

Novel Solution for Corrosion Coupon Access Fitting Abandonment

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ABSTRACT

The use of access fitting for intrusive corrosion monitoring tools is a common practice in the Oil & Gas industry; however, the Company has faced several difficulties including a recent incident during retrieval operations which has led to suspend, or significantly reduced the use of corrosion coupons and probes, decreasing the frequency of retrieval, and eliminating its use in new projects. In order to reduce the risk, it was decided to decrease 91% the use of corrosion coupons, hence suspending the retrieval activities in those locations. Therefore, more than 300 access fittings / locations were no longer required. These locations, un-attended, might result in dead legs (corrosion threat) which could create a possible leak path in the pipeline systems. In that sense, there was an urgent need to define a safe, efficient and permanent solution for the abandonment of the existing access fittings. Several options were reviewed, considering technical aspects as well as costs. The first option was to use a solid plug assembly with a high-pressure retaining cover; this was discarded due to possible creation of dead leg, thus needing further maintenance / monitoring and as such could not be considered as permanent solution. A second option was to carry out sectional replacement of the pipeline at the corrosion monitoring pit; this is a feasible alternative for pipelines with extended shutdown flexibility otherwise hot-tap & stopple operation would be required for execution with a considerable high cost associated. For the third option, the Company worked with a third-party pipeline isolation specialist to develop an optimal solution which considered the design of a permanent abandonment plug compatible with the existing access fitting that could be installed while the pipeline is in operation with the available service tools. A procedure was developed for the trial of the abandonment plug system to capture the required installation steps and testing criteria (pass/fail). The trial for the abandonment plug system was successful and there is ongoing plan for the roll-out across the pipeline systems. This paper will cover the selected option, including design, factory acceptance test and field trial results.

Key words: Corrosion Management, Corrosion Monitoring, Intrusive, Safety Management

INTRODUCTION

The use of access fitting for intrusive corrosion monitoring tools is a common practice in the Oil & Gas industry; however, the Company (Petroleum Development Oman) has faced several difficulties including a recent incident during retrieval operations which has led to suspend, or significantly reduced the use of corrosion coupons and probes, decrease the frequency of retrieval, and eliminate its use in new projects.

In order to reduce the risk to ALARP (As Low As Reasonably Practicable), the Company decided to decrease in 91% the use of corrosion coupons, hence suspending the retrieval activities in those locations.

Therefore, more than 300 access fittings / locations were no longer required. These locations, unattended, might result in dead legs (corrosion threat) which could create a possible leak path in the pipeline systems.

In the industry, there is no readymade solution for the abandonment of these corrosion monitoring access fittings. Therefore, there was an urgent need to define a safe, efficient and permanent solution for the abandonment of the existing access fittings.

This paper will cover the selected option, including design, factory acceptance test and field trial results.

REVIEW OF TECHNICAL OPTIONS FOR ABANDONMENT

The Company reviewed several options, considering technical aspects as well as costs. Details of the technical review are given below.

Solid plug assembly with high-pressure retaining cover

The first option reviewed, recommended from one of the access fitting manufacturers, was to use a solid plug assembly with a high-pressure retaining cover. The solid plug assembly would be a modified injection nut fitted with O-rings to stop debris accumulation inside the access fitting.

The high-pressure retaining cover consists of a bleed valve and pressure gauge, which would aid in visualization if any build-up pressure was occurring which would give indication of O-ring failure. In case of O-ring failure, fluid and debris accumulation would be expected with the risk of internal corrosion.

Although the option is easy to install and is a standard design, it cannot be considered a permanent abandonment solution since maintenance and inspection is required every six months to check the integrity of the O-ring, as per manufacturer recommendations.

In addition, if the internal threads of the access fitting are worn out, the risk of ejection is not mitigated. Further to this, the internal surface of the fitting is in an unknown condition. Therefore, the first-time success rate of the installation of such plugs cannot be guaranteed.

Sectional replacement

The traditional way for removal is by means of sectional replacement (hot tap and stoppling operation) of the pipeline at the corrosion monitoring pit.

This was the second option reviewed, it is considered a feasible alternative for pipelines with extended shutdown flexibility. If there are operational constraints, there would be a considerable high cost associated which would negate the use of this option.