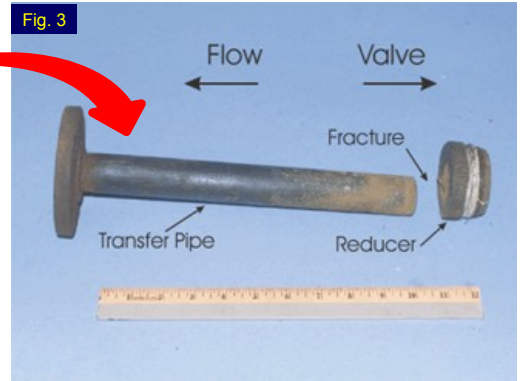
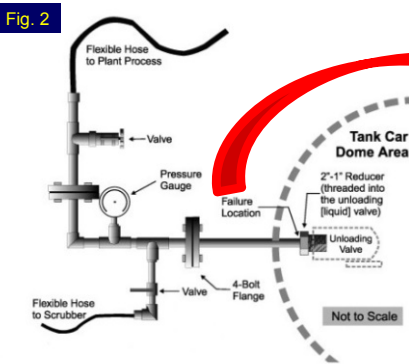


Unloading and Loading Hazardous Materials

September 2015



A railroad tank car of methyl mercaptan, a poisonous flammable gas (boiling point = 6 °C), was being unloaded in an area where other railroad tank cars containing methyl mercaptan and chlorine gas were stored or unloaded. During unloading, a failure occurred in a threaded section of pipe where it entered a 2-inch to 1-inch reducer attached to the tank car's unloading valve. A cloud of methyl mercaptan was released and ignited shortly after emergency response personnel arrived, sending a fireball 200 feet into the air and damaging unloading hoses on a chlorine rail car. Two workers were fatally exposed to toxic gases, a third fatality resulted from the effects of toxic gas exposure and burns, and approximately 2000 people in the area were evacuated. The entire contents of the methyl mercaptan railcar were released (nearly 150,000 pounds), and approximately 26,000 pounds of chlorine were also released (Fig. 1). Although both railcars had excess flow valves on their unloading connections, the valves did not close and stop the flow. The flow rate through the failed pipes was believed to be too low to close the excess flow valves.

The fitting that failed (Fig. 2 and 3) was found to be significantly corroded on the inside. The fitting was the only support for other piping (Fig. 2), which weighed more than 50 pounds. This fitting was a threaded connection and is likely to not be as strong as other types of connection, such as a welded or flange connection.

Did you know?

- While the things you do in your tank farm, loading and unloading operations, may seem simple – usually just transferring material – these facilities may be some of the most important contributors to process safety risk in your plant. The tank farm probably contains the largest inventory of hazardous material in your plant. Operations, though simple, involve large quantities. The consequence of a loss of containment may be severe.
- You cannot rely on an excess flow valve in a railroad tank car or a tank truck to stop flow in some unloading operations. These valves are designed to stop flow in case of a catastrophic failure of the tank discharge connection and will not close unless the flow rate exceeds a set value. The flow rate from a hose or pipe leak, or even a pipe failure if your unloading piping and hoses are smaller than the tank connection, may be too low to close the excess flow valve.

What can you do?

- Inspect all hoses and piping when setting up to load/unload trucks or railcars. If anything does not appear to be in good condition, ask for a more thorough inspection by a piping expert.
- Make sure that your plant's procedures for inspection and replacement of components (fittings, valves, hoses, etc.) for unloading operations are followed.
- Inspect piping support in loading/unloading equipment, make sure that piping does not have to support a large weight, and that it does not easily move or vibrate when used. If you believe there is a problem, ask a piping engineer to evaluate the system and recommend improvements.
- Suggest installation of remotely operated emergency shutoff valves in addition to excess flow valves in trucks/railcars.
- Consider using self-contained breathing apparatus or emergency escape respirators when loading/unloading gases or volatile liquids that are toxic or asphyxiating.

Reference: Hazardous Materials Accident Report: Hazardous Materials Release From Railroad Tank Car With Subsequent Fire at Riverview, Michigan July 14, 2001, NTSB/HZM-02/01, US National Transportation Safety Board, Washington DC, June 26, 2002.

Remember process safety in your tank farms!

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