*.

After Action Review (AAR)--As per AUC 350, an After Action Review was conducted. This involves getting the Officers involved and holding a critique of the operation. All aspects of the operation are discussed and recommendations made. The critique is followed up by a report by the Deputy Chief. This is given to the Borough Commander, who, in turn, develops an improvement plan.

Command issues--1. Consultation of pre-incident guidelines while en route to fire. 2. Early transmission of *10-86* and response of specialized units. 3. Weather was hot and humid, foretelling a labor-intensive operation. Proactive transmission of additional alarms for relief. 4. Chief engineer at the Command Post to supply floor plans, status of personnel, information on fire, equipment and remote means to stop fuel under pressure.

Members are urged to review "Wastewater Treatment Processes," by Assistant Chief Ronald R. Spadafora, on page 11, of this issue of *WNYF*, and "Rebreather Mask--New Tool for SOC," by Battalion Chief Joseph R. Downey, and "Lessons Learned at Rebreather Drills," by Lieutenant James McQuade, in the 2nd/2009 issue of *WNYF*.

About the Authors...



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