Learning Brief

PRODUCT SPILL DUE TO FAILURE OF PRESSURE INDICATOR COUPLING

Original Installation

Revised Installation

What happened?

- During a routine check a fuel oil spill was noticed within a pump pit
- The operator identified the origin of the leak and shut down the related operations

Findings and key learning points

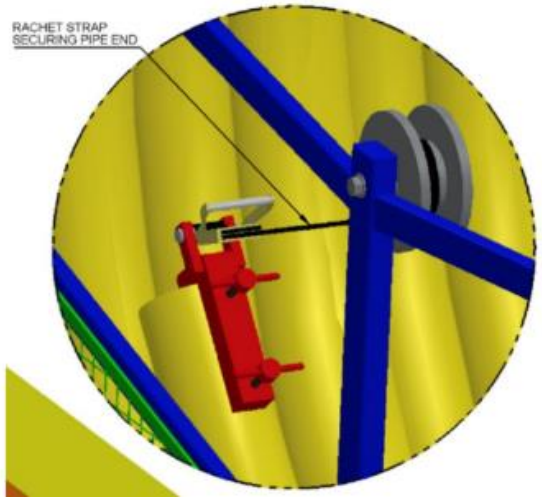
- The source of the leak was identified as a broken coupling located between a pipework flange and a pressure indicator (see upper photos)
- Prolonged vibrations from the pump had caused fatigue failure of the coupling
- The directly mounted pressure indicator was replaced with a capillary type of indicator. The flexible tube between the instrument and the connection point prevents transmission of vibrations (see lower photos)

Recommendation

- It is recommended that operators check for installations where transmission of vibration could lead to a fatigue failure and, where identified, re-design the installation
- Consideration should be given to using capillary connections for pressure indicators rather than fixed connections where vibration is present

Learning Brief

FATALITY CAUSED BY STRIKE FROM COILED PIPE



What happened?

- A fatality occurred during a directional drilling and coiled pipe installation operation
- The tail end of the coiled pipe sprung from a coil pipe trailer with sufficient force to fatally injure an operative

Findings and key learning points

- 180 mm diameter coiled polyethylene pipe was being fed through a pre-drilled bore
- As the dispensing operation was nearing completion, the final section of pipe (tail-end) sprung from the coil pipe trailer. The stored energy was sufficient to strike and fatally injure an operative
- There is a known risk that coiled pipe greater than 125 mm in diameter has sufficient energy to cause a fatality
- Mitigations to minimise this risk are to secure the pipe to the trailer (lower photo) and to set up an exclusion zone
- Other Improvements identified are the fitting of an energy dissipation device and fitting sufficient guarding to coil pipe trailers

Recommendation

- Operators should be aware of the risks caused by stored energy in coiled pipe and ensure that Risk Assessment / Method Statement is appropriate and adhered to

Learning Brief

SINKHOLE ADJACENT TO PIPELINE

What happened?

- During a weekly vantage point survey, a sinkhole was noted
- The sinkhole was formed due to an abandoned mine shaft re-opening
- An adjacent gas pipeline was unaffected

Findings and key learning points

- A pipeline operative noted the appearance of a sinkhole during a routine weekly vantage point survey
- The pipeline operator carried out investigations and established that a capped disused mine shaft had collapsed and re-opened. The appropriate agencies and landowner were informed. A fence was erected around the hole.
- An aerial survey was undertaken to confirm the exact location. An adjacent gas pipeline 33 metres away was unaffected.
- The presence of the mineshaft was known when the pipeline was constructed so the route was selected accordingly
- The operator carried out a geophysical survey of the pipeline to ensure that there had been no subsidence or settlement caused by ground movement or underground water

Recommendation

- Operators should be aware that capped abandoned mine shafts may re-open and should consider including these on surveillance lists

Learning Brief

UNAUTHORISED FENCING INSTALLED ABOVE PIPELINE

What happened?

- A fencing contractor erected a fence in a pipeline easement without permission
- One post was inserted directly above the pipeline to a depth of 500 mm
- The pipeline wasn't damaged

Findings and key learning points

- A pipeline operator was contacted by a landowner regarding drainage works
- On arrival at site, the operator's representative noted that a fence had been installed above the pipeline. This had not been authorised.
- The landowner had forgotten to inform the fencing contractor about the pipeline
- One post was directly above the pipeline and although the fencing contractor claimed that the posts were only driven-in to a shallow depth, it was found to be inserted to 500 mm
- The fence-post was adjacent to a pipeline marker post
- The operator explained to the contractor and the land-owner the serious nature of the incident, the potential hazard of striking a pipeline and the correct procedure to follow in future, including the need to contact LinesearchbeforeUdig (LSBUD)
- The post was removed

Recommendation

- Operators to reinforce the message to landowners that it is:
  a) their responsibility to inform contractors and
  b) that they need to contact the operator prior to any works near pipelines

PYROPHORIC DUST IGNITION

Photo by Cullan Smith on Unsplash

What happened?

- When a gas installation was opened-up, pyrophoric dust inside ignited
- The combusting dust was extinguished with water and no damage occurred

Findings and key learning points

- Dust can accumulate in gas installations such as filters and pipelines
- Some dusts may be pyrophoric in nature - they will spontaneously oxidise when exposed to air and release heat
- In gas pipelines, pyrophoric dust is likely to be iron sulphide – a result of the reaction between rust (from iron pipelines) and hydrogen sulphide
- Whilst in an enclosed gas installation, there is insufficient oxygen to allow combustion to take place but when containment is broken, the oxygen levels rise leading to oxidation
- Spontaneous oxidation of pyrophoric dust can result in the ignition of flammable substances such as natural gas
- When breaking containment if smouldering, smoke or burning embers are noted, the dust should be moved to a safe area (if safe to do so) and dampened down with water

Recommendation

- Operators should be alerted to the possibility that pyrophoric dust can be present in gas systems and that it can ignite in the presence of oxygen

Learning Brief

IMPROVED SIGNAGE AT ABOVE GROUND INSTALLATIONS

Photo of faded sign to go here!

Example of warning sign

What happened?

- The HSE noted faded warning signs whilst visiting a Pressure Reduction Installation
- The opportunity has been taken to replace old signs with signs of an improved design

Findings and key learning points

- An HSE visit to a Pressure Reduction Installation (PRI) revealed several age-related deterioration issues but especially faded warning signs
- Focus on the pressure integrity aspect of unmanned stations has resulted in gradual deterioration of the infrastructure (fences, signage, building fabric) going unrecognised
- Proper signage is required to identify the presence of hazardous substances and the associated risks to staff and the public and to enable PRIs to be located quickly in the event of an incident
- Action has been taken to replace existing faded, worn, damaged or missing signs with improved operator standardised signs (see lower photo for an example)
- The new signs are prominently located, are highly visible, give clear instructions, use standardised symbols and colours and are made of long-lasting durable material
- Using consistent standardised signs ensures that emergency responders quickly understand the information conveyed

Recommendation

- Operators should review their unmanned installations and if necessary, install replacement warning signs

Learning Brief

POOR CONSTRUCTION PRACTICES IDENTIFIED DURING ILI

What happened?

- A corrosion defect was detected in a 28” oil pipeline by In Line Inspection (ILI)
- On excavating, a section of off-cut pipe was found buried next to the pipeline adjacent to the defect
- It is unlikely that the pipe caused the corrosion, but it is an indication of poor construction practice

Findings and key learning points

- A routine ILI (magnetic flux leakage) run was carried out on a 28” oil pipeline
- An external corrosion defect was detected on the side of the pipeline
- The location was excavated. An off-cut section of 28” pipe was found buried in the trench adjacent to the defect. It is assumed that the pipe was put in the trench during construction
- The coating of the pipeline was visually in good condition but upon removal, minor external corrosion was identified. The coating was removed and the defect addressed
- Although it is unlikely that the section of pipe had caused or influenced the corrosion defect, it is an indication of poor construction practice and may have caused coating damage
- It is likely that the section of pipe had affected previous MFL readings and delayed the identification of the defect. Improvements in MFL technology enabled the defect to be identified.

Recommendation

- Operators are to be made aware that detection of metallic objects adjacent to pipelines may be an indication of poor construction practices and should be investigated accordingly

HOUSTON LIQUIFIED NATURAL GAS PIPELINE FIRE

Link to YouTube video
(ctrl + click)

Houston suburb evacuated after massive pipeline fire

What happened?

- A vehicle crashed through a fence hitting an LNG pipeline valve in Houston, Texas, USA
- The impact resulted in an explosion and the released gas burnt for more than 24 hours

Findings and key learning points

- A Sports Utility Vehicle (SUV) crashed through a fence separating a 20” Liquified Natural Gas (LNG) above-ground pipeline and a supermarket car park
- The SUV struck and damaged an above-ground valve causing the gas to release and ignite. The SUV was incinerated
- The pipeline was isolated either side of the release leaving a 20-mile section of pressurised pipeline. It took more than 24 hours before the gas fire burnt out
- Consequences were; heat injuries to first responders, radiant heat damage to properties, damage to electrical transmission and distribution cables and evacuation of the area
- Fire-fighters cooled adjacent properties with water to prevent them igniting

Recommendation

- Operators are advised to check that above-ground installations are adequately protected from vehicle impact

Learning Brief

ILI TOOL DAMAGED DURING THE LAUNCH PROCEDURE

What happened?

- An In-line Inspection (ILI) tool was damaged during the launch procedure
- Differential pressure across the ILI tool built up causing the tool to move backwards

Findings and key learning points

- A Magnetic Flux Leakage (MFL) ILI tool was being used to inspect a 24” pipeline
- Three runs had already taken place (gauging and profiling)
- The ILI tool was loaded into the (temporarily fitted) pig trap but the pig trap door was not immediately closed (contrary to the Non-Routine Operation (NRO) instructions)
- Pressure built-up in front of the ILI tool due to an up-stream 2” balance line valve passing and a vent valve being closed (contrary to NRO instructions). Differential pressure across the tool caused the ILI tool to move backwards damaging the sensors
- The passing 2” valve had been greased and operated 36 times during the whole pigging operation. Pressure gauges were not fitted to check that the valve was holding
- Non-compliance with the NRO was found to be due to inexperience of the staff carrying out the operation and inappropriate hand-over of the NRO (e.g. no site visits)

Recommendation

- It is recommended that experienced staff are included in a pigging operation site team
- Non-Routine Operation instructions should be reviewed on-site, appropriately handed-over and adhered to
- Critical valves should be checked to ensure that they are holding pressure