

# TruEdge™ Technology in Action. A Unique Challenge in Qatar.

Wellbore Integrity Solutions (WIS) TruEdge\* technology from our Red Baron product line demonstrated superior performance in both cutting and milling a Corrosion Resistant Alloy (CRA) liner in Qatar.

## TruEdge technology enables liner recovery and a subsequent successful sidetrack.

In an offshore well, a 7 inch, 29 ppf CRA-110 liner became stuck during conveyance and could not be retrieved. The local WIS team in Qatar was mobilized to perform remedial services, including section milling and pipe cutting. Working closely with the customer to address the known challenges of both section milling and cutting the CRA liner, TruEdge technology was successfully used.

### Section Milling:

To ensure the proper permanent abandonment of the cap rocks to prevent cross-flow contamination of the reservoir, 2 section milled windows were required in the CRA liner in a 61-degree tangent section at depths of 16,100 and 14,375 ft, respectively. Each joint of liner also included two centralizers to be milled.

### Pipe Cutting:

The CRA liner was also required to be cut just above the 9 5/8 inch casing shoe to enable a sidetrack at the desired zone. The sidetrack point selection was essential to avoid exposing 2 critical formations simultaneously. After cutting successfully, the liner was retrieved using a spear-fishing BHA.

### The CRA challenge:

With a high chrome and nickel content, the milling and cutting operation was known to represent a significant technical challenge. The effective milling and cutting of this material during the project was considered to be an industry first.

#### CRA-110, for severe environment applications, high concentration CO<sub>2</sub>, H<sub>2</sub>S, and Chlorides

Representative Properties:

Cr(%)	24.0 – 27.0
Ni (%)	29.5 – 36.5
Yield Strength(ksi)	100 Min – 140 Max

This challenging operation was remediated successfully. After liner recovery, a 9 5/8 inch TrackMaster Select system with an extended window profile was deployed to sidetrack the wellbore to plan.

### TrackMaster Select™

- A HISTORY OF INNOVATION
- UNRIVALED EXPERIENCE
- GLOBAL PRESENCE

### CHALLENGE

- Perform cut-out and section mill 2 x 30 ft windows in CRA-110 liner to enable the placement of rock-to-rock barriers across the cap rocks.
- The liner to be milled is stuck but is uncemented. Each joint of liner includes two centralizers that increases the milling challenge.
- Cut and Pull 7 inch, 29 ppf, CRA-110 stuck Liner to enable the wellbore to be sidetracked close to the 9 5/8 inch casing shoe.

### SOLUTION

- Deploy the ProMILL™ system to perform cut-out and section mill in a single trip
- Introduce knives with new TruEdge™ inserts, delivering increased durability and ROP
- Deploy the 5 1/2 inch hydraulic pipe cutter with TruEdge™ inserts to cut the liner

### RESULTS

- An industry-first application for both section milling and cutting the liner
- **Section Milling**
  - The TruEdge™ inserts on the 5500 ProMILL knives delivered excellent results
  - Excellent swarf recovery at surface
  - Rock-to-rock barrier enabled
- **Pipe Cutting**
  - TruEdge™ inserts on the 5 1/2 inch pipe cutter knives delivered a precision cut on the liner
  - Cut was completed in less than 7 minutes at 12,221 ft, just above the casing shoe
  - The 7 inch liner was retrieved on a separate trip with a spear-fishing BHA
  - Access provided to sidetrack the wellbore at the desired depth and successful sidetrack concluded



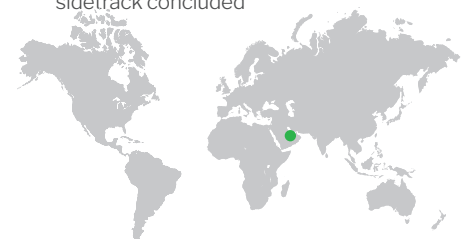
Figure 1: Post-run section mill (Note TruEdge cutting structure minimal wear)



Figure 2: Post-run dull condition of pipe cutter knives



Figure 3: View of the cut on the 7-inch CRA-110 liner



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