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CCPS Center for Chemical Process Safety

Process Safety Beacon

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Small Leaks Can Warn of Potential Catastrophic Failure

Operators at a refinery observed a leak in a pipe that contained light gas oil exiting a crude unit atmospheric column at a high temperature (Images 1 and 2). During the response to the leak, the pipe catastrophically failed, releasing a large quantity of hot gas oil (Image 3). The resulting fire (Image 4) injured six people, put others at risk, and caused significant damage to the refinery. Thousands of people in the surrounding community sought medical attention, and parts of the refinery were shut down for many months.


1


2


3

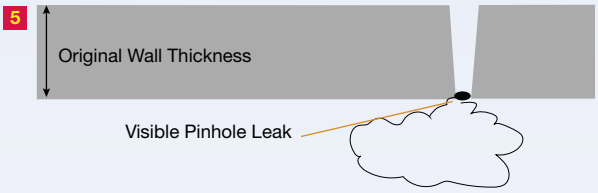

4

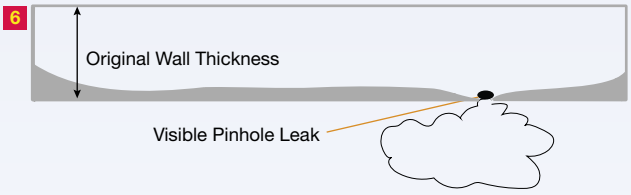
Did You Know?

A leak in a pipe or vessel wall may be caused by a small crack or pinhole, while the rest of the pipe or vessel wall is completely intact (Image 5).

Alternatively, the small leak could be the first complete penetration through a pipe or vessel wall that has been significantly thinned by corrosion or erosion (Image 6).

If a large area of the wall is thinned, the vessel or pipe may be ready to fail catastrophically and release a large amount of its contents. Efforts to respond to the leak may disturb the pipe or vessel, increasing the likelihood of a failure. Significant changes to the process conditions inside the pipe or vessel (pressure, temperature, flowrate, etc.) may also increase the likelihood of failure.





What Can You Do?

- If you find a small leak in any process equipment, first report the leak. Consider the possibility of a catastrophic failure, and ensure that the response plan will protect personnel, property, and the environment if a failure occurs.
- Understand the potential consequences of a catastrophic failure. These will depend on the properties of the material in the leaking pipe or vessel (flammability, toxicity, corrosivity, etc.) and the process conditions (temperature, pressure, flowrate, quantity of material, etc.).
- Consult your plant technical experts on the process and materials inside the pipe or vessel, corrosion hazards, materials of construction, and emergency response protocol to help determine how to safely respond to the small leak.
- For more information, read and review the April 2011 Process Safety Beacon, which discusses small leaks that become large leaks.

Small leaks can indicate larger issues!