[PS]Efficacious Use of Simple and Cost Effective Acoustic Flow Analyzer Measurement to Enhance Recovery and Improve Life Cycle of Wells*

Omar J. Alaref[1], Mahmound Saada[1], Mongi Abdelmoula[1], and Marvin Rourke[2]

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[1]GOWell International LLC, Dubai, United Arab Emirates (omar.alaref@gmail.com)
[2]GOWell International LLC, Beijing, China

Abstract

Well integrity technologies have been in high demand within the oil and gas industry in the recent years due to two main reasons - recent incidents and the down-turn in the industry. The recent failures and blow out incidents occurring in different parts of the world encouraged new strategies and well integrity management systems to be deployed in order to ensure wells are meeting health, safety and environmental standards. Moreover, the down-turn in industry caused by relatively low oil prices which led oil and gas operators to scale down exploration and drilling, and alternatively work-over existing wells. It is believed that the most economical way to work-over the well is by performing data acquisition first, which enables the work-over team to make an informed decision and tackle the specified problem, saving non-productive time.

One of the fast growing well integrity technologies is leak detection. Unlike conventional data acquisition techniques such as corrosion monitoring, the leak detection method traces the fluids entering the well-bore and gives a dynamic image of what is going on in a producing/injecting well. The leak detection is mainly based on passive acoustic measurement, which is typically based on listening to fluid vibration by moving through different aperture sizes, and recorded in different frequencies and amplitudes. Other measurements are recommended, such as temperature, pressure and multiphase sensors (in case leak is suspected to be inside the tubing). The technology has been used in various locations around the world with challenging environments. The typical and most desired ones are firstly the surface casing leaks where fluids of various types enter into the annuli between casings and build up on surface. Moreover, high amounts of undesired fluids contributing to the production and the source would be hard to identify with conventional technologies.

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ABSTRACT

Well integrity technologies have been in high demand within the oil and gas industry in the recent years due to two main reasons; recent incidents and downturn in industry. The recent failures and blow out incidents occurring in different parts of the world encouraged new strategies and well integrity management systems to be deployed in order to ensure wells are meeting health, safety and environmental standards. Moreover, the downturn in the industry caused by relatively low oil prices led to oil and gas operators to scale down on exploration and drilling and alternatively work-over existing wells. It is believed that the most economical way to work-over the well is by performing data acquisition first, which enables the work-over team to make an informed decision and tackle the specified problem, saving non-productive time.

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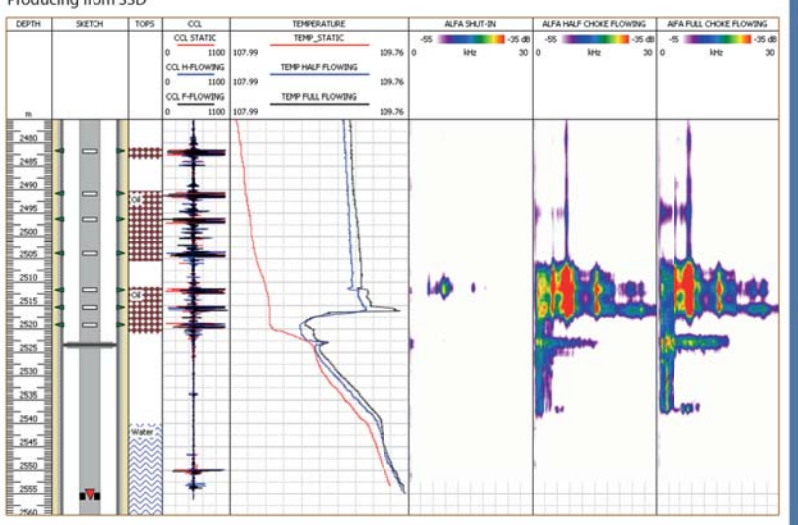
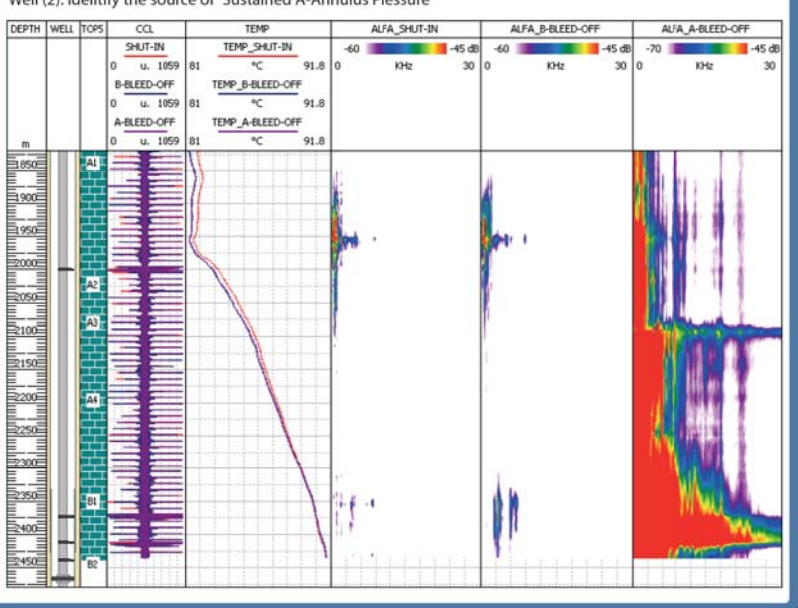
Well (1): Identify the Source of "High Water Cut"
Oil Producer
60 % Water Cut
Producing from SSD



Well (2): Identify the source of "Sustained A-Annulus Pressure"



Well (3): Identify the source of "Sustained A-Annulus Pressure"

INTRODUCTION

- First to introduce the concept of acoustic logging devices was McKinley in 1994
- Before that Enright in 1955 and Korotaev in 1970 introduced acoustic detection
- ALFA – Acoustic Leak Flow Analyzer

PROS

- Provides Dynamic View of the well
- Checks for complete integrity of completion, regardless of the number of casings
- Used in Well Integrity and Reservoir Flow Analysis

CONS

- Run in Memory only – Stationary

OPTIMUM SURVEY

- Number of passes to meet objectives
  - Shut-In Pass
  - Bleed off / Flowing / Injection Passes
- Optimum Stationary intervals
- Every 3 ft / 1 m, in alleged zones
- Every 10 ft / 3 m in other intervals

TECHNOLOGY BACKGROUND

- Acoustic Leak Flow Analyzer (ALFA)
- Passive stationary measurements – Hydrophone
- Data is recorded in Amplitude and frequency
- Usually combined with temperature to give a solid answer

CONCLUSION

- The technology of passive acoustic measurement has big potential in identifying undesired fluid movement entering or exiting the wellbore
- Designing an optimum logging program for the survey is crucial for achieving the objectives
- The case studies available show that with simple and cost effective intervention, a proper decision could be taken to improve lifecycle of the producing/ injecting wells, hence improving recovery

Authors: Omar Alaref, Mahmoud Saada, Mongi Abdelmoula & Marvin Rourke

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