

FIREFIGHTER INJURY REPORT

1050 EDWARDS ROAD

PARSIPPANY-TROY HILLS,

NEW JERSEY

DECEMBER 6, 1992



June, 1993

STATE OF NEW JERSEY

Jim Florio, Governor

DEPARTMENT OF COMMUNITY AFFAIRS

Stephanie R. Bush, Commissioner

Errata

Firefighter Injury Report

**1050 Edwards Road
Parsippany-Troy Hills, New Jersey**

December 6, 1992

The Division of Fire Safety notes the following emendations to the Firefighter Injury Report issued in June, 1993:

1. On page 4, change the final line of text to read:
"An internal memorandum of the Morris County Prosecutor's".
2. On page 5, change "show" in the first line of text to "shows".

Issue Date: February 17, 1994

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INTRODUCTION

This report was prepared in accordance with N.J.S.A. 52:27D-192 *et seq.*, Duties of the Bureau. The purpose of these firefighter casualty investigations is to report the causes of serious firefighter injuries or deaths. In some cases new information may be developed, or old lessons reinforced, in an effort to prevent similar events in the future. Fire cause and origin investigation is not a part of these reports.

This investigation was carried out by Bureau of Fire Safety staff. The Bureau acknowledges the invaluable cooperation of the Morris County Prosecutor's Office staff, particularly Investigator George Wendt, and the Morris County Sheriff's Department, Crime Scene Unit, Corporal Edward Poli and staff.

Mr. Eric Beckhusen, CIH, New Jersey Department of Health, Occupational Health Service, as well as Mr. Mark Pollak, Chief, and Mr. Ronald Gutek, Representative, New Jersey Department of Labor, Office of Public Employee Safety, performed an evaluation of regulation compliance. The Department of Health's Public Employee's Occupational Safety and Health Program and the Department of Labor's Office of Public Employee Safety have issued separate reports on this incident.

Analysis of the incident was provided by Richard W. Bukowski, PE, Senior Fire Research Engineer, Building and Fire Research Laboratory, National Institute of Standards and Technology, United States Department of Commerce.

Analysis of the FF Filippone's self contained breathing apparatus was provided by John M. Dower, MSSE, MSIH, Senior Industrial Hygienist, and staff, Certification and Quality Assurance Branch, Division of Safety Research, National Institute of Occupational Safety and Health, United States Department of Health.

SUMMARY

On Sunday, November 6, 1992 the Greystone Park Fire Department was conducting a recruit training class for the Greystone Park Fire Department's volunteer brigade members and volunteer firefighters from the surrounding communities. The students already had completed 23 classroom sessions. This day's session was to expose the recruits to actual fire conditions. The evolution took place in a converted school bus that was reportedly used as a live burn facility. A foam cushioned couch was used as the heat and smoke source. During the first entry by a team of five recruits and one instructor a flashover allegedly occurred and seriously injured three of the recruit firefighters. These firefighters were all transported either directly to St. Barnabas Burn Center in Livingston, or were taken first to local hospitals and then transferred to St. Barnabas.

OVERVIEW

GREYSTONE PARK STATE PSYCHIATRIC HOSPITAL

The Greystone Park State Psychiatric Hospital is a Department of Human Services (DHS) facility. It provides services to approximately 500 resident patients. Outpatient services are also provided. At one time the patient population reportedly exceeded 5,000. Much of the facility is in disuse due to the severe reduction in resident patient population.

GREYSTONE PARK FIRE DEPARTMENT

The Greystone Park Fire Department (GPFD) provides fire inspection, fire safety training and fire suppression services to Greystone Park State Psychiatric Hospital. The department is headed by Chief Robert Schumacher. There are 6 career members and 17 volunteer members of the department¹. Staffing is at least one Assistant Chief on each shift. The department chief generally works the day shift on weekdays. The career staff carries out fire inspections and fire safety education programs. Fire suppression activities are accomplished by the career firefighters, augmented by trained volunteer firefighters from the staff. The department responded to 123 incidents in 1992. Mutual aid is available from volunteer fire departments from the surrounding communities. The fire chief reports directly to Mr. George A. Waters, Jr., Chief Executive Officer (CEO) of Greystone Park for administrative matters. All fire departments at DHS facilities are responsible to Mr. John McQuade, Fire Safety Coordinator, for fire department operations.

THE TRAINING COURSE

The recruit training course was offered to new hospital fire brigade volunteers. The course also was open to recruits from nearby volunteer fire departments. It was sponsored by the "New Jersey State Fire Service Training Academy, Greystone Park Hospital". The volunteers attending from neighboring municipalities were charged a fee of \$120 per student. Greystone Park Fire Department has been providing this type of training since at least the early 1950's according to a memorandum by Mr. George Waters, CEO of Greystone Park Hospital.

¹1992 *New Jersey Fire Department Directory*, New Jersey Department of Community Affairs, Division of Codes and Standards, Bureau of Fire Safety, 1992.

The training course topic list, provided to the Morris County Prosecutor's Office, listed the following items:

- Orientation and Fire Prevention Lecture
- Fire Behavior Lecture
- Fire Fighter Safety Lecture
- Building Collapse Lecture
- Salvage/Overhaul/Sprinkler Lecture
- Forcible Entry and Ventilation Lecture
- Rescue Lecture
- Ladder and Hose Lecture
- Fire Extinguisher and Fire Stream Lecture
- Automobile Fire and Critical Incident Stress Lecture
- Mid-Term Exam
- Ropes and Knots Lecture and Drill
- Self Contained Breathing Apparatus Orientation
- Search Orientation
- Search Practices
- Ladder Practical 1
- Ladder Practical 2
- Salvage and Sprinkler Practical and Rope Review
- Ladder Practical 3
- Hose Practical 1
- Hose Practical 2
- Hose Practical 3
- Ventilation Practical
- Search and Rescue Practical and Rope Review
- Fire Attack and Extinguisher Practical
- Automobile Fire Practical and Natural Gas Practical
- Review
- Final Examination

The lessons from the training course topics listed above reportedly totalled about 90 contact hours.

The course outline utilized for this class was loosely based on lesson plans from another fire training academy in New Jersey. These lesson plans were originally designed for use at a permanent fire training facility. According to various discussions, transcripts and memoranda, it is evident that Mr. George Waters, CEO of Greystone Park Hospital, was made aware that the course was being taught. Copies of internal DHS memoranda submitted to the Morris County Prosecutor's

office show that Mr. John McQuade, Fire Safety Coordinator for DHS, was also aware of the course and that he reviewed the lesson plans. Chief Schumacher also reviewed the lesson plans and approved the training location and the facility to be utilized. The Greystone Park Hospital Safety Officer was not required, according to memoranda, to be notified of fire training evolutions. He was not notified of this evolution.

The lead instructor for the course was AC John Hund, of the Greystone Park Fire Department. He was assisted during the course by AC Don Elston, also of that department. AC Elston was not present, however, on the day of the incident. AC Hund was the only instructor present on December 6, 1992. AC Robert Campbell of the Parsippany-Troy Hills Fire District 5 also assisted this day, although he was not an instructor for the training class.

There were originally eighteen recruit firefighters from Greystone Park, Parsippany-Troy Hills, Randolph, Denville and Morris Plains Fire Departments scheduled for the training. Seventeen of these students were present on the day of the incident.

Statements reveal that the reported purpose of this training exercise was to "expose the trainees to heat" while they carried out search and rescue procedures. Later in the day it was reported that the bus was to be used for fire attack and extinguishment practices.

THE TRAINING FACILITY

The live fire training session was held on an unused portion of the Parsippany Sewage Treatment Plant property, located at 1050 Edwards Road, Parsippany, New Jersey. No written agreement could be found between any of the parties involved in this incident regarding this training site.

The "burn facility" consisted of a converted 1976 International Harvester full-sized school bus, measuring 34' long and 7' 6" wide. The bus had been owned by the Parsippany-Troy Hills Board of Education and was given to Parsippany-Troy Hills District 5 for use in training. The fire district has reportedly been using this bus for at least two years, according to statements made by several principals in the incident. The student seats had been removed and steel plates had been welded over the side windows.

Various memoranda, statements and police reports show that the bus had been utilized for live fire training on several occasions. Evident within the bus after the

incident were cut down 55-gallon metal drums containing wood scraps that were reportedly soaked in kerosene prior to being ignited for a source of heat and smoke when the bus was used as a "smoke house." A partially burned large truck tire and a wooden hollow core door were also found in the bus. A 5-gallon can containing a small amount of fuel type liquid was also found just inside and to the right of the rear door.

Investigation after the incident by the Morris County Prosecutor's Office determined that the mechanism for opening the front door was inoperable. The opening mechanism linkage was broken and the door was only operable by being forced from the inside or outside (as was done to gain entry after the casualties occurred).

THE INCIDENT

An upholstered 6 foot couch (reportedly a wood framed, foam couch covered with a burlap-like upholstery) was placed inside the bus, approximately midway up the left (driver's) side against the wall. Shredded paper was stuffed under the cushions.

There was a Parsippany-Troy Hills Fire District 5 fire engine at the site to assist with the training exercise. This engine was connected to a yard hydrant on the facility. There was reported to be a charged $\frac{3}{4}$ inch booster line stretched out toward the bus from this engine. This line was unmanned. With the engine there were four District 5 firefighters observing the training. These firefighters were not assigned as a back-up crew, but were simply observers. There was also a rescue unit from the Denville Fire Department to provide tools and equipment. No provision was made for on site EMS assistance and no basic life support (BLS) ambulance was standing by for the live burn.

Permission was neither sought nor obtained from the Department of Environmental Protection and Energy (DEPE) for conducting this live burn exercise. DEPE prohibits open burning in New Jersey, with the express exception traditionally granted to permanent fire training facilities. On extremely rare occasions, DEPE has granted permission for live fire training on other sites. On those occasions, written requests were submitted to the DEPE which relaxed its prohibitions only after receiving Bureau of Fire Safety assurance that the training exercise was to be conducted with due consideration for the safety of the participants and the public. In addition, DEPE required that those particular evolutions could not have been duplicated, at the time, at a permanent fire service training facility.

The couch was ignited by AC Robert Campbell, of the Parsippany-Troy Hills Fire District 5, aided by Firefighter (FF) Leno Rocha (a student) of the Lake Parsippany Fire Company. A highway flare was utilized to ignite the shredded paper and the couch. AC Campbell and FF Rocha exited the bus via the back door. The back door was then closed and the couch was allowed to burn for what was reported by various observers as five to ten minutes.

The students were told by AC Hund to don their personal protective equipment (PPE), including self contained breathing apparatus (SCBA), and prepare to enter the bus. Reports by the trainees indicate that the instructor did not check the students (PPE) prior to their entry into the bus. They were briefed on the evolution by AC Hund. The trainees were told that they were to enter the bus via the rear door and crawl past the fire and exit via the front door. They were told that the purpose of the evolution was to allow them to "feel heat." No hand line was to be used. The rear door was then opened. Heavy smoke issued through the door opening. The recruits and instructor entered through the rear door. The order of entry was FF Anthony Filippone, FF Jeffery Berry, FF Richard Van Orden, AC John Hund, FF Leno Rocha and FF Guy Ricker.

Observers outside of the bus reported that approximately 30 seconds to 1 minute after the group entered the bus there appeared to have been a flashover. It was also reported by AC Campbell that just before the flashover occurred screams were heard coming from the bus. These were believed to be from FF Filippone. FF Van Orden also reported hearing screams and then screaming himself.

AC Hund reported that he sensed that a flashover was happening and pushed the two students who were behind him out through the back door. He then exited the bus himself. These individuals were not injured.

FF Berry appears to have become overcome by heat but reported that he scrambled for the front of the bus. He reported extreme heat conditions occurred about 20 seconds after he entered the bus. Berry reported that when he looked up toward the ceiling of the bus his helmet face shield burned off. He also heard air escaping from FF Filippone's SCBA. He was aware of Filippone's being in front of him. He searched for Filippone but could not find him. Conditions forced him to move toward the front doors to try to escape. By this time Lieutenant (Lt.) Keith Dunn and FF Mike Kearns, both of the Denville Fire Department, realized what was happening. They tried to enter the bus to help. Dunn and Kearns found the front doors jammed and had to break out the glass and use a halligan tool to force the doors open. Lt. Dunn reported that when the doors opened that he could see that black smoke had banked down to the floor of the bus. He stated that large

quantities of superheated air and smoke forced him to retreat as he felt the heat through his facepiece and nomex hood. Dunn reported that FF Berry came out of the bus at this time. Berry's PPE was smoking and he was hosed down with the booster line. FF Van Orden also exited through the front doors behind Berry. His PPE was also smoking and he too was hosed down with the booster line.

Lt. Dunn reported that he heard an SCBA low air alarm going off and perceived that FF Filippone was still inside the bus. He reported that AC Hund also must have realized that one student was still in the bus because Hund was yelling for help to get Filippone out of the bus. Dunn reported that he entered the back door to find Filippone. He encountered heavy intense conditions and called for a hose line. Since the booster line was being utilized to cool down Berry and Van Orden, several of the other students went to Parsippany-Troy Hills District 5's engine to pull a 1 3/4" preconnected line. Lt. Dunn reported that neither preconnect line on the engine had a nozzle attached. Dunn also stated that the pump operator was unable to assist in getting the line into service. Dunn reported that he then obtained the booster line and utilized it to knock down the fire and enter the bus. He reported that he thought that there was only fire in the couch.

Lt. Dunn found FF Filippone and observed that he was lying on his back on the floor of the bus. His SCBA straps were burned off and the SCBA was lying on the floor next to him. The regulator was discharging air. He reported that the facepiece was still in place. Dunn stated that the Filippone's low pressure hose was being held in the left turnout coat pocket with his left hand.

It was reported that AC Hund, AC Campbell and a civilian sewer plant employee, Mr. Robert Miller, attempted to remove FF Filippone through the front of the bus after the doors were forced open. Campbell reported that they found Filippone lying on his back and tried to pull him out through the front door, however he burned his hands on Filippone's gear and had to let go. Hund and others found Filippone too heavy and could not get him around the turn at the doorway to remove him. Mr. Miller reportedly was overcome by smoke, but refused transport to a medical facility.

Lt. Dunn then reportedly grabbed FF Filippone by his turnout coat and dragged him out the back door of the bus. Lt. Dunn remembers FF Filippone exclaimed several times that he was in extreme pain. Upon removal from the bus it was reported that Filippone went into respiratory and cardiac arrest. Firefighter/Emergency Medical Technicians on location began cardiopulmonary resuscitation (CPR) and revived Filippone. Once revived, he began screaming from the pain.

Radio communication was made with Parsippany-Troy Hills Police Department for Emergency Medical Service (EMS) assistance. Three Basic Life Support (BLS) Ambulances, two Advanced Life Support (ALS) Units, and NorthStar (New Jersey State Police Aeromedical Evacuation Helicopter) were called to the scene.

FF Filippone was treated by local Emergency Medical Technicians (EMTs) and then was intubated and treated by paramedics from Mobile Intensive Care (MIC) 21 (St. Clair's/Riverside Hospital) and flown by NorthStar to St. Barnabas Burn Center in Livingston, Essex County. He was admitted to the burn center in critical condition.

FF Van Orden was initially treated by local EMTs and then by MIC 21 paramedics and taken by ground ambulance to St. Clair's Hospital in Denville. He was soon transferred to St. Barnabas' Burn Center.

FF Berry was initially treated by local EMTs and then by MIC 11 (Morristown Memorial Medical Center) and was taken by ground ambulance to Morristown Memorial Medical Center and was transferred several days later to St. Barnabas' Burn Center.

Investigator George Wendt from the Morris County Prosecutor's Office responded to the scene to begin an investigation. Photographs were taken, evidence impounded and statements recorded by the Prosecutor's Office and the Morris County Sheriff's Crime Scene Unit.

COMMENTS

CONCEPT OF THE EVOLUTION

One of the reported reasons for this training evolution was for the recruit firefighters to "feel heat." Recruit firefighters should only experience heat in controlled conditions at appropriately equipped facilities. Recruit firefighters are neither trained nor experienced enough to safely operate in the rapidly deteriorating conditions that accompany an uncontrolled fire. The recruits rely heavily on the expertise of their instructors to ensure that they are in a safe environment and will not be placed in harm's way. They cannot have a full perception of what hazards may exist and what risks they may be assuming.

TRAINING FACILITY

The training facility was the Parsippany Sewage Treatment Plant, utilizing an old school bus for a live burn facility. Utilizing this arrangement does not follow either N.J.A.C. 5:18C *et seq.* Standards for Fire Service Training and Certification, or National Fire Protection Association (NFPA) Standard 1403, *Live Fire Training Evolutions in Structures*.

The choice of a school bus for a burn facility with live fire was not appropriate. The school bus was not designed as a training facility. It was modified for this purpose. Even with the modifications, consisting of removal of the seats and covering of the windows, it is neither suitable, nor safe. While this type of facility may be suitable for cold smoke or covered mask training it is not acceptable for live fire training. In addition, the Morris County Police and Fire Academy has all the necessary dedicated facilities for carrying out such live burn evolutions.

TRAINING ORGANIZATION NAME

The DHS employees providing the training called themselves the "New Jersey State Fire Service Training Academy." The use of such a title gives the appearance of approval by the State of New Jersey. In this case the so called training academy had not applied to the Bureau of Fire Safety to become an approved organization, nor was there any knowledge by the Bureau of Fire Safety that this training was occurring. It is the Bureau's understanding that these employees apparently took the title from the name of the union local that represents DHS

firefighters statewide. There is in actuality no "New Jersey State Fire Service" as an organization or agency of state government.

FUNDS

The fee of \$120 per student was deposited into a bank account opened by Chief Schumacher and AC Hund under the name "Greystone Park Fire Department Association. \$20 was used to purchase the student's text book and the remainder was retained by the association. A review of records of that account reveals that these monies were used to purchase such items as baseball caps, t-shirts and refreshments.

SAFETY OFFICER

No safety officer was assigned to this evolution. Safety functions were maintained by the instructor along with his other responsibilities.

STUDENT SAFETY

Beyond the inappropriate selection of the facility for this type of live burn training, other factors compromising student safety were overlooked. Details such as inspecting the students prior to their entry into the hostile environment and a pre-burn walk through by the students were not carried out.

PERSONAL ALERT SAFETY SYSTEM (PASS) DEVICE

No PASS device was recovered with FF Filippone's PPE.

APPROVALS/PERMITS

The Department of Environmental Protection and Energy (DEPE) must be contacted for a permit to conduct open burning for live fire training. As a part of the permit process, the DEPE requires that the agency requesting the permit obtain approval from the Bureau of Fire Safety. The Bureau requires that the facility and evolution meet N.J.A.C. 5:18C *et. seq.*, *Standards for Firefighter Training and Certification*.

Additional Bureau of Fire Safety approvals are not required unless the students are to be certified under those standards.

Neither the Bureau of Fire Safety nor the Department of Environmental Protection and Energy have any record of prior requests for approvals or permits for this training evolution.

INSTRUCTOR TRAINING

Chief Schumacher, AC Campbell and AC Hund all have attended the following courses offered by the Bureau of Fire Safety for fire service instructor certification:

- Fire Service Instructor General Safety Course, 16 hours
- SCBA/Smokehouse Safety Course, 8 hours
- Live Burn Safety Course, 8 hours

The above listed courses offer information to the instructor for student and instructor safety. The cover such topics as: facility selection, facility safety, pre-use facility inspections, student safety, inspection of students' equipment prior to entry into hostile environments, equipment readiness inspections, fuel for live burns, *etc.*

STUDENT INSTRUCTOR RATIO

On this incident the student to instructor ratio of 17 to 1 far exceeds the recommendations of nationally recognized standards, such as NFPA 1403, *Standards for Life Fire Training Evolutions in Structures*. The number of students exceeded the instructor's safe span of control. In this case, the only instructor present was inside the burn facility. This left no one outside for control and coordination of the incident and of the students who were not involved in this operation. There appears to have been no procedure covering this matter within the Greystone Park Fire Department.

LIVE BURN PROHIBITION BY MORRIS COUNTY PROSECUTOR

The Morris County Prosecutor, in a letter dated April 18, 1989, issued a directive that there be no live burn training evolutions in Morris County except at the Morris County Fire and Police Academy. According to Morris County Prosecutor's Office

Investigator George Wendt, copies of the letter had been delivered to all fire departments in the county, including Greystone Park Fire Department. As a result of live burn activity utilizing the bus, the Morris County Prosecutor's prohibition was again brought to the attention of the Parsippany-Troy Hills Joint Chief's Committee, which includes Greystone Park Fire Department. These presentation were made during meetings in June and November 1992 by the Parsippany-Troy Hills Police Department's Fire Department Liaison Officer.

RECOMMENDATIONS

LIVE FIRE TRAINING

As this incident explicitly confirms, live fire training evolutions can expose fire-fighter trainees to extreme danger. Such evolutions must be limited to those locations having properly designed and well maintained facilities. Training may then be conducted in a manner that reduces the inherent hazards to their lowest possible level. Such standards as N.J.S.A. 5:18C *et. seq.*, *Standards for Fire-fighter Training and Certification*; NFPA 1403, *Standards for Live Fire Training Evolutions in Structures*; and others, provide vital information about safe live fire training.

SAFETY OFFICER

On this incident the instructor retained the safety officer functions at the fire training ground. The assignment of a dedicated safety officer would lessen the load on the instructor. NFPA Standard 1500, *Fire Department Occupational Safety and Health Program* and NFPA Standard 1521, *Standard for Fire Department Safety Officer* as well as the National Fire Academy's *Incident Command System* all suggest the use of a safety officer. The Bureau strongly recommends the use of a dedicated Safety Officer on incidents that warrant the instructor to delegate this function. Any live fire training warrants the assignment of a dedicated safety officer.

STUDENT SAFETY

The *Live Burn Safety Course* pre-use checklist should have been used before any live burn evolutions. Investigators, after the fact, found that the door mechanism on the bus was broken and jammed. In addition to the primary fuel source of the couch, investigators also found the three cut down 55 gallon metal drums containing wood scraps, a can containing a small amount of fuel, one truck tire and a hollow core wooden door in the bus. The wood scraps and the truck tire were reported to have ignited and added to the fire load within the bus.

At a minimum, the following items should be considered by instructors prior to any live burn evolution commencing in any facility:^{2,3,4}

- The students had only attended classroom sessions and practical exercises without fire. This was to be their first hands-on live fire training session. This should have been considered in planning and executing the live fire practical evolutions.
- The students should have a walk-through of the facility prior to the evolution.
- The students should be inspected by their instructor for proper use of their PPE (*e.g.*, compliant PPE, serviceability of PPE, proper wearing of PPE), including SCBA (*e.g.*, compliant SCBA, cylinder pressure, serviceability of SCBA, proper donning of SCBA), prior to their entry into the hostile environment.
- There should be an emergency contingency plan in place.
- There should be a back-up crew, wearing complete PPE including SCBA, standing-by with a charged hose line in case of an emergency. *New Jersey's Fire Service Instructor Live Burn Safety Course* states:
 - Fire - a back-up crew of firefighters should be assigned to control and/or extinguish any fire which gets out of control...
 - Rescue - a back-up crew of firefighters should be assigned to rescue any endangered student(s)...
- There should be a formal firefighter accountability system in place to track the trainees and instructors.

²*Fire Service Instructor General Safety Course*, New Jersey Department of Community Affairs, Division of Codes and Standards, Bureau of Fire Safety, Trenton, NJ 1991.

³*Fire Service Instructor SCBA/Smokehouse Safety Course*, New Jersey Department of Community Affairs, Division of Codes and Standards, Bureau of Fire Safety, Trenton, NJ, 1992.

⁴*Fire Service Instructor Live Burn Safety Course*, New Jersey Department of Community Affairs, Division of Codes and Standards, Trenton, NJ, 1992.

- There should be an emergency ventilation system to clear the facility if an emergency arises.
- There should be EMS apparatus on standby for live structural fire training evolutions.
- The standby engine should be checked for proper equipment, and a fully qualified driver/operator should be assigned, prior to the evolution being initiated.
- There should be sufficient instructors, or the class should be divided into sections to allow for a proper student-instructor ratio.
- The choice of fuel should be appropriate for the type of student and the facility. The fuel chosen for this incident was inappropriate due to its high heat output and its substantial generation of smoke.
- A pre-evolution safety inspection should be made of the facility prior to its use for a live burn evolution. This would reveal any additional problems in the facility. In this incident there were additional inappropriate fuel sources in the bus.

In addition to the New Jersey Guidelines, NFPA Standard 1403, *Standard for Live Fire Training Evolutions in Structures* states:

1-3 General. Live fire training in a training center burn building, or a *suitable* acquired building is an excellent means of training firefighters. While this type of training provides high levels of realism, *it obviously carries with it most of the hazards of interior firefighting* at an actual emergency. Live fire training evolutions must be planned with great care and supervised by instructional personnel...[italics added]

It also states:

5-2.2 The instructor-in-charge of the live fire training shall determine, prior to each specific evolution, how many...backup lines will be necessary. Each hose line shall be capable of delivering a minimum of 95 gpm (360 L/min)...

Had the instructor followed the above checklist and other appropriate standards it would have been evident that the use of the bus for live fire training was extremely inappropriate.

The Bureau of Fire Safety strongly recommends that the appropriate guidance from the *Fire Service Instructor General Safety Course*, *Fire Service Instructor SCBA/Smokehouse Safety Course* and *Fire Service Live Burn Safety Course* be followed. This is to ensure student and instructor safety.

TRAINING INCIDENT COMMAND SYSTEM (ICS)

The Bureau of Fire Safety recommends that ICS be used on training evolutions. The utilization of ICS is as important on training evolutions as it is on actual incidents. It allows for safer and better run operations. On this incident, once the accident occurred, there was no one actually in command of the incident as all the firefighters and officers present immediately went into rescue mode and left no one to direct and coordinate the activity of the firefighters present. Prior assignments should have been made for Safety Officer, Back-up line officer, EMS officer, etc.

PERSONAL ALERT SAFETY SYSTEM (PASS) DEVICES

The Bureau of Fire Safety recommends that every firefighter utilizing SCBA have a PASS device, and that it be activated prior to every entry into a hostile or potentially hostile, environment. New Jersey Department of Labor Personal Protective Equipment Regulations (N.J.A.C. 12:100 *et seq.*) enacted January 4, 1993 require the use of PASS devices for interior structural firefighting for all firefighters by January 4, 1994. NFPA 1500 states that "Each member involved in rescue, fire suppression, or other hazardous duties shall be provided with and shall use a PASS device in hazardous areas."⁶

EMERGENCY MEDICAL SERVICES (EMS) SUPPORT

The Bureau of Fire Safety recommends that provisions be made for on site EMS support at live fire training evolutions. Should there be an injury the EMS personnel are on location to provide immediate treatment. The choice of the appropriate

⁶Standard 1500, *Fire Department Occupational Safety and Health Program*, National Fire Protection Association, Quincy, MA, 1992.

EMS support level must be made after consideration of the potential harm that may be caused by the type of training evolution taking place. The *Live Burn Safety Course* offers several options for providing EMS support:⁶

- Emergency Medical Personnel standing by at training area.
- Emergency Medical Personnel standing by at their headquarters.
- Radio communication with emergency medical services.
- Telephone number of emergency medical services posted.

APPROVALS/PERMITS

The Bureau recommends that the appropriate approvals and permits should always be obtained prior to any similar evolutions. Endorsement as an approved facility and eligible organization should be applied for under the Standards for Firefighter Training and Certification N.J.A.C. 5:18C *et seq.*

The Bureau also recommends that the Department of Environmental Protection and Energy be contacted for any live burn activities proposed that are not at an approved facility (*e.g.*, approved county fire academy or approved municipal fire academy). The DEPE has a process to apply for such an approval.

CRITICAL INCIDENT STRESS DEBRIEFING TEAM USE

The Bureau of Fire Safety recommends the notification and use of CISD teams when the CISD trigger events are found to be present. Such significant events may include⁷:

- line of duty death of a co-worker
- mass casualty incidents
- death of a child
- death occurring after prolonged rescue efforts
- when a victim reminds an emergency worker of a loved one
- during highly dangerous or highly visible events
- when the emergency worker influences death or injury

⁶*Op. Cit., Fire Service Instructor Live Burn Safety Course.*

⁷Trigger events information from Critical Incident Stress Debriefing Network of New Jersey.

- co-worker suicides
- any other unspecified highly traumatic event

Further information on critical incident stress debriefing is available from the CISD Network of New Jersey at (201) 592-3528. The statewide emergency contact number for activation of a CISD team is (609) 395-3600.

STUDENT-INSTRUCTOR RATIO

The Bureau of Fire Safety recommends that sufficient instructors be present for all evolutions. This is especially true for live burn evolutions. Instructors must be available both inside and outside of the burn facility, as well as to fill a dedicated safety officer position. NFPA Standard 1403 *Standard for Live Fire Training Evolutions in Structures* states that:⁸

5-2.2 The instructor-in-charge of the live fire training evolutions shall...

- (a) Assign one instructor to each functional crew, which shall not exceed 5 students;
- (b) Assign one instructor to each "backup line";...
- (c) Assign one additional instructor for each additional functional assignment.

5-2.3 Additional safety personnel, as deemed necessary by the safety officer, shall be strategically placed within the structure to react to any unplanned or threatening situation or condition.

6-1.2 The participating student-instructor ratio shall not be greater than 5 to 1.

CONTINGENCY PLAN

A contingency plan for potential outcomes of the training evolution should have been prepared prior to initiation of the evolution by the instructor. The information provided in Module 5 of the *Fire Service Instructor Live Burn Safety Course* states in part:⁹

⁸NFPA Standard 1403, *Live Fire Training Evolutions in Structures*, National Fire Protection Association, Quincy, MA, 1992.

⁹*Op. Cit.*, *Fire Service Instructor Live Burn Safety Course*.

Contingency plans should be well established before the initiation of a live burn structural evolution...

The section continues by covering some of the areas that should be considered in the contingency plan:

Medical Emergencies Prepare for medical emergencies...

Uncontrolled Fire During live burn structural fire simulation evolutions, the Fire Service Instructor should make preparations to respond to uncontrolled fire...

Toxic Vapors During live burn structural fire simulation evolutions, the Fire Service Instructor should respond to a shift in smoke directions or increase in volume that threatens personnel...

The Bureau of Fire Safety recommends the preparation of a contingency plan to allow for an appropriate and rapid response to any foreseeable situations that may arise during any live burn evolution.

TRAINING ORGANIZATION NAME

The Bureau of Fire Safety strongly recommends that fire departments inquire into whether organizations or entities using such titles as "New Jersey State Fire Service Training Academy" or using the New Jersey State Seal are actually state agencies. The use of "New Jersey State" and the New Jersey Seal connotes official state authorization. Guidance was sought from the New Jersey Department of the Treasury, General Services Administration (GSA). Mr. Edward Krupa, of the GSA, stated that the use of the state seal by a non-State of New Jersey government entity such as the "New Jersey State Fire Service Training Academy" would have required the approval of the Secretary of State. The use of the title and/or state seal may not be legitimate.

PRESENT APPROVAL/PERMIT PROCESS FOR LIVE FIRE TRAINING

The Bureau of Fire Safety recommends that the appropriate approvals and permits should always be obtained prior to any similar evolutions. Endorsement as an approved facility and eligible organization should be applied for under N.J.A.C. 5:18C *et. seq.*, *Standards for Firefighter Training and Certification*.

The Bureau also notes the requirement that the Department of Environmental Protection and Energy (DEPE) be contacted for any proposed live burn activities that are not being conducted at an approved permanent fire service training facility.

LEGISLATIVE ACTION FOR LIVE FIRE TRAINING PERMITS

The potential for serious injury or death exists in all live fire training activities. This is seen in this instance and in other instances across the state and nation. Currently in New Jersey there is no permitting process in place allowing the Bureau of Fire Safety to regulate all live fire training activities. Nor is there any mechanism in state regulations to assure that all necessary safety precautions are taken during live fire training evolutions.

The existing training regulations (N.J.A.C. 5:18C *et. seq.*, *Standards for Firefighter Training and Certification*) are voluntary standards. They do not contain provisions for permits for the live fire training process, although the Bureau would review any applications submitted to DEPE. Legislation should be enacted, and regulations promulgated, to require fire service training organizations (fire departments, fire academies, *etc.*) to apply to the Bureau of Fire Safety for live burn training permits. The Bureau should have the ability to either approve the application as it was submitted, or deny an application for failure to meet the regulations. Applications denied should have the cause for denial stated and what measures are needed to bring the application into compliance, if possible.

These applications should contain such information as:

- The date and time of the evolution(s)
- The site of the evolution(s)
- Course objective(s)
- The building/simulator to be used
- The fuel(s)
- The plans (lesson plans, safety plan, contingency plan, *etc.*)
- Diagram of scenario

- Adherence to N.J.A.C. 5:18C *et. seq.*, *Standards for Firefighter Training and Certification*
- Adherence to NFPA 1403, *Standards for Live Fire Training Evolutions in Structures*
- Sign-off by the New Jersey Department of Environmental Protection and Energy for appropriate pollution controls
- For live fire training evolutions that are proposed to be held at a site other than a permanent fire service training facility, assurance that the activity cannot be duplicated at such a pre-approved site.

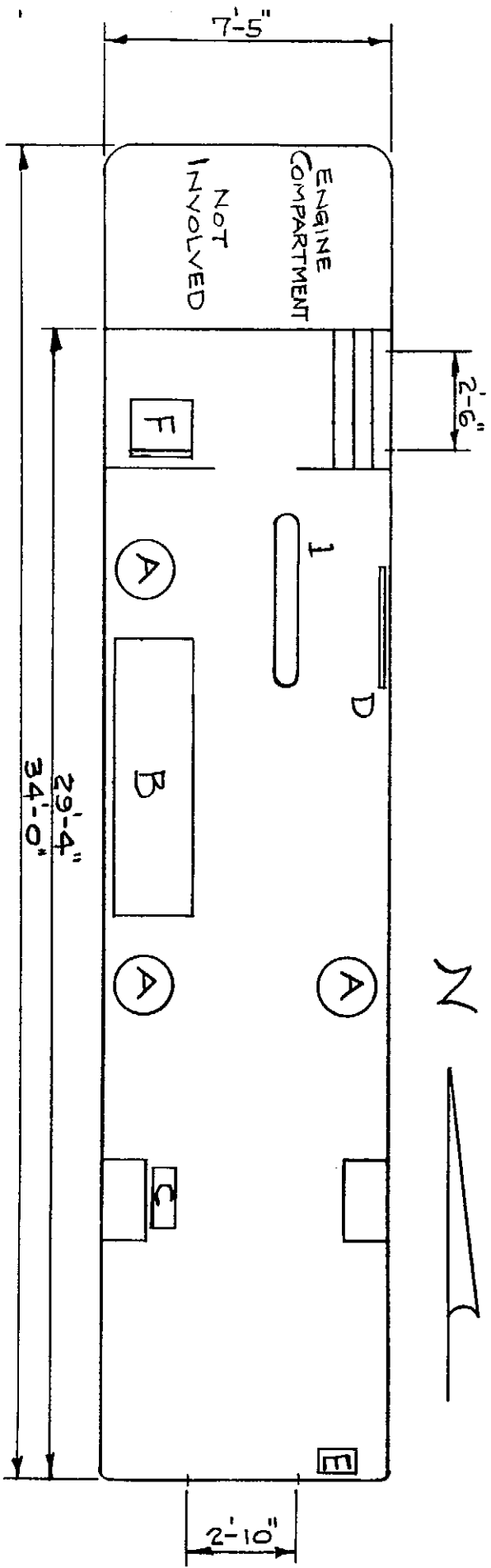
The Bureau of Fire Safety should observe a sample of all live burn evolutions in order to assure compliance. Provisions should be made to allow negative sanctions to be taken against any persons and/or organizations that violate the regulations. Considerations should be given to "one-time" permits for permanent, recognized, fire service training facilities that conduct the same evolution repeatedly for such classes as Firefighter I and Self Contained Breathing Apparatus Training. This "one-time" permit could be made a part of the package required for initial approval of the facility and the course through the approval process for a permanent training facility. It could also be a part of the package required for approval of an acquired or temporary site. Both of these existing approvals for fixed and acquired or temporary sites are currently included in N.J.A.C. 5:18C *et. seq.*, *Standards for Firefighter Training and Certification* and are applied for whenever an organization voluntarily applies for eligibility.

CONCLUSION

This unfortunate incident and its resultant injuries could have been avoided if the proper facility had been utilized and if proper safety precautions were followed. There are appropriate facilities in Morris County to carry out the planned evolutions.

Fire departments, fire instructors, and training academies must ensure that all possible safety measures are complied with during any training evolution. Instructors should be trained and experienced in their field of training and must carry out their duties in a safe and recognized manner. The recruit firefighters may not have a thorough understanding of training evolution dangers. The students rely on the fire service instructors for their personal safety. The fire service instructor cannot permit this trust to be violated. Firefighter safety must be the fire service instructor's primary focus above all other training concepts and goals.

APPENDIX A
DRAWING OF BUS INTERIOR



NOTE: ALL DIMENSIONS ARE APPROXIMATE

DATE: DECEMBER 21, 1992

LEGEND

- A - HALF CUT 55 GALLON DRUMS WITH WOOD AND DIESEL FUEL
- B - FOAM RUBBER SOFA
- C - TRUCK TIRE
- D - WOOD DOOR ON EDGE
- E - 5 GALLON CAN WITH SMALL AMOUNT OF DIESEL FUEL
- F - FOAM RUBBER DRIVER'S SEAT

1 - VICTIM LOCATION

APPENDIX B
NIST COMPUTER MODEL OF INCIDENT



NIST

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899

February 17, 1993

Mr. James Dolan
Bureau Chief
Bureau of Fire Safety
101 S. Broad St, CN 809
Trenton, NJ 08625

Dear Jim:

A few weeks ago you requested that BFRL analyze an incident involving injuries to several firefighter trainees to try to estimate the exposure of the victims. This report documents that analysis. Per your request I have examined the conditions to which the firefighter trainees might have been exposed in this training accident. From the drawings, accident reports, and investigative reports which you provided to me, my understanding of the incident is given in the following section.

Background

On the morning of December 6, 1992 a training accident occurred when the Greystone Park Fire Department was holding a Firefighter I Basic Training School at the Township of Parsippany-Troy Hills Sewage Treatment Plant on Edwards Road in Parsippany, New Jersey. Three firefighter trainees were injured when exposed to high temperatures within an old school bus that was used as a "smoke house".

The school bus measured approximately 2.3 meters (7 ft 5 inches) wide by 10.4 m (34 feet) long overall. The passenger compartment was 8.9 m (29 ft 4 inches) long minus the front engine compartment. Interior height was 1.8 m (6 ft 1 inch). The front door measured 0.5 m (1 ft 8) inches wide by 2 m (6 ft 6 inches) high, and the rear door measured 0.85 m (2 ft 10 inches) wide by 1.4 m (4 ft 6 inches) high. Window openings had been covered over with steel plates and provided negligible ventilation.

The passenger seats had all been removed, but the drivers seat remained. there were three, half-cut 55 gallon drums into which pieces of 2x4's were normally burned with a small quantity of diesel fuel as a source of smoke. There was also a 20 inch truck tire and a hollow core door measuring 0.9 m (34 inches) wide by 2.1 m (7 feet) high, lying along one wall.

The usual training exercise conducted in this bus was to burn pieces of 2x4 soaked in diesel fuel to produce heavy smoke and little heat. Trainees would be sent into the bus in turnout gear and breathing apparatus to crawl along on simulated search and rescue. This day, it was decided to give the trainees an experience with a fully developed fire; so a sofa (described as 1.8 m - 6 ft long burlap covered foam rubber -- more likely a polyolefin over polyurethane) was placed within the bus in the center along one wall. The sofa was ignited using shredded paper and a flare, and allowed to burn with the doors closed for about five minutes. The rear door was opened and the three trainees entered on their hands and knees.

After all three had gone in, they began to scream about it being too hot and the last two came out the way they came in. Firefighters outside tried to open the front door -- but it was jammed. Finally, the third trainee was removed by rescuers. They found that he had lost his mask, and his turnout gear was burned and smoldering.

The Analysis

The scenario described above was analyzed using NIST's CFAST (v1.6.2) fire model. The sofa was modeled with data for the sofa coded F32 described in the FIREDATA database of HAZARD I. The thermophysical properties used for the bus was the SHIP1 data included in the CFAST Thermophysical Properties database (these are data for the metal walls of a ship).

Three runs were made. The first, labeled **base** had the front door closed throughout and the rear door opened at 5 min (300 s). The second, labeled **opened together** had both the front and rear doors opened together at about 5 min (300 s). The third, labeled **always open** had both doors open continuously from the time of ignition of the sofa. The purpose of the three runs examined is to determine the potential effects of variations in ventilation.

Results

The rate-of-energy-release for the sofa which was input to the calculation is shown in figure 1. While the precise rate of involvement of the sofa in the incident is unknown, it should be similar to the

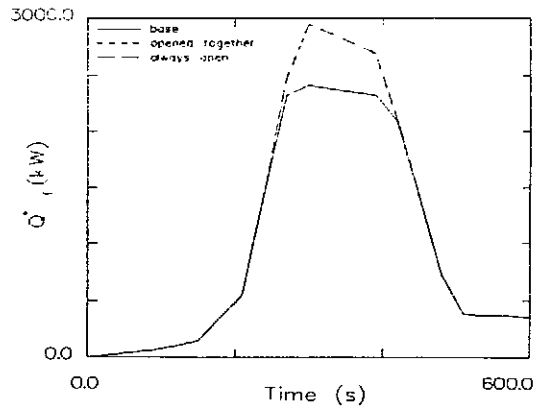


Figure 1 - Rate of energy release

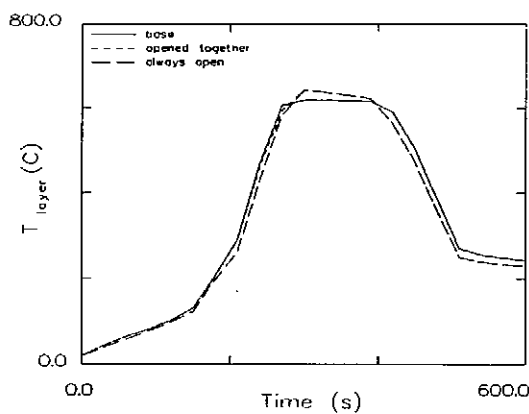


Figure 2 -Upper Layer Temperature

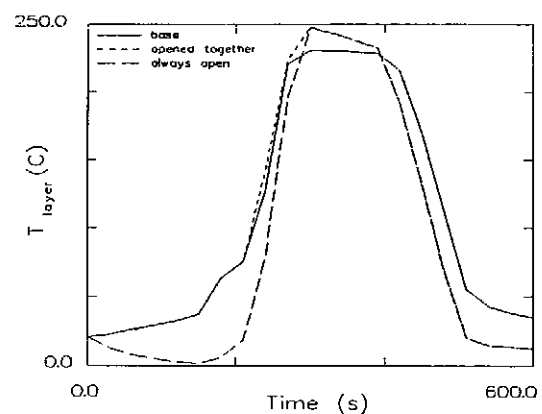


Figure 3 - Lower layer Temperature

experimental data used since it is described as a fabric-on-foam construction. Note that only when the doors were **always open** is there a difference -- the increased burning at the peak allowed by the increased ventilation. If one or both doors were opened at 300 s, no difference in burning rate is observed. Thus, if there were air leakage from windows or other small openings in the old bus, they would not have a noticeable effect. The burning rate of the sofa used in the calculation reaches its peak within the first four minutes after it is ignited.

Upper and lower layer temperatures are shown in figures 2 and 3 respectively. Again, there is little sensitivity to additional openings except for the lower layer temperatures being colder initially as (cold) outside air is brought in (the outdoor temperature that day was about 0 °C - 30 °F). The calculation shows the layer interface was at about 0.3 m (1 ft) from the floor after about three minutes (figure 4) this should represent the conditions during the time of exposure. The calculation predicts that the victims were exposed to a temperature of about 600 °C (1112 °F) over most of their bodies, presuming that they were on their hands and knees. Further, their backs were receiving flux levels of about 35 kW/m² (figure 5). This is a very high flux level -- sufficient to burn the turnout gear which they were wearing as was observed.

It is interesting to note that the prediction did not show any flames exiting the open rear door. The typical presumption with such a large fuel source in a small volume is that excess fuel would be produced, resulting in a burning door jet. A backdraft situation was also considered possible based on the scenario described. The calculation indicates that the conditions for a backdraft (significant unburned fuel and production of a pressure pulse on the introduction of air as the door was opened) were not even approached. In reviewing the narratives of all of the witnesses none reported flames out the door, confirming the calculation.

Prediction Accuracy

Since the exposures were short and the firefighters were wearing breathing apparatus, the primary concerns are with thermal exposures. In comparing the predictions of CFAST to experiments, temperatures are reproduced to an accuracy of 20% to 50% with upper layer temperatures overpredicted and lower layer temperatures underpredicted. The relative insensitivity of the

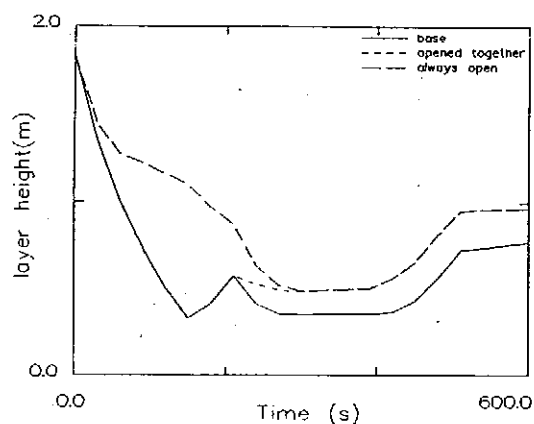


Figure 4 - Layer height

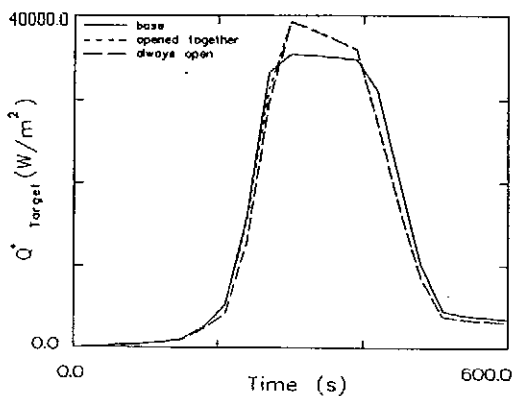


Figure 5 - Radiation to the floor

predictions for this case to variations in ventilation conditions support estimates of accuracy in this range and give confidence in the time lines presented. Finally, the facts that no flames were predicted or observed in the doorway and that the turnout gear on the victims was beginning to ignite as they were extracted lend credence to the prediction.

If you have any questions on this, please let me know.

Sincerely,

Richard W. Bukowski, P.E.
Senior Research Engineer
Building and Fire Research Laboratory

APPENDIX C
NIOSH SCBA EVALUATION



NIOSH Reference: TN-06537

Centers for Disease Control
National Institute for Occupational
Safety and Health - ALOSH
944 Chestnut Ridge Road
Morgantown, WV 26505-2888

May 14, 1993

Detective George Wendt
Arson Unit
Office of the Prosecutor
County of Morris
Courthouse
P.O. BOX 900
Morristown, New Jersey 07963-0900

Dear Detective Wendt:

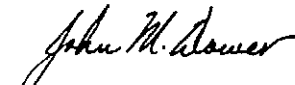
This letter is in response to your request that the National Institute for Occupational Safety and Health (NIOSH) examine a self-contained breathing apparatus (SCBA) used in an incident which resulted in an injury to a firefighter. The apparatus in question was reported to be a Scott IIA, SCBA.

The SCBA was tested at the NIOSH facility in Morgantown, West Virginia, on May 4, 1993. Selected tests were conducted to determine whether or not the SCBA remained in a condition as originally approved by NIOSH. Due to the condition of the facepiece received with the SCBA, a replacement facepiece was used during testing.

The SCBA was badly damaged and did not contain a NIOSH approval label, but appeared to be a standard Scott IIA, 30-minute, 2216 psig, SCBA. The SCBA met the requirements of all tests that were conducted and performed as originally approved. The specific test requirements can be found in Title 30, Code of Federal Regulations, Part 11, Subpart H. Copies of the NIOSH test and inspection reports are enclosed.

The SCBA is being returned under separate cover. If you have any questions or comments, do not hesitate to contact this office at (304) 284-5713.

Sincerely yours,


John M. Dower, M.S.S.E., M.S.I.H.
Senior Industrial Hygienist
Certification and Quality
Assurance Branch
Division of Safety Research

2 Enclosures

National Institute for Occupational Safety and Health
Certification and Quality Assurance Branch
Air Supplied Respirator Section

Pre-Test Inspection

TN-06537
Scott IIA SCBA
Non-Conformance Investigation
Tim Merinar
May 4, 1993

I. Background

In a letter dated April 13, 1993, Detective George Wendt, Office of the Prosecutor, County of Morris, Morristown, New Jersey, requested that NIOSH examine one Scott IIA self-contained breathing apparatus (SCBA). This respirator was being used in a live fire training exercise being conducted by the Greystone Park Fire Department Fire Training Academy. During the training exercise, on December 6, 1992, three firefighters were injured in a flashover. The training exercise was being conducted in a school bus, used to simulate a burning building.

One of the injured firefighters suffered severe inhalation burns. He was found on the floor of the bus, unconscious. The harness straps were burned completely off of the apparatus. The facepiece was still attached to the victims face, but the male end of the breathing tube was disconnected from the regulator. The breathing tube was found in the victim's left hand, tucked inside his turnout coat.

The respirator was received at NIOSH on April 14, 1993, and stored under lock in Room 178B prior to testing. The respirator was examined and tested by ASRS/CQAB personnel on May 4, 1993.

II. Examination

A cardboard box marked "From: Office of the Prosecutor, County of Morris, Morristown, New Jersey, was opened at 9:00 am, Tuesday, May 4, 1993. The box contained a letter addressed to NIOSH and a Scott IIA SCBA wrapped in a clear plastic bag. The box also contained a paper bag which contained a facepiece and breathing tube.

The general condition of the respirator was dirty and worn. The SCBA components appeared to have been exposed to heat and/or flames. All components were dirty and covered with varying degrees of what appeared to be soot and fire debris.

The SCBA was examined component by component in the condition as received.

Facepiece

The facepiece was marked with an evidence tag which bore the information:

<u>12/7/92</u> Date	<u>Parsippany</u> Town/Agency	<u>92-850</u> Case NO.
<u>Scott 2A Face Piece</u> Article	<u>Tot JWV. Dekler by Det. Wendt [sic]</u> Location	
<u>Inv. Dekler</u> Collecting Officer	<u>Inv. Dekler</u> Bagging Officer	

A breathing tube was connected to the facepiece. The male end on the breathing tube that connects to the regulator was intact but dirty. Dirt or debris was in the threads and also inside the tube. A red metal tag was on the male hose connection. The tag was not legible. The hose was otherwise intact.

The facepiece was also dirty and covered with debris. The facepiece showed evidence of exposure to heat and/or flame. The right side of the lens retaining ring was slightly melted. The lower portion of the lens was covered with what appeared to be some type of plastic material. This material was a tan to light brown color and appeared slightly porous. The lens itself was scratched and dirty. The lens was so dirty that you could not see clearly thru it.

The date code on the facepiece was not legible. The numbers in the center of the date code appeared to be 74-75-76.

The pull tabs on the facepiece head harness were broken off on the right side of the harness. The facepiece did not contain a nose cup. The facepiece was otherwise intact.

The exhalation valve was marked with a Scott label which was only partially legible. The valve body was marked B4 1016000.

Note: The breathing tube threads were cleaned and the tube was connected to the regulator. The connection was tight and secure.

Backframe

The nylon straps were completely melted in-two and showed other evidence of exposure to heat and/or flame. The backframe was dirty. No cylinder was received with the backframe.

The cylinder retaining band had a Scott label that was not legible.

The backframe was marked with a label which said "Parsippany R. N. District Five."

The backframe also bore a fire fighter decal that was not legible but contained what appeared to be:

"655
P...
F. 655 D.
Dist. 5"

The backframe bore a property tag which said:

"Property of
Rockaway Neck
Vol. Fire Co.
00310"

No NIOSH approval label was present on the backframe or the apparatus.

High Pressure Hose

The high pressure hose outer protective cover was slightly blistered from exposure to heat and/or flame. The cylinder connector was intact, including the "o" ring inside the cylinder connector.

The hose connection to the regulator turned freely.

Numbers stamped on the hose ferrule end closest to the regulator were not completely legible. The numbers appeared to be "4C...S".

Regulator

The regulator body showed evidence of exposure to heat and/or flame. The red bypass knob was partially melted. The mainline valve knob was slightly deformed. The pressure gauge lens was melted, completely obscuring the gauge.

The regulator was received with the donning switch in the off position. This is the demand mode position. The mainline valve was fully open. The bypass valve was in the fully closed position.

All valves turned freely when activated.

The regulator outlet (connection to the breathing tube) was dirty with some debris inside the outlet. The "o" ring was intact.

The regulator body was marked:

"Scott Air-Pak II
S/N 38-20 0233
S00212-04"

A fire fighter decal on the regulator was not legible.

III. Summary

The apparatus did not contain a NIOSH approval label but appeared to be a Scott IPA SCBA, TC-13F-40.

Although damaged by exposure to heat and/or flame, the apparatus was determined to be safe to test.

Following testing the respirator was stored in Room 178B pending return to Detective Wendt.

National Institute for Occupational Safety and Health
Certification and Quality Assurance Branch
Air Supplied Respirator Section

Test Report

TN-06537
Scott
Mike Commodore
May 5, 1993

I. Background:

On May 4, 1993 one Scott, TC-13F-40 was received from the field problem coordinator for testing.

II. Test Outline:

- Notes:
1. No cylinder was received with the unit, therefore all testing was conducted using either the test stand or a NIOSH cylinder as a substitute.
 2. All testing was conducted with the regulator donning switch in the normal use mode (positive pressure on).
 3. Due to the condition of the facepiece, all testing was conducted using a substitute facepiece except for the exhalation resistance test which was conducted using the facepiece received with the unit.
 4. In addition to the following tests the function of the donning switch was checked and it operated normally.

A. Positive Pressure Test - 11.70(a)(2)(ii)

Procedure -

A breathing machine with a 622 kg.-m./min. cam operating at 24 RPM with a 40 Lpm vol. (115 LPM peak flow) is connected to an anthropometric head for cycling. A pressure tap in the head is connected to a transducer which in turn is connected to a strip chart recorder for determining the pressure in the facepiece.

Results -

The breathing curve remained positive (i.e. above ambient) when tested with 2200 psig, 1500 psig, 1000 psig, and 500 psig.

The unit passes the requirement.

B. Breathing Resistance Test; Exhalation Sec. 11.85-6.

Procedure -

The mask is mounted on a head form. The probe in the head form is connected to a slant manometer for measuring static pressure. Then 85 Lpm is injected into the head form and the exhalation resistance is measured.

Results -

Exhalation Resistance	2.82 " H ₂ O
Static Pressure	1.30 " H ₂ O
Difference	1.52 " H ₂ O

The unit passes the requirement.

C. Gas Flow Test - Sec. 11.85-8

Procedure -

A pressure tap in the anthropometric head is connected to a slant tube manometer for determining when the pressure inside the facepiece is at zero. A mass flow meter is connected in line between the anthropometric head and an adjustable vacuum source to measure flow. The SCBA cylinder is replaced by a test stand which is adjusted initially to full cylinder pressure. The vacuum source is adjusted during the test to maintain the required pressure inside the facepiece. The procedure is then repeated with the test stand adjusted to 500 psig.

Results -

Full Cylinder Pressure - 305.87 Lpm

500 psig - 226.56 Lpm

The unit passes the requirement.

D. Remaining Service Life Indicator - Section 11.82(F)

Requirement -

Each remaining service life indicator or warning device shall give an alarm when the remaining service life of the apparatus is reduced within a range of 20 to 25% of its rated service time or pressure.

Procedure -

To measure the pressure at which the alarm sounds, a calibrated gauge is connected in line between the air supply bottle and the

regulator. The unit is then bled down through the regulator bypass valve. When the alarm sounds, the pressure on the gauge is noted. This procedure is repeated six times.

Results -

Pressure (psig)	PASS	FAIL
550	X	
550	X	
550	X	
545	X	
545	X	
545	X	

The unit passes the requirement.

E. Special Test - Bypass Flow - Sec. 11.63(c)

Requirement -

All variable bypass valves must provide greater than or equal to 130 Lpm of air when the bypass is in the full open position and the unit is provided with 20 to 25 percent of full cylinder pressure.

Procedure -

The facepiece is put in an airtight tank and the tank is connected to a mass flow meter. The test stand is substituted for the air cylinder and adjusted to 20 and 25 percent of full cylinder. The readings are taken from the mass flow meter. The main line is completely closed and the bypass is completely open.

Results -

<u>Supply Pressure</u>	<u>LPM</u>
443 psig or 20%	453.0
554 psig or 25%	529.6

The unit passes the requirements.

III. Disposition:

On May 4, 1993 after testing was completed, the unit was returned to the field problem coordinator.

APPENDIX D
INJURED FIREFIGHTERS' EQUIPMENT INSPECTION

INJURED FIREFIGHTERS' EQUIPMENT INSPECTION

Firefighter Anthony Filippone

Turnout Coat

Manufacturer: Globe
Date of Manufacture: March 1991
Serial Number: 507809
Shell Material: 40% PBI/60% Kevlar
Liner Material: Quilted Aramid
Labeled: NFPA 1971-86

There was severe thermal damage to coat on the back and sleeves, Scotchlite reflective material burned off. The coat was destroyed.

Turnout Pants

Manufacturer: Globe
Date of Manufacture: March 1991
Serial Number: 507819
Shell Material: 40% PBI/60% Kevlar
Liner Material: Quilted Aramid
Labeled: NFPA 1971-86

There was severe thermal damage to the pants, Scotchlite reflective material burned off. The pants were cut off by EMS.

Helmet

Manufacturer: Cairns
Model: Metro N660C
Date of Manufacture: Undetermined
Serial Number: Undetermined
Shell Material: Composite Fiberglass
Labeled: NFPA 1972-85

There was severe thermal damage to the outer shell. The entire surface burned of the helmet had burned off leaving the fiberglass fibers exposed. The face shield was melted/burned off of the helmet (a portion was found fused to the SCBA face piece). The helmet strap burned/melted off. The helmet was destroyed.

Hood

Manufacturer: Undetermined
Model: Undetermined
Date of Manufacture: Undetermined
Material: 20% PBI/80% FR Rayon
Labeled: Cal-OSHA

There was severe thermal damage to the hood in areas not covered by other PPE. The hood burned through in areas that were exposed to heat/flame. The hood was destroyed.

Boots

Manufacturer: Ranger
Model: Fire Walker
Date of Manufacture: Undetermined
Labeled: NFPA 1974-87

There was no perceptible damage and the boots appear serviceable.

Gloves

Manufacturer: Tempo
Model: Tempo Max?
Date of Manufacture: Undetermined
Material: Leather Shell/Wool Liner
Labeled: Undetermined

Only the left glove is available, the right glove was left on FF Filippone for removal at St. Barnabas. The glove present showed heavy thermal damage. The gloves were destroyed.

Personal Alert Safety System (PASS) Device

None found

Self Contained Breathing Apparatus (SCBA)

Manufacturer: Scott Aviation
Model: Scott Model II (upgraded to pressure/demand)
Serial Number: 38-200233
Model Number: S00212-04
Date of Manufacture: period between 1974 and 1977
Last Hydro Test: 10/92
Labeled: Undetermined

All back pack straps were burned/melted off (nylon straps-not upgraded kevlar), the entire Air-Pak shows heavy thermal damage. The gauge and rubber bumper melted. Face piece shows heavy thermal exposure, but is basically intact. The face shield from the helmet is melted to the SCBA face piece front at the bottom of the lens.

Firefighter Jeffrey Berry

Turnout Coat

Manufacturer:	Morgan Fire-Dex
Date of Manufacture:	December 1988
Serial Number:	Undetermined
Shell Material:	Undetermined
Liner Material:	Undetermined
Labeled:	Undetermined

There was severe thermal damage to the coat. It was burned through in several areas and the bottom of coat had disintegrated. The investigators could not determine coat material or if it was listed as approved by any agency. The coat was destroyed.

Turnout Pants

Manufacturer:	Globe
Date of Manufacture:	February 1988
Serial Number:	108327
Shell Material:	Undetermined
Liner Material:	Undetermined
Labeled:	NFPA 1971-86

There was severe thermal damage to the lower leg areas of the pants. The Scotchlite reflective material was burned off. It was noted that what appears to be an SCBA waist strap buckle (Scott II style - Filippone's?) was found fused to the knee area of the pants. The pants were destroyed.

Helmet

Manufacturer:	Undetermined (possibly Safeco or Bell)
Model:	Undetermined
Date of Manufacture:	Undetermined
Serial Number:	Undetermined
Shell Material:	Undetermined
Labeled:	Undetermined

There was severe thermal damage to the helmet's outer shell and face shield. Burn patterns on ear laps indicate that they were not in use at the time of the injury. The helmet was destroyed.

Hood

Manufacturer:	Undetermined
Model:	Undetermined
Date of Manufacture:	Undetermined
Material:	20% PBI/80% FR Rayon
Labeled:	Cal-OSHA & NFPA

There was charring to the hood in areas not covered by other PPE. The hood is probably no longer serviceable.

Boots

Manufacturer:	Ranger
Model:	Fire Master
Serial Number	108327
Date of Manufacture:	Undetermined
Labeled:	NFPA 1974-87

There is no perceptible damage and the boots appear serviceable.

Gloves

Manufacturer:	Fire Grip
Model:	Style 1000
Date of Manufacture:	March 29, 1985
Material:	Undetermined
Labeled:	#236-R5?

The gloves both show damage to the finger areas from heat and are probably no longer serviceable.

Personal Alert Safety System (PASS) Device (Attached to 2)

Manufacturer:	Undetermined
Model:	PAL III
Serial Number:	64167
Labeled:	NFPA 1982-88

The PASS device appears serviceable.

Self Contained Breathing Apparatus (SCBA)

Manufacturer:	Scott Aviation
Model:	Scott 4.5
Serial Number:	9750251
Model Number:	Undetermined
Date of Manufacture:	period between 1989 and 1992
Last Hydro Test:	Undetermined
Labeled:	NFPA 1981-87
Face piece:	Upgraded face piece with speaker ports

The entire Air-Pak showed moderate damage from heat. The gauge lens and bumper were melted.

Firefighter Richard Van Orden

Turnout Coat

Manufacturer:	Morning Pride
Date of Manufacture:	Undetermined
Serial Number:	Undetermined
Shell Material:	40% PBI/60% Kevlar
Liner Material:	"100% Teflon based vapor barrier"
Labeled:	NFPA 1971-?? / 1910.156

There was moderate damage to the coat. There was discoloration in several areas on the back (where not shielded by Air-Pak) and sleeves that are consistent with exposure to high heat conditions. The coat is no longer serviceable.

Turnout Pants

Manufacturer:	Morning Pride
Date of Manufacture:	Undetermined
Serial Number:	Undetermined
Shell Material:	40% PBI/60% Kevlar
Liner Material:	Undetermined
Labeled:	NFPA 1971-??

There was damage to the pants from the knees down. There was discoloration in the cuff area consistent with exposure to high heat. The pants are probably no longer serviceable.

Helmet

Manufacturer:	Cairns
Model:	Century N880
Date of Manufacture:	Undetermined
Serial Number:	Undetermined
Shell Material:	PPC Lexan
Labeled:	OSHA

There was severe thermal damage to the helmet's outer shell. The face shield and helmet strap were melted. The helmet was destroyed.

Hood

Manufacturer: PGI
Model: Undetermined
Date of Manufacture: Undetermined
Material: PBI/FR Rayon Blend
Labeled: Cal-OSHA & NFPA

There was charring to hood in areas not covered by other PPE. The hood probably is no longer serviceable.

Boots

Manufacturer: Morning Pride
Model: Undetermined
Serial Number Undetermined
Date of Manufacture: Undetermined
Labeled: NFPA 1974-?? / NFPA 1500

There was no perceptible damage to the boots and they probably are serviceable.

Gloves

Manufacturer: Richmond?
Model: Undetermined
Date of Manufacture: Undetermined
Material: Undetermined
Labeled: CFR 1910.156

The gloves both show exposure to heat, but may be serviceable.

Personal Alert Safety System (PASS) Device

Manufacturer: Antenna Specialists
Model: Lifeguard IV
Serial Number: Undetermined
Labeled: NFPA 1982-88

The PASS device appears serviceable.

Self Contained Breathing Apparatus (SCBA)

Manufacturer:	Scott Aviation
Model:	Scott 2.2
Serial Number:	6840303
Model Number:	Undetermined
Date of Manufacture:	period between 1987 and 1990
Last Hydro Test:	Undetermined
Labeled:	NFPA 1981-87
Face piece:	Original type face piece

The entire Air-Pak showed moderate damage from exposure to heat. The gauge lens and rubber bumper were melted.

APPENDIX E
REFERENCES

REFERENCES

1992 Fire Department Directory, New Jersey Department of Community Affairs, Division of Codes and Standards, Bureau of Fire Safety, Trenton, NJ, 1992.

Fire Department Occupational Safety and Health Program, National Fire Protection Association, Quincy, MA, 1922.

Fire Department Safety Officer, National Fire Protection Association, Quincy, MA, 1922.

Fire Service Instructor General Safety Course, New Jersey Department of Community Affairs, Division of Codes and Standards, Bureau of Fire Safety, Trenton, NJ, 1991.

Fire Service Instructor Live Burn Safety Course, New Jersey Department of Community Affairs, Division of Codes and Standards, Bureau of Fire Safety, Trenton, NJ, 1992.

Fire Service Instructor SCBA Smokehouse Safety Course, New Jersey Department of Community Affairs, Division of Codes and Standards, Bureau of Fire Safety, Trenton, NJ, 1991.

Incident Command System, United States Fire Administration, National Fire Academy, Emmitsburg, MD, 1989.

Live Fire Training Evolutions in Structures, National Fire Protection Association, Quincy, MA, 1922.

APPENDIX F
MORRIS COUNTY PROSECUTOR'S OFFICE
UNAUTHORIZED BURNING DIRECTIVE



LEE S. TRUMBULL
County Prosecutor

OFFICE OF THE PROSECUTOR
COUNTY OF MORRIS

Courthouse
Morristown NJ 07960
201-285-6200

JOHN J. O'REILLY
First Assistant Prosecutor
KAREN LEE BARRETT
Deputy First Assistant Prosecutor
CHARLES H. COE
Chief of Investigations

TO: ALL COUNTY FIRE CHIEFS

FROM: LEE S. TRUMBULL
MORRIS COUNTY PROSECUTOR *L.S.T.*

DATE: APRIL 18, 1989

SUBJECT: UNAUTHORIZED BURNING

It has been brought to my attention that there have been several incidents where buildings have been set on fire for the purpose of fire training exercises. This memo is being issued as a directive that all such exercises shall cease immediately.

The New Jersey Administrative Code Title 7, Chapter 27, Subchapter 2, entitled "Control and Prohibition of Open Burning", clearly states that the burning of a structure is a violation of this Act. This Code is enforced by the Department of Environmental Protection. Violation of this Act can bring fines of up to \$1,000.

The only exception to this statute is burning that takes place for training purposes at a permanent fire training facility.

As of the date of this letter, any fire intentionally set in any building in Morris County will be dealt with as an Arson. For your convenience, I have attached a copy of the appropriate statute.

If you have any questions regarding this matter, please contact Investigator Paul Sagal or Investigator George Wendt of the Arson Unit at 285-6200.

Thank you for your anticipated cooperation.

LJH/LST/mc
25/45

Enclosure
cc: Morris County Police Chiefs

APPENDIX G
NEW JERSEY AND MORRIS COUNTY MAPS

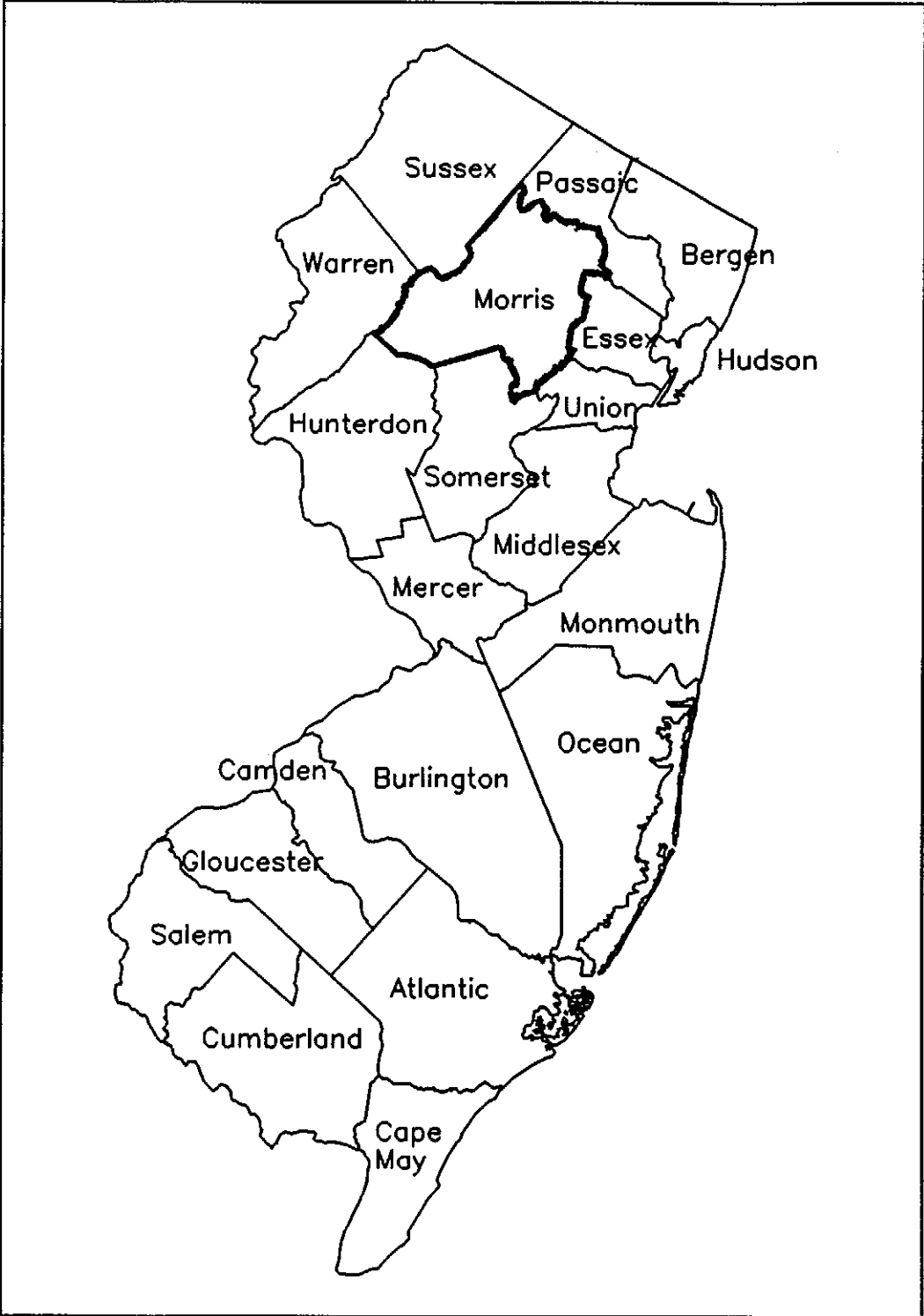


Figure 1 New Jersey Counties Map

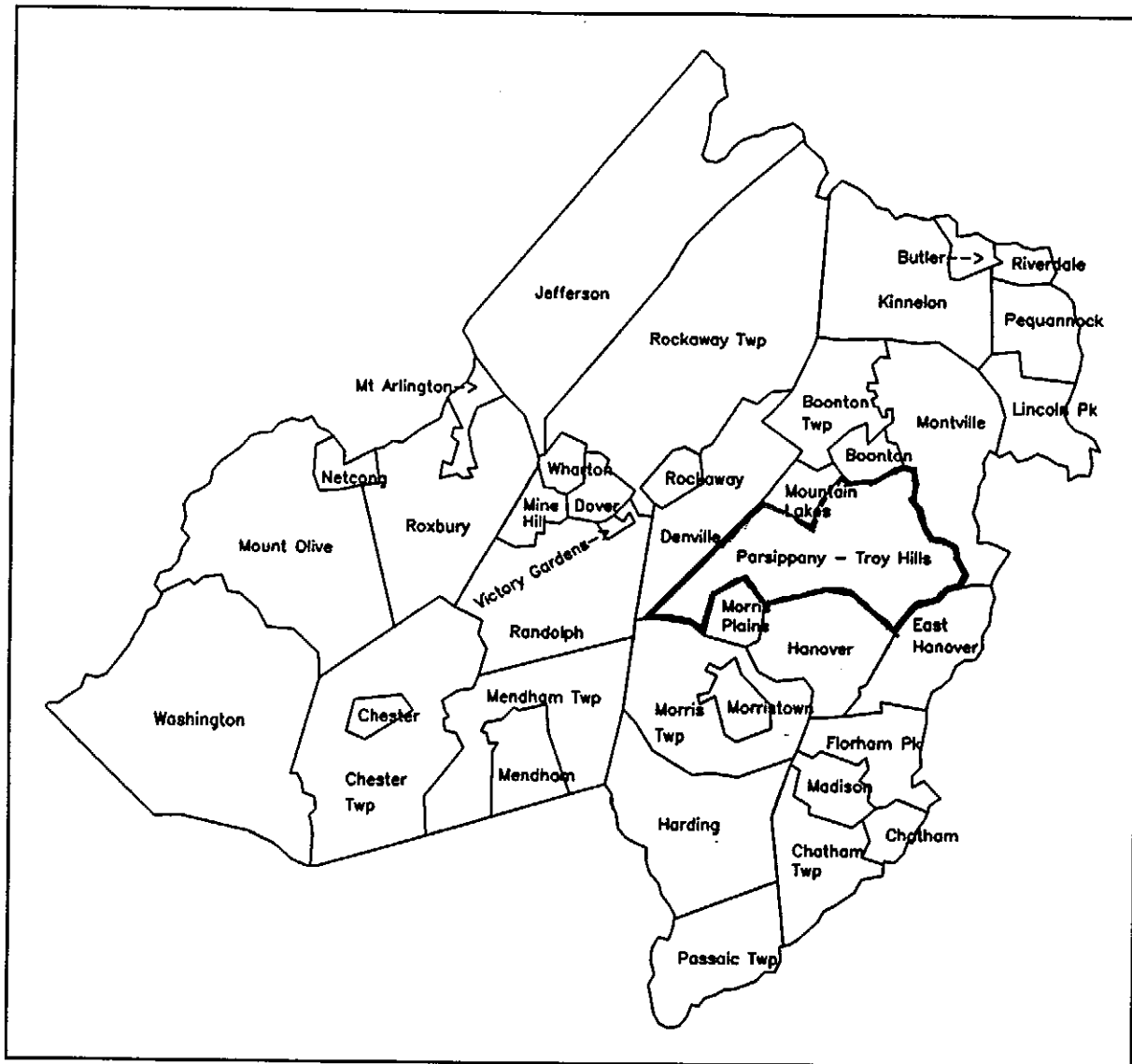


Figure 2 Morris County