CASE STUDY

Sustained Casing Pressure Localization using DFOS Slickline

South America

Project Overview

Maintaining well integrity is of utmost importance to ensure safe operations throughout the entire lifespan of a well. Among the critical well integrity challenges, sustained casing pressure (SCP) stands out as a significant issue related to the failure of well barrier elements such as casing and cement. SCP refers to the pressure existing between the casing and the wellbore. It is essential to monitor and control SCP as it can indicate potential well integrity issues that may lead to well control problems or leaks.

This case study focuses on a wet gas producer well located in South America, which is experiencing sustained casing pressure in the outer annulus between 9-5/8" and 5-1/2" casings. The pressure in the annulus has reached 76 psi and during the bleed off it produces 130 bbl/day of water.

Solution

In the presence of sustained casing pressure, localized changes in temperature and acoustic signals generated by the fluid or gas passing through the leak can be observed. By monitoring temperature changes and analysing the acoustic signal detected by a fiber optic cable, the presence and location of the SCP can be identified.

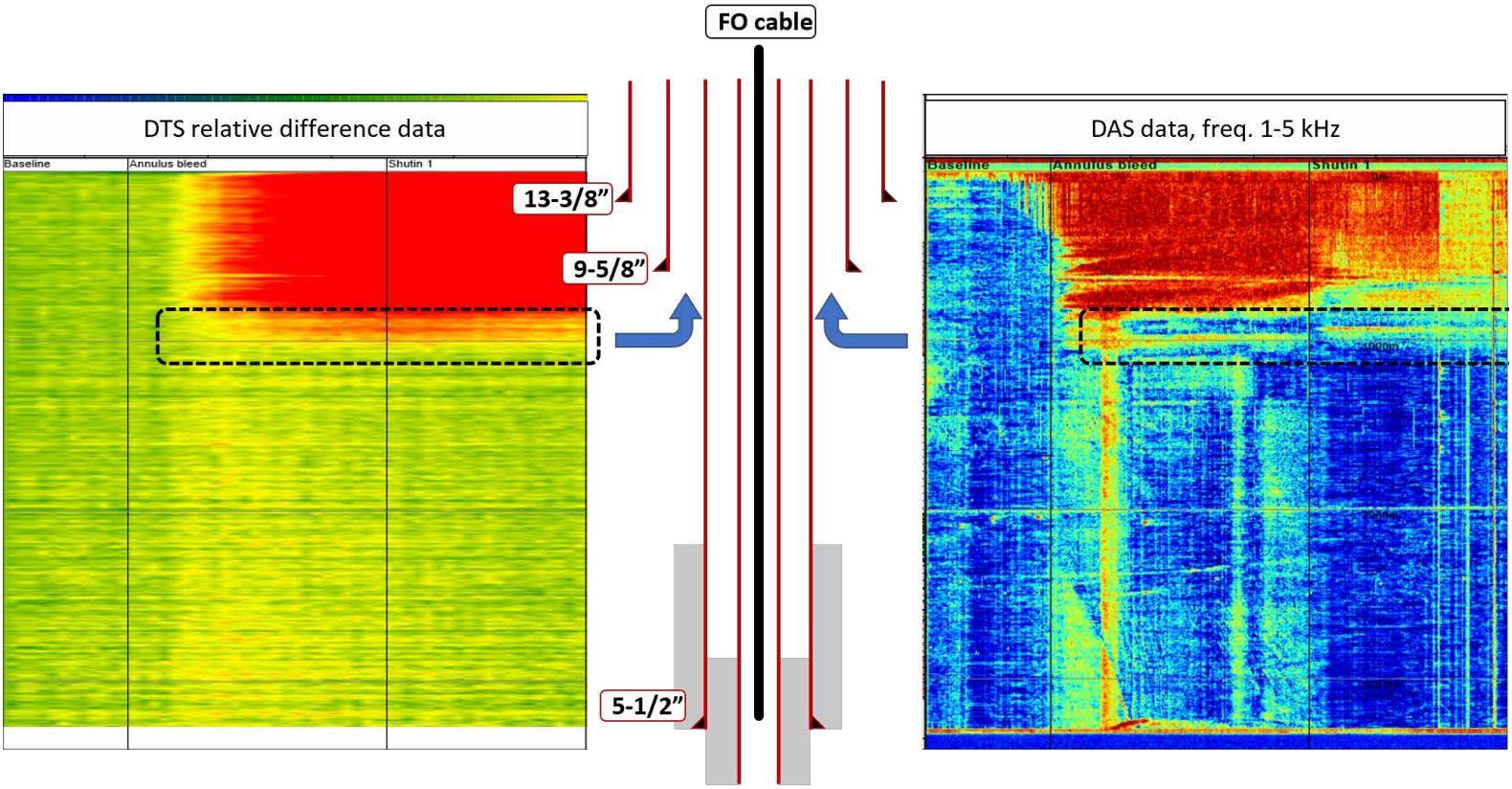
To efficiently locate and identify the source of SCP, Expro offered an optical fiber-enabled slickline to the operator. The fiber optic cable acts as a sensor, capable of detecting changes in temperature, pressure, or strain. Slickline capabilities are widely used in the oil and gas industry for routine operations, making it a common and cost-effective method for well interventions. By deploying the fiber optic cable using slickline, Distributed Fiber Optic Sensing (DFOS) data can be gathered, and intervals in the well requiring further

Background

- Wet gas producer was experiencing sustained casing pressure (SCP) in an outer annulus
- The operator needed to locate and identify the source of SCP to plan for remedial action proactively

Solution & Benefits

- A slickline survey utilizing DFOS was employed by Expro to identify the source of SCP; data was acquired using AP Sensing's DTS and DAS
- The operator received information about the source of SCP within hours after the survey
- This cost-effective solution resulted in a reduction of HSE risks



The well schematic displays the various casing sections along with their corresponding sizes. The DFOS enabled slickline was deployed until the 5-1/2” casing shoe, as indicated on the schematic. DTS and DAS data were acquired through the DFOS technology to identify and locate the sustained casing pressure (SCP) interval. Blue arrows were used to indicate the specific SCP interval.

investigation can be determined.

In addition to deploying the fiber optic cable, Expro provided rapid data evaluation through onsite data processing, enabling the delivery of quick results within hours of conducting the survey. Surface interrogator units also play a crucial role in a DFOS survey. For data acquisition during the DFOS slickline survey, AP Sensing’s Distributed Temperature Sensing (DTS) and Distributed Acoustic Sensing (DAS) interrogators were used. These interrogators can accurately localize different temperature and acoustic events with a precision of 0.5 meters, making them ideal for detecting common well integrity and flow assurance issues.

Results & Benefits

The integration of Expo’s DFOS-enabled slickline and powerful onsite software, along with AP Sensing’s interrogator units, enabled the operator to properly locate the source of the SCP, identify the path of fluid behind the casing, and identify the fluid entry point right after the DTS and DAS data acquisition. The primary annulus well integrity issue was identified to be water entering the well at the 9-5/8” shoe.

Localizing and addressing sustained casing pressure (SCP) is crucial for ensuring wellbore integrity, preventing well control incidents, protecting the environment, and maintaining operational efficiency. By identifying the source of SCP, operators can take appropriate measures to address underlying issues and mitigate potential risks associated with casing pressure buildup.

The application of DFOS on slicklines has proven to be a valuable surveillance technique that can be combined and integrated with other conventional sensors to provide a robust diagnosis of the well’s condition and performance. Implementing DFOS technology resulted in fewer operating hours, leading to savings in field personnel and a reduction in associated HSE risks.

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