



U.S. Chemical Safety and Hazard Investigation Board

September 22, 2017

Factual Investigative Update

Midland Resource Recovery Investigation Update

On May 24, 2017, an explosion at the Midland Resource Recovery (MRR) facility in Philippi, West Virginia (see Figure 1) killed two workers and severely injured one worker. The founder and president of MRR was one of the victims. The CSB initiated an investigation of the incident and deployed an investigative team on May 28, 2017. Subsequent to the initiation of the investigation, the MRR facility experienced a second explosion on June 20, 2017. This explosion killed an employee of a contractor that had been hired to perform work at the facility.

Facility Overview

MRR began operations in 2006. It has US facilities in Philippi and Midland, Texas. The Philippi facility was constructed in 2007, serves as the primary operation center for MRR and at the time of the incident employed about 15 full time employees. The

Philippi facility handles a variety of operations related to odorant services, including decommissioning old or unserviceable odorant equipment. This decommissioning activity was underway when both incidents occurred.

Process Description

The primary purpose of decommissioning, and why a company like MRR is needed instead of the operator doing the scrapping itself, is to sufficiently remove the mercaptan odor prior to destruction. Equipment that once contained mercaptan is frequently recycled in a scrap yard, but during the scrap process mercaptan residue can enter the atmosphere. Even small quantities of released mercaptan can cause complaints and false natural gas leak concerns in the surrounding community. The low odor threshold of the mercaptan makes it ideal for use as an



Figure 1. Google image view of MRR Philippi facility.



Figure 2. Exemplar vessel involved in the explosion.

odorant for natural gas, but also makes it difficult to get rid of equipment that contained concentrated mercaptan. Therefore, the mercaptan must be neutralized so that it is not odorous when the storage tanks are scrapped. The goal of decommissioning is to take a vessel used in mercaptan service and convert it to scrap metal. MRR will decommission anything that once contained mercaptan. This includes tanks, pumps, piping, valves, fittings, and other small components.

The vessels involved in both of the incidents were referred to as Peerless MP-85 Odorizers. They were constructed of carbon steel and consisted of three interconnected tanks (see Figure 2). The top tank was the mercaptan storage tank which held concentrated mercaptan. In the middle tank, a slip stream of the natural gas pipeline entered the vessel so that mercaptan could be added to the pipeline from the top tank. In some MP-85s there is an aluminum component in the interior of the middle tank as well. The bottom tank served as an overflow tank for the top and middle tanks.

The MRR process of decommissioning the MP-85s involves deodorizing the tanks by adding dilute sodium hypochlorite to react with the mercaptan. The sodium hypochlorite oxidizes the

mercaptan, neutralizing the odor. After the mixture has been allowed to react for some time, the resulting liquid, referred to as "process water," is drained from the MP-85s. The vessels are then purged with air and cut into scrap metal.

Incident Description

On May 24, 2017 three MRR workers, including the company founder and president, were working to drain a number of MP-85s that had been filled with cleaning material about a month prior. Fourteen MP-85s had been filled with sodium hypochlorite and needed to be drained. During the initial stages of the draining, one of the MP-85s violently exploded, killing two workers and seriously injuring the third worker. Workers were likely preparing to pump process water out of the top tank and were either removing plugs from the top of the top tank or beginning to pump out the liquid from the tank. The container that failed on May 24, 2017 is pictured in Figure 3, which shows a rupture of the vessel at both the top and middle of the tank.

Less than a month later, on June 20, 2017, contractors, who had been hired to drain the remaining MP-85s, were beginning the process of draining another MP-85. Within a few minutes

of initiating the draining, the middle tank ruptured, killing one of the contractors performing the work.

The explosions likely occurred when unintended chemical reaction(s) caused highly reactive or unstable chemicals to form in the respective vessels, which resulted in the two explosions.

CSB Investigation Plans

The CSB is continuing to investigate the primary causal factors of both incidents. Among the areas of interest, the investigation will examine the potential chemical reactions that could have led to the incidents, potential learnings for other industries using reactive chemicals, and the process safety management systems in place at the MRR facility.



Figure 3. Tank that failed after the May 24, 2017 explosion. The middle tank failure was located at a threaded connection that connected an end cap to the middle tank.