

## **Persistence – Good or Bad?**

July 2014

In some process safety incidents, operating personnel have failed to recognize that a process was not responding as expected. They attempted to keep a process in operation by deviating from standard procedures, or put themselves in danger by attempting to correct an out of control process condition rather than evacuating. Some examples:

- **April 1995 Lodi, New Jersey blender explosion**, 5 fatalities: The plant was blending water reactive chemicals. The operation continued 24 times longer than expected, with unexpected heat and gas generation. Workers were trying to empty the blender when it exploded.
- **April 2004 Illiopolis, Illinois polyvinylchloride plant explosion**, 5 fatalities [Picture 1]: A valve on a pressurized reactor was inadvertently opened generating a flammable vapor cloud in a building. Operators remained in the building trying to stop the release, and the vapor ignited.
- **March 2005 Texas City, Texas refinery explosion**, 15 fatalities [Picture 2], and **December 2005 Buncefield, England oil storage terminal explosion**, 43 injuries and major damage [Picture 3]: Operators continued to fill vessels even though level instruments showed no increase, eventually resulting in a flammable material release which ignited.
- **January 2010 Charleston, West Virginia phosgene release**, 1 fatality: A process problem reduced the flow of phosgene from a cylinder. The feed was switched between cylinders to keep the process running. Standard procedures to clear phosgene from feed hoses were not followed. A liquid filled hose failed and released phosgene because of pressure from thermal expansion of the liquid and a faulty hose, exposing a worker to phosgene.



[1]



[2]



[3]

### **What went wrong?**

Many things contributed to the incidents above. However, there are lessons from them which can help you prevent injuries and fatalities in your plant:

- A process did not respond as expected from a known change. Nobody recognized the problem or asked for help about what was happening. For example, when filling a vessel, you expect the level to increase and should investigate what is happening if you do not get the correct response.
- Operators used non-standard procedures to attempt to keep a process in operation without recognizing the hazards involved.
- People tried to take heroic measures to remove reactive materials from a process vessel which exceeded safe operating limits, or to stop a leak from a process. Workers put themselves in danger while trying to correct a problem.

### **What can you do?**

Persistence is admirable, but know when to stop and get help, and what limits cannot be exceeded.

- When you have difficulties during operation or maintenance, don't try to force your way through the problems. Stop and get help, ask if you should continue, and be willing to shut down if you don't understand what is happening.
- Review startup and re-commissioning plans for potential failures, and plan what you can do to prevent or mitigate problems.
- Make sure instruments are accurate, and use the information they provide to make decisions. If an instrument reading does not seem right, don't assume it is a faulty instrument! Think about what it could mean if the instrument is correct, and ask if the activity should continue.
- Know when to evacuate the area when your process is out of control, or if there is a leak of hazardous material.
- If you do not have criteria for when to switch from normal to emergency operating procedures or evacuation, ask leadership in your area for guidance.

***Know when to stop – and when to get help!***