Hazardous Materials Company No. 1

by

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The New York City Fire Department has been charged with the responsibility of mitigating by containment and/or control any hazardous substance accidentally released in the environment in New York City. This responsibility has been placed on the Fire Department in the Mayor's Hazardous Materials Response Plan outlined in Mayoral Directive 82-2 dated September 1, 1982. The Fire Department is the only city agency properly trained and equipped to handle mitigation of these incidents.[1]

Hazardous Materials Company No. 1 was established on October 15, 1984 to address the problem of a growing number of hazardous materials incidents in the City. From its central location in the quarters of Engine Company 288 in Maspeth, Queens, this specialized company responds citywide to any fire or emergency involving hazardous materials. With a roster of 35 members, the Haz Mat Company has seven firefighters and an officer on duty each tour.

APPARATUS, EQUIPMENT AND TRAINING

Haz Mat Company 1 is a two piece unit consisting of a heavy rescue vehicle and a pumper. The officer, chauffeur, and firefighter designated the Resource Person ride in the rescue vehicle which is equipped with a computer terminal, cellular phone, sophisticated testing equipment, chemical protective suits, various power tools and a chemical reference library. The pumper carries the other five firefighters and is equipped with absorbents, recovery drums, foam, emulsifiers, and hose.

All the original members of Haz Mat Company 1 were given special schooling at the Division of Training, supplemented by courses at the National Fire Academy in Emmitsburg, Maryland. Subsequently, new members have been trained on the job for 90 days by Haz Mat Company personnel. Ongoing training for the Company includes on-site visits to chemical plants and attendance at special seminars. The daily activities of the Company include training, testing equipment, researching new tools and developing innovative procedures. In addition to a base-line physical exam to establish a basis for comparison, members of the Company have annual check-ups, including blood tests, to monitor their health.

OPERATIONS

Team Assignments

The seven Haz Mat Company members are assigned to operate in teams for maximum safety and protection. Team assignments for each tour are made at roll call. The teams and their duties are listed below.[2]

Resource Person

The Resource Person is responsible for obtaining all available information on the substances involved in the incident. This complicated and often time-consuming task may require the help of the entire crew.

Entry Team

Wearing protective clothing appropriate to the situation, the Entry Team sizes up and attempts to mitigate the incident.

Safety Team

Equipped with the same level of protective clothing, the Safety Team stands by in case of accident or injury to the Entry Team.

Decontamination Team

Dressed in the appropriate level of protective clothing, the Decontamination Team sets up and maintains three contiguous control zones. Zone 1, the innermost of the three, is the Exclusion Zone where contamination is occurring or could occur. Zone 2, the Contamination Reduction Zone, provides a transition between contaminated and clean Zones. Zone 3, the outermost part of the site, is the Support Zone. This is considered a non-contaminated or clean area. Support equipment, such as the Command Post, is located in this Zone.

In addition to establishing and maintaining the Zones, members of this Team decontaminate the Entry and Safety Teams if necessary.

Coordinator/Control Person

The officer on duty is responsible for sizing up the areas involved in an incident and its boundaries;

Photo by J. M. Shanus

Propped on recovery drums and displayed among volumes from its library are Haz Mat Co. 1's equipment and tools, many of them unique to the Co. From *left* to *right* on the floor are the leak-sealing kit; the air-operated pump which, since it uses no electricity, can be used in an explosive atmosphere; file box on the floor contains microfiche file of 10,000 chemical material safety data sheets, updated quarterly. Directly above file box is microfiche reader and directly behind that is a situation board similar to that used by the Field Communications Unit. On the table from *left* to *right* are, in the foreground, the base station for Haz Mat Co. communications system. Behind it is radiological measuring equipment and the Co.'s cellular phone. In front of that is the Thermal Imaging Monitor, which detects any heat source. In center foreground are the computer terminal and modem. Behind that is the PCB test kit and infra-red heat spy. At far right are explosive-proof, rechargeable lights.

obtaining information from the various Teams; formulating a plan of attack; and maintaining communications with Team members and the Incident Commander.

Protection from Exposure

Protecting members and civilians at hazardous materials incidents is a complex problem. Humans can be exposed to toxic substances through inhalation, ingestion, and contact with, or absorption through, skin. The effects of exposure vary widely but they are classified in two major categories—acute and chronic. Acute exposure occurs over relatively short periods of time, from a few hours to one or two days. Chronic exposures are those occurring over longer periods of time, generally months or years. Acute exposure to hazardous materials in air are more typical in transportation accidents, fires, or releases from manufacturing or storage facilities. Acute exposure through inhalation and absorption can occur when firefighters come close to substances while controlling their release. Therefore, SCBA and full firefighting equipment are the firefighter's greatest protection in an incident where contamination is suspected.

Haz Mat Co. 1 is equipped with a variety of protective clothing. Using information provided by the Resource Person, the officer determines the level of protection required by the various teams. There are three levels, A, B and C, with A providing the greatest protection.

Level A requires full encapsulation in suits made of butyl rubber, PVC, or viton. The choice of material is based on its reaction to the substances involved in the incident. A compatibility chart is used to determine the choice. Each of the Level A suits contains SCBA and can be pressurized using an air line up to 300 feet long. This provides positive pressure to keep members safe from contamination should the suit develop a pinhole leak.

Level B requires a chemical-resistant suit with full SCBA outside the suit. Level C is full firefighting gear—a Nomex jumpsuit, boots, helmet (ear flaps down), gloves and SCBA.

Specially designed communications equipment, consisting of ear phones, throat mike, receiver and transmitter can be used with all three levels of protective clothing to maintain communication with the Support Zone.

HAZARDOUS MATERIAL ASSESSMENT

Hazardous materials are any liquid, gas, solid, dust, or vapor that can damage or destroy by explosion, fire, corrosion or toxic reaction. There are millions of shipments of hazardous materials in the United States every year. Some analysts estimate that one out of every three trains and one truck in every ten is carrying some type of hazardous material. In most cases, when they are properly contained or used, hazardous materials do not present a problem. But when the materials are not under control, e.g. during fires, accidents, spills or releases, they present significant problems. In many cases waste products from substances can cause more problems than the original product, particularly when wastes are illegally transported and dumped.

Identification

At a hazardous material incident, identification and isolation of the substances involved are the most important considerations. The first units to arrive can assist the Haz Mat Company by providing as much information as possible. Of particular importance are:

the name of the product, its manufacturer, shipper, the size and general type of container and whether or not it is leaking. If sufficient information is available, it is possible that the Resource Person of the Haz Mat Company can advise units on the scene of preventive actions they can take before the Company arrives.

A typical example of a situation where information is *not* available would be a rubbish fire in a vacant lot where "midnight dumping" of hazardous waste has taken place. Units at the rubbish fire notice an unmarked drum and the officer in charge calls the Haz Mat Company. On arrival, the Company isolates the area and members of the Entry Team, in Level A protection, open the drum and take samples. The Environmental Protection Agency may be called in to assist in identification.

Labelling

The federal Department of Transportation (DOT) is responsible for making rules and regulations to enforce federal laws pertaining to the labelling and packaging of hazardous materials during interstate transportation. Identifying labels must be affixed to the surface of the package or container, and placards must appear on each end and side of a motor vehicle or railroad car containing 1000 pounds or more of a hazardous material.

In addition to DOT labels there is a system of identification recommended by the National Fire Protection Association for fixed installations. This consists of a diamond-shaped panel divided into four sections, color- and number-coded to identify the hazard involved.

Regulations regarding labelling are designed to protect civilians transporting and handling hazardous materials but they are often of limited assistance to firefighters or other first responders. Fires and accidents can obscure or destroy labels and weaken or rupture containers. Heat can cause chemical and physical changes in materials, transforming them from harmless to dangerous and from dangerous to highly hazardous. These conditions complicate and add additional risks to the job of firefighters. Recognition of potential hazards and informed action or calculated inaction at hazardous materials incidents can make the difference between a controlled operation and one of major proportions.

Data Base

Even after the material involved in an incident is identified, information necessary to successfully conclude the operation is usually not available on site. The Haz Mat rescue vehicle carries a computer terminal and printer which are hooked up to an on-line interactive computer data base containing over 78,000 important industrial chemicals. The data base, which provides operational rather than bibliographic information, covers approximately 90% (by volume) of the known potentially hazardous compounds used in interstate commerce.

Information in the data base can be accessed using the chemical name of the substance, a synonym, the key word, the chemical formula, the Chemical Abstracts Service number, the Registry of Toxic Effects number, or a description of the symptoms caused by exposure. Information in the data base is organized under a number of major categories. Those

Photo by J. M. Shanus

Haz Mat Co. members model three levels of protective clothing. From *left:* Frs. Olenwicki and Hudak are in Level B suits made of butyl and tivec respectively. In the center, two Level A suits are shown; both are fully encapsulated with SCBA, pressurization and communications capabilities. Fr. Gimbl is in a butyl suit; Fr. McLaughlin is wearing the Co.'s silver, flash-protection suit (gold visor not shown). At far right, Fr. McArdle is wearing Level C protection, a Nomex jumpsuit with padded shoulders for SCBA.

of particular importance to firefighters are described below.

Chemical and Physical Properties

Provides information such as a substance's solubility in water; its flash point, and its upper and lower explosive limits.

Incompatibilities

Lists materials with which the substance will violently react.

Personal Protective Clothing

Defines the level of protective clothing required to safely enter and control an incident involving the substance.

Route of Entry

Describes how the substance can enter the body: by inhalation, absorption, ingestion or radiation.

Permissible Exposure Level

Information in this category is based on Toxic Limit Values established by the Occupational Safety and Health Administration (OSHA). The Permissible Exposure Level is the concentration of a substance that can be tolerated over an eight-hour period. Other Toxic Limit Values are the Lethal Dose Low and the Lethal Dose 50. The Lethal Dose Low is the lowest dose of a substance introduced by any route, over a given period of time, reported to have caused death in humans or animals. The Lethal Dose 50 is the dose calculated to cause the death of 50 percent of the experimental population.

IDLH

Reports the concentration of a substance that is Immediately Dangerous to Life or Health.

Symptoms

States the symptoms medical personnel should look for in individuals exposed to the substance.

First Aid

Describes the most up-to-date procedures for limiting or stabilizing the effects of exposure.

Surveillance

Provides a list of the medical tests required by OSHA and the specific tests to be conducted after exposure to a particular substance.

Also available for access by computer are Material

Safety Data Sheets which are prepared by the manufacturers of hazardous materials and list information required by OSHA. (Haz Mat Company 1 carries Material Safety Data Sheets on microfiche. These are updated quarterly.)

ON THE JOB: 10-80

One morning recently the Haz Mat Company responded to a Brooklyn clothing factory where several workers had been overcome, complaining of nausea, dizziness, headaches, chest pains and shortness of breath. Seventy people were evacuated; ten were taken by Emergency Medical Services ambulances to hospitals for treatment. Haz Mat Company 1 was faced with the problem of identifying the source of the problem.

From the description of the symptoms experienced by workers and the fact that no one in the three-story building had detected an odor, members suspected that carbon monoxide was responsible. Without conclusive evidence, the company took the precaution of establishing an Exclusion Zone the width of the building and 50 feet on either side. Dressed in full protective clothing (Level A), and with the Safety Team standing by outside, the Entry Team searched the building for other victims and a possible source of contamination. Using explosive-proof lights they found a clogged flue in the gas-fired steam press on the third floor, where the victims had been working. Their Gas Tech instrument, which tests the environment for oxygen-deficiency, explosiveness and carbon monoxide, revealed traces of carbon monoxide.

At this point, having reported their findings, the Entry Team was joined by the Safety Team in further searching and venting the building. The discovery of several 55-gallon drums of toluene and methyl ethylene on the second floor postponed a final verdict until all the drums of stored chemicals were examined for leaks. This part of the operation took several hours. In the end it was determined that the carbon monoxide from the clogged flue was the sole source of the workers' symptoms.

This operation exemplifies the careful, painstaking approach required by hazardous materials incidents. Despite the evidence of the victims' symptoms and the clogged flue, all other possibilities had to be thoroughly explored.

CONCLUSION

The complex threats posed by hazardous materials put first responders at a grave disadvantage. Hazardous Material Company 1 has been organized, staffed, trained and equipped to provide a highly sophisticated tool for the Department to use in accomplishing its mission of protecting life and property as safely as possible. ▲

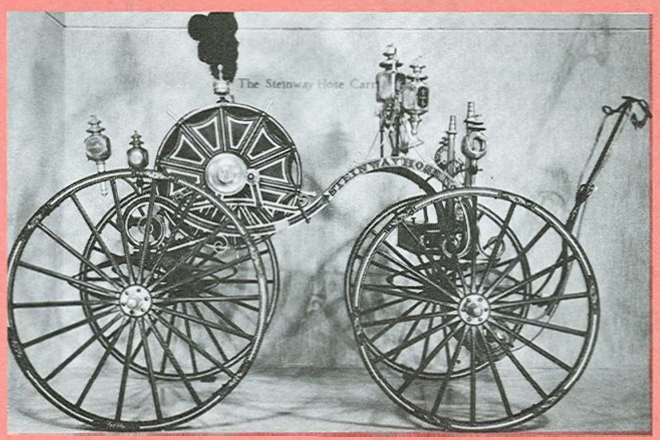
FOOTNOTES

1. **FDNY, *Fire Tactics and Procedures, Hazardous Materials 2*, p. 1.**
2. **The Team concept is described in more detail in *Fire Tactics and Procedures, Hazardous Materials 2*, FDNY Publications.**

FIRE MUSEUM UPDATE

Progress Report: The FDNY Historical Collection

From JOSEPH E. SPINNATO
Fire Commissioner
Chairman, Board of FDNY Collection



I am pleased to report that the installation of the FDNY Historical Collection in the renovated former quarters of Engine 30, 278 Spring St., is underway. Construction on the first two floors is complete and exhibits are being set up. Prior to the official opening in the near future, FDNY members are invited to stop by to see work in progress on their "museum."

The FDNY Historical Collection is a living tribute to New York City's "Bravest," combining historical artifacts and fire safety exhibits. Its historical; contents will be displayed as "The Working Firehouse"—everyday apparatus, tools and techniques; and "The Parade"—ceremonial objects and traditions especially among 19th century volunteers of New York City. Fire safety and fire prevention will be presented in "hands-on" educational exhibits.

In the past, many of you have expressed interest in the Collection and have responded generously to appeals for its support. We are encouraged by progress made in recent months and think you will be too. Announcements will be made shortly regarding membership subscriptions. I urge you to become an ongoing participant in this historic testimonial to our Department. The Museum needs your help! For further updates about the Collection call (212) 691-1303 or (718) 403-1471.