From the *Sultana* to Medina, the Whole Nine Yards —

Nine Boiler Accidents That Changed The Way We Live

By Margie L. Emigh
Communications Coordinator

There was a time in 1865 when Thomas B. Reeves surely considered himself a lucky man. A Union Army lieutenant, he had survived internment at the notorious prisoner-of-war camp in Andersonville, Georgia, a place where thousands of other POWs had died as a result of malnutrition and disease. Now, he just wanted to return home. It had been a long war.

The year was 1933. Virginia farmer Zeke Kelly was simply going about the daily business of owning a farm. He and 15 other local men had taken their corn to Earl Breeding’s gristmill for grinding.

Fast forward 70 years later. Eighteen-year-old Bryan Hammond was enjoying a typical summer day in northeast Ohio. His boss loved antique tractors, and Mr. Hammond had volunteered to assist his employer with an antique steam tractor at the county fair.

On the surface, the lives of these three men seem to contrast more than converge — a 55-year-old farmer who had marked the major passages of his life by a season’s harvest; a young man with most of his life ahead of him, looking forward to an upcoming marriage; and an army officer who had no doubt witnessed some of the worst examples of human suffering during a war that divided a nation.

However, history brings them together through a common legacy: each died from injuries sustained during boiler accidents. Lt. Reeves was a victim of the *Sultana* steamboat boiler explosion of 1865, while Mr. Hammond lost his life as a result of the 2001 Medina steam tractor explosion — both accidents well known and widely followed in the industry. Zeke Kelly, on the other hand, was one of three victims claimed by a small yet equally catastrophic boiler explosion at a Virginia gristmill.

The seeming randomness of such accidents serves to underscore the point that tragedy can occur at any time, to anyone who is simply in the wrong place at the wrong time. After all, who would think that attending a county fair could lead to death? Or going about the simple day-to-day activities of one’s occupation, such as taking crops to the local mill? And while the industry has come a long way in terms of improvements in the practice of equipment inspection (sometimes as a direct result of boiler accidents), the Medina catastrophe — which occurred on July 29, 2001 — reminds us that such tragedies are not simply a legacy of the distant past, and that danger lies in complacency.
That is why the National Board has undertaken the daunting task of ranking the most notable boiler accidents of our time. With more than 25,000 accidents occurring in the last ten years alone, not to mention the almost daily accidents that occurred at the turn of the 19th century, the work was cut out for us, to say the least. Some accidents immediately stood out due to their extreme destructive force and resulting loss of life, while others affected the public in a more indirect manner, and the impact was only seen and felt years later.

**Hartford Fales and Gray Car Works, Hartford, Connecticut** — This explosion occurred on Thursday, March 2, 1854. Nine people were killed instantly, and several more died later, as a result of injuries sustained when an unattended boiler failed catastrophically. Several rumors circulated about the specific cause of the accident, one account going so far as to claim the operator left the boiler unattended to get a beer. Regardless, a total of 21 people lost their lives in the accident and an additional 50 were injured. It was widely reported at the time that the accident would never have occurred if the boiler had been equipped with a fusible plug or a properly functioning pressure relief valve.

Despite the tragedy, this accident left a vital imprint on the boiler and pressure vessel industry. As a result, several men interested in science in general and steam safety in particular founded the Polytechnic Club of Hartford. Though the group was disbanded a few years later at the start of the U.S. Civil War, the idea of combining inspection and insurance together was first germinated here.

**Sultana, on the Mississippi River, outside Memphis, Tennessee** — Most people in the industry are familiar with the tale of this most infamous of boiler explosions. For those who aren’t, this important story can’t be repeated too often. The year was 1865 when the steamboat *Sultana*, carrying a load of approximately 2,000 people, left Vicksburg, Mississippi, transporting many surviving Union soldiers who were returning home from the war. Several problems plagued the steamer from the moment it left port, among them extreme overcrowding (the normal carrying capacity was 300 passengers) and boilers in a state of disrepair.

Finally, on April 27, 1865, one of the steamer’s boilers exploded just outside of Memphis, resulting in the death of approximately 1,800 people. Although at the time it was clearly the worst disaster in recent memory, it was largely ignored by the general public, due to competing news events such as the assassination of President Abraham Lincoln and the daily accounts of horrors which emerged from the Civil War. That’s not to say the awful accident didn’t leave an indelible mark on the world.

“The *Sultana* is really what started our whole industry in motion,” says Bob Schueler, senior staff engineer of the National Board. In fact, immediately after the terrible accident, two former members of the disbanded Polytechnic Club of Hartford founded Hartford Steam Boiler Inspection and Insurance Company.
Grover Shoe Factory, Brockton, Massachusetts — Though not as well known in industry circles as the Sultana disaster, this March 20, 1905, accident contained just as much deadly force. Another instance of a boiler left unattended, the unfortunate result was an overheated boiler that exploded and tore through the roof of the four-story shoe factory, killing 58 people. This extreme example of the destruction that can be caused by steam is illustrated in stark before-and-after pictures showing the leveled building. As a direct result of the accident at the Grover Shoe Factory, Massachusetts enacted the most rigid boiler inspection laws in the country to date.

American Sheet and Tin Plate Company, Canton, Ohio — Of the seven boilers in the complex at American Sheet and Tin Plate, three failed simultaneously on May 17, 1910. The remaining four were knocked from their foundations due to the force of the explosion. With 100 workers in the area at the time of the afternoon blast, local newspapers reported a gruesome scene. Fragments of the factory were blown 600 feet to the north and body parts were strewn about. In fact, one body was actually forced through a man’s home, coming out the other end and landing on a fence. Death toll estimates ranged from 15-17, with an additional 50 people injured. The blast was costly not only in terms of loss of life, but also because the company promised to pay all hospital expenses for the wounded as well as for families of the dead. The accident occurred when an operator noticed a low-water reading and added cold water to the boiler.

Again, it took a tragedy to bring about necessary legislation. Ohio had no boiler laws on the books at the time, and was widely reported to be a dumping ground for old boilers from surrounding states. One year later, a boiler inspection act was passed in the Ohio General Assembly and signed into law the following year. Two years later, in 1913, the Industrial Commission of Ohio was formed, which still exists today.

New York Telephone Company, New York, New York — Another workplace tragedy, this October 3, 1962, boiler accident left 23 dead and 94 injured. The failed boiler was a low-pressure type, and weighed seven tons empty and 11.5 tons with water. Like many previous accidents, the initial focus on the cause of this tragedy was the boiler operator, who reportedly started the boiler, then left the building to have lunch.
However, the boiler operator had several other factors working against him that October day. Three different safety systems were not operational. First, the operator started the boiler with the shutoff valve in the header closed. Second, a mercury switch had not been attached to the master board, inadvertently unplugged by a maintenance worker. Third, a pair of safety valves on top of the boiler apparently did not function when they exceeded pressure limits.

Regardless of the cause, the outcome was disastrous. The force of the explosion propelled the boiler forward about 120 feet, through two concrete walls, killing and disfiguring employees who were dining in the nearby cafeteria. Out of the wreckage of one of the most deadly boiler accidents of the time, New York enacted a low-pressure boiler law.

**Gate City Day Care Center, Atlanta, Georgia** — A place of employment for one victim, the Gate City Day Care Center was simply a place of play for four other victims, preschool-aged children who died when a cast-iron boiler exploded on October 13, 1980. The explosion occurred less than an hour after the boiler had been started for the first time during the heating season. Reports indicated the boiler was only partly filled with water, and that the low-water burner cutout control had been wired out of the circuit, thus rendering it ineffective.

The tragic death of one adult and four children (not to mention the seven other children who were seriously injured) certainly caught the attention of Georgia lawmakers, as the terrible accident became the driving force behind Georgia’s passage of a boiler and pressure vessel act in 1984.

**Star Elementary School, Spencer, Oklahoma** — Any boiler accident has the potential for fatalities, but on the afternoon of January 19, 1982, one of the most tragic explosions in recent memory occurred. Six children and one adult were killed instantly, and an additional 42 other people were injured, when an 80-gallon water heater exploded at Star Elementary.

The water heater, located in the cafeteria kitchen, had been in a state of disrepair for at least three years. The controls showed evidence of tampering, the temperature probe had been removed, and the pressure relief valve was improperly installed. Oklahoma’s boiler and pressure vessel law, like New York’s before 1962, only covered high-pressure boilers. Therefore, the school’s water heater was exempt from inspection.

Again like New York, the tragedy of Star Elementary led to the passage of more stringent laws. In fact, nine months later, the Oklahoma legislature passed broader safety laws governing water heaters and heating boilers of all types, as well as providing for annual inspections.
Mohave Power Plant, Laughlin, Nevada — Though not a boiler explosion in the technical sense of the phrase, the rupture of a hot re-heat pipe at the Mohave Generating Station, nonetheless, had a lasting impact on the boiler and pressure vessel industry. Six workers died and 12 were injured on June 9, 1985, when the 30-inch-diameter pipe ruptured without warning, creating a 6’ x 8’ fishmouth opening, larger than the size of an average human being! Those killed were caught by the sudden release of 600 pounds of steam pressure (reaching temperatures up to 1,000 degrees F.), which struck them as they were changing shifts in the area of the lunchroom and control room, about 30 feet away.

Several explanations have been advanced as to the cause of the accident, including problems with welding of the rolled pipe, as well as creep failure. Regardless of the cause, the end result was not only tragic but costly, resulting in approximately $100 million in property damage to the power plant structure.

However, the implications reached far beyond costs at Mohave. Due to the large size of pipes that were needed, the facility employed rolled pipe welded on the longitudinal seam. When the pipe ruptured along that longitudinal seam, it was one factor that caused power plants across the United States to re-evaluate their piping systems (many of which were identical to the system used at Mohave). Though there were a handful of other similar explosions at power plants, none had caused the level of destruction witnessed in Nevada.

Medina County Fair, Medina, Ohio — Still in the forefront of industry consciousness after only two years, the antique steam tractor explosion at the Medina County Fairgrounds on July 29, 2001, is not likely to be forgotten any time soon. Five people died and another 48 were injured.
when an antique steam tractor catastrophically failed, lifting the 18-ton structure ten feet in the air and raining hot soot and shrapnel on a crowd of fairgoers, as well as engulfing those nearest the tractor in live steam.

In response to this tragic accident, the State of Ohio created an Historical Boiler Licensing Board and established licensing requirements for historical boilers. Though other jurisdictions have not yet followed suit, the long-term impact of this most recent boiler tragedy remains to be seen.

**Conclusion**

Though boiler accidents have been an unfortunate and common part of history ever since the Industrial Revolution of the 19th century, the proliferation of today’s more stringent rules and regulations have helped to combat the frequency of such tragedies. Nonetheless, as the Medina accident illustrates, the potential for the kind of gruesome fatalities of yesterday still exists in today’s modern world. An axiom that was true 100 years ago is still true today: disaster can strike at any time. In fact, many of the victims in the boiler accidents above were simply going about their daily lives, eating lunch, supervising children at play, or awaiting the start of a county fair.

Due to the past frequency of such tragedies, it is impossible to comprise an all-encompassing list of the worst boiler accidents ever. After all, even the smallest boiler accident, barely significant on a national or international scale, could be the most tragic if the victim is a loved one. The widow and children of farmer Zeke Kelly could have certainly attested to this fact, after the beloved husband and father died in a small boiler explosion at a Virginia gristmill.

Though the tragedies of the past are certainly difficult to evaluate, in each of the instances above, we can take at least some small comfort in the fact that the loss of life was not completely in vain. Out of the ashes of death and destruction arose necessary safeguards — and in some cases even legislation — to protect future generations from tragedy.

**SOURCES:**


