

# CSB's DRIVERS OF CRITICAL CHEMICAL SAFETY CHANGE

U.S. Chemical Safety and Hazard Investigation Board



## Safe Hot Work Practices

**Hot work is defined as burning, welding, or similar operations** that can ignite fires or explosions. Hot work incidents occur throughout many industries in the United States, including food processing, pulp and paper manufacturing, oil production, fuel storage, and waste treatment. Most hot work incidents result in the ignition of combustible materials, e.g., a roofing fire, or the ignition of structures or debris near the hot work.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) has found that the most common causes of worker death due to hot work are explosions and fires due to flammable atmospheres in confined spaces. The table of hot work investigations below demonstrates that the CSB continues to see these types of hot work incidents involving tanks or containers containing flammables, especially at high hazard facilities like refineries and chemical plants. These incidents often result in injuries and fatalities and have the potential to result in a major catastrophic incident.

In February 2010, the CSB published the Safety Bulletin, *Seven Key Lessons to Prevent Worker Deaths during Hot Work in and around Tanks*. These items have since been incorporated into the International Code Council 2015 International Fire Code, in a new Section 3510, Hot Work On Flammable And Combustible Liquid Storage Tanks. The CSB provides the following summary of the seven key lessons from the bulletin:

**1. Use Alternatives** – Whenever possible, avoid hot work and consider alternative methods.



Use Alternatives



Analyze the Hazards

**2. Analyze the Hazards** – Prior to the initiation of hot work, perform a hazard assessment that identifies the scope of the work, potential hazards, and methods of hazard control.

**3. Monitor the Atmosphere** – Conduct effective gas monitoring in the work area using a properly-calibrated combustible gas detector prior to and during hot work activities, even in areas where a flammable atmosphere is not anticipated.



Monitor the Atmosphere

The CSB has found that explosions and fires caused by hot work are among the most common incidents it investigates. These incidents typically result in injuries and fatalities and have the potential to result in a major catastrophic incident.



CSB MAR Oil investigation, 2008

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## Test the Area

**4. Test the Area** – In work areas where flammable liquids and gases are stored or handled, drain and/or purge all equipment and piping before hot work is conducted. When welding on or in the vicinity of storage tanks and other containers, properly test and, if necessary, continuously monitor all surrounding tanks or adjacent spaces for the presence of flammables and eliminate potential sources of flammables.

**5. Use Written Permits** – Ensure that qualified personnel familiar with the specific site hazards review and authorize all hot work and issue permits specifically identifying the work to be conducted and the required precautions.

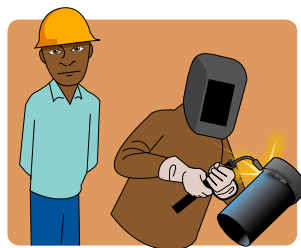


## Use Written Permits



## Train Thoroughly

**6. Train Thoroughly** – Train personnel on hot work policies/procedures, proper use and calibration of combustible gas detectors, safety equipment, and job specific hazards and controls in a language understood by the workforce.



## Supervise Contractors

**7. Supervise Contractors** – Provide safety supervision for outside contractors conducting hot work. Inform contractors about site-specific hazards including the presence of flammable materials.

Year	Investigation/Deployment
2017	Packaging Corporation of America (PCA) (DeRidder, LA)
2016	Sunoco Logistics Partners (Nederland, TX)
2014	Omega Protein (Moss Point, MS)
2012	Long Brothers Oil Company (El Dorado, AR)
2009	ConAgra Foods (Boardman, OR)
2009	A.V. Thomas Produce (Atwater, CA)
2009	E.I. DuPont de Nemours & Company Inc. (Buffalo, NY)
2009	TEPPCO Partners (Garner, AR)
2008	MAR Oil (La Rue, OH)
2008	EMC Used Oil (Miami, FL)
2008	Philip Services Corporation (Kapolei, HI)
2008	Packaging Corporation of America (PCA) (Tomahawk, WI)
2006	Partridge-Raleigh LLC (Raleigh, MS)
2006	Bethune Point Wastewater Plant (Daytona Beach, FL)
2001	Motiva Enterprises (Delaware City, DE)

**VISION:** A nation safe from chemical disasters.

**MISSION:** Drive chemical safety change through independent investigations to protect people and the environment.

The CSB is an independent federal agency charged with investigating serious chemical incidents. The agency's board members are appointed by the president and confirmed by the Senate. CSB investigations look into all aspects of chemical incidents, including physical causes such as equipment failure as well as inadequacies in regulations, industry standards, and safety management systems.

The Board does not issue citations or fines but does make safety recommendations to facility management, industry organizations, labor groups, and regulatory agencies such as OSHA and EPA.

## U.S. Chemical Safety Board

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