

CSB SAFETY SPOTLIGHT: INNOVATION, A 'KEY' FACTOR IN DRIVING CHEMICAL SAFETY



U.S. Chemical Safety and Hazard Investigation Board

The U.S. Chemical Safety and Hazard Investigation Board (CSB) spotlights the actions of a single plant for its response to our investigation. The MGPI Processing, Inc. (MGPI) facility's thorough, thoughtful, innovative thinking and immediate implementation of safety improvements serve as an example of how companies can drive chemical safety change following an incident.

Summary of Incident and Key Findings

On October 21, 2016, a chemical release occurred at the MGPI facility when the driver of a chemical company's delivery vehicle (owned and operated by another company) inadvertently connected its sulfuric acid hose to a tank containing sodium hypochlorite, better known in its less concentrated form as bleach. This mixture of two incompatible chemicals formed a solution, and the uncontrolled chemical reaction quickly formed a toxic vapor cloud. There was no way to stop the continued mixing of the chemicals other than closing manual valves or triggering one of the truck's emergency shut-offs, neither of which could be accomplished due to the vapor cloud. The CSB found that the close proximity of the sulfuric acid and sodium hypochlorite fill lines increased the likelihood that workers would make an incorrect connection during chemical unloading. The two fill lines looked and functioned identically, and used the same type of connections, which were not clearly labeled or properly secured.

Thoughtful, Safety-Minded Planning

As the CSB conducted its investigation, MGPI facility managers were also examining their own processes and equipment to identify opportunities to reduce risk and prevent reoccurrence. Prior to the discussion of potential



BEFORE: Old unloading portals (photo courtesy of CSB)



AFTER: New unloading portals with magnetic key fob access (photo courtesy of MGPI)

recommendations, the company presented the CSB with a list of processes and equipment that they were looking to modify.

As a result of MGPI's initiative to address potential safety issues, the CSB only issued two recommendations to the facility. The first required MGPI to commission an independent

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engineering evaluation of its building and ventilation system, and implement design changes and controls to protect occupants from a chemical release. The second recommendation required MGPI to conduct an evaluation of the chemical transfer equipment and install appropriate engineering safeguards to prevent and mitigate an unintended reaction, chemical release, or spill during bulk unloading. MGPI elected to have independent third parties conduct both evaluations.

Innovative Thinking

Based on the third-party evaluations and the CSB's analysis of the incident, MGPI implemented several new safeguards specific to the facility's ventilation system and chemical transfer equipment, with special focus on the fill lines, transfer valves, transfer piping, tanks, and associated equipment, including:

- Upgrading chemical unloading and transfer equipment with chemical portal separation, signage, unique locks, and fittings;
- Implementing an innovative key control and chemical unloading sequences;
- Upgrading monitoring and detection equipment to decrease the risk of chemical releases;
- Adding new emergency shutdown devices to complement the devices that were already in place;
- Adding an egress from the facility control room;
- Installing more emergency supplied air packs along the egress path;
- Improving movement within the control room by moving the center control console from the middle of the control room to the walls;
- Conducting several Process Hazard Analyses (PHAs) covering propylene oxide, phosphorus oxychloride, and acetic anhydride; and

- Removing the acetic anhydride process entirely, leaving only four liquid bulk chemicals at the facility as opposed to five, thus reducing the number of bulk flammable chemicals from two to only one.

Immediate Implementation

It took MGPI less than 90 days to implement the CSB's recommendations. This is one of the fastest full implementations of substantial safety recommendations in the history of the CSB.



New key fob lockout system (photo courtesy of MGPI)



New shutoff valve (photo courtesy of MGPI)

The CSB acknowledges MGPI's efforts to identify and implement important safety changes in a timely and comprehensive way. This type of positive collaboration during a CSB investigation should serve as one example of making chemical safety a shared responsibility.