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AWARENESS ALERT

2013AW07

Shell Global Solutions

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April 2013

Misidentification of Pipeline Leads to Crude Spill

Target audience for this alert

- Project Managers
- HSSE Professionals
- Those involved with projects/maintenance of M underground pipelines

What happened

An estimated 1-5 m³ (6-30 barrels) of crude oil were released from a third-party, off-plot pipeline in September 2012. The line had been mistakenly identified as an abandoned Shell pipeline, and a 5 mm (1/4") test hole was drilled into it.

A new process HDPE (high-density polyethylene) water line, 20 kilometres (12 miles) long and 140mm (5 1/2 ") diameter was being laid on property that was located between and outside the fence line of a third party tank farm and a Shell refinery. In one section, the HDPE pipeline was pulled through a 500mm (20") out-of-service pipeline owned by Shell. The 20" line ran through a pipeline corridor, with approximately 8 other pipelines owned by various oil & gas and chemical companies in the area.

The work involved cutting access holes in the pipeline and pulling the small line through in sections. To support and fix the HDPE line inside the larger line, foam insulation was injected into the annular space through 37mm (1 1/2") holes drilled along the length of the outer line. In the four months prior to the incident, over forty access points and holes had been cut in the pipeline.

On the day of the incident, the contractor excavated an access pit 3.5-4 meters (11-13 feet) deep in the area. The excavation did not fully uncover all the pipelines present. The contractor used a GPS survey to identify the line routing. A Shell Pipeline Services operator used a radio detection device to identify the line when it was partially uncovered. The contractor drilled a 5mm (1/4") hole in the line to confirm that it was empty and subsequently used a small rod to check that the HDPE pipeline was not going to be damaged when a larger (37mm, 1.5") hole was drilled to apply the foam. He then detected crude oil in the line, recognised that it was the wrong pipeline, and stopped the work.

While the contractor and Shell Pipeline Services were working to identify the owner of the line, the operator of the pipeline started to pump crude and the line started to leak. The leak continued for over an hour until the operator of the pipeline was identified and the pump was shutdown.



Figure 1 – Pipeline that was drilled and leaked
Post incident photo

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Why it happened

- A nearby 24" third party pipeline was misidentified as the 20" Shell pipeline. The radio detection tool provided inaccurate or erroneous data. After the incident, testing and advice from the radio detection tool manufacturer indicated that the proximity of the pipelines and/or the thickness of the insulation layer in the Shell pipeline could cause such an error.
- The contractor coordinating the work and the Shell Pipeline Services employee believed that the radio detection tool was accurate and reliable.
- They did not use a secondary means of identifying the line such as:
 - Excavation of the pipeline area and identification of each pipeline by its owner, or
 - Measuring the diameter of the line. (Since the pipeline was partially uncovered, the difference in size of a 24" line and the 20" line was not apparent.)

Lessons learned

- Using radio detection tools (electromagnetic identification) may not be reliable in situations where many pipelines are located close together. The electromagnetic pipeline detection method works by impressing an alternating current (with a frequency of 256 Hz to 8 kHz) from a known point of the pipeline. The pipeline can then be detected by picking up the electromagnetic radiation from the alternating current. It is possible for this current to transfer to other pipelines through metal to metal contact or by inducing a current in a pipeline in close proximity. Also, a thick insulation layer of a pipeline may contribute to misidentification of the pipeline. Users should understand the limitations of equipment.
- If an area has multiple pipelines present in close proximity to one another, radio detection tools should not be the sole means of identification. Consider working with other pipeline owners (to the extent they can be identified) to facilitate excavation of adjacent pipelines in order to confirm identification of the proper pipeline before conducting work. This is a regulatory requirement in some locations.
- The pipeline work did not use a permit to work process, since it was outside the refinery fence line. In such circumstances, the DSM process isolation and permitting standards should still be applied for work on or near M pipelines carrying hydrocarbons or other hazardous substances, as applicable.

Further information

- Learning Materials



Safety Meeting
Learning Session DSM



Learning
Opportunities DSM-AI



LFI Summary
DSM-AW-201307.doc



Safety Meeting
1-pager DSM-AW-201

- [DSM-2500006-ST – Process Isolation and Control of Process Energy](#)
- [Shell Pipeline USA](#)
- [Common Ground Alliance](#) – Best Practices publication, [Chapter 4 section 12 – Locating and Marking – Locating Electromagnetically](#)
- Manufacturing LFI Coordinator

