



**FIREWORKS MANUFACTURER
AND DISTRIBUTOR**

Jaffrey, NH
August 14, 1988



**FIRE
INVESTIGATIONS**

NATIONAL FIRE PROTECTION ASSOCIATION

1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101 USA
Telephone: 1-617-984-7263 E-mail: investigations@nfpa.org



National Fire Protection Association

International

Executive Offices
Batterymarch Park
Quincy, Massachusetts 02269-9101 USA
Telephone (617) 770-3000
Telex 200250 Fax (617) 770-0700

Fire and Explosion

Fireworks Manufacturer and Distributor

Jaffrey, New Hampshire

August 14, 1988

On August 14, 1988, a late afternoon fire occurred at the Atlas Fireworks facility in Jaffrey, New Hampshire. The fire, which caused stored pyrotechnic materials to explode, destroyed the building of fire origin and two exposed trailers. In addition, two other exposed trailers were damaged by fire and three fire fighters received minor injuries while extinguishing the resulting fire. There were no civilian injuries.

The fireworks facility is located in a residential area. The business office building is adjacent to a two-story apartment building and is about 150 feet from the street. (See attached figure.) The building and trailers involved in the fire are about 200 feet from the business office and about 350 feet from the street. Other exposed dwellings are 300 to 500 feet away from the fire area. One of the magazines used to store fireworks is about 150 feet from public tennis courts and 1/4 mile from a school.

Publishers of the National Fire Codes and National Electrical Code

A non-profit membership organization dedicated to promoting safety from fire, electricity, and related hazards through research, codes and standards, technical advisory services, and public education since 1896.

Atlas Fireworks is a wholesale and retail dealer of Class C fireworks that have been assembled by other manufacturers. In addition, the company contracts to perform displays using Class B and Class C pyrotechnics. Company employees use prepacked components to assemble the display pyrotechnics, and plans were in place to resume the component packing operation that was discontinued following a September 1986 explosion, which injured one employee.

At the time of the incident, Atlas Fireworks had licenses which had been issued by the U.S. Treasury Department, Bureau of Alcohol, Tobacco and Firearms and by the New Hampshire State Police. The State of New Hampshire has adopted the 1981 BOCA Basic Building Code and the 1981 BOCA National Fire Prevention Code; these codes provide the regulations that apply to this facility. The local fire department has responsibility for code enforcement and facility inspection. However, upon request of the local authority, the State Fire Marshal's office can also perform inspections of these facilities. Prior to this incident, the local fire department was not making regular inspections of the facility, nor had the department requested inspections by the State Fire Marshals Office.

The building of fire origin was a five-year-old, two-story warehouse with a gambrel roof. The 30-ft X 40-ft wood structure had a concrete floor slab, post and beam frame, 2-in. X 4-in. wall studs, 2-in. X 10-in. floor joists, and 2-in. X 6-in. roof rafters. The walls were covered with wood planking and the roof had plywood sheathing covered with asphalt-type shingles. A 120 volt, 60 amp service provided electrical power for lights and standard wall receptacles.

The first floor of the warehouse was used as both a service and storage area. There were tables, a large workbench, many hand tools, power tools, and even a gasoline engine powered grass trimmer on this level. In addition, the first floor contained several bundles of unassembled corrugated shipping

cartons; boxes of plastic, rubber, and canvas tarps; several assembled display sets constructed with lance (a pyrotechnic material that produces colored light and sparks); 20 to 30 cases of lance; cases of roman candles; unlanced flag frames; wooden wheels; metal pins; paper; and an automobile engine.

An open wooden stairway provided access to the second floor, which was used for bulk storage. Several cases of quick match (a black powder-impregnated fuse covered with wax) were stored at the top of the stairs, and approximately eight cases, an estimated 320 pounds, of black match (another type of black powder-impregnated fuse) were stored in the center of the floor. The black match contained an estimated 160 pounds of black powder. In addition, there were thousands of combustible paper cans, corks, paper discs, tubes, caps, covers, and capped tubes with time fuses stored on the second floor.

The warehouse had several immediate exposures. Two permanently parked trailers that were used to store bulk wood stock were near the building's northwest side. On the northeast side there were two fireworks magazines in a wooded area, approximately 45 feet from the building's north corner. Another magazine was 45 feet from the warehouse's east corner and two 20-ft and one 40-ft mobile trailers, one with nine cases of finished Class B pyrotechnics, were 25 feet away from the warehouse's southwest side. None of the buildings or exposed trailers had placards or other external labels indicating the hazard of the stored commodities.

Sunday, August 14, 1988 was a sunny day with a high temperature of 98⁰ F and a relative humidity of 75 to 80 percent. Shortly after 5 p.m. an employee, who was in one of the dwellings close to the facility, heard noises coming from the direction of the unoccupied facility and went to investigate. He entered the office building, looked out the rear windows, and saw flames and smoke on the northwest side of the warehouse. Within moments of this observation, a blast lifted the roof off and caused the building to collapse.

The Jaffrey Volunteer Fire Department received telephone notification of the fire at 5:16 p.m. Three fire fighters who were in the fire station at the time of the call responded with an engine and arrived at the scene at 5:25 p.m. They found that the warehouse was a burning pile of rubble with fire extending to the trailers on the northwest and southwest sides of the structure. As the fire fighters prepared for their attack, several small explosions continued to occur, so they chose to use master streams and to keep as far away as possible.

Four other pieces of apparatus from the Jaffrey Fire Department responded, and a request was made for assistance from mutual aid communities. Arriving units were assigned to protect exposures and to direct fire streams toward the building of fire origin. A ladder pipe was used to flood the burning rubble and to minimize the need for fire fighters to enter the burning area.

Despite the use of the ladder pipe, fire fighters with hand lines had to approach the area and open the un placarded trailers near the southwest side of the building. When they opened the trailer closest to the building, they found that the fire had burned through the floorboards at one end and that nine cases of finished Class B pyrotechnics were stored at the opposite end of the trailer.

The fire was considered under control at 6:20 p.m. but fire fighters continued to apply water for several hours. The 60 fire fighters and 16 pieces of apparatus that responded from Jaffrey and the five mutual aid communities were released by 10 p.m. that night.

No civilians were injured, but three fire fighters were treated at the scene for heat-related injuries. The building of fire origin was completely destroyed by the blast and fire, and the two trailers near the northwest wall were also destroyed by fire. Two of the three trailers near the southwest wall were damaged by fire.

Several large fragments of the roof were heavily burned even though they were blown away from the area of the post-explosion fire. This evidence plus the statements from the first employee on the scene reveal that there was a fire in the building before the explosion. The cause of that fire and the materials first ignited are not known.

Investigators believe that the fire originated on the first floor near the northeast side of the building, because structural framing members in that area had the most severe fire damage and many floor members in that area of the building were completely consumed by fire. Shortly after the fire spread to the second floor the explosion occurred.

Since the incident at the Atlas Fireworks warehouse began as a typical structural fire involving combustible materials, the explosion and total destruction of the warehouse serves as a reminder that facilities used for the storage of pyrotechnic materials have unique fire protection problems. Explosion potential, ignition prevention, building construction, distances between buildings and other exposures, and the impact of an explosion on exposures should be considered during the firesafety evaluations of these facilities.

An additional firesafety problem with such facilities was revealed when fire fighters discovered Class B pyrotechnics in a burning unmarked trailer. Apparently, no information was available to fire fighters that would inform them of the pyrotechnics in the trailers and the threat to their safety. Therefore, they were exposed to a distinct secondary explosion hazard.

PLOT PLAN: ATLAS FIREWORKS

- 1) DWELLINGS
- 2) APARTMENT BUILDING
- 3) BUSINESS OFFICE
- 4) OTHER ATLAS BUILDINGS
- 5) PERMANENT TRAILERS
- 6) WAREHOUSE -- BUILDING OF FIRE ORIGIN
- 7) MOBILE TRAILERS
- 8) PERMANENT TRAILERS
- 9) MAGAZINES
- 10) DIRT COVERED PARKING AREA
- 11) POND
- 12) TENNIS COURTS

