October 18, 1990

UNITED STATES OF AMERICA

before the

ATOMIC SAFETY AND LICENSING BOARD

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| In the Matter of<br>PUBLIC SERVICE COMPANY OF<br>NEW HAMPSHIRE, et al.<br><br>(Seabrook Station, Units 1 and 2) | ) | Docket Nos. 50-443-OL-1<br>50-444-OL-1<br>(Offsite Emergency<br>Planning and Safety<br>Issues) |

AFFIDAVIT OF DR. DENNIS S. MILETI

I, Dr. Dennis S. Mileti, being on oath, depose and say as follows:

1. I am a Professor of Sociology and Director of the Hazards Assessment Laboratory, Colorado State University, Fort Collins, Colorado. My professional qualifications are a matter of record in this proceeding. I have testified before this Licensing Board regarding the New Hampshire Radiological Emergency Response Plan and specifically with regard to the issues of human behavior and role conflict during emergencies. I have also testified regarding the Seabrook Plan for Massachusetts Communities on the issue of human behavior during emergencies.

2. The purpose of this affidavit is to address the issue of whether Massachusetts school teachers and day care center personnel would respond to assignments in an emergency to escort children on buses and care for them at the School Host Facility at the College of the Holy Cross until they are no longer needed.

3. This affidavit is divided into four sections. The first two sections entitled "Bus Escorts" and "Host Facility Personnel", present the theoretical basis for why it is reasonable to expect Massachusetts school teachers and day care center personnel to accompany students on evacuation buses, and to stay with students in the host school facility until they are no longer needed. The third section entitled "A Case Example", illustrates how these theoretical conclusions are supported by empirical observations. The fourth section of this affidavit provides my overall conclusions on these issues.

Bus Escorts

4. An elaborate research base exists in the social sciences on the topic of people performing emergency work roles during emergencies (cf., Lewis M. Killian, 1952. "The Significance of Multigroup Membership in Disaster." American Journal of Sociology. January: 309-314; Lewis M. Killian, 1954. "Some Accomplishments and Some Needs in Disaster Study". The Journal of Social Issues. X: 66-72; M. White, 1962. "Role Conflict in Disasters: Not Family But Familiarity First." Unpublished, M. A. Thesis. Chicago: Department of Sociology, University of Chicago; E. L. Quarantelli. No date. "Structured Factors in the Minimization of Role Conflict: A Re-examination of the Significance of Multiple Group Membership in Disasters." Working Paper. Columbus, Ohio: The Disaster Research Center at the Ohio State University; and many others). A thorough reading of all available research on this topic leads to the following interpretations and conclusions.

5. Would-be emergency workers may perform other roles before engaging in emergency work if their emergency roles are not "certain." Emergency work role certainty did not exist for most emergency workers in reference to most types of emergencies several decades ago. The reason for this is straightforward; several decades ago there were very few emergency plans that clearly specified emergency work roles for responding to infrequently occurring natural or technological emergencies. Early sociological research interpreted as role "conflict" or "abandonment" observations of people in emergencies performing non-emergency response roles before volunteering for emergency work roles. This conclusion was sometimes reached in reference to members of the general public, as well as for people who worked

for some governmental entity that the researcher concluded ex post facto should have an emergency response function. In both cases, the conclusion was often reached that role "conflict" kept emergency workers from performing emergency work until other non-emergency roles were performed. Subsequent sociological research suggested that emergency workers do not abandon emergency work roles when they know that they have them, that is, when role certainty prevails.

6. There are fewer and fewer examples in American society of emergency workers who lack role certainty, because as time passes the nation plans and trains for more emergency types. On rarer and rarer occasions, examples do surface that are reminiscent of the early sociological studies done when role certainty for emergency workers did not exist. For example, some members of the National Guard evacuated with their families during the 1979 accident at Three Mile Island. Later on, their headquarters had trouble locating them to call them for duty. There was no offsite emergency plan in place at the time. The evacuating guardsmen hardly abandoned an emergency role because of role conflict. These Guardsmen simply did not know that they had an emergency role, that is, they lacked role certainty.

7. Role certainty is a consequence of emergency planning and training; however, emergency planning and training are not the only vehicles for attaining emergency role certainty. For example, the National Guard has now been incorporated into emergency plans for nuclear power plant accidents at some plant sites. This will provide role certainty for guardsmen since planning and training will lead guardsmen to perceive their response role with certainty. However, planning and training are not necessary to lead a teenaged babysitter to perceive certainty in her role of responsibility for an infant during an emergency; that role certainty exists by virtue of having assumed the role of babysitter. There are roles in society that put people in positions of responsibility for others that provide role certainty in emergencies independent of emergency plans and training. More than a few of these roles come to mind, for example, the roles of teacher, nursing home worker, babysitter and others.

8. People who are performing roles of responsibility for others before an emergency begins have role certainty about being responsible for their charges during an emergency independent of planning and training. The reason people in such roles perform emergency work remains role certainty, however, role certainty exists in the emergency for a reason other than planning and training. This is likely why, to the best of my knowledge, I know of no case in any emergency in which charges -- for example, students, nursing home inhabitants, and so on -- have been abandoned regardless of the presence or lack of pre-emergency plans and training. Consequently, an emergency at the Seabrook Station would witness Massachusetts teachers and day care center personnel holding perceptions of responsibility for their students. This role certainty would exist independent of pre-emergency planning and training. It would exist independent of whether organized emergency response were part of a state or utility response plan. This role certainty would prevail since it originates in the routine teacher-student role relationship which exists independent of emergencies, training, plan sponsorship and so on. It is most probable that teachers and day care center personnel would escort children on buses to the school host facility at the College of the Holy Cross in Worcester to ensure students' safety while en route. The distance to this facility would not significantly dissuade teachers and day care center personnel from fulfilling their ongoing and traditional role of responsibility for children.

9. One factor could intervene to keep teachers and day care center personnel from accompanying their students on the bus ride to the school host facility. It would not be role conflict or abandonment. The factor would be if teachers perceived that the obligations and duties of their role relationship with students were adequately transferred to someone else. For example, a teacher may not accompany his or her class on the bus if responsibility for those students were shifted to another teacher who was making the trip. This shifting of responsibility would not leave students on buses unsupervised.

Host Facility Personnel

10. The adequacy of staffing to run the school host facility at the College of the Holy Cross in Worcester, and the number of teachers and day care center personnel who will

remain with children at that facility, can not be adequately addressed independent of the general context in which the evacuation would occur.

11. An emergency evacuation, because of an accident at Seabrook Station, would constitute a collective threat situation. These situations change the human character. People give up personal forms of identification, individual interests and private motives for behavior. Instead, people identify with the entire human collective; and the emergency goal of helping others takes precedence over almost everything else. The staffing and operation of the school host facility can only be understood in this context of altruistic emergency consensus.

12. The school host facility is a college that will likely be in session if day care centers and schools in the Massachusetts EPZ are evacuating children and students. It is very probable, therefore, that a variety of persons will be at the school host facility who would volunteer to provide help to run the facility, for example, older students who were themselves evacuated to the facility, students and faculty at the College of the Holy Cross, college staff like maintenance, cafeteria workers, administrators, and even adults arriving to pick up evacuated children or the public who live nearby. These volunteers would undoubtedly be joined by teachers and day care center personnel who accompanied students on evacuation buses. In short, the basic functions to be provided at the school host facility would be fulfilled by volunteers including teachers who evacuated with students. This is how evacuation centers are traditionally staffed in evacuations.

13. Volunteering to help operate the school host facility would occur because of the altruistic emergency consensus context in which the facility would operate. All such emergency host facilities operate in such a context. In fact, the American Red Cross in their operation of congregate care centers does so by conscripting volunteers. Such organizations "expand" their ability to adequately perform work in emergencies by using volunteers as part of the work force (cf., Russell R. Dynes. 1970. Organized Behavior in Disaster. Lexington, Massachusetts: D.C. Heath and Co.). Most shelter workers in emergencies are typically volunteers.

14. The teachers and day care center personnel who accompanied students on evacuation buses would likely stay at the school host facility to help for two reasons. First, to do so is consistent with the context of altruistic emergency consensus which will operate to direct most human behavior. Second, to do so is consistent with continuing to play out a role of responsibility for students; for example, teachers will perceive that they can help inform facility operators of their students' names and so on.

A Case Example

15. The prior sections of this affidavit have presented the theoretical reasons why I believe it is reasonable to expect teachers and day care center personnel to accompany students on evacuation buses, and to stay with students in the host facility until they are no longer needed. An evacuation study I and a colleague recently completed illustrates how these theoretical conclusions are supported by empirical observations (cf., Dennis S. Mileti and Colleen Fitzpatrick. 1989. Emergency Response to the Seaford, Long Island Propane Tank Truck Accident. Report Prepared for Long Island Lighting Company. Fort Collins, Colorado: The Hazards Assessment Laboratory at Colorado State University, attached and marked "A").

16. A propane gas tank truck overturned on a highway in a populated section of Long Island. The propane ignited; a large area of the community was evacuated since the risk of a great explosion was high. The evacuation included schools. The evacuation host facility was the Seaford Middle School. There was no emergency response plan in place for responding to a propane tank truck emergency. In people's memories, no evacuation had ever occurred in this part of Long Island before this event.

17. The following paragraph describes the conclusions reached regarding the behavior of teachers who worked at evacuated schools in reference to accompanying pupils to the host facility and then volunteering to stay there to help. It also describes how other volunteers surfaced from other available populations to perform host facility operations.

> Volunteering for emergency work in response to this emergency was characteristic within all relevant organizations performing emergency response. For example, volunteering for emergency work at the Seaford Middle School where the Red Cross Shelter was in operation was prototypical. Teachers from the Montessori School and St. Williams of the Abbot School brought their students to the shelter and then volunteered to stay to help with child identification. The Seaford Middle School nurse volunteered to remain at the school since the Red Cross did not immediately bring a nurse. The cook and cafeteria staff volunteered to prepare snacks when the shelter first opened; and then they came in on following days to prepare breakfast and other meals for the evacuees. Some teachers even stayed to volunteer their services, and the school's administrative secretary volunteered to maintain a communication center for the shelter. Evacuees in the shelter even volunteered to help with things that needed to be done. (Mileti and Fitzpatrick, 1989, at pages 54 and 55; emphasis added.)

18. This case documents that teachers evacuated with pupils, and then stayed at the host facility to help with child identification. This observation suggests that teachers remained in roles of responsibility with pupils until they were no longer needed; that is, when the responsibility function of the teacher-student role relationship could be assumed by others at the host facility.

19. This case also illustrates how people, (the school nurse, the cook, cafeteria staff, host facility teachers and administrators -- the latter are not referenced in the quoted paragraph), volunteered to do work to run the host facility and get done what needed to be accomplished. This illustrates how people identify with the entire human collective in emergencies, and how the emergency goal of helping others takes precedence over almost everything else in the climate of altruistic emergency consensus.

20. This study went on to address the topic of role "conflict" or abandonment even more broadly. The study's general conclusion on this issue follows.

> Organizational respondents were also asked about any known incidents of role conflict or emergency role abandonment by emergency workers. That is, were emergency workers in a position of having to choose between performing non-emergency roles (for example, staying at their non-emergency jobs or being with their family) versus emergency work roles, and did anyone actually abandon their emergency job. No cases of role abandonment were identified. In fact most organizational respondents reported an excess of emergency workers, and even an excess of emergency response organizations in the case of responding fire departments. Additionally, staff absences at the Seaford Middle School were reported the same as under normal circumstances. (Mileti and Fitzpatrick, 1989, at page 55; emphasis added.)

21. This case documents how role abandonment was not a problem in response to the emergency.

22. Teachers accompanied children as bus escorts, stayed at the host facility to help until they were no longer needed, and the host facility was adequately staffed with volunteers including evacuated teachers during this emergency on Long Island. It is reasonable to expect that the behavior of Massachusetts school teachers and day care center personnel will be the same in an evacuation because of an emergency at Seabrook.

General Conclusions

23. Theoretical and empirical observations are consistent and lead me to the following conclusions regarding the evacuation of Massachusetts schools and operation of the school host facility at the College of the Holy Cross. An abundance of Massachusetts teachers and day care center personnel would act as bus escorts. These same people would stay at the host facility to help until they were no longer needed. The host facility would not suffer from a lack of workers to do needed work. The host facility could possibly have an excess of emergency volunteer workers.

Dr. Dennis S. Mileti

Denver County, Colorado October 18, 1990

The above-subscribed Dr. Dennis S. Mileti appeared before me and made oath that he had read the foregoing affidavit and that the statements set forth therein are true to best of his knowledge.

Before me,

Notary Public John Reno
My Commission Expires: 3/23/91

ATTACHMENT A

# EMERGENCY RESPONSE TO THE SEAFORD, LONG ISLAND PROPANE TANK TRUCK ACCIDENT

Dennis S. Mileti

and Colleen Fitzpatrick

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and

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Colorado State University

Fort Collins, Colorado 80523

Report

Prepared for

Long Island Lighting Company

April, 1989

## ACKNOWLEDGEMENTS

We thank the residents and officials of Nassau County who provided us with time and information through personal interviews, phone conversations, and correspondence. This study and report would not have been possible without their cooperation. We appreciate their assistance.

We also thank the Long Island Lighting Company for asking the Hazards Assessment Laboratory to conduct this case study. Their support is appreciated. We hope that this report enables them and others to better understand the response and lessons learned from the May 24, 1988 propane tank truck accident on Long Island.

Dennis S. Mileti
Director, Hazards Assessment Laboratory
Professor of Sociology

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# A. INTRODUCTION

## 1. The Community

Nassau County is located in the west-central section of Long Island, and it is bordered on the west by New York City and Suffolk County on the east. It consists of a 287-square-mile land area populated by about 4,610 people per square mile based on a 1980 population of approximately 1,321,582 people. About 40 percent of Nassau County residents work outside the county. Over half (61 percent) of the working population drive to work alone, 16 percent carpool, and 17 percent rely on public transportation for commuting to and from work.

The villages of Seaford and Wantagh are located in Nassau County, and they are about 15 miles east of New York City. They comprise a combined land area of almost seven square miles located in the south-central portion of Nassau County. This area has a combined population of 35,934 or approximately 5,133 persons per square mile.

The Village of Seaford has a population of 16,117 and it consists of a land area of almost three square miles occupied by 4,887 housing units. Wantagh has a population of 19,817 residing in a land area of almost four square miles occupied by 5,949 housing units. Thus, Seaford has a population density of approximately 5,372 people and 1,629 housing units per square mile. Wantagh has a population density of approximately 4,954 per square mile in which about 1,487 housing units are located.

Many roadways provide traffic access in and out of the Seaford-Wantagh area. The Long Island Railroad is an additional source of transportation, and it is relied upon by some commuters for getting to and from New York City.

Sunrise Highway is a major east-west auto route which runs through the middle of both villages and also provides access to the Seaford-Oyster Bay Expressway. This expressway provides a major link to the Long Island Expressway which serves as the major east-west vehicle thoroughfare from New York City to all of Long Island. The Long Island Railroad runs close to the junction of Sunrise Highway and the Seaford-Oyster Bay Expressway. The railroad has stations located in both Seaford and Wantagh.

## 2. The Accident

On Tuesday morning, May 24, 1988, a 2,500 gallon propane gas tank truck which was owned and operated by Conservative Gas Company of Hicksville, Long Island overturned in the Village of Seaford on the Seaford-Oyster Bay Expressway near its junction with the Sunrise Highway. The propane ignited and created a torch fire (see Figure 1) with the potential for a boiling liquid evaporation vapor explosion (BLEVE).

The Sunrise Highway and the Seaford-Oyster Bay Expressway were closed to traffic as a result of the accident. The Long Island Railway was also closed. Additionally, residents of Seaford within a one-fourth mile radius of the accident were warned to evacuate their homes. The original period of evacuation was estimated to be up to 10 days, but it lasted only for about two and one-half days.

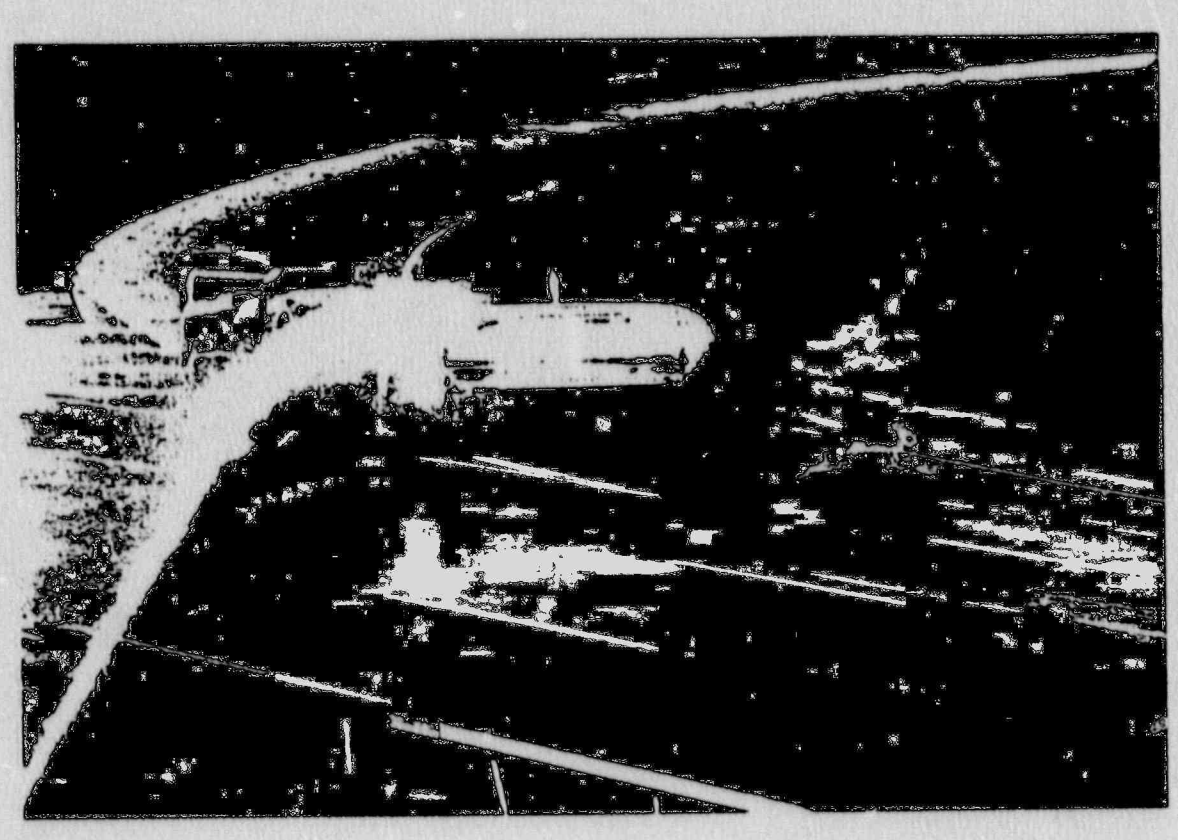
The tank burnt off all its propane and it did not explode. The potential fire ball that could have resulted if the tank had exploded could have been almost as large as the area evacuated.

## 3. The Study

This report is a case study of emergency response to the May 24, 1988 propane tank truck accident. The report emphasis is on the response of people, groups, and organizations to the emergency.

Figure 1

PROPANE TANK FIRE



The study was undertaken at the request and sponsorship of Long Island Lighting Company. Early reports about the emergency suggested that it triggered many different emergency response elements, for example, the mobilization of many emergency workers, public warning and evacuation, sheltering and so on. Additionally, few community-level emergencies have been documented in the recent history of Long Island. Consequently, it seemed worthwhile to study this emergency in order to document any response lessons that could be learned.

The propane tank truck accident and fire occurred on the morning of May 24, 1988 and ended on May 26, 1988. Our field work began about one week later and lasted for almost one week. People and officials were interviewed in person, and two interviews were conducted by telephone. An interview guide was used to give some structure to the interviews, and to make all interviews as comparable as possible. It is attached to this report as Appendix A. The questions on the guide were adapted to fit this emergency from standard guides used in disaster research. The interview guide was developed drawing upon guides used by the Committee on Natural Disasters in the National Academy of Sciences, the Disaster Research Center at the University of Delaware, and our own experience in the Hazards Assessment Laboratory at Colorado State University.

Interviews were completed with almost all organizati[illegible] officials involved in emergency response. At least one interview was [illegible] relevant organizations with the exception of the company that [illegible] truck. The organizations represented in our intervi[illegible] interviewee are listed in Figure 2. A total of 16 inter[illegible] eight different organizations. Interviews ranged in ti[illegible] minutes to 3 hours.

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Interviews were completed with almost all organizations and officials involved in emergency response. At least one interview was obtained from all relevant organizations with the exception of the company that owned the tank truck. The organizations represented in our interviews and the positions of each interviewee are listed in Figure 2. A total of 16 interviews were completed across eight different organizations. Interviews ranged in time from approximately 45 minutes to 3 hours.

Some respondents expressed initial reluctance to be interviewed. All respondents became open, candid, and cooperative once the interview had begun.

Figure 2

ORGANIZATIONS AND POSITIONS OF PERSONS INTERVIEWED

- American Red Cross, Nassau County
  - Director of Disaster Services
- Executive's Office, Nassau County
  - Coordinator
- Office of the Fire Marshal, Nassau County
  - Inspector
  - Inspector
  - Inspector
  - Inspector
- Police Department, Nassau County
  - Chief of Operations
- Salvation Army
  - Director for Nassau County
- Seaford Fire Department
  - Chief
  - Commissioner
- Seaford Middle School
  - Principal
- Wantagh Fire Department
  - Chief
  - Assistant Chief
  - Assistant Chief
  - Assistant Chief
  - Dispatcher

Openness and cooperation by respondents is typical of disaster and emergency research; it was certainly characteristic of this research. Nevertheless, it is unlikely that all respondents told us everything they perceived. We feel confident, however, that we were able to compile a reasonably accurate account of the major elements of response to this event. The data we sought and obtained was reasonably straightforward. Most data were confirmed across interviews with different respondents. Moreover, when all data, interviews, documents and observations were collated, it was clear that no important piece of information was excluded.

We did obtain some conflicting or inconsistent statements from some of the persons interviewed. These were all in reference to details that did not affect any report conclusions. Conflict and inconsistent statements always exist in this type of research. The matters being studied are not issues of absolute truth since different people often have different perceptions or recollections about the same event. We did not attempt to reconcile different views. More detailed research could have undoubtedly generated more report details and minor clarifications. Almost certainly, however, it would not have altered our overall findings and conclusions.

## B. CHRONOLOGY OF EVENTS

1. Introduction

At about 9:25 a.m. on Tuesday, May 24, 1988, a 2,500 gallon propane tank truck overturned and burst into flames on the Seaford-Oyster Bay Expressway in Seaford, Long Island, New York. This accident caused major concern about the potential for the propane tank to create a boiling liquid evaporation vapor explosion (BLEVE). The explosion could have been violent and threatened both life and property in a densely populated community.

Many emergency response activities took place over more than two days following the accident. A chronology of events and accident response follows. The times listed are approximations, and they are presented in a twenty-four hour clock format.

2. Tuesday 24 May 1988

Pre-0925 : Nassau County Police Department radio car passed the traveling propane truck on the highway; very shortly thereafter a motorist stopped the police officer and reported that the truck had overturned on the highway and was on fire.

Police officers immediately went to the accident and also radioed for assistance.

Passenger in the overturned propane truck called the 911 emergency phone number.

0925 : Wantagh Volunteer Fire Department notified of accident via Nassau County Emergency Center.

Wantagh Volunteer Fire Department responded to scene and then called Seaford Volunteer Fire Department after realizing that the accident was in Seaford Fire Department's jurisdiction.

A Nassau County Fire Marshall Inspector, in the field at the time, overheard the emergency dispatch and responded to the scene within five minutes of the report.

Shortly after 0925 the Nassau County Executive's Office found out about incident by monitoring the radio.

0925-0933 : Wantagh Assistant Fire Chief arrived on scene and set-up equipment and command post.

0925-0950 : Seaford Fire Department Assistant Chiefs arrived on the scene.

0930 : Quite a few police officers arrived at the scene of the accident. The police called in its hazardous materials team.

Shortly after 0930 the fire departments made the decision to evacuate the immediate area. The police department began implementing the evacuation and radioed for assistance.

Principal at Seaford Middle School heard sirens, helicopters, and emergency vehicles -- he knew something was happening but did not know what.

0935 : Evacuation of community ordered by fire departments for 1,000 foot radius which was almost immediately expanded to a 1,500 foot radius.

Police Department began evacuation of the area designated by the fire department.

0945 : Wantagh Fire Department contacted other fire stations for mutual aid.

0945-0950 : Fire Marshal Hazard Materials team (3 inspectors) arrived at the scene of the accident. They immediately went down to the truck to attempt shutting off a valve.

0950 : Seaford Fire Chief arrived on scene.

0952 : Seaford Fire Chief first had to select hose set-up site and establish ladder companies.

0953 : Seaford Fire Chief ordered the community evacuated and the Long Island Railroad shut-down.

Police Department set-up separate command post for evacuation procedures at the 7th Precinct.

Ambulances used to help transport some of the evacuees.

0955 : Evacuation zone was expanded to one-half mile radius and then contracted back to one-quarter mile radius shortly thereafter.

1010-1020 : Fire Marshal team went to the fire department (had difficulty finding who was in charge) to advise and recommend.

1040 : Fire departments, after recommendations from Fire Marshal, decided to attempt extinguishing the flame. The flame was extinguished.

1045 : Fire Marshal inspector approached truck second time to shut-off the valve.

1055 : Tank reignited. Conservative Gas Company wanted to try extinguishing the flame again.

1100 : Evacuation zone expanded to one-quarter mile radius by order of Seaford Fire Chief.

Seaford Fire Department sent bus to pick-up evacuees from St. William of the Abbot School where evacuees had originally been sent. This was necessary since expansion of the evacuation zone now included this school within the evacuation area.

Police Department evacuation team went through the evacuation area a second time.

1130 : Fire Marshal team and Conservative Gas person heard creaking noises from the tank and made a "quick and orderly" retreat from the immediate area. Decided to let it burn. Full community evacuation and railroad shut-down decided.

1140 : Fire Marshal team and Conservative Gas Company expert made first of several attempts to shut-off valve.

1300 : Police notified the Principal at Seaford Middle School not to let students out until parents came to sign them out or until he was notified differently by the police department. This was the principal's first official notification of the incident.

After the police department accomplished the evacuation, officers patrolled the evacuated community around the clock.

Nassau County Civil Preparedness Office notified the Red Cross of the evacuation and requested shelter assistance. The Red Cross responded immediately.

1330 : Parents began arriving at the Middle School to get their children.

1300-1400 : The Nassau County Emergency Office notified the Nassau County Salvation Army Office of incident and requested canteen services.

1330 : Other fire departments mobilized for relief.

1400 : Nassau County Red Cross Director of Emergency Services arrived at the Middle School to set-up evacuation shelter.

1430 : Red Cross began serving snacks to evacuees in the Middle School shelter.

1430-1530 : Salvation Army canteen services arrived on scene of accident.

1515 : Evacuation shelter in full swing at Middle School at time of school dismissal. This created a confused situation due to the simultaneous arrival of evacuees and dismissal of students.

The Principal of Seaford Middle School left and went home for a short while then came back to the school.

1600 : Parents picking up children at the Middle School began to slow down.

Red Cross assembled all the people at the school in order to separate out residents from school students.

1700 : Police Department and Fire Departments notified evacuated area of evacuation again since residents were beginning to arrive home from work.

Traffic was seriously congested for several hours.

Nassau County Salvation Army Director arrived in the area and reported to the Wantagh Fire Station where he found an evacuation center set-up, already occupied by evacuees.

1800 : Red Cross volunteers began to arrive at Middle School.

2000 : Last student picked up from the Middle School.

2015 : Principal of Seaford Middle School went home for the night. Other school staff remained as volunteers.

2030 : Red Cross requested additional supplies from the New York Red Cross chapter.

2300 : Nassau County Red Cross asked the New York Red Cross Chapter to deliver comfort kits to the Middle School shelter.

3. Wednesday 25 May 1988

0000 : Red Cross shelter head-count revealed approximately 60 evacuees sleeping in the gym and 25 socializing in the cafeteria.

0100 : Red Cross released volunteer staff for the night.

0215 : Young boy in the Middle School shelter experienced breathing problems and needed ambulance transportation to the hospital.

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| 0221 | : | When ambulance arrived to transport the boy, the driver informed the Red Cross that the Middle School shelter was in the evacuation zone. |
| 0300 | : | A police officer informed Red Cross that the shelter was back in the safe zone. |
| 0530 | : | Red Cross requested a donation of 100 morning newspapers from Newsday. |
| | | School cafeteria staff arrived to prepare breakfast for evacuees. |
| 0530-0600 | : | Suburban Gas expert tried to crimp a gas hose in a fourth attempt to extinguish the flame. |
| 0630 | : | Red Cross met with school administrator to discuss arrangements for shelter procedures during the day. |
| 0645-0700 | : | Red Cross distributed comfort kits and served breakfast to the evacuees at the Middle School shelter. |
| 0700 | : | Newsday delivered morning newspapers to the Middle School Shelter. |
| 0700-0800 | : | Fire Marshal team made fifth attempt to control the fire. |
| 0800 | : | Middle School opened for regular classes. |
| 1030 | : | Red Cross assembled evacuees in the gym in order to maintain some control throughout the school. |
| 1145 | : | Red Cross served lunch to evacuees. |
| 1200 | : | Red Cross decided to have another overnight shelter. |
| 1500 | : | Fire Marshal team and Conservative Gas Company expert attempted to accelerate leak in hopes that the flame would burn out faster. |
| Between 1500-1900 | : | Fire Marshal team and Conservative Gas expert attempted to disconnect hose from the tank. |
| 1900-2000 | : | Fire Marshal team attempted to open another valve in hopes of making the flame burn faster. |
| During the day | : | Nassau County Executive's Office set into motion emergency transportation procedures to assist in transporting stranded rail passengers. |

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| Night-time | : | Heat went out in the Middle School shelter and Red Cross had to distribute additional blankets. Ninety evacuees stayed the second night. |

4. Thursday 26 May 1988

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| 0600 | : | Fire Marshal team concluded that the best thing to do was to let the tank burn itself out. |
| 0600-0615 | : | Fire Marshal team approached tank to take heat sensitive pictures to ascertain the amount of propane left in the tank. |
| 0600 | : | Evacuees at the Middle School shelter began getting up. They heard on the news that the flame had diminished. |
| 0615 | : | Fire Marshal team reported the flame went out. |
| 0620 | : | Fire Marshal team and Conservative Gas Company expert declared the tank to be empty. |
| 0620-1400 | : | Fire Marshal team and Conservative Gas Company purged the tank. |
| 0700 | : | Evacuees at Red Cross shelter heard on the news that the flame had gone out. |
| Morning | : | Even though the flame was out, the fire departments advised evacuees to remain at the shelter because of continuing danger. |
| 0845-0900 | : | Red Cross shelter evacuees began going home. |
| 1000 | : | Red Cross reported that last evacuee left the Middle School shelter. |
| 1200 | : | Incident ended for the police department except for ongoing paper work. |
| 1330 | : | Incident ended for Wantagh and Seaford Fire Departments. |
| 1400 | : | Emergency considered over by the Fire Marshal team. |
| 1500 | : | Almost all the evacuees at the Middle School shelter were gone, most had left earlier, the last evacuee departed at this time. |
| 1530 | : | Incident ended for Salvation Army; they retrieved cots and got some sleep. |

## C. ORGANIZATIONAL RESPONSE

Many different organizations responded to the Seaford propane tank truck fire and emergency. Organizational response to the event was directed toward three basic functions. These functions were fire fighting, conducting the evacuation, and the provision of essentials to the evacuees, for example transportation, food and shelter. The discussion of organizational response presented in this chapter is organized in terms of these three functions since these functions focused the response of organizations. Some exceptions to this one organization-one function response pattern did exist. For example, the Wantagh Fire Department helped to provide food and shelter to some evacuees in addition to fire fighting. These exceptions will be presented as they occurred.

### 1. Fire Fighting

Nassau County contains 71 volunteer fire departments, and over thirty (estimates ranged from 31 to 32) of them responded to the propane tank truck fire. Additionally, the Nassau County Fire Marshal's Office and the Conservative Gas Company also joined the effort. Most of the responding fire departments were available to provide relief teams on the scene, or to cover routine fire fighting needs of the departments which focused resources on the propane fire. The major fire fighting response was provided by the Seaford and Wantagh Fire Departments and the Office of the Fire Marshal. In all, over 400 firefighters were involved in some form of emergency response to this incident. All of these firefighters were volunteers, except for members of the Office of the Fire Marshal.

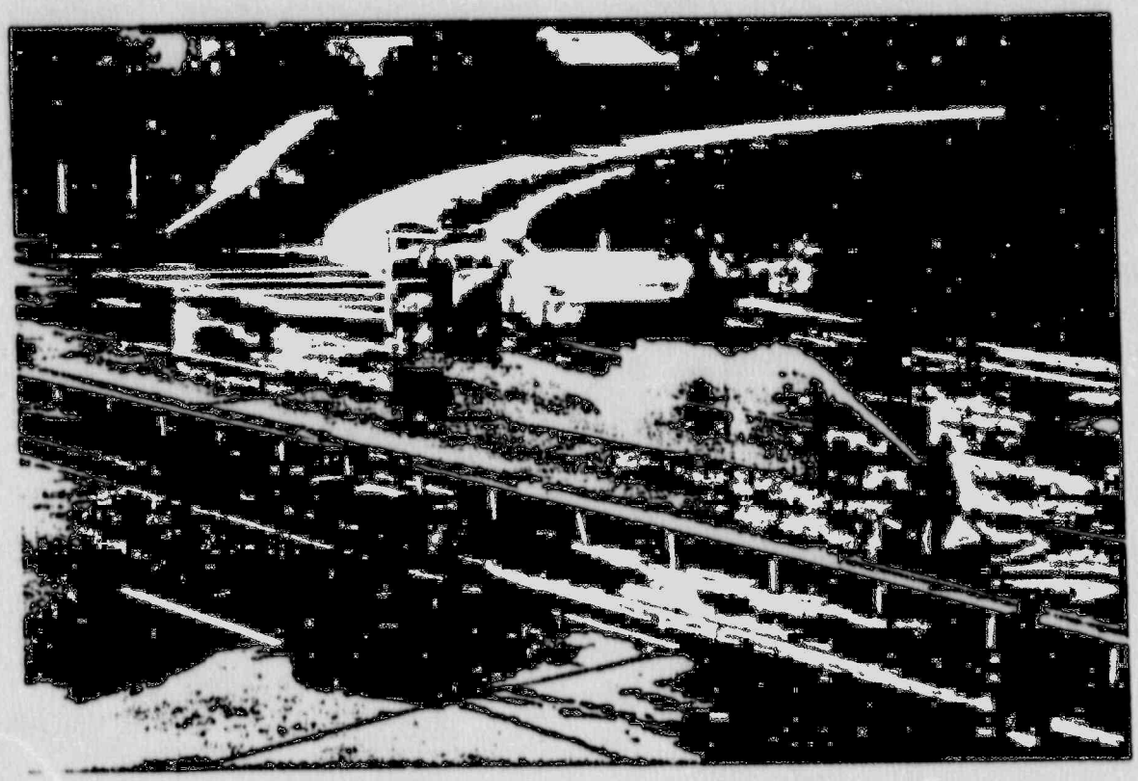
a. Wantagh Fire Department. The dispatcher on duty at the Wantagh Fire Station received a 911 emergency call from the Nassau County Fire Communications Center in Mineola just prior to 0925 on Tuesday, May 24, 1988. A propane tank truck was reported to have overturned and to be on fire. Three to five volunteer stations responded immediately, and an additional station responded as a standby unit. A unit from the Wantagh Station was the first to arrive at the scene. The location of the accident was originally reported incorrectly as at Route 135 and Merrick Road. This location is in the jurisdiction of the Wantagh Department. Thus, the Seaford Fire Department, which is dispatched by the Wantagh Station, responded as a mutual aid department only to find that the emergency was actually in its own district.

Sometime between 0925 and 0933 a Wantagh Assistant Chief arrived on the scene; officers from the Nassau County Police 7th Precinct were already present. Another Wantagh Assistant Chief arrived on the scene four minutes later. Their initial concern focused on cooling the tank in hopes of reducing the explosion danger. Initially, firemen held hoses and tried to keep the tank cool (see Figure 3). It took between five to seven minutes for the Wantagh Station to set-up equipment and establish a command post. The nozzles of the fire hoses (see Figure 4) had to be weighted and tied down onto concrete and hammered into the asphalt. They decided to leave the overturned tanker truck under the bridge (see Figure 5) because it was too dangerous to attempt moving it to a safer location. Once they had the hoses securely in place, they sprayed water into the fire and left the hoses unattended (see Figure 6). This allowed the fire fighters to operate from a safer distance since anyone close to the truck was in a serious life-threatening position.

Around 0935 the fire department chiefs decided to order an evacuation of the surrounding area. The initial evacuation was for a 1,000 foot radius. The area

Figure 3

FIREMEN HOLDING HOSES TO KEEP TANK COOL



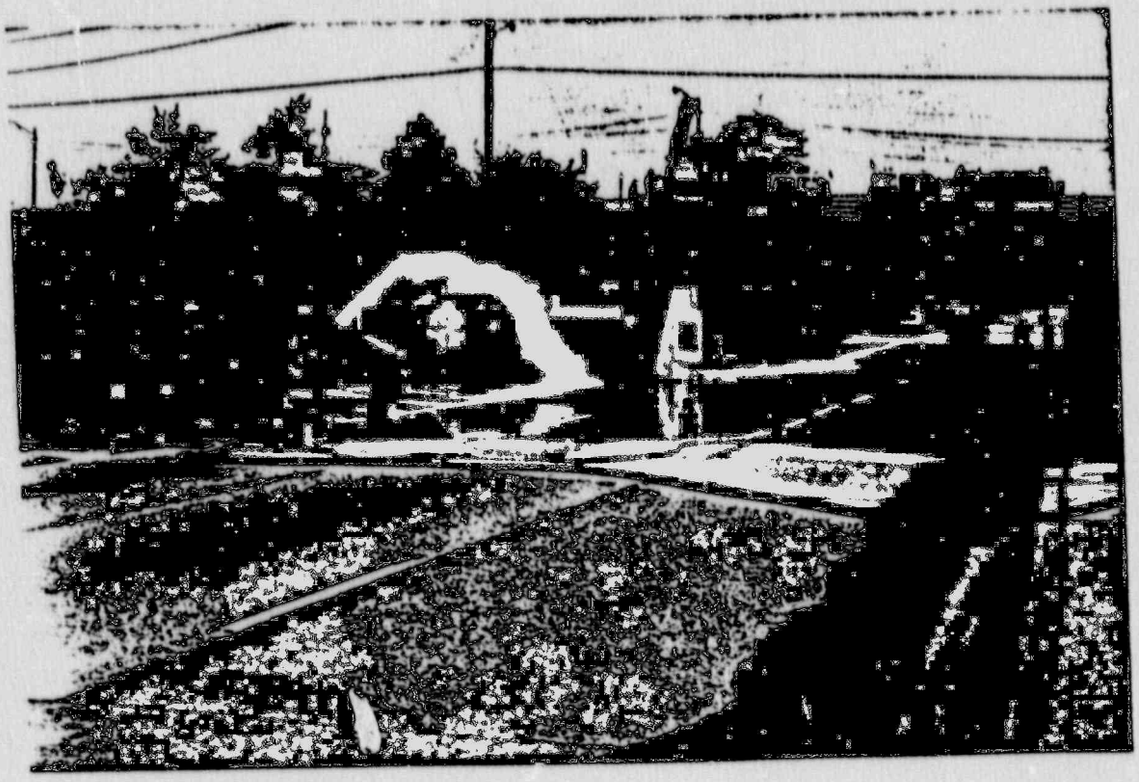


Figure 4

FIRE HOSE NOZZLES USED DURING ACCIDENT

Figure 5

BURNING TANK TRUCK UNDER BRIDGE

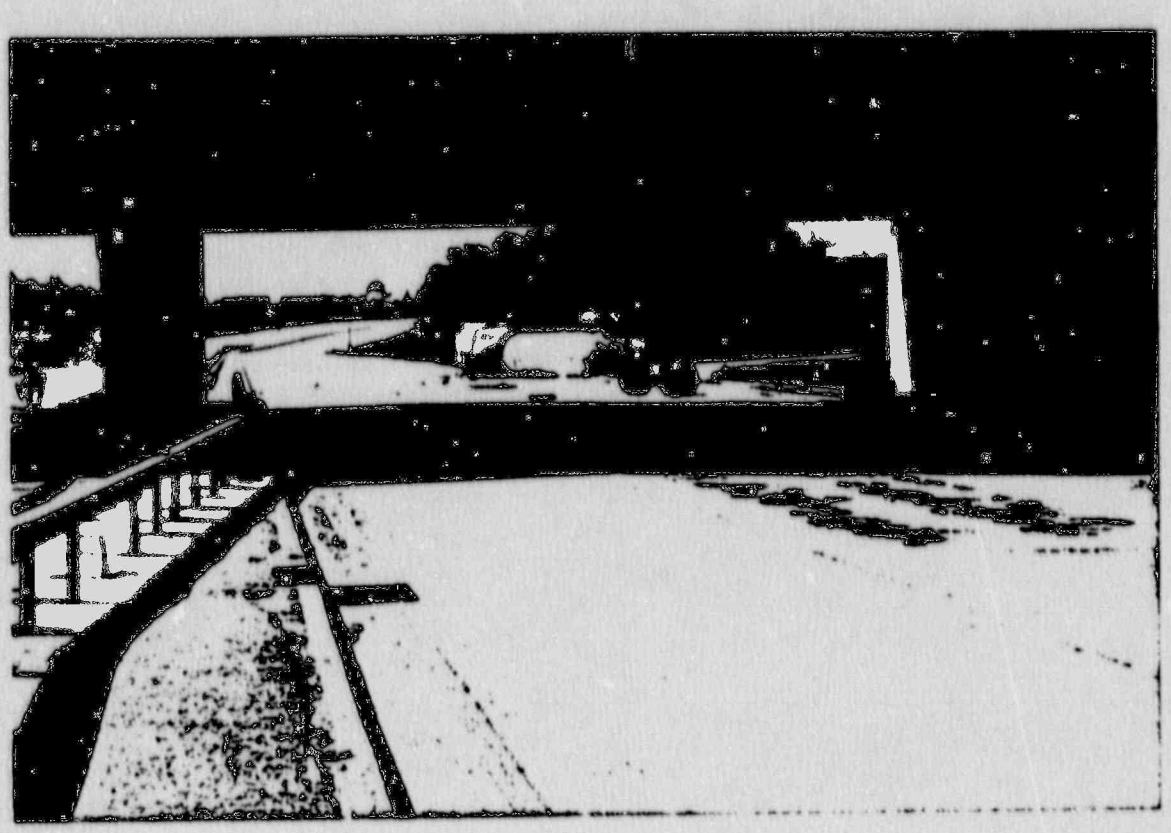


Figure 6

UNATTENDED HOSES SPRAYING WATER ONTO BURNING TANK

was almost immediately extended to a 1,500 foot radius. A fire department liaison alerted the police department from the 7th Precinct about the evacuation zone. The police quickly began evacuating the community by going door-to-door with bullhorns, and they knocked on doors. Once the fire stations had set-up for handling the actual emergency, excess fire fighters assisted the police with the evacuation. Some disabled people needed special assistance and rescue teams went to houses known to be occupied by disabled persons. The Wantagh Fire Department maintains a computer database list of all disabled persons in the area which catalogued at least a dozen such persons living in the evacuation zone. Members of the fire department evacuation team reported that possibly three people refused to evacuate. The evacuation team specifically told the people that they should evacuate because they were in serious danger since an overturned propane tank might explode. Some people did not want to leave because they thought it was a joke.

At about 0945, within 20 minutes of the accident, the Wantagh Fire Department contacted other fire departments for mutual aid support. This was necessary in order to maintain adequate coverage in case of additional calls about other emergencies. By 0955 the fire fighters and police made a joint decision to extend the evacuation zone to a one-quarter mile radius; by this time fire fighting experts had arrived on the scene and advised the fire departments that the longer the fire burned, the greater was the risk of an explosion. By 1035 the fire departments extended the evacuation zone to one-half mile only to contract the radius back to one-quarter mile very shortly thereafter.

The Wantagh Department developed a staging area and divided the evacuation zone into four quarters. An assistant chief was put in charge of and was responsible for each quarter. The fire deparments maintained logs for monitoring the fire trucks' refueling needs since the trucks had to be kept constantly running.

The fire departments replaced trucks in phases. The fire chiefs developed this plan as events occurred since they had no emergency plan for this type of event on which to draw.

The Seaford or Wantagh Fire Departments coordinated all fire activities. The fire chiefs used "runners" to relay communications to the command post. This became necessary because media monitoring and broadcasting of the incident clogged up the fire departments' phone channels. Wantagh had three to four cellular phones on the scene at all times.

Fire fighters inspected the fire fighting equipment every 45 minutes often accompanied by a Conservative Gas Company expert. This expert kept assuring the fire departments that the tank would not explode.

One fire fighter related that he did not want to be "down in the hole" (referring to being near the truck), but he "was there anyway" since it was his job. The fire chiefs reported that all fire fighters performed their jobs in an exemplary fashion and that nobody refused to perform any requested duties.

Sometime during the first night of the incident, the fire fighters spotted three teenagers scaling the expressway fence and climbing aboard a fire truck attempting to steal equipment. They were promptly apprehended by the police.

A Wantagh Fire Department dispatcher reported that they received calls from as far away as California with advice on how to put the fire out. Suggestions such as "pour milk on it", "drop a bomb blanket over it", "shoot a bazooka into it", "take a 752 piercing round from an M-16 to put holes into it", "lay mats on it", "take a tank of liquid nitrogen and freeze it", "airlift it to a safer area then explode it", and "bulldoze a trench around it" were offered sometimes jokingly and other times quite seriously.

The incident ended for the Wantagh Fire Department by 1330 on Thursday. The Department used 12 pieces of equipment during the emergency. These

included seven engines, one ladder truck, one telesquirter, and three rescue units used to remove people from the evacuated area. In addition, 13 other departments, with a total of 32 pieces of equipment, provided mutual aid. Also, nine fire departments with five-inch hoses provided special call assistance.

b. Seaford Fire Department. At about 0925 on May 24, 1988 a Seaford Fire Department dispatcher received a message from the Wantagh Fire Station that the overturned propane truck was located in Seaford's fire fighting jurisdiction. The Wantagh Fire Department had initially responded to the accident under the impression that it was in Wantagh's jurisdiction. Sometime between 0925 and 0950, a Seaford Assistant Chief arrived at the scene of the accident. The Seaford Fire Chief was at his regular job when the incident began; it took between 20 to 25 minutes after notification before he arrived at the accident scene, at approximately 0950. By 0952 the Seaford Chief began selecting an alternative site for fighting the fire with five-inch hoses. He also established ladder companies so that the fire department would have adequate response capacity for other possible alarms in the area. Shortly after the chief's arrival, at about 0953, he made the decision to evacuate the area and notified the Long Island railroad to shut-down.

The Chief of Seaford informed the Jamaica/Queens railroad office of the Long Island railroad, where he is a police officer, that the railroad had to close at the Seaford station. He immediately ordered evacuation of the community. The initial evacuation zone was less than a quarter mile radius. The Chief also set-up an emergency operations center in the field "around" his car.

The police department helped with the evacuation; they used route notification by driving through the streets with sirens and bullhorns. The Seaford Chief consulted at 1100 with propane fire experts on the scene and then expanded the evacuation zone to a one-quarter mile radius. Evacuation teams went into action for the second time. The chief then became aware that children at St. Williams of

the Abbot school had been sheltered in tbe basement of the school. He believed that this was the worst place they could have gone since propane is heavier than air. If it escaped and traveled it could have easily ended up in the basement of the school. He redirected a bus from the fire fighting post to the school in order to evacuate the children.

Some 31 to 32 other fire departments also responded to the accident by 1330. Many responded as mutual aid units, relief, or to provide back-up assistance. About 25 to 28 percent of Seaford's force called in to volunteer for duty. The Seaford Chief indicated that there is always a problem with getting adequate initial response to emergencies when volunteers are at work, but typically the response rate is between 20 to 25 percent.

At 1700 the evacuation teams renotified the community about the evacuation because people began arriving home from work. The fire department wanted to make sure the community was adequately warned.

Between 0953 and 1700 five disabled residents had to be evacuateed via ambulance. Provision of food, blankets, and transportation for evacuees became a concern. Some residents refused to evacuate because they did not think the situation was serious. There were no reports of anyone evacuating from areas outside of the evacuation zone.

Traffic in the area became very congested from 1700 on into the evening. The railroad station at Seaford was closed; people got off at the Freeport station and had to be bused to Masapequa where they were then put back on the railroad at Merrick Road. Sunrise Highway was also closed. No major accidents occurred, the traffic just could not move quickly. The Seaford Chief became concerned that someone needing emergency care would not be able to get through the heavy traffic. There were no reports of aberrant or any usual behavior by people in evacuating vehicles.

During the incident, between 15 and 20 people went to the bridge overlooking the accident to see the fire. The police promptly chased them away. During the night some teenagers attempted to loot a light off of a fire truck and they were arrested.

The fire fighters, the Hazards Materials Specialists for the Office of the Fire Marshal, and the Conservative Gas Company expert went down to the tank truck at regular intervals to observe the "burners" and to refuel their water pump trucks. The Haron Bus Company donated a bus in which fire fighters could rest. This bus was used at one point to help evacuate additional people from the community. A local pizza shop provided pizza for the fire fighters and the Fire Department Ladies Auxiliary supplied sandwiches.

Eventually, some evacuees began to complain that the fire departments should be able to put the fire out since they were anxious to return home.

The Seaford Chief was in charge of the situation, and he received all sorts of suggestions throughout the emergency. His strategy was to take information from others and make decisions. He would meet with representatives from all the direct emergency agencies, get advice, then make decisions accordingly. The flame burned out at about 0630 on May 26, 1988. Thus, the incident ended for the Seaford Fire Department with the exception of post-incident briefings and evaluations.

c. Nassau County Fire Marshal's Office. An Inspector for the Nassau County Fire Marshal's Office was in the field on May 24, 1988 and heard about the propane truck accident and fire over his vehicle radio. He went directly to the accident; he arrived within five minutes of the event at about 0925.

The Nassau County Fire Marshal's Office regularly monitors radio dispatches. While doing so, they overheard the Wantagh Fire Department notifying the Seaford Fire Department of the accident. The Fire Marshal's Office

concluded that the emergency sounded like one that would involve their hazardous materials (hazmat) team. Consequently, their hazmat team prepared to respond. The volunteer fire departments are in charge of emergency situations related to fires according to law. The Fire Marshal's Office responds to fire emergencies in an advisory capacity.

Sometime between 0945 and 0950 three Fire Marshal Inspectors arrived at the scene of the accident. Their initial observation of the incident was that it was a "serious situation". The hazmat team was already dressed in full gear, and they assessed the situation with a spotting scope from the vantage point of the Sunrise Highway overpass. They visually located the burning point and evaluated the position of the tank. They approached the burning tank after putting on appropriate breathing apparatuses. One hazmat specialist walked up to the tank to attempt to shut off the valve which was emitting the torch-like flames. The Wantagh Fire Department was applying water to the tank. The hazmat specialist tried to close the valve, but the fire was hot and prevented him from staying very long. The valve was operational, but he was unable to turn it off. He tried to shield his face with a helmet but he received flash burns and had to back-off.

At 1010 the hazmat team approached a person whom they thought looked to be in charge of the incident. The Chief of the Seaford Fire Department walked up to this group as the conversation was occurring. The Seaford Chief was the person actually in charge since the incident was located in Seaford's jurisdiction. The Wantagh Fire Department who was first on the scene relinquished authority to the Seaford Department. The Wantagh Department Chief told the Fire Marshal team that it was Seaford's fire when the Seaford Chief joined the group. Thus, the Fire Marshal team had to explain their intentions a second time. Explaining everything twice took time, from 1010 to 1020, and thus delayed the situation. They felt that the only way to shut the valve was to first extinguish the flames. They then

advised the fire departments that the fire needed to be extinguished. The dilemma at this point was to determine what would happen to the vapors once the fire was put out. They reasoned that the best approach was to put the fire out and then turn the valve off. The Conservative Gas Company expert on the scene agreed with this approach.

At 1040 the Wantagh Fire Department attempted to extinguish the blaze. The fire was actually extinguished at this time due to the sheer force of water being put into the flame which caused flame separation. One hazmat team member approached the tank to look more closely at the valve. It would not move at all. This was due to either the effect of 3,000 degree flames or a pressure build-up. At 1055 they went to the underside of the truck to try to shut off the main valve. The fire reignited as this was being attempted. A smoldering rubber hose caused the vapor to burst into flames again. They left the scene saying "so much for that idea".

An expert from Chemtract's chemical industrial response team arrived at 1045. By approximately 1100 a total of three propane fire experts had arrived at the scene of the accident. The Conservative Gas Company expert wanted to attempt to extinguish the fire once again by turning the valve. Once again the valve could not be turned and the fire was not extinguished.

The Fire Marshal's team assessed the tank condition and flame impingement prior to each time the tank was approached. At 1130 they gave up the idea of closing the valve when two Conservative Gas representatives said that the "tank was making creaking and grinding noises" and that it sounded like "fatigue" and that it could "blow". Everyone made an orderly retreat from the tank. At this time the Seaford Chief decided to let the fire burn out. The Fire Marshal's team thought this was a good decision since they had already had three unsuccessful "shots" at solving the problem by turning off the valve, and the tank was decaying.

Their philosophy then became that if it cannot be put out it must be contained or isolated. It was at about this time, according to the Fire Marshal team, that the Seaford Chief decided to extend the evacuation zone beyond 1,000 feet and to close down the railroad.

Since the valve could not be closed, it now became important to keep the propane flame burning. Propane is heavier thar air and could escape into sewers and basements causing secondary explosions. A steady stream of water could keep the tank cool and slow down the evaporation. On the other hand, the walls of the tank could weaken and rupture resulting in an explosion. At this point the Fire Marshal team reasoned that any of several things could happen: the tank could burn out, it could explode, or they could attempt to make another hole in the tank and the gas could evaporate. The Fire Marshal team advised the fire departments to pull back all unnecessary equipment and personnel. Thus, the fire stations moved back and set-up a hose stream.

The command post had to be moved three times. The farthest back from the fire it was at any one time was one-quarter to one-half mile. Fire personnel had to return to the danger zone several times to check on equipment and the burning tank. The Fire Marshal team rotated shifts and took a break from 1900 on Tuesday to 0300 on Wednesday. The inspector on duty was on call during this time.

At 0400 on Wednesday, May 25, 1988, another expert referred by Chemtract wanted to try to crimp the hose to stop the burn. The expert did not consult with the Fire Marshal team and never attempted to find out what they had already tried. He decided to wait for daylight and at about 0600 they made this attempt. It did not work because the Fire Marshal team had shut that particular valve much earlier. According to one inspector of the Fire Marshal's Office, the problem with so-called "experts" was that they wanted to try things that others had already attempted, and they did not bother to talk to others involved.

Between 0700 and 0800 the same expert who tried to crimp the hose and several others approached the truck. They hoped to control the situation by cutting a hole into the deck plate of the truck so that they could reach in to shut off another valve. During this time, other members of the Fire Marshal team functioned as "look-outs," scanning the truck for unusual conditions. If danger seemed imminent, they would alert the people at the truck with a boat whistle. This attempt failed since there was no valve inside the deck plate to shut off. This concluded the "shut it down" phase of response.

A sixth attempt to control the situation began the "burn it off faster" phase of response and it occurred around 1500. It consisted of trying to access a fitting on the bottom of the tank to insert a hose in hopes of making the flame burn faster. This did not work because the check-valve on the fitting was in place and operational.

Sometime between 1500 and 1900 the Fire Marshal team made a seventh attempt at intervention by trying to disconnect the hose which they had previously tried to crimp. This failed because the tank was built with a safety feature which prevented the gas from escaping.

After nightfall, between 1900 and 2000, the Fire Marshal team attempted to open yet another valve in hopes of making the flame burn faster. This too failed and they concluded it would take about eight days for the fuel to burn off. Thus began the "let it burn" phase of response.

At 0600 on Thursday, May 26, 1988 the Fire Marshal team approached the tank with a thermal image camera to determine the amount of "product" (propane) left in the tank, and to spot weaknesses in the tank. They were unable to detect anything with this camera. They did not notice that there was less "fire" than when they left the tank the previous night. About 15 minutes later "the thing went out." This was a surprise. Thus, a burn estimated to last for eight to nine

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days lasted only 45 hours. This may have been because the tank load was underestimated, the burn was faster than estimated, some of the interventions unknowingly worked or, as one Fire Marshal Inspector said jokingly, "the driver had customers the company didn't know about."

When the fire unexpectedly went out at 0615, the Fire Marshal team decided to cautiously approach the tank since they did not know why it had gone out. They were now unsure as to what to do: should they relight any remaining vapors or try to disperse the fumes? The Fire Marshal team along with the Conservative Gas Company expert approached the tank and at 0620 the Conservative Gas Company expert declared the tank empty. From 0620 until 1400 the Fire Marshal team and the Conservative Gas Company expert purged the tank with nitrogen. The tank was then loaded onto a flatbed truck for transport out of town. At this time they discovered a separate 60 gallon propane tank on the side of the truck which had neither exploded nor burned. It was at 1400 that the propane emergency incident ended for the Fire Marshal's Office. The Fire Marshal's Office expended approximately 360 person hours during this incident and estimated that six million gallons of water were used.

2. The Evacuation

The evacuation of the public in response to the propane tank truck fire involved several organizations. For example, the Nassau County Police and some volunteer firefighters helped to warn residents and inform them of the evacuation advisement; the Seaford Fire Department Chief determined the size at the evacuation zone and revised this zone several times on the basis of new information. The prime organization in charge of the evacuation, however, was the Nassau County Police.

a. Nassau County Police. Prior to 0925 of May 24, 1988 a Nassau County Police radio car passed the propane truck on the Seaford-Oyster Bay Highway.

When the officer turned around at the end of the highway, a motorist stopped him to report that the propane truck had overturned. The officer immediately proceeded to the scene of the accident. The driver of the truck informed the officer that the propane tank was fully loaded. The officer called for the police hazardous materials team. At about 0930, a number of additional Nassau County Police officers arrived on the scene.

The first sergeant on the scene arrived shortly after 0930 and made the decision to evacuate the area. He radioed for help. The police department set-up its command post at the 7th Precinct Headquarters in Seaford. The first evacuation began shortly after 0930 when the police directed people to the assembly hall at a nearby Catholic school. Other evacuees went to the Wantagh Fire House. The fire department subsequently expanded the evacuation zone, and the people who were originally directed to the catholic school had to evacuate a second time.

The Wantagh Fire Chiefs indicated that the police did not make public announcements from helicopters, nor were helicopters used for evacuation. Although, the police did use helicopters for traffic observation, standby transportation, and for transporting county officials to the scene of the accident. The Fire Marshal Inspectors indicated that by the time the command post was withdrawn to one-quarter mile, the community evacuation began with police going door-to-door alerting people. The police also used fire trucks and police car loudspeakers while going house-to-house. They announced that people were not being forced to leave, but it was strongly recommended that they evacuate. The County Executive also made a television announcement that it was optional for people to evacuate. The Fire Marshal Inspectors thought this was not a good move on the County Executive's part since it could have confused some people.

The police department's first priority was to accomplish a safe evacuation; its second priority was traffic control and protection of the evacuated area; and

its third priority was to take care of its own personnel who had to pull extra duty and were not able to get food breaks. The police also provided transportation for experts from the airport to the scene of the accident by both automobile and helicopter. It was difficult for the police department to get an accurate count of evacuees because they were too busy going door-to-door alerting the community, but they estimated that about 2,000 people evacuated. Most evacuees did not stay in the evacuation centers.

Between 50 to 60 officers went door-to-door to warn the people to evacuate. The police department also had patrol cars driving through the neighborhood to alert residents with a public address system. One woman had to be transported via ambulance. The police told the people in the neighborhood exactly what had happened and that they needed to evacuate. They also told the people where to go for shelter. Evacuation became complicated because children were in school when the incident occurred. When school was dismissed some children tried to enter the evacuated neighborhood and had to be directed to the Middle School. Wantagh Fire Department Chiefs reported that some private schools had not been informed of the evacuation. Police were in charge of coordinating and informing the schools regarding the evacuation and the event.

Traffic control presented some difficulties; however the public was very cooperative. The roadways were congested and some people were confused about which alternative routes they should take to get to their destination. It took drivers much longer than usual to reach their destination. Many drivers slowed down to look at what was going on and this added to the traffic problems. In addition, more traffic problems occurred since the Long Island Railroad had been shut-down by early afternoon of the first day. Buses were used to help transport people who were stranded because the trains were stopped. The police department used buses, the County Executive's Office provided buses, and the Long

Island Railroad also provided buses to help alleviate this transportation problem. People also used their own cars and shared rides with one another. Long Island Railroad assigned officers to the police department command post for the duration of the incident.

The police department knew of no one who evacuated from outside the actual evacuation zone. They also knew of no people who evacuated early since the people did not have a "handle on what was going on." Several businesses had to be shut-down during the evacuation.

One woman went to the grocery store when she was first notified of the evacuation. She apparently thought the evacuation would not last very long. When she returned from the store she discovered that it was still unsafe for her to go home with her groceries. Many people stood around the perimeter of the evacuation zone. Most were nonworking women who had no idea that it would turn into a long-term situation.

The police also had to intercept workers who lived in the evacuation zones as they came home from work and inform them of the evacuation and where shelters were located. Some drivers stopped to ask police for alternative routes. There was some confusion about where to go and how to get there. The police department allowed some people to go back into their houses for special reasons, but only if accompanied by an officer.

The evacuation was very orderly from the perspective of the police department. Everyone took it very well with the exception of some who became upset when they could not return home in a few hours. Most of the people who complained about the inconvenience caused by the fire not being extinguished sooner were not fully aware of its real danger. The police department knew of no problems with the behavior of evacuees in the shelters where police officers were assigned. The Red Cross did not become involved immediately because the police

department did not notify them of the incident right away. The police department had four to five ambulances on the scene and around the area at all times.

The police department used its standard operating procedures for large accidents. They used an evacuation plan which is included in their general civil defense emergency plan.

The police department assigned about 20 officers per shift to patrol the area around the clock after the initial evacuation was completed. The police auxiliary also assisted in patrolling the area. The police department reported no larcenies or burglaries commited in the evacuation area during the incident with one exception. Three teenagers were arrested for taking a piece of equipment off a fire truck. One police detective, not assigned to the emergency area, lived in the evacuation neighborhood. He asked to be relieved from duty so that he could make sure his family was safe. The police department had enough staff at all times, they were able to make due with what they had, and the detective's request was granted.

The fire went out shortly after 0600 on May 26, 1988. Everything was back to normal by noon. Long Island Railroad opened up right after the incident was over, but not before the bridge was inspected for damage. It was thought that the propane truck could have hit the bridge when it had its accident. The truck did not impact the bridge, since the police department found no damage.

The police impounded and inspected the propane tank and vehicle. Before it could be moved the tank had to be purged with nitrogen. This was done by Conservative Gas Company. The tank and truck were then taken to Mitchell Field for further inspection. The actual incident ended for the police department in the afternoon of that Thursday; although it was defined as still ongoing when we conducted our interview since the county was pursuing a law suit and reports still had to be prepared.

The police used 319 staff hours the first day of the incident, 368 the second day, and 344 the third day.

3. Food, Shelter and Transportation.

a. Seaford Middle School. The principal of the Seaford Middle School heard sirens, helicopters, and emergency vehicles at 0930 on Tuesday, May 24, 1998, and he concluded that something was going on. The Middle School is the planned and designated evacuation center for any emergency operation in the area. This designation is a part of a countywide emergency plan which determines how facilities are to be used during an emergency.

It was not until 1300, however, that the police called the principal to tell him not to let the students out until he either heard from the police again or parents came to pick them up. At 1330 some evacuating parents began arriving at the school to pick up children. The school allowed the children to leave only if the parent signed a release form. A "big rush" of parents began to arrive at 1500 to get their children as planned. At the same time, other schools (The Montessori School and St. William of the Abbot) brought their students to the Middle School as evacuees. The teachers from these schools stayed to identify the children since the Middle School did not know their children. One mother complained because the Middle School did not know the location of her Montessori School child. Many parents had difficulty getting to the school because of traffic congestion. In one instance, a bus driver just dropped off a "retarded boy who barely knew his name." The driver left and no one knew who the boy was or where he belonged. Eventually someone came for the boy, but not before it caused the boy considerable stress; he kept saying "this is the baddest day of my life."

The most evacuees and parents began to arrive about 1530 and some brought pets, for example dogs and birds. These pets also used the school as an evacuation

shelter. The police never called the principal back, although officers arrived for duty at the school by 1500. A few members of the school staff left at 1500, some left at 1600, and some stayed until 2000 or 2030. The principal briefly left the school at 1515 to go home to tend to personal business. Everything was being covered pretty well by others at that time. He returned to the school shortly thereafter.

The Red Cross arrived at the school at 1530 to set-up the evacuation shelter. The Red Cross ran the evacuation center. Red Cross workers took care of the needs of evacuees, for example medications, emergency kits, cots, and blankets. They also made arrangements for residents to go back into their homes to get things. Local pizza and doughnut merchants donated food.

Shortly after 1300 six Middle School students "split" out a window. These students subsequently got detention and had to hear a police lecture on obeying rules during an emergency. In addition, students from a high school located near the scene of the accident were told to go to the Middle School evacuation shelter; they never showed up. They were not supervised after being released from the High School.

The Principal of the Middle School related that the school nurse volunteered to remain at the school since the Red Cross did not bring a nurse. It helped that her home was located in the evacuation zone. Some teachers stayed all night and the administrative secretary stayed to maintain a communication center at the school.

The board of education discussed the possibility of cancelling school for the next day. They decided against this because it would likely contribute to children being out in the community unnecessarily who could then possibly try to look at the accident more closely.

The media came to the school. This added to the already hectic environment. However, people did not mind when a familar CBS news person arrived.

All kinds of rumors circulated, for example some people thought a convict had escaped when they heard helicopters overhead, and some thought that they could not go home for 20 days.

The Red Cross told the principal immediately that they would pay for any food used in the cafeteria, thus the principal began making arrangements to get food out to the evacuees. The principal was annoyed that some nearby neighbors (adults and children) not in the evacuation zone came into the school for free food.

At 1600 the number of parents arriving to collect children began to slow down. At about this same time approximately half-a-dozen kids who had already been picked up by parents came back onto the school grounds. They were riding on bicycles, passed in front of windows, and waved at the children in school who were still waiting to be picked up.

At 2000 the parent of the one remaining student arrived at the school. The school had been unable to contact this single parent because he lived on a boat and did not have a telephone. The principal went home at 2015 after he was sure that everything was well covered. At the time he left, 60 to 70 evacuees had already arrived at the school and more were on their way.

The next day (Wednesday, May 25, 1988) the Middle School opened in full session, but only 198 students arrived for classes. The total enrollment at the Middle School is 518 students. The school adjusted its curriculum. New material was not introduced because the absentee rate was so high. Staff absences were the same as under normal circumstances.

The evacuees stayed in either the gym or in a partitioned off section of the cafeteria. The school maintained its full schedule, and adjusted its activities

around the evacuees. Some students expressed problems with having their restrooms filled with older people shaving and grooming. Animals were also present. Everyone was very tired. The school cafeteria staff prepared all the food for the evacuees, the head cook came in early and everyone stayed longer than usual. The school charged the teachers and the television crews for food but not the evacuees.

No one really felt in danger throughout the incident, even though at one point they were told to keep the blinds closed in order to contain shattering glass in case of an explosion. Classes went on as usual, although the students were distracted and wanted to talk about the emergency. At one point, a fireman told the principal that the school should evacuate, but that only the police had authority to make such a decision.

Police officers were assigned to the school for the entire emergency period. They stayed in the office around the communications center. The police department also had officers on every street corner around the sealed off community.

On the third day, Thursday, May 26, 1988, people in the school heard over television that the fire had gone out. The evacuees were nevertheless advised to stay at the shelter since there was still danger. The school had a scheduled field trip this day, and 383 students were in school. Most evacuees left early in the morning even though they were not allowed back into their homes until about 1400. The last evacuee left at 1500. This marked the end of the incident from the viewpoint of the school.

Clean-up was accomplished by normal custodial staff; they also temporarily stored the Red Cross cots and blankets used during the emergency. The evacuees were very "good," they did no damage.

By Friday, May 27, 1988, school was back to normal, although people were still talking about the emergency. The incident was no longer prominent on television, and enrollment was back to routine or about two absentees per day.

b. Red Cross. At approximately 1300 on Tuesday, May 24, 1988 the Director of Emergency Services for the Massau County Chapter of the American Red Cross received a call from Civil Preparedness. This call alerted the Red Cross of the ongoing situation in Seaford and stated that no shelters were open at that time. The Red Cross Director told Civil Preparedness that they would respond immediately and go to the command post. However, at 1335 the Red Cross received a request from the 7th Precinct of the Nassau County Police to go directly to St. Williams of the Abbot School to staff a shelter that had already been opened.

Traffic impeded the Red Cross Director's arrival since the Seaford-Oyster Bay Highway had been closed and other routes were severely congested. Upon arrival at St. William of the Abbot, evacuees were being told that the evacuation zone had been extended and that they should re-evacuate to the Seaford Firehouse. The Red Cross were also informed by telephone from the 7th Precinct that some evacuees from St. William of the Abbot had gone to the Wantagh Firehouse.

The Red Cross Director began the registration of the evacuees when he arrived at the Seaford Firehouse. He then received another phone call from the 7th Precinct. It informed him that this firehouse site was declared dangerous and that everyone should proceed to Seaford Middle School. The Middle School was then opened as a Red Cross shelter. The Nassau County Director was the only Red Cross person present during the first four hours. Fire companies and the Red Cross transported 37 students to the school. A registration desk was set up and operated by school staff.

Between 1400 and 1430 the Seaford Middle School became the officially designated Red Cross shelter for the emergency. At 1445 the registration showed 71 residents and 98 students from St. William's and the Montessori schools. Since the shelter opened before school was dismissed at 1500, parents began to arrive to

sign-out their children at the same time that evacuees arrived at the shelter. For 45 minutes to an hour thereafter, the school setting was confused because of congestion in the hallways due to this simultaneous influx of evacuees and school dismissal. Parents were required to sign release forms before taking their children, and this added to the "confusion." The registration of evacuees was also hampered due to all the congestion.

At 1515 shelter operations were in full swing. The cafeteria staff, upon the request of the Red Cross, volunteered their time and began to serve snacks. Two nurses were at the shelter; the school nurse stayed and eventually a Red Cross nurse arrived. Five wheelchair evacuees were present. Several evacuees had forgotten their medication, and the Red Cross went to a pharmacy to get them their prescriptions.

At 1600 the Red Cross Director asked the teachers of both evacuated schools to assemble their students in the gym. He also asked the evacuated residents to go in the cafeteria. He told the students that snacks were being served, and he asked the teachers for the names of students. He then addressed the shelter residents about the situation, told them why the Red Cross was brought in, and informed them about how they could help. The next two hours were extremely hectic. Nevertheless, the operation of the shelter ran smoothly, and all the concerns and needs of the residents were addressed. This was because school staff and evacuees were cooperative and the arrival at approximately 1600 of two additional Red Cross staff. Red Cross volunteers began arriving at 1800 when dinner was being served. After dinner, the shelter was "besieged" by the media. News crews conducted interviews and taped shelter activities.

The last student left school at 1900; and the registration of evacuees continued. The Red Cross still had not been informed of the scope of the situation at this time. The decision to make the Middle School into an overnight shelter

occurred because it looked like it would continue as a long-term situation. This was surmised after a fireman observed on the television news said, "don't know, it could last another day or another 20 days." The Red Cross then decided to prepare for an overnight operation. They contacted the Mineola office and asked them to go to the chapter office to help others transport cots and blankets. They returned to the shelter and began to set up cots. Evacuees were then addressed about what the Red Cross was doing; they were told that the gym would be set-up for sleeping, and that the cafeteria would remain open throughout the night for use by anyone who could not sleep. Initially, 100 cots were obtained from the Mineola office and transported with four station wagons and vans. The Greater New York Red Cross Chapter was contacted at 2030 to request 150 additional cots, 200 blankets, and 400 comfort kits.

At approximately 2100 the 7th Precinct phoned again and stated that the Salvation Army would be distributing cots and blankets to various shelters. It was at this time that the Red Cross first discovered that more than one shelter was operating in the area. The Red Cross Director then contacted the Wantagh Fire-house and spoke with a Fire Commissioner about other shelter operations. The commissioner stated that approximately 75 evacuees were at the Wantagh Fire-house, and that the fire station's auxiliaries were taking care of the needs of evacuees. The Red Cross relayed the information about the cots and offered assistance. The Red Cross then amended its original request for cots, blankets, and comfort kits from the New York Chapter to only comfort kits. At this point, another Red Cross staff person phoned the shelter to offer assistance. They were asked to drive to the New York Chapter to pick up the comfort kits and transport them to the shelter. The last cot was set-up at midnight. Traffic congestion prevented the timely arrival of supplies that came from New York City.

A midnight check found approximately 60 residents sleeping in the gym and 25 socializing in the cafeteria. A total of 125 evacuees spent the first night, and approximately 150 additional evacuees were sheltered at other places around the Seaford area. About 25 evacuees slept in their cars in order to have more privacy. Two school cafeteria staff stayed in the shelter overnight because they lived in the evacuation zone; other cafeteria workers went home to sleep and returned at 0600 the following day to prepare breakfast. The people in the shelter had "fun and tried to make the best of the situation" throughout the whole incident.

At 0100 on the second day the Red Cross Director released all extra staff for the night. However, a nurse, two police officers, and an auxiliary police unit assigned to the shelter were still present. Around 0200 one evacuee stated that his three year old grandchild was having difficulty breathing. The nurse checked the boy and recommended that he be taken to the hospital. An ambulance arrived at 0221, within six minutes of the call for assistance, to transport the boy and his mother to Massepequa General Hospital. The Red Cross found out from the ambulance driver (who was also a police officer) that the evacuation zone had been extended and that the shelter was on the fringe of the danger zone. The Red Cross Director did not tell the evacuees, but he did have evacuees in the cafeteria move away from the windows, and he closed the curtains. He was never officially notified that the shelter was in the evacuation zone. However, at 0300 a police officer informed the Red Cross that the shelter was once again in the safe zone.

The cafeteria staff arrived at 0530 to prepare breakfast for the evacuees. The U.S. Food and Drug Administration provided the food. The Red Cross paid for extra food as well as any custodial services. At this time, the Red Cross called the Newsday newspaper to request a donation of 100 copies of the morning paper for use by the shelter evacuees. The papers were delivered at 0700. The Red Cross then delivered 100 comfort kits to evacuees at the Wantagh Firehouse.

The Red Cross Director met with an assistant principal of the Middle School at 0630; he said that school would be in full session that day, but that attendance would likely be low. The assistant principal gave assurance that he would ask for the full cooperation of staff and students, and that the shel er operation would not interfere with the school's operations.

At 0645 the Red Cross distributed comfort kits t the evacuees at the Middle School, and then served a breakfast of eggs, bacon and bagels at 0700. Evacuees were talked with about the presence of the media. They were told that arrangements would be made to limit media activities if anyone felt uncomfortable about being interviewed. Rumors were circulating by this time, such as people could go home in three hours or in 20 days. A lot of effort went into rumor control. School opened for classes at 0800; although about half of the students did not attend classes. Many parents simply chose to keep their children out of school for that day. One class went on a previousy scheduled field trip. Evacuees were asked to assemble in the gym at 1045 so the cafeteria could be cleaned and set-up for lunch, and it was served at 1145.

The shelter received a call from Red Cross staff in the Mineola office indicating that they would soon be at the shelter. With lunch finished and replacements present, the Director went to the Wantagh Firehouse to see how that shelter was running. He spoke with a Fire Commissioner who stated that the Wantagh Firehouse was doing as best as possible, and that staffing did not seem a problem. The commissioner did, however, express some concern about the cost of operations. The Red Cross Director mentioned consolidating the shelters at the Middle School. The Fire Commissioner and the Red Cross Director both felt that the heavy traffic conditions precluded that option. Consequently, both shelters stayed in operation. They decided, however, that the Middle School shelter would absorb the firehouse evacuees if the incident lasted another day.

The Red Cross then found out that the fire departments were unable to cap the fire, and that the incident could very well turn into a long-term situation. Thus, at 1200 the decision was made to make it another overnight shelter. Sometime after 1300 the Red Cross Director went home for three hours and then returned to the shelter.

The phone company automatically shut off the payphones at the school some time that day, because the money from them had not been collected. This constrained evacuee access to communication. Service was restored later that day.

During the evening, an evacuated physician volunteered to do hypertension checks on the other evacuees. About 90 people stayed at the shelter the second night. Some evacuees from the previous night left to go elsewhere and new evacuees came in for the first time. About five people stayed awake all that night. The heat went off, and this required the use of extra blankets.

People began to wake up at 0600 on Tuesday, the third day of the incident. The Red Cross and cafeteria staff served a regular breakfast with coffee, along with doughnuts which had been donated by a local merchant. They heard on the television news at 0600 that the flame on the propane tank had diminished; and at 0700 they heard that the flame was out. The police also called about this time to inform the shelter that the fire was no longer burning.

Evacuees started to go home at approximately 0845. The police department still had the perimeter around the evacuation zone closed off. Returning evacuees had to present identification to get back into the area. The last evacuee left the shelter at 1000. The incident then ended for the Red Cross with the exception of cleaning up and paying bills.

c. Salvation Army. The Salvation Army in Nassau County was called by the Nassau County Fire Emergency Office sometime between 1300 and 1400 on Tuesday, May 24, 1988, the first day of the incident. They told them about the

emergency, and requested that a Salvation Army canteen be set up for use by emergency workers. The Salvation Army maintains a mobile canteen, stocked with food and emergency kits. It is always ready to go in the event of an emergency. All they needed to do to prepare the canteen was fill it with fresh water.

A Salvation Army Major who is a response coordinator and a secretary left in the canteen. It took about one and a half hours to arrive at the scene because of traffic congestion. It is normally a 30 minute drive. They arrived sometime between 1430 and 1530, and the canteen was set up near the fire fighting command post. The Director of the Nassau County Salvation Army arrived on the scene about 1700, and he went directly to the canteen. He found out who was in charge of the emergency by asking others. As far as he knew, the Seaford Fire Chief was in charge of the whole operation.

The police department had gone through the evacuation area to tell people to evacuate and about the Wantagh Fire Station shelter. The Director of the Salvation Army went to the Wantagh Firehouse to check on the shelter. He found about 100 evacuees at the station who needed cots, food, and other supplies. He then "bought out a couple of 7-11's" to give food to the women's auxiliary for distribution to evacuees. The Salvation Army also supplied the firehouse evacuees with cots and comfort kits. They fed breakfast on both mornings to about 100 evacuees and firemen. The Salvation Army also operated a nourishment station near the command post throughout the entire incident. They also delivered food under Police escort to the Red Cross evacuation shelter at the Middle School and gave out "overnight packs" to evacuees.

Different relief shifts of Salvation Army personnel and volunteers came from Staton Island, Brooklyn, Queens, and Suffolk County. Volunteers were mobilized via CB-type radio calls. Only one volunteer could not respond due to a

previously scheduled important meeting that day; all other contacted volunteers responded. The Salvation Army set up volunteer shifts once the situation was understood. They scheduled a meeting for 0730 on the 26th to set-up three worker shifts, since they did not know how long the emergency would last. They subsequently cancelled the meeting after the fire went out. At times, voluteers had to be pulled out and told to get rest. Everyone went beyond the call of duty. Everyone worked very long hours the first day.

One Salvation Army truck driver who was transporting cots and supplies had trouble getting into the area. Some communication problems between the driver and the Salvation Army command post arose. Thus, the Salvation Army driver misdelivered the cots and supplies to the Red Cross Middle School shelter where "they were put to good use."

Most of the public encountered by the Salvation Army seemed to understand the situation, yet some did not think the situation was dangerous. Some evacuees wondered why they had to evacuate, and some expressed concern about potential looting in the evacuated areas. Salvation Army personnel heard of some people who refused to evacuate, but they did not hear of anyone evacuating from areas outside of the evacuation zone.

The Salvation Army provided services in the area until the fire went. The incident ended for the Salvation Army at 1530 on Thursday, May 26, 1988, when they arrived back at the Mineola office. They retrieved their cots and then got some sleep.

During the incident, the Salvation Army expended 238 person hours and 133 mobile canteen and truck hours. They provided approximately 500 cups of hot chocolate, 9,000 cups of coffee, 700 sandwiches, 61 dozen doughnuts, 150 bowls of stew, 750 cups of soup, 14 gallons of milk, 1,250 cold drinks, 900 cups of water,

300 cups of tea, 1,350 granola bars, and provided cots and blankets for the Wantagh Fire Station and Middle School shelters.

d. Nassau County Executive's Office. Shortly after 0925 on Tuesday, May 24, 1988 the incident coordinator for the Nassau County Executive's Office unofficially heard about the truck accident through routine monitoring of the radio. The coordinator felt as if it was his job to make sure that everyone else did their jobs.

The coordinator was not aware of any refusals to evacuate, although he did receive reports that some people went back to their homes with police escort to get clean clothes and other supplies.

The coordinator was not officially notified about the incident until some time the second day. His office then implimented an emergency transportation plan. This plan made arrangements to pick up and transport railroad commuters by bus through the area where the railroad was shut down. After evening rush hour traffic, the incident ended for the Nassau County Executive's Office incident coordinator since there were no more commuters who needed to be transported.

## D. EVALUATIONS BY THOSE INVOLVED

The organizational respondents that we interviewed were asked about lessons learned from their experience with this emergency. This was done by asking them questions about how they thought their organization and others performed, and what they might do differently were they to experience the emergency a second time.

In general, all respondents felt that the emergency was well handled. Most respondents gave their own organization high marks. There was some tendency to offer criticisms of how other organizations performed; however, evaluations were definitely positive. Public behavior was also positively evaluated. Respondents freely suggested what they would have their organization do differently were a similar emergency to occur im the future. All evaluative comments contribute to lessons learned from this emergency. These lessons fall into two categories. The first is needed changes in regulations and safety laws. The second is what was learned regarding emergency preparedness.

### 1. Regulations

This emergency was reason for many respondents to question the adequacy of safety laws in Nassau County on the conditior of trucks hauling dangerous materials. The view was recorded during our field interviewing that the propane tank truck was deficient in repair, and that this contributed to the accident in the first place. We heard more than once, for example, that the driver's seat in the truck was actually a lawn chair. One reported lesson, therefore, was that safety laws could be revised regarding such vehicles. This is not surprising. In fact, most

legal changes regarding emergency response, preparedness, mitigation, and relief are the consequence of experienced emergencies.

2. Emergency Preparedness

Several lessons regarding emergency preparedness were referenced in different ways by different organizational respondents. Some of these comments were general while others were specific to particular organizations. The preparedness lessons referenced by the people we interviewed follow.

First, most respondents recognized that one cannot plan ahead for every possible specific emergency contingency. Nevertheless, it was thought that some specific organizational and inter-organizational emergency planning and/or standard operating procedures should be developed for emergencies of this type. In fact, most respondents thought response to this emergency was good considering that no such plans were in place prior to the emergency, but that plans should be developed to help guide response in future emergencies.

Second, firefighters repeatedly suggested that too many firemen were exposed to too much risk. In retrospect, it seemed that too many firefighters went too close to the burning propane tank truck too many times. It was suggested that the development of standard operating procedures (SOPs) for emergencies like this one could reduce the exposure of firefighters to the risk of explosion, and reduce the need to rely only on personal experience in responding to future emergencies like this one.

Third was the way in which outside experts could best be managed in future emergencies. It was thought that ideas and subsequent attempts to extinguish such a fire are best managed by channeling all efforts through centralized command and control; and central command and control must have all available information at all times. For example, one attempt to extinguish this fire was

performed without the knowledge that it would be unsuccessful. This knowledge was already in the possession of other firefighters. The development of SOPs for how different organizations would communicate information could help to minimize this problem in the future.

Fourth, the person(s) with major decision-making responsibilities for firefighting and other duties, for example running a shelter, got too little rest and sleep. Fatigue can impair the judgment of anyone. Although there was no evidence that it did so in this emergency, the use of SOPs could define leadership rotation and avoid this potential problem in the future.

Fifth, members of emergency response organizations pointed to the need to manage the media in future emergencies. The media, of course, converged to the emergency scene and to shelters. However, they had to have their safety assured (they sought to go too close to the fire), and it was reported that their presence got tiresome at shelters. A formalized way to plan for the presence of the media in future emergencies was seen as potentially useful.

Sixth, many of the people we interviewed pointed to communications as a problem in this emergency. For example, communication problems arose between the command post and shelters, between the police and shelters, between fire chiefs and assistant chiefs, between response organizations with different radio frequencies, and with the use of cellular phones because of overload. Adequate communications in the emergency could have been facilitated with better or more integrated equipment and plans that would facilitate the communication of information between organizations.

Seventh, coordination between responding organizations was not seen as a major problem which affected general response to this emergency. However, the lack of coordination in some arenas was occasionally pointed to as a constraint to response. For example, it was stated several times that too many fire depart-

ments volunteered to offer help; and that some wished that information presented to the public about the evacuation had been coordinated. One organization stated on television that the evacuation was voluntary, while those carrying the word to the public through door-to-door communication attempted to portray the need to evacuate with more certainty. It was recognized, therefore, that coordination of response to emergencies between organizations could be useful, and that planning could help achieve coordination.

Finally, people we interviewed had a number of specific recommendations. These recommendations follow. The Red Cross thought it would be useful to plan how it could be in better communication with the Nassau County Police in future emergencies. The Seaford Fire Department thought consideration should be given to developing a county-level emergency plan. The Wantagh Fire Department thought a large mobile Emergency Operations Center (EOC) would be useful in response to future emergencies. An EOC, it was reported, should be large enough to house everyone. The Salvation Army thought county-wide identification cards would enhance response by decreasing delays caused by strict perimeter control. The Seaford Middle School thought it would be good to develop a list of emergency numbers for use in calling parents of students. The Nassau County Police thought it would be good to have better ways to determine the size of the initial evacuation areas.

The lessons for emergency preparedness pointed out in this report section were those reported by the people who responded to this emergency. The list does not outline all that one could say about emergency preparedness. Nevertheless, the listed lessons were based on their first-hand experience. In general, this emergency and these lessons document an already well-established principle in emergency research. Emergency plans are not necessarily needed for sound response to an emergency; however, they certainly can help.

## E. CONCLUSIONS ABOUT EMERGENCY RESPONSE

This concluding report section addresses emergency response issues as experienced in the Seaford propane tank truck emergency and evacuation. These issues are divided into three categories. The first is public response; the second is response by emergency workers; the third is organizational response.

### 1. Public Response

Respondents across organizations were asked about public behavior during this emergency evacuation. Their accounts describe prototypical public emergency response.

The public came together to help one another during the emergency in a way that has often been labelled as an "altruistic or therapeutic community" in the disaster research literature. For example, the director of the Red Cross shelter noted that the whole community was really fantastic and came together during the emergency. Respondents with the Seaford Fire Department reported that they knew of no incidents of aberrant or any usual behavior by people in evacuating vehicles despite the heavy traffic during the evacuation. The Nassau County Police Department reported that some motorists were confused as to which alternative routes they should take to get to their destinations, but that the evacuating public was cooperative. They also reported that evacuees shared rides with one another. The sense conveyed to us during interviews was aptly put by the Principal of the Seaford Middle School when he said "people in these emergencies, they stop being grouches and they help."

As is often the case in emergencies, one exception did exist to the general conclusion that people helped one another and were altruistic in their emergency

response. Respondents at the Wantagh Fire Department and others told us of one case of attempted theft. Firemen spotted some teenagers scaling the expressway fence and climbing aboard a fire truck to steal some lights. The teenagers were arrested by the police, and the story was fully covered by the media. This isolated case, and the media coverage devoted to it, is illustrative of why and how the myth of looting during emergencies is perpetuated in American culture.

Respondents also were able to share information with us about public participation in the evacuation. Several respondents were aware of some members of the public who simply refused to evacuate. For example, the Wantagh Fire Department reported that members of the fire department evacuation team knew of possibly three people who refused to evacuate. There is no way to precisely estimate what proportion of the persons advised to evacuate chose to stay at home based on this study. It can readily be concluded, however, that there were some refusals to evacuate. Additionally, the number was not likely large. The Nassau County Police Department told of how some Fire Marshal inspectors thought the County Executive could have confused people when he announced on television that the evacuation was voluntary. Nevertheless, there are almost always some people who refuse to evacuate in all emergencies.

Respondents were unaware of any members of the public who evacuated from areas outside of the evacuation zone. For example, the Seaford Fire Department knew of no reports or cases of "shadow evacuation." Additionally, the Nassau County Police were unaware of any one who evacuated from outside the actual evacuation zone. Our organizational respondents were unaware of any "shadow evacuation," but this does not mean that none occurred. Nevertheless, if it did occur it was likely small enough to go unnoticed by members of organizations involved in and in charge of the evacuation.

Evacuees became anxious to return home. For example, the Seaford Fire Department reported that some evacuees eventually began to complain that the fire departments had not been able to put the fire out quickly and that they wanted to go home. People unware of the emergency did attempt to gain access to the evacuated area. For example, the Nassau County Police told of how they had to intercept workers who lived in the evacuation zone as they came home from work, and inform them of the evacuation and where shelters were located. The police also told of many people who stood around the perimeter of the evacuation zone waiting to go home. The police also allowed some evacuees to go back to their homes for special reasons, but only if accompanied by an officer. The need for return trips home was not great, but incidents did occur.

Convergence to the site of the emergency also occurred. During the emergency some 15 to 20 people went to the bridge overlooking the accident to see the fire. The Seaford Fire Department also informed us that these people were made to leave by the police. This account possibly documents more than convergence. It also adds further reason to conclude that some people refused to evacuate. However, there is no way to determine if the persons on the bridge were in fact members of the public who never evacuated, reporters or someone else.

The Red Cross was in charge of shelter operations and operated the Red Cross shelter at the Seaford Middle School. Other shelters were also in operation at other places around the Seaford area. For example, the Wantagh Fire Department offered shelter to evacuees. A total of 125 evacuees spent the first night at the Seaford Middle School and approximately 150 additional evacuees were sheltered elsewhere. Of these, 75 were sheltered at the Wantagh Fire Department. The Principal of the Seaford Middle School (the site of the Red Cross shelter) told of how some evacuees arrived with pets. The Nassau County Police informed us that it was difficult for them to get an accurate count of the total number of

evacuees. They estimated that about 2,000 people evacuated. This estimate is not likely far off. The zone evacuated was a one-quarter mile radius circle around the propane fire in a region of Long Island with about 5,133 people per square mile. These figures suggest that 13.75 percent (13 to 14 percent) of the evacuees used public shelters in this evacuation. This confirms the judgment of the Nassau County Police who said that most evacuees did not stay in public shelters. It is also a typical shelter use rate in U.S. evacuations.

Rumors were documented among evacuees in this emergency. For example, the Principal of the Seaford Middle School heard some evacuees talking about an escaped convict in response to hearing overhead helicopters, and others talking about not being able to go home for 20 days. These rumors were confirmed by the Red Cross Director who was in charge of the evacuation shelter at the Seaford Middle School. He also stated that a lot of effort had to be put into rumor control.

Public response to the Seaford propane tank emergency on Long Island was prototypical of how people behave in U.S. emergencies of this sort. For example, people came together to form an altruistic or therapeutic community. The evacuation was orderly and free of aberrant behavior. Selfish and anti-social acts were all but absent. An isolated case of attempted theft did occur, and it was presented by the media in a way that illustrates why myths about public emergency responses are perpetuated in American culture. There were some people who simply refused to evacuate. Most evacuees did not make use of public shelters. Rumors occurred among evacuees that had to be addressed by response organization personnel. Evacuees became tired of being away from home. The public was concerned about looting and the police worked to prevent it, but none occurred. These and other examples illustrate general public behavior principles that are characteristic.

2. Emergency Worker Response

Persons interviewed were asked about the response of emergency workers within their own organizations and in others. Their accounts portray exemplary behavior by workers in emergencies.

Emergency workers were readily available to staff response organizations, and staff mobilization occurred quickly. Staff of fire departments, the Fire Marshal's Office and the police department were on the scene within minutes of the accident. In fact, there was a surplus of emergency workers and organizations who responded to the emergency. For example, respondents in the Wantah Fire Department pointed out that excess firemen were made available to assist the police in disseminating evacuation warnings to the public. It was also reported that excess fire departments arrived at the accident scene. The Seaford Fire Department reported that about 25 to 28 percent of its force called in to volunteer for duty, and that their typical response rate is between 20 to 25 percent. It should be remembered that all firemen are volunteers on Long Island, and that response by firemen typically requires that they get off work at their regular jobs before reporting for duty as firemen.

Volunteering for emergency work in response to this emergency was characteristic within all relevant organizations performing emergency response. For example, volunteering for emergency work at the Seaford Middle School where the Red Cross Shelter was in operation was prototypical. Teachers from the Montessori School and St. Williams of the Abbot School brought their students to the shelter and then volunteered to stay to help with child identification. The Seaford Middle School nurse volunteered to remain at the school since the Red Cross did not immediately bring a nurse. The cook and cafeteria staff volunteered to prepare snacks when the shelter first opened; and then they came in on following days to prepare breakfast and other meals for the evacuees. Some teachers even

stayed to volunteer their services, and the school's administrative secretary volunteered to maintain a communication center for the shelter. Evacuees in the shelter even volunteered to help with things that needed to be done.

Volunteering for emergency work was hardly limited to firemen and to people at the Red Cross shelter at the Seaford Middle School. It also characterized what happened in other relevant involved organizations. For example, the women's auxiliary prepared and delivered food to evacuees at the Wantagh Fire Department shelter; and the Salvation Army mobilized volunteers for multiple shifts from Staton Island, Brooklyn, Queens, and Suffolk County. In fact, the Salvation Army reported that only one person requested to perform volunteer work was unable to do so because of a previously scheduled appointment.

Organizational respondents were also asked about any known incidents of role conflict or emergency role abandonment by emergency workers. That is, were emergency workers in a position of having to choose between performing non-emergency roles (for example, staying at their non-emergency jobs or being with their family) versus emergency work roles, and did anyone actually abandon their emergency job. No cases of role abandonment were identified. In fact most organizational respondents reported an excess of emergency workers, and even an excess of emergency response organizations in the case of responding fire departments. Additionally, staff absences at the Seaford Middle School were reported the same as under normal circumstances.

These conclusions do not mean that there were not a few cases involving emergency workers (or people that had jobs somewhat related to emergency response) who went somewhere else during the emergency.

The closest case to role abandonment documented involved one police detective who was not assigned to do work in the emergency area. He did, however, live in one of the neighborhoods that was being evacuated. He asked the

police department if he could be relieved of duty so that he could make sure that his family was safe. The police department had enough staff that day to accomplish their work without the detective. His request was granted. This is hardly a case of role abandonment by an emergency worker for a couple of reasons. First, the detective was not involved in emergency response. Second, the detective only left his routine job after receiving permission from superiors.

Another person marginally involved in an emergency response role had reason to leave his job during the emergency. In this case, however, it was not role abandonment since he left only when it was clear that other workers were available to do the jobs that needed to be performed. The principal of the Seaford Middle School left to go home to tend to personal business for a brief period. He did not leave until the end of the routine school day and until he was sure that emergency work was being covered by other people. He returned to the school quickly. It should be noted that the principal had no emergency response role, although he was the person in charge of the school. This case is hardly one of role abandonment. The principal's short absence was actually a way for him to clear conflicting obligations so that he would be free to participate in what became an emergent, voluntary emergency response role.

Finally, there was the already referenced case of the one Salvation Army volunteer who could not report for volunteer duty because of an appointment scheduled before the emergency. This case was also not one of role abandonment. It is not expected that Salvation Army volunteer workers are able to respond each time they are called. The Salvation Army had ample volunteers to do work in this emergency. Typically, they call upon a large reserve of potential volunteers until enough are recruited for work.

We also were interested in any acts of heroism performed by emergency workers. Individual cases were certainly reported. For example, one hazmat

specialist with the Fire Marshal's Office attempted to turn off a valve on the burning tank while shielding his face from the flames with a helmet. He received flash burns.

It is difficult, however, not to consider the behavior of all responding firemen as heroic. The risk in this emergency was a severe explosion and fireball that could have engulfed the entire evacuated area. Nevertheless, firemen repeatedly were within not only the perimeter of the potential fire ball, but also close to the burning tank. As one fireman put it, he did not want to be "down in the hole" but he "was there anyway" since it was his job. The truck tank was frequently approached by many fire fighters. Their response to this event was also defined as heroic by the public. A special celebration for them by the townspeople was planned at the time we conducted our research.

Emergency worker response during this emergency revealed familiar patterns observed in other U.S. emergencies. People quickly reported to work in mobilizing emergency organizations. A surplus of emergency workers were available to do work. People volunteered for emergency work in large numbers and from all walks of life. Role abandonment by emergency workers was simply not a problem. It did not occur. Finally, the emergency was characterized by heroic acts, in this case as firemen exposed themselves to severe risk and flames.

3. Organizational Response

Organizational response to the propane truck tank fire was effective, particularly when one considers that no emergency response plans were in place for this type of emergency.

The Nassau County Police Department used its standard operating procedure (SOP) for large accidents. It is a general plan. They used an evacuation plan which is included in their general civic defense emergency plan. The fire depart-

ment had no SOPs for response to a propane truck tank fire. In fact, the Seaford Fire Department thought that SOPs for response to a future similar emergency are needed and that a county response plan is also needed to help coordinate future response between organizations. Despite the lack of plans and training on event-specific procedures, organizations were able to adapt to the needs of the situation as they emerged.

The lack of plans, however, did reveal problems for organizational response in reference to communications and coordination between some response organizations. For example, communication problems existed both with communications technology, as well as with attempts to communicate between organizations. Fire department phone channels became clogged since reporters were using the same channels. Some private schools were never officially informed of the evacuation. The Red Cross was not notified of the emergency early, consequently the Red Cross shelter was not opened until the evacuation was well underway. The Red Cross shelter only learned over television that it should prepare to house people rather than from an official communication. The Salvation Army had to the Red Cross shelter rather than to the shelter at the Wantagh of poor communication. These communication problems ems for emergency response. This is fortuitous.

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Coordination of activities were sometimes a problem between response organizations. For example, the Fire Marshal's Office was concerned that it took time to explain its intentions twice to two fire departments as the Wantagh Department relinquished control to Seaford when the Seaford Chief arrived at the accident site. The different shelters available to house evacuees only became aware of each other well after they had each opened and had received evacuees. Shelter consolidation at the official Red Cross shelter could only then be considered. Additionally, an outside fire expert brought in to offer assistance was

never put in touch with fire fighters already on the scene. Consequently, he sought to shut a tank valve that others had already shut before his arrival.

Despite these coordination problems respondents generally thought that coordination between and within response organizations was good. For example, activities between volunteer fire departments were coordinated. Mutual aid agreements worked. A staging area was quickly established by fire fighters, and the evacuation zone was divided into quadrants to facilitate warning the public. The police and firemen worked cooperatively to alert the public. Response to the emergency was described as "picture perfect" from the viewpoint of the Office of the Nassau County Executive. The Nassau Police Department thought everyone did what they were supposed to do during the emergency.

In many ways the praise offered about how well response went during this emergency is warranted. In fact, everything that needed to get done was accomplished. However, as the people who responded to this emergency are aware (see report section D entitled "Evaluation by Those Involved") there were some lessons that were learned about how to better ready for future emergencies.

# APPENDIX A

INTERVIEW GUIDE

Nassau County, Long Island, New York

Propane Truck Emergency

June 1988

We are interested in getting a detailed picture of what happened in connection with the propane truck fire emergency during the week of May 23rd.

Let's focus on your organization (the X).

We would like to get a step-by-step account of what your group did.

To start off: (NAMES-AFFILIATIONS-TELEPHONE-TIME)

1. a. Tell me how your organization first got involved in the situation? (NOTIFICATION) (Get initial perceptions, definitions, actions) (Separate out own organization and other organizations)

   b. What happened next? (MOBILIZATION) (ROLE CONFLICT) (VOLUNTEERS-LILCO) (EXTREME BEHAVIOR=COWARDICE OR HEROISM) (Trace from first hearing of something was going on to later actions) Who, when, why) (Get clear decision points) (Obtain pictures as informant saw at the time)

   c. When/how was the public involved/warned?

   d. What was the last involvement of your organization in the situation? (Trace to cessation of organizational action) (Obtain definition of normal)

2. a. Let's look at the evacuation a little more closely and in detail -- when did the question of evacuation first come up in your organization? (Get who, when, and why)

   b. What sort of issues arose in the evacuation? (volunteers) (people, organizations, other things) (enough staff - refusals to warn)

   c. what issues arose regarding public participation in the evacuation? (Orderly, shadow, early, late, non) altruism-selfishness) (aberrant behavior)

d. Was your organization involved in sheltering the evacuees?
If so, what did you do?
Were there any problems in the shelters?
(People, organizations, other things)

e. When was the evacuation over?
(How long did they expect it to last?) Get perceptions, definitions, actions) (Who, when, and why involved in return of evacuees)

3. Why did your organization do what it did in the situation? (altruism) (Separate out threat, warning, evacuation and return stages) (Find out to what extent decisions and actions followed: prior planning and/or experiences, and/or was ad hoc)

4. a. How would you evaluate how your organization acted in the situation? (Keep in mind different stages)

b. How about other organizations? (Especially those with which the organization had the most interaction)

c. How well or how poorly do you think the public (especially those evacuated) felt the situation was handled? (Separate evacuation and sheltering)

5. If your organization had to do it all over again, would you do anything different than you did this time? (Any lessons learned)

Leaving this particular situation aside:

6. What kind of disaster planning does your organization have?
(formal and/or informal)
(Intra- and inter-organizational)

7. What disaster-relevant resources does your organization have?
(People, equipment, facilities)

THANK RESPONDENT
INDICATE THAT IT MIGHT BE NECESSARY TO PHONE LATER TO FILL IN GAPS

ASK IF THEY WOULD RECOMMEND ANYONF IN PARTICULAR WHOM WE SHOULD TALK TO

OBTAIN:
1. logs and/or radio tapes
2. after-action report or critique
3. disaster plan
4. organizational chart
5. any write-ups of prior disasters

WITHIN ORGANIZATIONS:
- head
- operational decision makers
- line staff
- communication personnel (radio, switchboard)
- liaison personnel

GET:
- interviews
- statistics
- documents
- photographs

BACK-OF-MIND CONCEPTS:
- communications
- coordination and control
- conflict
- priorities
- convergence
- leadership (intra- and interorganizational)
- authority
- new tasks/functions
- new organizational structure
- decision making
- how long evacuation took
- defining the area at risk
- number of evacuees
- mass media behavior
- number of people in shelters
  - how many spent the night
  - how many checked in