By the Numbers – Hot Work

Hot Work

DID YOU KNOW?

Industrial Safety & Hygiene News, using figures from OSHA studies, reports that 1 in 250 construction workers will die from a welding injury. With over half a million American welders working today, we can conservatively expect 2,000 welding fatalities in our lifetime. That's not even mentioning the many more permanent injuries that welders will incur.

- From 2001-2018, five firefighters were fatally injured in four unintentional fires started by torches.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) has found that hot work is one of the most common causes of worker deaths among incidents investigated by the agency. The CSB continues to see hot work incidents and has found a significant subset of occurrences—those involving piping, tanks, or containers where flammables are present—to be particularly dangerous. In addition, the CSB repeatedly observes hot work incidents involving tanks or containers at high-hazard facilities such as refineries and chemical plants that typically result in injuries and fatalities and have the potential to result in major catastrophic accidents.

Since 2001, the CSB has deployed to and investigated 14 hot work–related incidents that have resulted in 25 fatalities and 21 injuries to employees and members of the public. The CSB continues to monitor hot work incidents where continuous monitoring could have alerted workers to the changing conditions in areas where hot work activity was conducted.

Between 2010 and 2013, the CSB reviewed 187 hot work incidents, 85 of which resulted in a fire or explosion while hot work was being conducted on or near a tank or container. These incidents resulted

in 48 fatalities and 104 significant injuries. Twenty-three percent of injuries and 42 percent of fatalities involved contractor workers.

The CSB continues to see catastrophic incidents involving hot work on tanks and containers containing flammable vapors. Past investigations into these incidents demonstrate a lack of awareness of the hazards of conducting hot work on containers that in some cases had previously been cleaned. The CSB recently deployed to two hot work incidents, one at the Sunoco Logistics LP terminal in Nederland, Texas, and the other at the PCA facility in DeRidder, Louisiana. At Sunoco, seven contractors were injured in a flash fire while conducting hot work on a pipeline on August 12, 2016. On February 8, 2017, three contractors were fatally injured in an explosion at the PCA facility while conducting hot work.

According to the NFPA report "Structure Fires Started by Hot Work," issued last September, fire departments in the United States responded to an average of 4,400 structure fires a year involving hot work from 2010 to 2014.

There are other revealing statistics.

According to estimates from the Consumer Product Safety Commission (CPSC's) National Electronic Injury Surveillance System (NEISS), and estimated 11,500 people visited hospital emergency departments because of injuries associated with welding soldering, and cutting tools considered consumer products in 2018.

Note that in many cases, no fire occurred.

- Radiation burns to the eyeball caused 4,300 (58%) of these injuries.
- 2,300 (20%) of the injuries involved foreign bodies in the eyes.

The following examples from the **NEISS narratives show the importance of wearing eye protection.**

- A 25-year-old man who was welding without eye protection suffered radiation burns to his eyes.

- A 35-year-old female was assisting someone who was welding and later woke with “burning, itching, eye pain, and photophobia”. She was diagnosed with welder’s keratitis.
- Welding debris caused a corneal abrasion in a 69-year-old man.
- A 32-year-old man went to the ED after suffering flash burns while welding the night before.
- A 43-year-old man burned his eyes while welding without wearing eye protection.
- A 55-year-old man had a piece of metal in his eye. He believed that this occurred while soldering the night before.
- Foreign material fell into the eye of a 51-year-old man who was welding under a car.

CPSC estimates that another 1,800 (16%) of the injuries associated with welding, soldering, and cutting tools were thermal burns. Some of these were due to contact with hot metal or a blow torch; others involved actual fires.

- A 25-year-old man was welding at home when sparks ignited his jacket causing second-degree burns to his forearm.
- A 76-year-old man was welding when a spark ignited his pants causing burns to his lower leg.
- A 49-year-old man burned his hand on hot metal while welding.
- An 18-year-old man picked up a piece of bare metal while welding barehanded.

KEEP IN MIND

Hazards / Dangers

Hot work produces electrical arcs or flames that can reach up to 10,000. High temperatures, sparks and slag, are also an ever-present danger. Hot work equipment, such as arc welding circuits, can cause serious or fatal electrocution. **Arc welding** produces intense UV light that can damage welders’ retinas.

Health Dangers

These components in welding smoke can affect the welder's lungs, heart, kidneys and central nervous system. Long-term exposure to welding smoke can cause chronic respiratory problems, decreased lung capacity, heart disease, skin disease, hearing loss, kidney damage, reproductive harm, and other diseases.

As defined by NFPA 51B, hot work is any work that involves "burning, welding, or a similar operation that is capable of initiating fires or explosions." It's not just work that involves flames. After all, you don't need a flame to generate heat. Activities such as drilling, soldering, brazing, tapping, grinding, heat treating, chipping, thawing pipes, and abrasive blasting—often referred to as sand blasting—are all considered hot work.

According to the NFPA report on hot work structure fires, soldering causes 34 percent of hot work fires started in homes. Because this work must usually be performed close to combustible construction materials and insulation, it can be a significant hot work safety challenge.

NFPA 51B and other hot work safety practices require someone—normally a trained fire watch—to remain at the work site for a minimum of 30 minutes after hot work has stopped to monitor the site for any smoldering conditions or reignition from hot embers or retained heat. And heat has a way of sticking around. Insurance data indicates that retained heat has contributed to reignition conditions up to four hours after the hot work was performed.

NFPA 51B requires establishing a hot work safety team consisting of three individuals: the person in charge (referred to in NFPA 51B as the permit authorizing individual, or PAI); a hot work operator; and a fire watch. The standard defines their duties as being responsible for safety on the work site and identifying any change in conditions so that hot work stops until the conditions are reevaluated. The message on the job site for all workers is if they see something that might be an unsafe change in condition, they need to tell someone so it can be checked.

Many types of hot work, such as welding, grinding, and torch cutting, produce sparks, slag, or spatter that can reach well beyond the immediate work area. For that reason, NFPA 51B establishes a minimum safe distance of 35 feet in all directions from the location of the hot work. In other words, combustible materials must be moved at least 35 feet away from the work to prevent contact with the hot work residue, such as sparks or slag. That distance is only a minimum, and conditions such as wind or proximity to dry grass might necessitate a greater distance. While working at an elevated location, for instance, where sparks can fall vertically.