CCPS An AIChE Technology Alliance
Center for Chemical Process Safety
www.aiche.org/ccps

Process Safety Beacon

http://www.aiche.org/CCPS/Publications/Beacon/index.aspx

Messages for Manufacturing Personnel

Aging Process Facilities and Infrastructure

May 2018

Aging process equipment, facilities, and infrastructure are a safety concern in the process industries. In 2010 there was a violent explosion at an oil refinery in the state of Washington, USA (1). A heat exchanger shell failed catastrophically, and there were seven fatalities. The exchanger had been in service for almost 38 years and cracks had developed in the carbon steel shell after continuous exposure to hydrogen at high temperature and pressure. The failure mechanism (high temperature hydrogen attack) was not well understood when the refinery was built, and the cracks had not been detected when the shell was last inspected twelve years earlier.

In another incident, the roof of an ore processing plant collapsed onto the gallery below causing significant damage to process equipment. Fortunately, there were no injuries. Beams on the underside of the roof had been exposed to steam releases from equipment below for nearly twenty years. Snow and rain on the roof caused the steam to condense and corrode the beams. The roof finally collapsed one winter under a heavy snow load. No one in the plant had been assigned responsibility for maintaining the building. Operators did not routinely look beyond the process equipment. This incident shows the importance of maintaining all facilities and infrastructure, even if the equipment does not directly contact process chemicals.

Examples of aging equipment:

2. Silos
3. Separation equipment
4. A riveted tank car

Did You Know?

- Aging affects the condition and integrity of all process equipment, facilities, and infrastructure.
- Prolonged exposure to normal operating conditions, and occasional upsets, can cause equipment to deteriorate, making it more prone to failure.
- Many plants are now operating at rates and conditions not anticipated at the time of their initial construction.
- Aging does not necessarily relate to how old a facility or piece of equipment might be. It is really about how well it has been operated and maintained. Aging is about change and this requires constant awareness and vigilance by workers in an industrial facility.

What Can You Do?

- Ensure that all facilities and equipment are operated within specified safe operating limits.
- Report any deviations from safe operating limits to management so that technical experts can evaluate the potential impact of the deviation on the equipment.
- Look for any unusual conditions or signs of equipment deterioration in your daily plant or facility inspections.
- Look beyond your immediate area of responsibility as you travel about the plant. For example, inspect loading racks, and railway sidings, pipe bridge supports, building structural steel, and other infrastructure which can be missed in formal inspections.
- Report any concerns to your supervisor or foreman.

Aging equipment requires extra care!

The Beacon is usually available in Afrikaans, Arabic, Catalan, Chinese, Czech, Danish, Dutch, English, Filipino, French, German, Greek, Gujarati, Hebrew, Hindi, Hungarian, Indonesian, Italian, Japanese, Korean, Malay, Marathi, Mongolian, Persian (Farsi), Polish, Portuguese, Romanian, Russian, Spanish, Swedish, Telugu, Thai, Turkish, Urdu, and Vietnamese.