CYANIDE SCARE IN QUEENS

by
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Deputy Chief, 15th Division

On August 14, 1985, at 1408 hours, a BARS* alarm was transmitted for Queens Box 6001, located at 94th Avenue and 100th Street. It was one of the hottest days of the year, with the mercury climbing to 95°F.

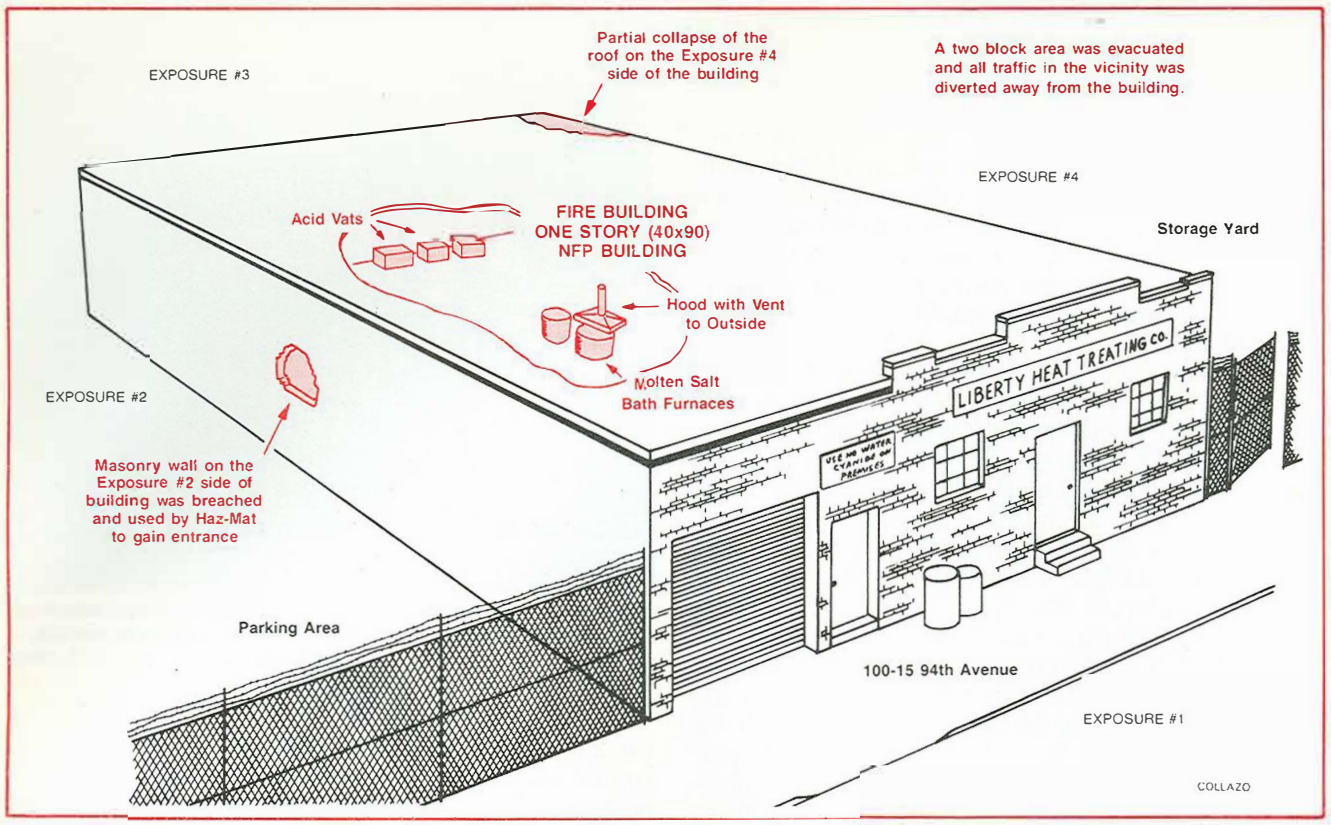
The initial response was Engine Company 294 and Ladder Company 142. On a report from a second source, the alarm assignment was filled out with Engine Companies 293 and 236, Ladder Company 107, and the chief of the 39th Battalion.

At the time of this alarm, the chief of the 51st Battalion, the assigned battalion, was responding to an alarm transmitted for John F. Kennedy Airport. Lt. Vincent Finnegan, commanding Engine Co. 294, the first arriving unit at Box 6001, transmitted a 10-75 for a fire at 100-15 94th Avenue, the Liberty Heat Treating Company. He also advised incoming units that the fire building was a CIDS† building that contained hazardous chemicals, including cyanides, and that water was not to be used. Lt. Finnegan and the members of Engine Co. 294 had recently conducted an inspection of the premises and were familiar with the various chemicals

*Box Alarm Readout System.
†Criticol Information Dispatch System.

. . . threat of toxic gas forces evacuation of two block area

All photos this article by G. Tufte



and acids stored in the building, and the hazards associated with them. Battalion Chief James M. Frawley, 39th Batt., while enroute to the fire, and hearing this ominous transmission, requested that Haz-Mat Unit #1 respond to the scene. The chief of the 15th Division was also notified to respond, as the 13th Division chief was operating at an "all hands" fire at Box 4767.

While enroute, Deputy Chief John F. O'Connor, 15th Div., referred to his *Hazardous Chemicals Data* booklet to refresh his memory on the physical properties of cyanide. Classified as extremely poisonous, it will generate hydrogen cyanide, a flammable poison gas, on contact with acids. Hydrogen cyanide gas! The words conjure up the image of gas chambers and death. The recent event of thousands of unsuspecting victims dying of exposure to poisonous gas only served to heighten his awareness of the potentials of the situation facing the Department.

THE FIRE BUILDING

The Liberty Heat Treating Company is a one-story, 40′ x 90′, non-fire-proof, building, occupied as a factory in the business of treating metals to alter their strength and durability. One type of treatment will make parts strong, another develops extreme hardness, and a still different treatment can be used to develop the softness that is required in baling wire or in a rivet. Basically, it consists in heating work to a prescribed temperature, holding at that temperature for a specified time, and cooling at a predetermined rate. The temperatures required for different heat treating processes vary over a wide range. Some treatments are effective at 250°F., while others require a temperature as high as 2,400°F. Most heat treating processes are carried out in gas fire ovens and furnaces. A variety of salts and mixtures may be used, depending on the specific treatment and temperature required for the work at hand. Nitrates, for example, are commonly used for temperatures between 500°F. to 1,100°F., cyanides for temperatures between 1,450°F. and 1,750°F., and chlorides of sodium and potassium for temperatures between 1,100°F and 2,400°F. Molten salt bath heating, as the term implies, is essentially controlled heating of the metal by immersion into a bath of molten salt. In this type of atmosphere, the possibility of fire is always present. At working temperatures of from 300°F to 2,400°F, any contact of the heated salts with combustible materials can result in a fire.

The cause of a serious fire could be the improper use of quenching oil, which is used in the cooling process of some metals. The most common type of fire occurs when red hot work that is hung up is only partially submerged beneath the surface of the oil. This condition tends to heat the oil at the surface above its flashpoint. Another way a fire can be started is by quenching an oversized load of heated metal in the oil. This condition may cause the oil in the quench tank to become overheated to the point where it will flash and cause a fire. These fires can reach full intensity within a few seconds, and are difficult to extinguish.

While the fire hazards associated with this type of occupancy are many and varied, it was suspected that the probable cause of fire in this case was the inadequacy of the structure to withstand the heat generated in the heat treating process. This conclusion was reached after talking to factory workers at the scene, who stated that they first noticed the fire in the ceiling.

HAZARDS FACED

Members arriving on the scene were alerted to the presence of cyanide by the CIDS and the sign on the building. Also stored in the building were nitrates, ni-

trites, and acids, along with other chemicals and oils. The storage of sodium nitrate and sodium nitrite was cause of special concern. Sodium nitrate is classified as an oxidizing agent and, as such, evolves oxygen when heated, thereby increasing the intensity of the fire. Prolonged exposure to fire or heat could eventually result in an explosion. As with sodium cyanide, it generates toxic oxides of nitrogen when involved in fire. And, in the molten state, the salts are particulary reactive. When they become overheated in the presence of certain materials such as cyanide and oil, they may even explode.

The acids stored in the building included hydrochloric acid, nitric acid, and chromic acid. This, too, was of serious concern to our forces. There certainly was the possibility that members could receive severe burns if they were to come in contact with the acids that were stored throughout the building. In addition to being corrosive, nitric and chromic acids are oxidizers and, while nomcombustible, will accelerate the burning of combustible materials. The cyanide used by the Liberty Heat Treating Company was sodium cyanide. Classified as a Poison B, it comes either as a white crystalline or lump solid, and has the faint odor of bitter almonds. Toxic oxides of nitrogen are produced in fires involving sodium cyanide and, in contact with acids, decompose rapidly to give off hydrogen cyanide gas, as illustrated by the following chemical equation: $NaCN + HCl \rightarrow Na + Cl + HCN\uparrow$. With so many acids stored in the building, this was a distinct possibility. Hydrogen cyanide gas is an extremely poisonous gas and is lethal, even in small doses. A few breaths may cause unconsciousness and death. The characteristic bitter almond odor sometimes warns of its presence, but during a major fire, it wouldn't be prudent to rely on the sense of smell to detect it.

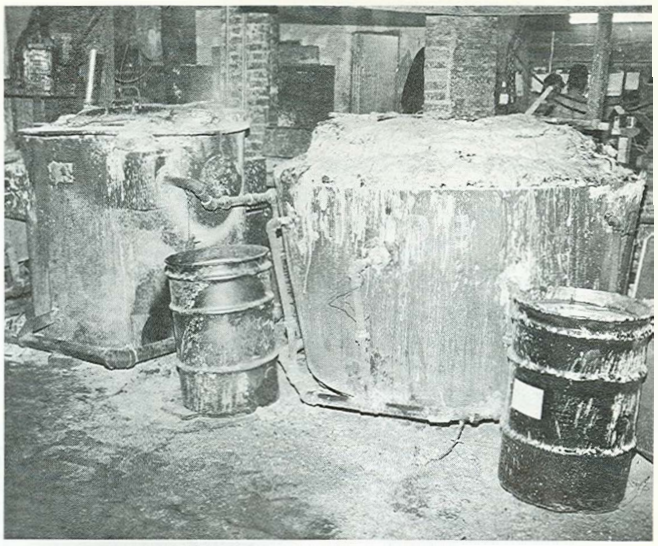
The ingredients for a potential catastrophe were literally brewing inside the building. The wrong mixture could generate a disaster.

INITIAL OPERATIONS

Upon arrival at the scene, Chief Frawley found a medium fire condition in the ceiling of the Liberty Heat Treating Company. The fire was situated near the front of the building, and was rapidly extending along the ceiling beams. The entire building was in danger of becoming involved. Posted conspicuously on the front wall of the building in large, bold letters was a metal sign warning: USE NO WATER—CYANIDE ON PREMISES.

At 1423 hours, Chief Frawley transmitted an all hands, and requested an additional engine company and a tower ladder to respond. Lt. Finnegan, Engine Co. 294, reported to Chief Frawley, and informed him that on a recent inspection of the premises many hazardous materials were discovered in the building, including cyanides, nitrates, and acids.

As the fire intensified, the members of Engine Co. 293 stretched a handline to the front doorway and directed a stream toward the ceiling in an attempt to prevent further extension of the fire. This immediately resulted in a series of violent explosions and, in the interest of safety, the unit was withdrawn. As the fire gained in volume and intensity, reports of deteriorating roof conditions were reported by the personnel of Rescue Co. 2 and Ladder Co. 107, who were performing roof ventilation. The violent explosions, coupled with the presence of the sign warning against the use of water, and reports of a possible roof collapse, precluded an offensive/interior attack, and prompted Chief Frawley to opt for a defensive strategy. Units were immediately ordered off the roof, and tower ladders were positioned to protect the exposures.



Gas fire "pot type" molten salt bath furnaces in which metals to be treated are immersed. Vented hoods over these furnaces are necessary in order to exhaust the excessive heat and fumes. These molten salt baths require highly accurate and reliable temperature controls in order to ensure proper operation and to prevent fires and explosions.

Battalion Chief Norbert Meehan, Chief of Rescue Services, arrived on the scene shortly after the first alarm companies. He had been on his way to his office, noticed the heavy smoke condition in the area, and decided to "take it in." As a former commanding officer of Engine Co. 285, Chief Meehan was not only familiar with the occupancy, but is also an expert in the field of hazardous materials.

At 1434 hours, Deputy Chief John F. O'Connor, 15th Div., arrived on the scene and assumed command of operations.

After being apprised of conditions and potential hazards posed by the chemicals stored in the fire building, Chief O'Connor ordered the evacuation of a two square block area, and all traffic on Atlantic Avenue diverted away from the area. To effect this large scale evacuation as quickly as possible, police assistance was requested. A 2nd alarm was transmitted to assist in the evacuation, and to provide sufficient manpower in the event poisonous fumes were generated. The hazard to life in the immediate and surrounding areas, in the event toxic fumes were released, was a priority factor. Persons unable to leave their homes were instructed to close their windows, shut off air conditioners and fans, and close any air vents that may admit smoke or fumes. At this point in time, it was obvious that unless a change in strategy was inaugurated, a collapse of the building would ensue. In that event, it would likely result in tanks of acid, along with drums and furnaces containing nitrates and cyanides, being overturned or damaged. The consequences of this occurring, and releasing poisonous fumes into the atmosphere, could not be tol-

Acids and caustics, used for stripping and cleaning metals, are stored in vats along the rear of the factory, approximately 30' from the cyanide baths. Hydrochloric acid, along with nitric, sulphuric, and chromic acids are some of the acids used in this process. Drums of acid are normally stored outside, and are brought indoors when they are needed.

erated.

Haz-Mat #1, under the command of Captain John Fanning, was in the process of gathering as much technical data as possible about the involved chemicals. That information was necessary in order to assist in making intelligent and proper command decisions.

Preparing for the worst scenario that could possibly occur, Chief O'Connor called for a conference with chief officers and Haz-Mat personnel to reassess the situation. The following objectives and concerns were considered:

- Our priority objective: Prevent the generation of poisonous fumes. To accomplish this, control over the interior fire must be established, the location of the concerned chemicals and acids determined, and the possibility of further roof collapse and explosions occurring reevaluated. To arrive at an intelligent conclusion on which to base proper decisions, as much information as possible—including technical data—from reliable sources, would be required. This would include a rough sketch of the interior of the building, showing the approximate location of the chemical and acid storage areas. This was accomplished, after conferring with the building owner and workers familiar with the building.
- Complete technical data on the materials involved, including the recommended extinguishing agents. This was accomplished by Haz-Mat personnel using a portable computer carried on their apparatus, which provided a comprehensive print-out of the data requested.
- The explosions experienced by the first alarm units were determined to be steam explosions resulting from the reaction of water with the molten salts. To alleviate this condition, spray nozzles were substituted on all handlines and tower ladder pipes. In addition, all units were instructed to use water as sparingly as possible.
- A partial collapse of the roof had occurred on the Exposure #4 side of the building. To avoid this area, and determine a safe access into the building, reference was made of the rough sketch. It was decided to breach the masonry wall on the Exposure #2 side of the building. This access provided a safer and more direct route for our firefighting forces.

Based on the technical data compiled by Haz-Mat personnel, and the feasibility of these tactics working, it was decided to change from a purely defensive posture to an offensive/defensive strategy.

UNDER CONTROL

As handlines were being redeployed to commence with an interior attack, members of the Haz-Mat Unit were suiting up in fully encapsulated, Eastwind CP-1111, butyl rubber suits, preparing to enter the building. Ladder company units were heavily engaged in breaching the walls on both the Exposure #2 and #4 sides to afford entry for the Haz-Mat team, and to ventilate the interior of the building. As a precaution, fog nozzles were directed on escaping smoke to absorb any toxic fumes that might have been released into the atmosphere. It was at this time that the most critical stage was reached.

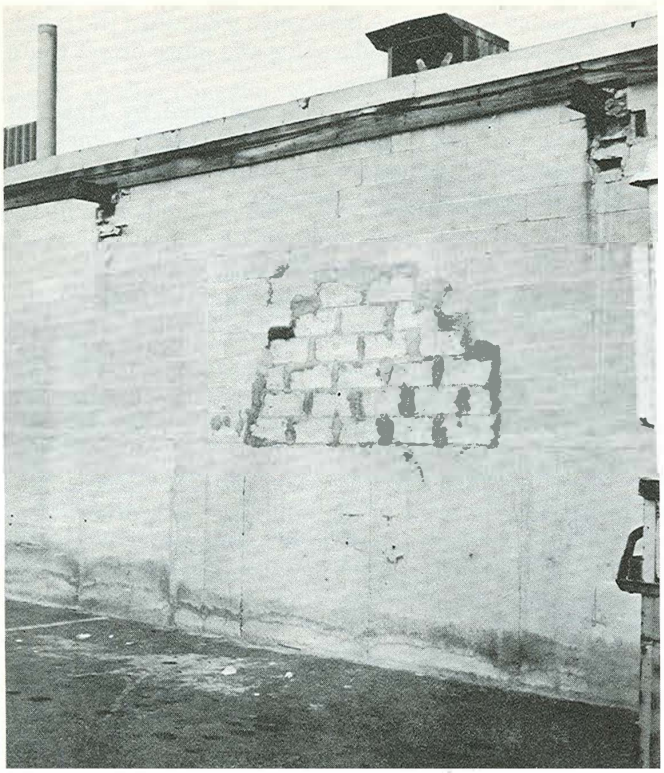
The strategy employed had several objectives in mind:

- The Haz-Mat team was to enter the building via the breached wall on the Exposure #2 side, as this offered the most direct and safest route to where the acid vats and cyanide were located. They carried CO_2 and dry chemical extinguishers with them, which were to be used to extinguish any fire in their vicinity, including a chemical fire.
- Handlines, equipped with fog nozzles, were positioned and operated by members outside the breached walls to protect the Haz-Mat team, and to absorb any toxic fumes that might have been escaping.
- To prevent any runoff water, containing poisons or corrosives, from entering the sewer system, dikes were constructed with absorbents that are carried by the Haz-Mat Unit. To preserve their integrity, these dikes were augmented with additional absorbent throughout the operation.
- To determine the exact condition of the cyanide drums and acid tanks.

While being protected by handlines, Captain Fanning, along with the Haz-Mat entry team, conducted a survey of the factory. They extinguished any fire they found around the drums of cyanide and acid tanks. Their survey of the area revealed that the plastic drums containing acids had remained intact, as had the vats containing cyanide. These observations indicated that the immediate hazard had been mitigated, and that the primary objective had been reached.

Now that the threat of hydrogen cyanide gas being generated was allayed, the offensive attack on the ceiling fire was resumed. Although there were reports of recurring steam explosions, the overall fire conditions were abated.

Chief of Department John J. O'Rourke, who had arrived on the scene and assumed command of operations, declared the fire under control at 1707 hours; almost three hours, to the minute, after the initial alarm. Due to the gravity of the situation, Fire Commissioner Joseph Spinnato and Mayor Edward Koch, along with other top city offficials, arrived on the scene to observe and evaluate conditions. The handling of a hazardous materials incident almost always involves the expertise



Bricked-up hole on Exp. #2 side of the building. Wall was breached and used by Haz-Mat personnel to gain safe entry to the fire building.

and cooperation of many agencies at the local, state, and federal levels. As weary firefighters were preparing to leave the scene, other agencies would be just beginning their task of investigating the events of the day. A Fire Department watch line was established to keep the building under surveillance throughout the night.

HAZ-MAT OPERATIONS

Due to the alarming increase in hazardous material incidents in recent years, the New York City Fire Department established a Hazardous Materials Unit that is specially equipped to handle such emergencies. The Haz-Mat Unit proved to be of particular value at this fire, not only because of the special equipment it carries, but also because of the specialized training and knowledge of its personnel. Part of their special equipment includes exposure suits, overpak drums, absorbate booms, leak sealing devices, and a Haz-Mat library. In addition, they carry a portable computer and a cellular phone. With this recently acquired equipment, they can quickly obtain technical data on hazardous materials, either while enroute to an emergency or, as required, at the scene of operations. This information is extremely important to the officer in command, and allows him to make sound decisions.

In addition, the Division of Safety works closely with the Haz-Mat Unit to ensure the safety and well being of members who are operating at a hazardous materials incident. At this operation, Battalion Chief James Manahan, Safety Operating Battalion, assumed control and supervision of decontamination procedures. A mobile decontamination vehicle, operated by the Police Department, in a cooperative effort with the Fire Department, Department of Environmental Protection, and the Emergency Medical Service was utilized by fifty members of the Fire Department who were suspected of being exposed to hazardous materials. This vehicle is equipped with sixteen showers, and is available twenty-four hours a day, seven days a week.

After investigation of this incident by agencies at the local, state, and federal levels, it was concluded that the impact on public safety and the environment from this incident was minimal, largely due to the quick and efficient actions of the Fire Department.

LESSONS LEARNED/REINFORCED

- The officer in command must continually evaluate the situation and, if necessary, adjust strategy as conditions change. To assist him when technical advice is needed, he should recognize the value of holding a conference on the fire ground to obtain as much information as possible. Ultimately, however, the final decision and responsibility remains with him.
- In some cases, in incidents involving hazardous materials, the best decision that can be made is to do nothing—except possibly evacuate the area and prepare for a defensive posture. Although contrary to our normal operating procedures, it may be the wisest and most prudent decision to make until reliable information can be obtained on the hazards encountered.
- Special units, such as the Haz-Mat Unit, should be called to the scene as soon as the need for their services is recognized. Early notification, describing the incident, sets the wheels in motion. Valuable data can start being compiled and special equipment readied.
- When preparing a CIDS card, include the types of chemicals stored (space permitting) and, if the use of water is prohibited, the recommended extinguishing agents.
- Conduct a study of the possible locations for a hazardous materials incident within your administrative and response areas. Be alert during building inspection to recognize existing hazards. Where practicable, conduct an on-site/multi-unit drill, and confer with management on the hazards that can be encountered.

CONCLUSION

The Office of the Mayor, cognizant of the unique dangers to the health and welfare of its citizens during incidents involving hazardous materials, issued a "Hazardous Material Response Plan" directive to all heads of agencies and departments, outlining the actions each is to take. The Fire Department's responsibilities include the following:

- *Where fire or potential for fire or explosion exists, employ the appropriate strategy and tactics to contain, control, and/or extinguish such fire or explosion.*
- *In consultation with the Department of Environmental Protection and the On Scene Coordinator,* use whatever tactics are necessary to contain and control the hazardous material.*

Once again, the New York City Fire Department's main objectives—the protection of life and property—were accomplished. The success achieved by the members who were operating at this potentially catastrophic emergency is surely a tribute to their professionalism and expertise. ▲

*On site representative of the Police Department.

PHOTO REPORTER

Photo by F. Incantalupo

Tower Ladder 18 operates its heavy caliber stream into 3rd floor window of warehouse located at 48 Orchard Street in Manhattan. Heavy stock loading, lack of ventilation, and maze conditions inside the building necessitated an exterior attack and prevented early extinguishment. Water absorption by stock, and fire extension in walls caused a partial collapse of the 2nd and 3rd floors. Box 3-3-228 was transmitted for this blaze which occurred on Oct. 11, 1985.

Photo by F. Incantalupo

Firefighter, using 20′ hook ladder for balance prepares to open up peaked roof of one family dwelling located at 24 Bard Avenue, S.I. Initial operations disclosed heavy fire conditions in the cellar, which extended vertically through wall voids to the rooms on the upper floors. Fire occurred on December 14, 1985 at Box 2-2-191.

Photo by F. Incantalupo

Fire Department units had their hands full battling this stubborn 3rd alarm fire at Box 927 in Brooklyn on October 23, 1985. The fire occurred in a one story 100′ x 100′, taxpayer located at 1508 Fulton Street. It was only an aggressive attack by the members on the scene that prevented this fire from extending to the surrounding exposures.

The Third Annual FDNY Bravest Body Building Contest was held at the High School of Fashion on December 10, 1985. This year's "Mr. Bravest" is Ronald Baginski of Engine Co.243. Posing with Baginski for this photo are (left to right) Mr. Dan Lurie, the publisher of Muscle Training Illustrated Magazine and president of the Dan Lurie Barbell Company, and Mr. Norman Becker, FDNY Community Relations Unit, who coordinated this year's contest.

Photo by F. Incantalupo

Fr. Al Warta (without helmet) and Fr. Joseph Imperato (both R.4), with the aid of EMS personnel, rush a smoke inhalation victim to a waiting ambulance. The victim, Mrs. Janice Moore, was injured at a fire which occurred in a 2½-story wood frame dwelling located at 33-23 83rd Street in Queens. Fire occurred on January 1, 1986. Happily, the victim recovered from her injuries.

Photo by S. Spak