Proposal of Integrity Enhancement of Plant by Dead Leg Management System in Zirku Island - Ahmed Mohamed Al Dhuhoori - Corrosion Engineer - ADNOC OFFSHORE COMPANY

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Abstract

Majority of plant consequence events piping leaks have been due to corrosion associated with dead legs. This Includes control valve bypasses, heat exchanger bypasses and other infrequently uses bypass lines/ Intermittently operated piping and vent/drains which does not have flushing arrangement. Earlier failure statistics with in ZADCO facilities indicate that majority of leaks in plants are occurring at interconnecting piping systems out of which 70-80% due to dead leg and small bore piping. this situation system to address these concerns and mitigate the associates risks as part of the drive to ensure that all production facilities are available to support long return business requirements. The objective of the study is reviewing the practices at zirku Dead Legs Management and to discuss gaps / Scope for improvement and way forward. Dead Leg is a section of Pipework which contains corrosive hydrocarbon and / water under stagnant condition (either permanently or intermittently) where there is no measureable flow. In Zirku Facilities Corrosion related leaks were recorded and analyzed for mitigation. Dead leg Identification was carried out in plan twice and list prepared for periodical flushing and inspection / elimination of dead leg piping.

Practice of Dead Leg Management System

1. Inspection is being carried as part of DLMS. Dead Leg have been identifying as integrity thread Location along with the related pressure piping system and which subjected to periodical inspection based on the remnant life of piping
2. Stagnant Flow location like Future Extension, Drain valve / Sample Points High Point Vents, Level bridles / Instrument connections, Valve bypass. Upstream nozzle of PSV, Spare Pump Piping, in which specific ITL's (integrity Threat Locations) was marked for UT/RT. Inspection.
3. The Dead Legs are identified 7 tabulated by ZRPRD/ZRFIP Team and subjected to periodical Flushing Program as a corrosion Mitigation Prevented measure by ZRPRD
4. Elimination/ Removal of Dead Leg
5. Modification of Pipe Work: Relocated isolation valves as close as possible to the active steam. Upgrade of dead leg piping Material of Construction (MOC) and increasing the Thickness/Piping schedule.
6. Dead Legs Inspection and mitigation issues are covered in Various document and procedures, there is no specific COP (Code of Practice) is Available to manage the dead leg so related documents are used:
   - Inspection Management System Manual
   - Topside Piping Systems
   - Mothballing procedures
   - Ultrasonic Thickness gauging

Code Practice CP-059 Dead Leg Management System covers comprehensively all the issues related to dead legs, few salient points are Criteria & methodology to identify dead legs, Equations to calculate the probability and consequence of failure and rank the risks, Adequate Coverage of Inspection and Mitigation options, Inspection intervals are based Consequence Category and Grade, Roles and Responsibilities

Historically, the management of Dead Legs on an installation has been problematic primarily because of the large numbers of Dead Legs that usually exist. This article describes a high-level dead leg integrity management program overview and is based on experience, knowledge and adaptation of inspection management philosophies currently being implemented within the Oil & Gas and the petrochemical industry. The requirements and philosophy described herein serve to provide a systematic approach upon which future inspection and maintenance requirements can be developed, planned and implemented. Dead legs can be defined as locations in piping circuits containing idle, stagnant or intermittently flowing fluids. Corrosion in dead legs represents a significant threat to the integrity of hydrocarbon production facilities.

High rates of degradation are readily observable at susceptible locations, where corrosion rates of millimeters per year are possible. This article describes how degradation at dead legs can be prevented. In addition, it provides the mechanisms by which the threat from dead leg corrosion may be assessed in order to develop and establish a written scheme for examination, if prevention is not possible and/or practicable. API 581 defines "Dead Leg" as a section of piping or piping circuit that is used only during intermittent service such as start-ups, shutdowns, or regeneration cycles rather than continuous service. API 574 defines "Dead Leg" as components of a piping system that normally have no significant flow. Dead-leg locations include: blanked branches, lines with normally closed block valves, lines which have one end blanked, pressurized dummy support legs, stagnant control valve bypass piping, spare pump piping, level bridles, relief valve inlet and outlet header piping, pump trim bypass lines, high point vents, sample points, drains, bleeders, and instrument connection.

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