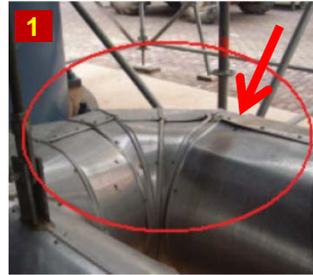


Corrosion Under Insulation (CUI)

January 2014

What can happen?

- A 4-inch (10 cm) pipe containing liquid ammonia leaked because of extensive corrosion. The quality of the pipe insulation was poor allowing water to soak into the insulation. The piping system had been partially inspected during the previous turnaround, but this particular section of pipe was not examined.
- A 1-inch (2.5 cm) flammable gas feed line ruptured because of wall thinning of the pipe due to corrosion under the insulation, causing a gas fire. The pipe which failed was a bypass which was not actually in operation at the time. Because there was no flow through the line, it was cooler, about 80 degrees C (175 F), than the main process pipe. The temperature was low enough that steam or moisture in the air could condense, and liquid water which contacted the insulated pipe did not evaporate quickly. This, in combination with damaged insulation, created conditions which make corrosion more likely.



**(1) and (2) – Examples of damaged insulation
(3) – Corrosion resulting from damaged insulation**

Do you know?

- ➔ Corrosion Under Insulation (CUI) is corrosion of piping, tanks, or other equipment which occurs due to water under insulation or fireproofing. Faulty or damaged insulation is frequently a source of the water that causes corrosion, and the insulation may also hide the damage so you are not aware of it.
- ➔ Literature suggests that CUI may be a concern for equipment service temperatures between minus 4 and 175 deg. C (25 to 350 F).
- ➔ Some common contributors to CUI include:
 - Water in the insulation, either because of improper storage before installation, improper installation, or damage after installation. This may be compounded if there is corrosive chemical contamination of water soaked into the insulation – for example, acids and other process chemicals, or chlorides such as salt from the air near salt water or from de-icing chemicals.
 - Water or other fluids can flow through certain types of insulation and move away from the source of the leak. CUI may occur in areas farther from the leak than expected –especially in low spots.
 - Pinholes or small process leaks from gaskets and fittings underneath insulation, which may remain undetected until the damage causes a larger leak.

What can you do?

- ➔ For process plant construction or maintenance workers:
 - Make sure that insulation is always installed according to the specified procedures. This includes proper covers and seals on the insulation, and proper coating or painting of the equipment which is insulated.
 - If you must remove insulation, be sure to protect the removed insulation until the job is finished and the insulation is properly re-installed.
 - When you remove insulation to do a maintenance job, take advantage of the opportunity to look at the equipment under the insulation. If you see evidence of corrosion, report it to management so experts can inspect the equipment.
- ➔ For process operators:
 - Look for damage to insulation or other signs of CUI as you work in the plant, and report your observations to management so damaged insulation can be repaired and the insulated equipment can be inspected if necessary.
 - When a maintenance job is complete, check the insulation to make sure it has been properly replaced.
- ➔ If you damage any insulation in the course of your work, report it and make sure it is repaired.
- ➔ See the February 2005 *Beacon* at www.sache.org for another example of CUI. You can also read more about the incidents above in this journal article: F. De Vogelaere, *Process Safety Progress* **28** (1), pp. 30-35, March 2009.

Take care of the insulation in your plant to prevent corrosion!