

Incident

The Hamlet chicken processing plant fire — outcomes and good practices for avoiding a recurrence

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Summary

A major fire occurred at a chicken processing plant in North Carolina, USA, resulting in the death of 25 workers. The main outcome of the investigation into the accident was that the consequences of the fire resulted from serious shortcomings in the management of safety, including that the plant had never received a safety inspection. While the investigation was in progress, another fire occurred at a different, totally unrelated plant at which very similar processes were carried out. In this case, there were no personal injuries at all, and this was judged to be so because the safety precautions were fully effective and very much what should have been in place at the North Carolina facility. It was a clear demonstration of how good safety standards pay by saving lives and, in the long run, enhancing production.

Keywords: Fire, emergency response, safety management, inspection

Introduction

The Hamlet chicken processing plant, operated by Imperial Foods in the town of Hamlet, North Carolina, was located in a single-storey brick and metal constructed building that was eleven years old. The original structure, on which the Hamlet plant had been based, had previously been used for a variety of food processing applications that dated back to the early 20th century. Poultry parts were shipped to the plant, prepared, cooked, quick-frozen and packed, then distributed to various markets for use in restaurants. The plant had a total worker complement of about 200, with each shift comprising around 90. On 03 September 1991, a fire broke out stemming from the failure of a hydraulic oil feed line which powered a conveyor belt. There were 90 employees in the plant at the time, of whom 25 died and a further 54 were injured. Many of them were trapped behind locked doors inside the building. The management kept the doors of the plant padlocked to prevent theft and vandalism and the incursion of flies into the chicken processing areas. The investigation into the accident would show that this had a major bearing on the tragic outcome. There had never been any safety inspections, though a poultry inspector, who visited the site daily was aware of these fire violations.

Imperial Foods had a poor safety record although there had been no previous fatalities. At another of its plants, in Moosie, Pennsylvania, there were safety violations in the 1980s,

including poorly marked or blocked emergency exits. This facility was closed down before the Hamlet fire. There had been three other fires at Hamlet prior to this accident, but no action was taken to unlock the doors or to otherwise prevent a recurrence. There was no fire alarm system and no water sprinklers as an extensive fire was considered unlikely.

Details of the accident

The fire began when a 25ft (7.6m) long deep fat fryer (cooking vat) in the processing room (Figure 1) spontaneously ignited at around 8.30 am. The fryer's temperature was thermostatically controlled and maintained at 375°F (190°C), variable by design to 15°F (8°C) either plus or minus. The fire spread rapidly, causing panic, which resulted in injuries as workers rushed to escape. Large quantities of smoke were produced by a combination of burning soybean oil and chicken, together with melting roof insulation. The smoke was hydrocarbon-laden and had the potential to disable someone after just a few breaths. Several gas pipelines in the ceiling caught fire and exploded.

Most of the workers were trapped by large quantities of smoke. Others were trapped behind locked doors and tried unsuccessfully to kick the doors down. The majority of those who escaped were working in the front of the building and were able to leave through the unlocked main entrance. Some working in the rear of the building survived by getting out via a loading bay and a few escaped by breaking down doors. Twenty-five people died and the 54 injured suffered after-effects including burns, blindness, respiratory diseases from smoke inhalation and post traumatic stress disorder. Many of the survivors died prematurely or still suffer from their injuries. Of the dead, eighteen were female and seven were male. Figure 1 shows the origin of the fire marked X, and the locations of those who perished^{1,2}.

The emergency response to the incident had major shortcomings. Telephones inside the building could not be used to summon help. A person who drove to the nearby fire station to report that the factory was on fire did not even say that workers were trapped. The Chief Fire Officer, who was in charge of the emergency response, refused help from the Dobbins Height Fire Department several times, despite the fact that it was only a five-minute drive away. He later attempted to justify this by saying that he did not realise the doors were locked. Witnesses said that only two oxygen cylinders were available to help the victims of smoke inhalation.

Investigation of the accident

The US Fire Administration report on the accident provides a detailed account of the cause of the fire, its consequences and

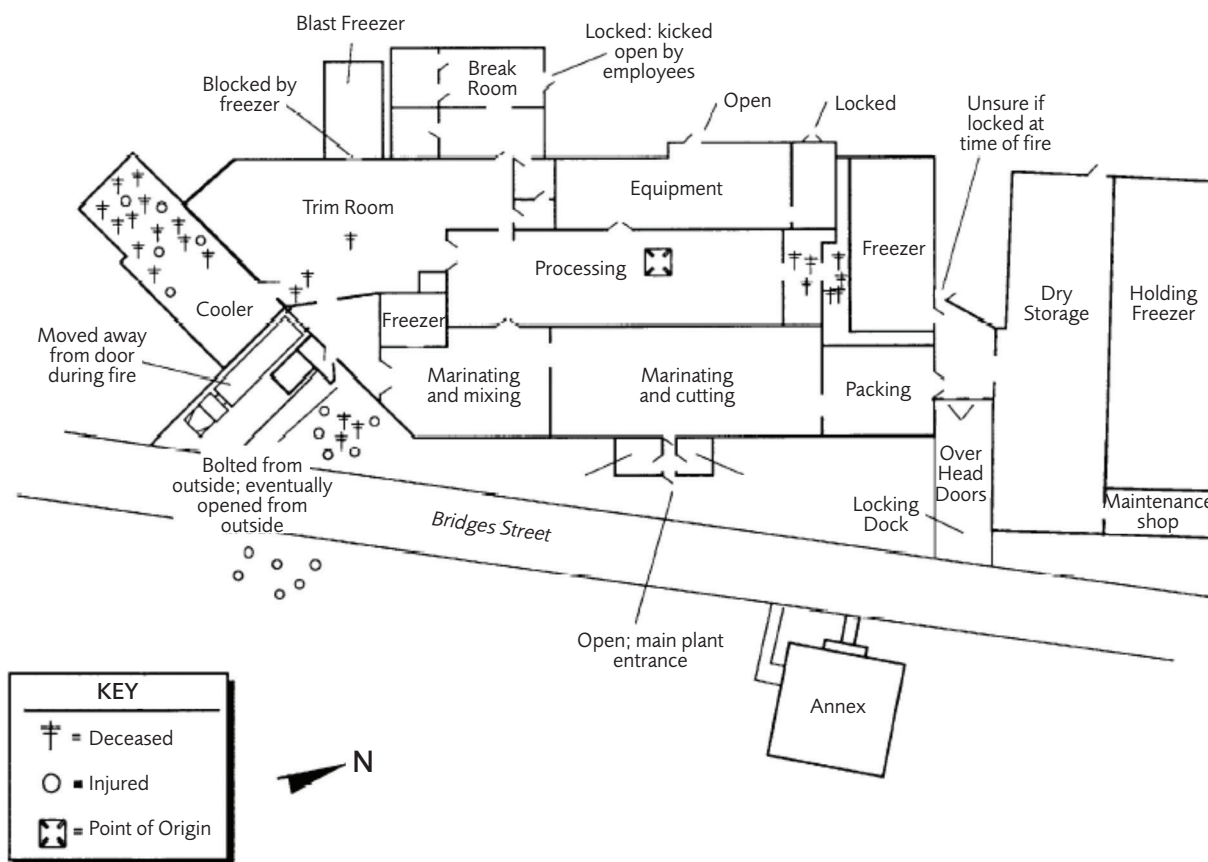


Figure 1 – Floor plan showing the origin of the fire and locations of those who died

the arrangements that might have prevented it had they been in place².

The detailed layout of the plant, without doubt, contributed to the severity of the fire and its consequences, as the following details explain. The layout allowed easy movement of products from one area to another by use of pallets on forklift trucks. The entryways between the various parts of the plant were mainly open, though some entrances had a curtain of plastic strips to assist in holding in refrigerated air. The freezers and coolers had standard refrigeration doors. The main operating areas (marinating, cutting and processing, Figure 1), by virtue of their cooled, open rooms, did present a problem in that there were no smoke or heat barriers between work areas. Thus, in the event of a fire, there would be nothing to impede the travel of heat or smoke and, furthermore, the hard, smooth surfaces of the walls and floors would do little to absorb it. The main entrance doors to these areas were designed to seal the structure, with door seals similar to those on a refrigerator. However, in contrast to these potential hazards, the probability of a fire was considered to be remote because there was very little combustible material.

The scene immediately after the fire was harrowing in the extreme. There were indentations on one door caused by people trying to kick it down in order to escape. There were bodies around fire exits and inside a large walk-in freezer where workers had panicked and walked in to try to escape the fire. Twelve deaths occurred inside this freezer, either from smoke inhalation or by severe hypothermia at the temperature

of -28°F (-33°C). Amazingly, five people inside the freezer survived. An insurance assessor was quoted as saying "not a single door in the plant met the criteria of a fire exit."

The precise cause of the fire was the failure of a hydraulic line which powered a conveyor belt supplying the cooker vat. When the original line first failed, a worker replaced it with a new line and new connections. However, this line was too long and thus became a tripping hazard, so it was cut and shortened. When it was reconnected, the new end connector was mistakenly replaced by the old one, which was defunct.

The line was rated to a pressure of 3,000 psi against a maximum operating pressure of 1,500 psi, clearly a very safe margin. However, when operations resumed, and normal pressures were being attained, the end connector separated from the line at somewhere between 800 and 1,500 psi. Hydraulic fluid splattered onto the heating lines to the cooker and immediately vaporised. The vapour went directly into the flame of the gas-fired cooker and erupted into a fireball. The ruptured hydraulic line then pumped 50-55 US gallons (40-45 Imperial gallons) of hydraulic fluid into the fire before an electrical failure shut it down. In addition, the fire reached a natural gas regulator that also failed resulting in an induction of natural gas to the fire, increasing the intensity and build-up of toxic gases.

The cooking vat did have a hood-mounted CO_2 extinguisher unit above it which for some time prevented the vat contents from igniting. However, the intensity and duration of the fire eventually overcame this system and the oil in the vat ignited,



Figure 2 – Severe damage to steel girders and roof supports above the cooker vat

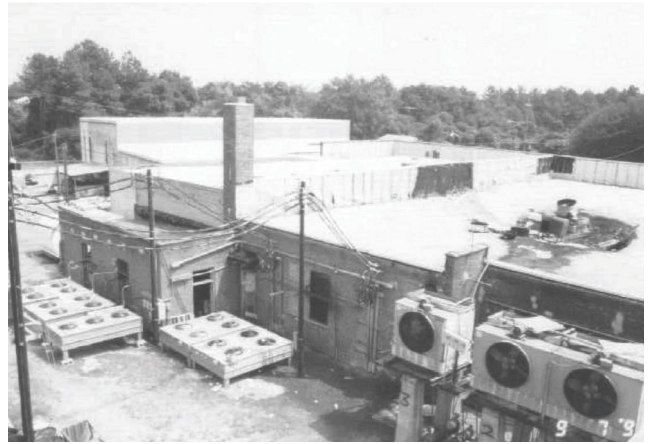


Figure 3 – Aerial view showing the collapsed roof above the cooker vat

thus adding to the extent of the conflagration, which destroyed much of the surrounding equipment and building structure. Figure 2 shows damage to steel girders and roof supports above the cooking vat and, in Figure 3, a section of collapsed roof above the vat, can be seen². From this photograph, it is possible to conclude that the roof insulation was sandwich panelled, though the available literature does not state this. Witnesses who survived said that much of the plant was enveloped in fire and smoke in less than two minutes. Workers had their visibility almost eliminated and oxygen was rapidly consumed in the blaze. Hydrocarbon-charged smoke was, in effect, all that was left of the breathing atmosphere, as confirmed by autopsies on the deceased. Most died of smoke inhalation, not burns. The violent nature of the fire is illustrated by Figure 4.

There was no effective organisation of plant evacuation. Several employees moved to the trash compactor/loading dock, near the south-east corner of the building (Figure 1). Here, they were trapped by a locked door to the outside of the plant. Several of them went into a large cooler (freezer) adjacent to this loading dock, but did not shut the door behind them, so smoke got into the cooler. More workers died in this cooler (twelve) than in any other location. The second largest fatality area was to the north of the processing area where seven died. Three perished in the trim room, from which the exit door to the outside, via the break room, was locked. The company received the highest fine in the history of North Carolina, though potentially smaller than a federal penalty would have been, and the owner received a prison sentence of 19 years and 11 months, subsequently commuted to four years. The fine was \$808,150 for offences including the locked doors and inadequate emergency lighting. The plant was never brought back into operation, so 215 jobs were lost in what was already a severely economically depressed area. Hamlet declared itself bankrupt, so the fine was never paid. Eventually, several years after the fire, insurance damages amounting to \$24M were awarded but, after deduction of lawyers' fees and other costs, individual Hamlet workers received between \$35,000 and \$70,000 each.

Emergency response

As already indicated, some judged the emergency response to

be less than satisfactory and while this may be the case, there were a number of mitigating circumstances:

- The town of Hamlet was not connected to the "dial 911 telephone emergency" system.
- Extremely heavy smoke prevented the emergency response teams from pinpointing the seat of the fire in its early stages.
- Firefighters were met by intense heat, so they had to alter their initial approach into the processing room and tackle the blaze via the equipment room. Even so, they were able to bring the fire under control within two hours.
- Word of the incident's severity spread rapidly throughout the surrounding community, with the result that virtually everyone with any involvement in medical care responded by presenting themselves at the plant site.
- The Chief Fire Officer said that the entire incident centred around one problem — lack of enforcement of existing safety and fire protection codes, as expanded upon below in Recommendations.
- The North Carolina Department of Occupational Safety and Health Administration (OSHA) had never inspected the Hamlet facility in all of its eleven years' existence.

The fire at Tyson Foods

During the course of the investigation into the Hamlet fire, another, very similar, fire occurred at a plant in Arkansas. This was at Tyson Foods Inc., in Little Rock but the outcome of the fire was dramatically different to that of the Hamlet disaster. The operations at Tyson Foods were much the same, though larger in scale than those at Hamlet, and the fire broke out in the hydraulic system of their cooker, just as at Hamlet. At the time of the fire, there were 115 people working in the plant and within three minutes of the fire starting, every one of these was outside the plant with no injuries of any kind.

The plant design was such that only the minimum number of workers needed to operate the cookers were actually in that area, and the cooker room walls and ceilings were rated to a 2-hour fire protection standard. Fire brigade personnel were guided safely to the seat of the fire. Combustible materials, such as wooden pallets, cardboard boxes etc,



Figure 4 – The fire raging in and around much of the plant⁴

were not permitted in the cooker rooms. Sprinkler systems were available in all non-wet areas of the plant. There were regular emergency and evacuation drills, safety committees incorporating management and hourly-paid personnel were in operation and trained plant fire brigade units were in place. Damages to the plant structure amounted to \$8M and losses in production, wages and clean-up came to \$4M. However, operations resumed after 13 weeks, incorporating several additional safety features and efficiency measures. The significantly superior safety management programme at Tyson Foods was the reason why the consequences of their fire were so dramatically lower than those at Hamlet. Nobody died or got hurt, the plant was re-built and production resumed.

Recommendations

The US Fire Administration Report² made ten recommendations, as follows:

1. Life safety codes must be enforced, with compliance with safety regulations. These should include adequate exits, fire detection and suppression equipment, emergency plans and training.
2. Cooking areas must be separated from other areas. Walls and ceilings should have appropriate time-rated fire resistance.
3. Exits from wet operation areas should have emergency lighting above the exit door and at floor level to maximise visibility in heavy smoke conditions.
4. Maintenance on high pressure (hydraulic) systems must be carried out only by specifically trained personnel.
5. High pressure hydraulic systems must be fitted with valves that would automatically close in potentially catastrophic

6. Negative air flow systems should be modified to accomplish smoke evacuation. Existing systems were designed to purge toxic fumes of ammonia but installation of heat sensors could enable the systems to pull smoke away as well if needed.
7. State and Federal inspectors from various departments should be cross-trained. There was great criticism of the lack of inspection by OSHA at Hamlet prior to the accident, which was partly attributable to staff shortages in OSHA. At the same time, there were frequent inspections by the US Department of Agriculture (USDA). It was proposed that, as a minimum, USDA inspectors could be trained to recognise significant safety problems and shortcomings so that they could alert OSHA.
8. Employees should be encouraged to report their concerns and problems to management. Many employees stated that they were afraid of pointing out safety concerns in case it led to disciplinary action, or even dismissal. This fear must be eliminated. Secure reporting addresses and telephone numbers, with reporting individual anonymity, should be set up.
9. There should be an increase in the number of OSHA inspectors, commensurate with the number of inspectable premises and adequate inspection schedules.
10. Emergency plan rehearsals should be put into use at all facilities. A proper schedule of rehearsals needs to be established, with a "learning from shortcomings" culture. The value of such a system was clearly demonstrated by the fact that there were no human casualties arising from the Tyson Foods fire.

Clearly, these recommendations were never put into effect at the Hamlet plant, as it never operated again. However, they serve as a template for all industries and plants that might have a significant potential for fire hazards.

The wider picture

The Hamlet tragedy has recently been re-examined in detail in a book published in 2017 and written by Bryant Simon³. This excellent, and very readable, work discusses the background and circumstances leading up to the accident, the social factors, industrial relations and employment scenarios existing at the time and the quite shocking and appalling conditions that the workforce had to operate in at the plant. Whilst it is not the purpose of this publication to pass judgement on the moral issues at stake, it would be an omission not to refer to an authoritative work that does exactly that — with severe condemnation of those in a position to have done something about them.

To summarise the book in any kind of detail would be impossible in this article, but it is recommended reading for anyone wishing to learn more about the Hamlet fire. What follows, then, is a synopsis of some of the relevant points extracted from the text, as follows:

- The exit doors were locked at management's insistence to keep flies out and to minimise petty theft by the workforce.

The USDA inspectors were aware of the closed doors, but said, after the accident, that they were "not trained to look for fire hazards."

- The locked doors were never discovered by OSHA inspectors because they never carried out a safety inspection.
- New employees were never given any training in fire drills or emergency procedures.
- Labour relations were deplorable. Workers had to pay for their own protective gear (smocks and caps). Bathroom breaks were restricted to lunchtimes or to the two ten-minute additional mid-shift pauses, unless absolutely essential. Exceeding five minutes at such times would incur management displeasure, leading if repeated to dismissal. Workers would return to work too soon after illness or injury because they were in fear of their jobs if they stayed off work too long.
- Corner-cutting on plant maintenance was *de rigueur*, including on and around the main cooker vat. The emphasis was always on minimising downtime, rather than ensuring that a proper job was done.
- There had been fires at other plants owned by Imperial Foods. At their facility in Cumming, Georgia, there were fires in December 1989 and December 1990. After the first of these, the findings included broken sprinklers, faulty ventilation and poorly marked exits.
- The owner of the Hamlet plant did not have the necessary permits to work. This was only discovered after the fire and appeared to be due to the owner's exploitation of administrative oversights in OSHA and the Department of Labour.
- Throughout much of North Carolina, about three-quarters of industrial plants displayed an incorrect telephone number to contact in the event of safety violations. This conflicted with OSHA requirements. At Hamlet, the workers could not even see the wrong sign, as it was hidden behind time clocks.

The backdrop to all this was an inefficient legal and administrative system, both regionally and nationally. When the OSHA Act was embodied into law by the Nixon administration in 1970, it was widely hailed as a triumph for those wishing to see employers held accountable for the safety of their workforce. Unfortunately, the reality was that, within the finer detail of the Act, there were provisions for individual states to set up their own safety agencies. The rigour with which this was pursued varied dramatically from state-to-state and in North Carolina, Simon relates, it was not set up to favour the interests of hourly-paid workers such as those

at Hamlet. Furthermore, across the whole of the USA, there were, in 1991, only 1300 OSHA inspectors for about 7 million workplaces. To quote reference 3, "if every safety official knocked on the door of one business every day, it would take him 20 years to visit every *facility (sic)* in his portfolio." Add to this, the steady decline in the prosperity of Hamlet from the first half of the 20th century to the deprivation of the 1980s and 1990s, and the perfect recipe for the conditions prevalent at the fated plant becomes evident. Hamlet had been a busy and prosperous railway junction town with maintenance of rolling stock, together with many spin-off industries, providing steady and well-paid employment for the vast majority of the residents. Then, with the coming of major trunk roads providing a reliable and cheaper transport option bypassing the town, the prosperity steadily declined. Small wonder then that the Hamlet employees were prepared to put up with their terrible workplace conditions in return for an hourly wage that was slightly above the federal minimum for the time.

Conclusion

As already stated, it is not the place of this article or author to make moral judgements. However, The Hamlet Fire³ paints a picture of institutional disregard for the health, safety and welfare of people within its sphere of influence that is only rivalled or exceeded by such tragedies as Bhopal. It would be encouraging to conclude that the outcome of this terrible event was an improvement in the conditions for workers in factories like Hamlet; however, the major fire at a chicken processing plant in Jilin, China, as recently as 2013, shows that there is still work to be done. In this fire, 120 people perished behind closed, locked doors⁵. In echoes of the Hamlet accident, there were reports that the doors were locked to prevent theft and that the foreman's permission was necessary in order to use the bathroom.

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