Urgent inspection of unregistered in-service hydrocarbon pipework

Following a RIDDOR reportable incident a petrochemicals company realised there were some significant gaps in its pipework inspection and registration processes. A large number of hydrocarbon pipelines were unregistered and had not been inspected for a long time. Given the seriousness of the incident and the potential further failure posed to the company’s license to operate there was a need to complete an urgent inspection of all carbon steel non-registered hydrocarbon lines on its off plot areas.

The company selected ABB due to our ability to rapidly assemble a team capable of shaping the scope and carrying out the work. The team comprised inspection engineers supported by chartered mechanical engineers.

The inspection team commenced inspections with the available information in parallel with the full detailed workscope being finalised. The original request to provide a small team of inspection engineers was met and increased at the company’s request to a team over twenty. The actual numbers varied across the period.

Solution

Over 1000 lines were inspected with a total length of over 50 km. Line lengths varied from a couple of metres to several hundred metres.

ABB proposed the scope of inspections and the methods for reporting; managed the line list defining the scope, retrieved data from the company’s on-line registry to produce inspection packs and developed job safety procedures.

ABB provided a chartered mechanical engineer to act as the company’s responsible engineer, to review and endorse all reports and to define detailed procedures for the extent of inspections and reporting.

The first inspections were carried out using a set of inspection packs for systems that had previously been inspected but not followed up, as they had not been entered into the maintenance management system. To enable inspections to be carried out meaningfully and safely, a number of project procedures were put in place to supplement the company’s standard procedures.
A project specific procedure was produced to define the categories of defects. This is summarised below:

- **Category 1 defect** - One which may be about to cause a loss of containment i.e. one for which the residual strength and/or deterioration rate(s) and hence remaining life of the system cannot be determined visually with confidence and consequently immediate response shall be initiated within 24 hours

- **Category 2 defect** - One for which the remaining life of the system may be less than 3 months

- **Category 3 defect** - One for which the remaining life of the system is likely to be greater than 3 months but may be less than 30 months

- **Category 4 defect** - One for which the remaining life of the system is likely to be greater than 30 months

- **Acute task** - A follow up inspection task/inspection enabling task required to be completed within 3 months to enable the integrity of the line to be better assessed

The company’s Job Safety Analysis (JSA) was reviewed and revised. It was then used to brief the inspectors prior to the start of work. As additional hazards were identified it was revised and recommunicated as below:

- A project-specific inspection checklist was defined and agreed
- A project-specific Point of Work checklist was developed and used
- Coating damage and surface corrosion was assessed using the company’s reference table
- Reporting was recorded on the ABB database using a project-specific report format
- The inspection of all non-registered hydrocarbon lines was focused in a fluid risk priority order
- The identification of all acute defects and the specification and work scope for their remediation
- Individual reports with photographs, marked-up P&IDs and isometrics were issued for each line
- Weekly project progress reports were issued and weekly meetings with the company were used to monitor and steer progress
- A report into the shortfalls of the company’s registration process was created

The work was completed on time, on budget and with no accidents.

**Benefits**
- Reduced the overall risk of further failure by prioritisation of inspection and defect verification
- Improved the clients position with the regulatory authority because all the lines considered to be at greatest risk were inspected within 10 working weeks of the start of the project
- Identified severe defects on a line that was taken out of service preventing a second loss of containment
- ABB carried out fitness for service assessments of other defective areas to ensure business continuity
- ABB provided the company with information to rapidly demonstrate trends for condition of pipework