Imperial Foods Plant Fire Hamlet, North Carolina, on September 3, 1991

Reference: NFPA Alert Bulletin 91-4

On Tuesday, September 3, 1991, at approximately 8:15 am, a fire occurred at the Imperial Foods Processing Plant in Hamlet, North Carolina resulting in 25 fatalities and 54 injuries. The intense fire quickly spread products of combustion throughout the plant causing employees to search for available exits. Although many of the estimated 90 occupants escaped without incident, others found exterior doors unavailable and sought alternative means of escape. Not all of those who remained were able to be rescued and many perished.

Background

The fire occurred in a one-story, unprotected noncombustible building of approximately 33,000 sq. ft. The nonsprinklered, windowless building had undergone several changes in ownership and numerous alterations over the years including several additions to the building and changes to its interior partitions. At the time of the fire, the facility would be classified as a food processing plant (industrial occupancy). The plant operation included preparing and cooking chicken pieces for distribution to restaurants. During a normal shift, approximately 90 employees would be involved in the various phases of production. Portions of the plant included a large preparation area, including trimming, marinating, and packing areas, and areas for storage of preparation materials and finished product. Several of these storage areas were cooler or freezer units. The layout of the preparation areas ... resulted in the majority of the occupied portions of the facility containing no effective barriers to prevent the spread of products of combustion.

The building had numerous exterior openings for shipping and receiving of goods and for personnel doors.... Although the service doors would be utilized as exits for maintenance workers within the room, they could not be considered in the exit design for occupants of other locations within the building. Each of the personnel doors lacked various components, sizing, or arrangements that prevented their consideration or utilization as a component of a properly designed exiting system for the building.

The Fire Incident

The fire originated in the processing area of the plant at approximately 8:15 am. This was a critical area since the fire originated at a central portion of the occupied space. The cause of the fire was determined to be the ignition of hydraulic oil from a ruptured line only a few feet from a natural gas-fueled cooker used in preparation of the chicken... Ignition of the fluid was immediate, likely from the natural gas burners. The fire soon drove employees in the processing room away from the immediate area of involvement. The ignition resulted in a rapidly developing and spreading fire that quickly distributed thick, black smoke throughout the building. The intense fire also impinged upon a natural gas regulator on the supply line to the burners, which soon failed and added to the fuels being consumed. This combination resulted in an intense fire and rapid dispersal of smoke and heat throughout most of the plant within minutes of its ignition. Occupants within the affected areas had little or no time to evacuate before their way was blocked or their visibility obscured by the thick smoke.

Employee Actions at the Time of the Fire

Those employees located in the processing room were immediately confronted with the fire and attempted to reach safety by moving northeast and southwest through structural
openings. Employees outside of the processing room where the fire originated were alerted to the fire by other employees shouting and by smoke moving rapidly throughout the building. Upon becoming aware of the fire, employees working in the trimming and marinating/mixing areas moved to the loading dock/trash dumpster area located at the southeastern corner of the building. Reaching this area, a cluster of occupants found an inoperable personnel entry door located next to the loading dock. A tractor trailer truck was parked at the loading dock making their exit through this opening impossible as well. Within one (1) minute of discovering the fire, these employees found that the smoke had obscured their visibility... Others moved southwest toward the cooler area and apparently took refuge in the cooler when they found that they could not move past the fire area. Employees located in other portions of the building were not as severely exposed to the fire but also immediately began seeking escape routes...

Fire, Rescue, and Emergency Medical Services Operations
The Hamlet Fire Department was notified of the fire when an employee drove several blocks to the fire station and advised fire personnel on duty that there was a serious fire at the plant. Fire equipment responded at 8:24 am and arrived on the scene at 8:27 am. First responding units were immediately confronted with 14 casualties (3 fatalities and 11 injuries) outside the south end of the plant. The first actions of arriving fire fighters was to administer first aid to the injured. First arriving fire fighters observed evidence of a severe fire burning within the building, prompting requests for mutual aid assistance from neighboring fire and rescue departments.

NFPA Analysis
The location of the area of fire origin was centrally located in the plant. Its location, intense magnitude, and rapid development and spread immediately threatened two groups of employees: those within the processing room and those located in the area of the trim room. Although there was one known survivor from the processing room, the majority of these employees were separated from exit ways by the fast developing fire. Seven (7) fatalities were located in the north end of the processing room.

The combination of the rapid growth of this fire and the open layout of the building resulted in a narrow window of time for occupants to evacuate safely. In spite of this, many occupants were still able to escape from the building during this time, often using unconventional means. In addition, in the moments before their vision was obscured by the smoke, other employees found exterior openings unavailable for prompt exiting and took alternate actions. Some of these occupants survived through the assistance of others on the exterior of the building or were rescued by fire fighters.

Analysis of this incident illustrates the importance of adhering to basic firesafety principles in order to ensure life safety. Among these principles are the need for automatic fire detection and fire suppression systems, a fire alarm system for alerting occupants, proper exit design (including an adequate number, properly sized and arranged exits), and the need for occupant firesafety training.

The initial magnitude of the fire likely prohibited its extinguishment by employees utilizing portable fire extinguishing devices. However, properly designed and maintained fixed fire suppression systems, such as automatic sprinklers, would have been effective in confining such a fire and maintaining life safety to ensure safe evacuation. The building did not contain any of these systems.
Further, true building exits need to be provided in sufficient number, be accessible, and be arranged and marked to provide emergency egress during all occupied times of the building. The personnel openings utilized in the incident lacked various components of a properly designed exiting system for the building.

Finally, emergency evacuation plans must be developed and implemented for such buildings to ensure occupants are aware of its fire protection features, including means of egress and evacuation routes. Practice drills need to be conducted to ensure they are knowledgeable of emergency procedures in the event of a fire.

FRAME Risk assessment

A FRAME calculation was made with the elements available from the NFPA Alert Bulletin nr 91-4. The results were R=2.51 R1= 3.46 and R2=3.10. The catastrophic fire was foreseeable! Major elements that contributed to this drama were the lack of compartmentation between hazardous and non hazardous areas, the lack of openings for smoke evacuation, the lack of adequate warning and the lack of training of the people. In the FRAME calculation, these considerations are reflected by the value of the following factors: the area factor g, the ventilation factor v, the activation factor a, the normal protection N, the special protection S and the escape protection U.

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