

LOX (liquid oxygen) Stalls the LIE

by Battalion Chief Charles Kasper, SOC

all photos by FF Wayne Ludwig, SOC Battalion

It was a very warm Sunday morning on August 1, 1999, when Queens Box 6403 was transmitted at 0841 for an overturned tractor-trailer truck on the Long Island Expressway (LIE). The accident had occurred on the westbound side of the LIE, approximately one-quarter mile west of Little Neck Parkway. First-arriving units discovered a 4500-gallon tank truck containing liquefied

oxygen (LOX) that had rolled over. The truck lay diagonally across all three westbound lanes, with the tractor wedged up on the concrete center road divider and a vapor cloud emanating from the rear. (See photos above and left.)

Liquefied oxygen is a pale-blue, cryogenic liquid with a boiling point of -297 degrees Fahrenheit. It has an evaporation rate of 857 to 1 and a vapor density of 1.1. Although only slightly heavier than air, the gas generated from a spill is very cold and will sink and settle to low spots rapidly, increasing the possibility for contamination and subsequent reactions and ignition.

Transported in double-shell, insulated tanks with safety-relief valves, a liquid spill presents three major dangers: 1. *The large vapor to liquid ratio.* A spill of several thousand gallons produces an enormous vapor cloud. 2. *As a cryogenic, it is extremely cold.* Any contact with the liquid will destroy living tissue instantly and permanently. 3. *LOX, essentially super-charged oxygen, reacts violently and explosively with many substances.* For example, a spill on the LIE almost certainly would become unstable, merely from contact with the asphalt and roadway contaminants.

Initial actions taken by first-arriving units reflected their Haz-Mat First Responder training. The 10-80 signal was transmitted and a contamination control line estab-



Photo #2--
Vapor cloud
emanates from
flipped-over
tractor-trailer
truck.

Signal 10-80--Hazardous Materials Incident

The initial notification by field units of a hazardous materials incident. Transmission of the signal 10-80 will serve to warn responders to proceed with caution to avoid entering a restricted area. The Incident Commander will transmit the following codes after size-up and evaluation of the incident. The IC will be guided by information in the Emergency Response Plan in determining the incident level.

Code 1: Signal indicating a Level 1 incident. An incident that can be controlled by the responding unit or units up to and including three Engines, two Ladders, two Battalion Chiefs. It is not a request for additional units or specialized resources. The incident does not require evacuation of other than the involved structure or the immediate outdoor area. It is confined to a small area and does not pose an immediate threat to life or property.

Code 2: Signal indicating a Level 2 or 3 incident. The dispatcher will order the response of:

- A total first-alarm assignment of three Engines, two Ladders and two Battalion Chiefs
- Deputy Chief
- Hazardous Materials Company #1
- Safety Operating Battalion
- Special Operations Battalion
- Field Communications Unit
- Public Information Officer
- One Haz-Mat Technician Unit

The following notifications of a hazardous materials incident will be made by the dispatcher upon receipt of signal 10-80, Code 2 (Level 2 or 3 incidents):

- Police Department Operations Unit
- Department of Environmental Protection (DEP)
- Department of Health (incidents involving radioactive materials)
- NYS Department of Environmental Conservation (fuel oil spills)

In addition, the following Fire Department units also will be notified:

- City-Wide Tour Commander
- Fire Department Operations Center
- Medical Officer on Duty
- Chief of Haz-Mat Operations
- EMS city-wide dispatcher for response of one Haz/Tac ambulance and an Emergency Response Squad (ERS)

If the Incident Commander determines that additional resources beyond the 10-80 Code 2 are required, the dispatcher shall be directed by the Incident Commander to use the Hazardous Materials Response Group (listed in Section 7.5 of Chapter 7, Communications Manual). An example of this would be an incident where there are multiple casualties and specialized personnel in level "A" suits are required.

The procedure to follow for this added response to a large-scale incident is to transmit the 10-80 Code 2, followed by a description of the incident and a request for the Haz-Mat Group response. The standard "Hazardous Materials Response Group" includes:

- Two additional Technician units
- One Tactical Support unit
- One Decon unit
- One Decon Support unit
- Two CPC units
- One Rescue Company

The remaining units with haz-mat capability may be special-called as needed.

lished. FF John Signorelli, the 53 Battalion Firefighter, used the Battalion vehicle to stop westbound traffic, which still was proceeding past the tanker along the right shoulder of the roadway, despite the presence of a visible vapor cloud. Identification markings were relayed to the responding Hazardous Materials Co. 1. Based on this information, Captain Vincent Doherty of Haz-Mat 1 advised closing the eastbound LIE as well. Closing down the LIE is not easy. This task required time, the commitment of significant resources and NYPD assistance.

Evacuation of the surrounding areas was begun and two hand-lines with fog nozzles were stretched for vapor control. A Command Post was established, uphill and upwind, on the LIE, approximately 1000 feet west of the tanker. Location of the Command Post was announced on the Department radio. Representatives from the Departments of Environmental Protection, Traffic, Police and Sanitation, as well as the Director of the Office of Emergency Management, Jerry Hauer, reported in to this Command Post and provided valuable assistance to the Incident Commander. Acting Battalion Chief Robert

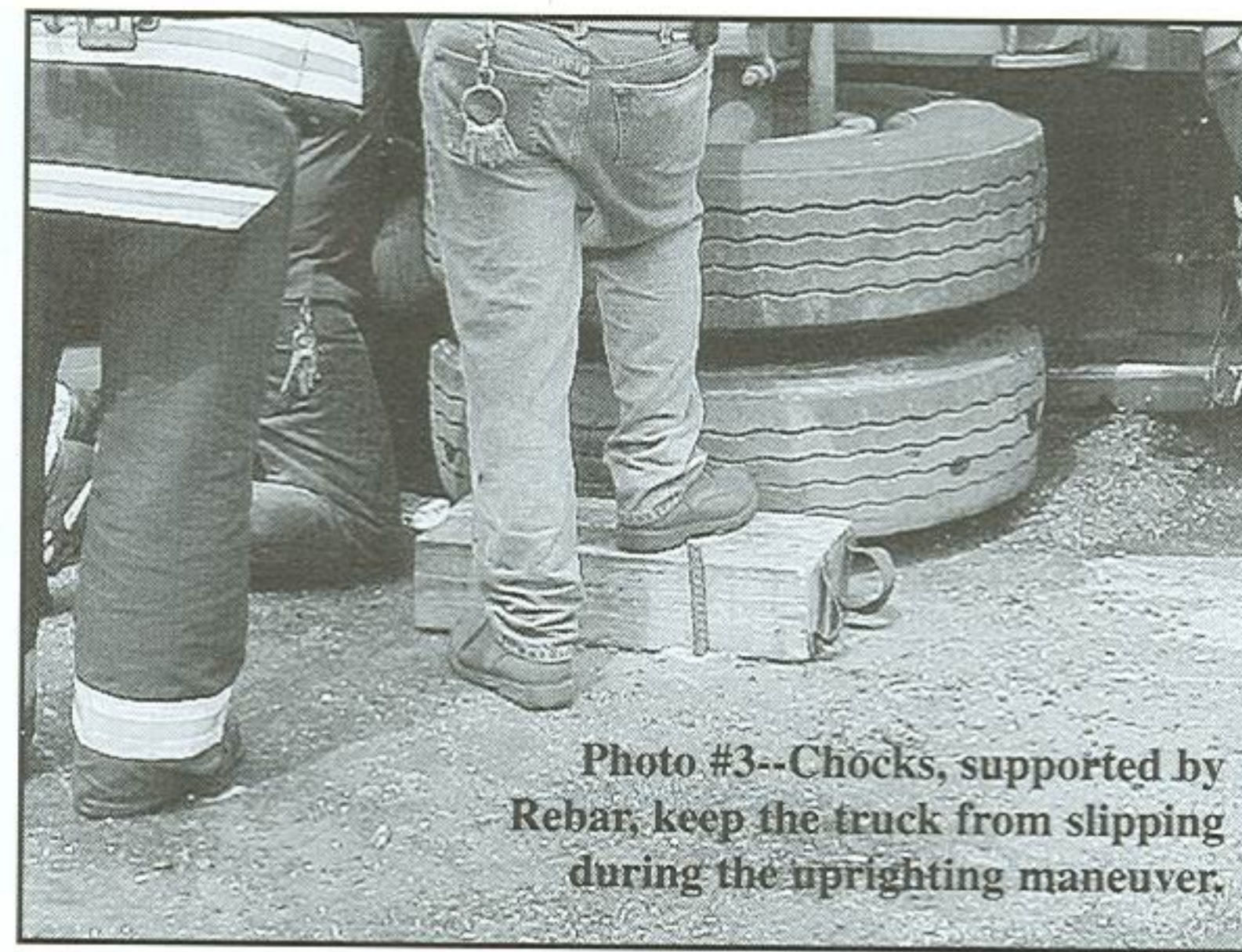


Photo #3--Chocks, supported by Rebar, keep the truck from slipping during the uprighting maneuver.

Strong of the 53 Battalion had the presence of mind to interview the injured truck driver prior to being transported from the scene by EMS. He learned that the tanker just had made a delivery and was carrying only several hundred gallons of LOX. This valuable information helped shape the strategy and tactics employed to mitigate this incident.

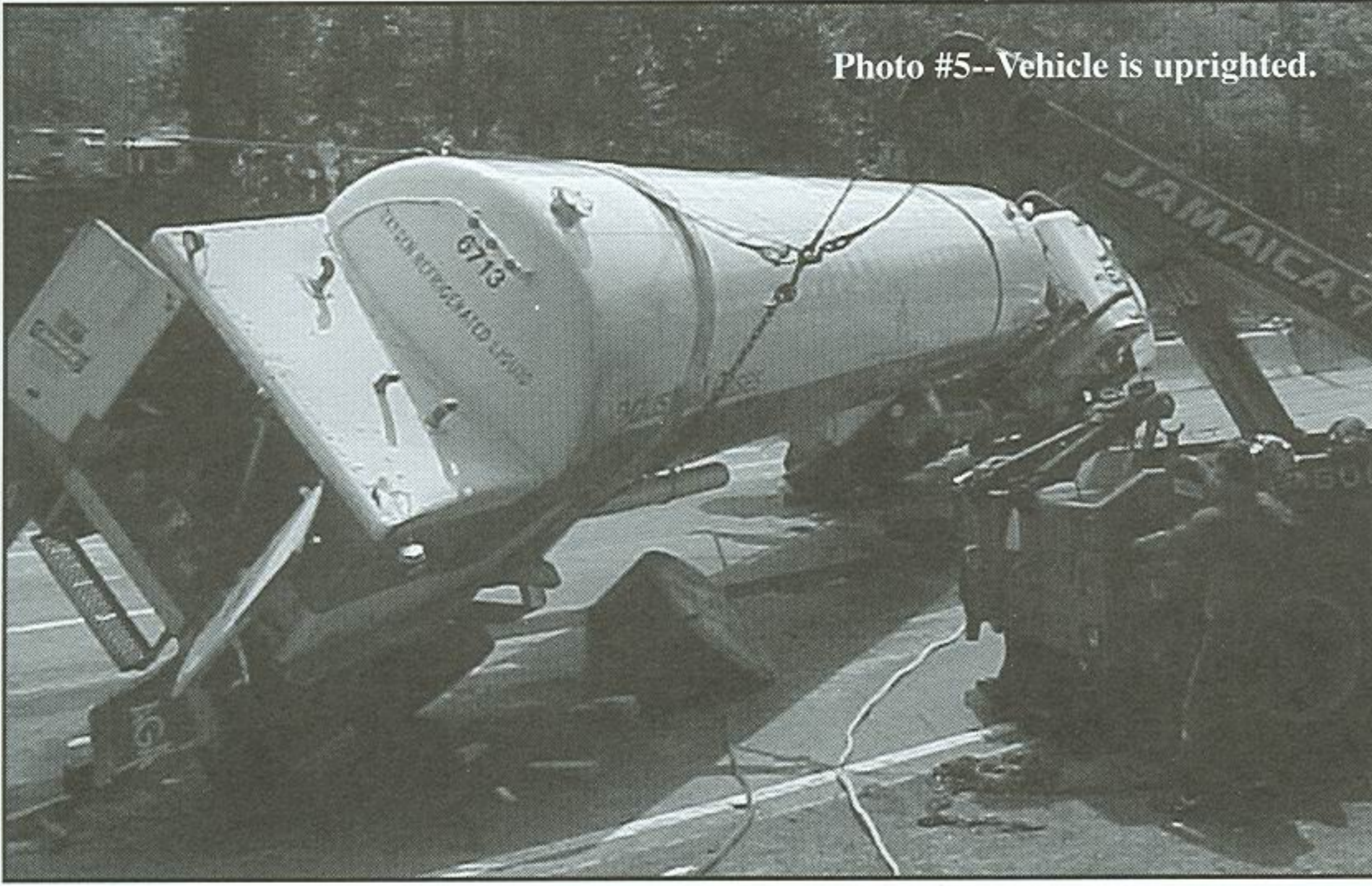
At 0920 hours, Deputy Chief Thomas Dunne, Division 14, arrived and assumed command. After being briefed, he directed that additional protective lines be stretched, specifying that they come from a hydrant other than the one supplying the initial lines. As a precaution, he also expanded the evacuation zone to include neighboring homes on both service roads.

The City-Wide Tour Commander, Assistant Chief Harry Norum, arrived at 0933 hours, conferred with Deputy Chief Dunne and assumed the position of Incident Commander. Per the Incident Command System, Chief Norum established sectors. Acting Battalion Chief Strong supervised units operating from the eastbound service road and Battalion Chief Stampfel, Battalion 52, supervised units operating from the westbound service road. Special Operations Battalion Chief Charles Kasper was placed in charge of operations at the tanker. Safety Chief, Battalion Chief James Jackson, super-



Photo #4-- Two low-pressure, high-lift air bags raise the truck several feet, facilitating a more gentle and controlled uprighting by the tow trucks.

Photo #5--Vehicle is uprighted.



vised overall operational safety and Battalion Chief Jack Fanning, Chief of Haz-Mat Operations, acted as liaison between Operations and Command.

Upon arrival, members of Haz-Mat 1 conducted a size-up, took meter readings and inspected the shell of the tank for damage. Simultaneously, Squad 288, a Haz-Tech Unit under the command of Captain Denis Murphy, removed all electrical power from the truck that could act as a source of ignition.

Several ruptures of the outer shell were discovered, but it was unclear, at this stage, if the inner shell had been compromised. Vapor continued to vent from the safety-relief valve in the rear (see photo #2) and the truck's pressure gauges showed an internal pressure of 26 psi. It was determined that off-loading would not be a viable option because of the position of the truck. As a result, it was decided to open all vents fully to relieve the internal pressure that might cause the inner shell to fail. In less than one hour, pressure readings came down to zero and vaporization reduced dramatically.

With conditions stabilized, the job of uprighting the truck was addressed. The overriding concern was not damaging an already traumatized container, thereby causing a spill of liquid oxygen. The first step was to pull the tractor section of the truck off the concrete center divider. Under the cover of fog streams, the trac-

tor section was disengaged from the barrier and aligned parallel to the roadway, enabling tow trucks to position on opposite sides of the tanker. One tow truck lifted and pulled and the other truck held and controlled.

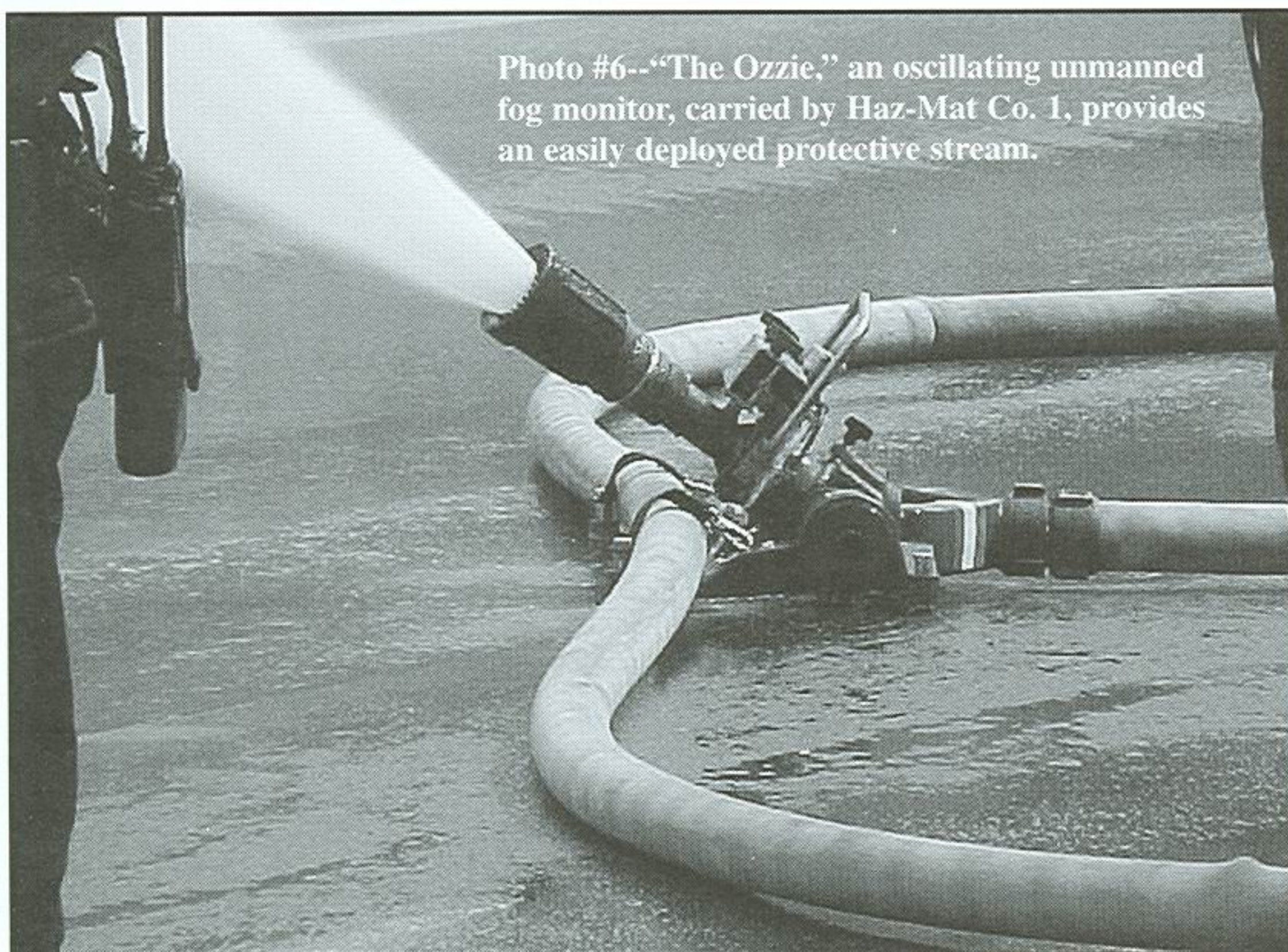
Rescue 4, under the command of Captain Brian Hickey, installed wheel chocks consisting of 4-x-4 timber, secured in place with Rebar (see photo #3, prior page). Air bags were used to lift the tanker enough to slide canvas straps under and around. Wide canvas straps were preferred to chains, which would exert much more stress on the shell.

Additional lift was provided by deploying the low-pressure, high-lift air bags carried by Haz-Mat 1 (see photo #4, prior page). With this advantage, the tow truck was able to bring the truck back on its wheels gently (see photo #5). Once upright, the truck was towed safely off the LIE, which had been closed in both directions for more than five hours. Although a sizable traffic jam may have been created, a major disaster had been averted.

Lessons learned

1. *Fog streams for vapor control.* Fog streams from hand-lines, tower ladders and unmanned monitors (see photo #6, below) were effective in controlling vapors. Remember that the involved area is greater than the visible vapor cloud.
2. *Adequate sources of water.* Hooking up to additional hydrants ensured there would be an adequate source of water for an incident of this magnitude.
3. *Hazard assessment.* Questioning the injured truck driver proved significant in providing valuable information regarding the extent of the hazard.
4. *Command Post procedures.* The early establishment and announcement of the Command Post location contributed to a smooth operation involving numerous agencies.
5. *Slick roadways.* The driver of the vehicle stated that he lost control of his vehicle because of a slippery road condition caused by an early-morning rain shower. This is a good example of how rain, particularly after a dry spell, will emulsify road oils and make the road extremely slick.
6. *Incident Command System.* The use of the ICS aided in the coordinated and efficient use of available resources in the mitigation of this incident without any injuries other than those to the truck driver.
7. *Supervision and control.* When employing civilians, such as tow truck operators, close supervision and control are required. At this job, Officers were assigned to each driver to ensure control and coordination.
8. *Influence of weather.* The high temperatures affected the evaporation rate and increased internal pressures.

Photo #6--"The Ozzie," an oscillating unmanned fog monitor, carried by Haz-Mat Co. 1, provides an easily deployed protective stream.



About the Author...

Battalion Chief Charles Kasper is a 28-year veteran of the FDNY, currently assigned to the Special Operations Battalion. He was a Lieutenant in Squad 1 and a Captain in Rescue 1 and the Rescue Liaison Unit.

