TRIDENT SYSTEM

The TRIDENT System is a single-trip cut and pull rotational spear which incorporates several innovative trip-saving features, including an integral tension set packer, a hydraulically activated spear and a cutting mode which eliminates the accumulation of swarf at surface. In a single trip, the TRIDENT System can run and set a bridge plug or dress a cement plug; positive/negative pressure testing; cut casing; circulate annular gas; and recover casing to surface.

Functionality used on this case study:
- Dressed cement with anchor dormant
- Anchor in 9 5/8" for cutting (no marine swivel required)
- Pulled from 10 3/4" (no short trip of spear required, no slip or grapple change required)
- All in single trip

THE MAG VALVE

TRIDENT System with the MAG Valve - what do you get...
- Ability to hydraulically set the anchor on demand - motor and cutter dormant
- Full flow once valve open during cutting process or dressing cement
- Allows high overpull cuts up to 1m lbs in tension (without packer)
- MAG Valve does not interfere with any TRIDENT functionality

MAG Valve Closed
- Reduced flow to cutter, knives dormant

MAG Valve Open
- Increase flow to open MAG Valve - anchor remains active
- Motor and cutter fully operational
### Ardyne Efficiency Gain

- 4 Trips saved
- 12,000 tripping ft avoided
- 18 Red zone exposures avoided due to single BHA (per person)

*Note - additional toolbox functionality used*

- TITAN ran to recover section in settled solids - 18 strokes at 925k lbs jacking force

### Ardyne Actual Application

#### Rig Activity

**Run 1**
- P/U and test TRIDENT BHA
- RIH
- Washdown

**Run 2**
- Dress Cement
- Pull Out Of Hole Rack BHA
- Pick Up and test Cutter BHA
- RIH
- Cut Casing
- POOH Rack BHA

**Run 3**
- Pick Up Spear and Pack Off
- RIH to Hanger
- Engage Spear, Attempt to Pull, Attempt to Circulate
- Release Spear, POOH and Rack BHA

**Run 4**
- Pick Up & test Cutter BHA
- RIH
- Cut Casing
- POOH Rack BHA

**Run 5**
- Pick Up Spear and Pack Off
- RIH to Hanger
- Engage Spear & Pack Off, Circulate
- Pull casing to surface

### Conventional Approach

#### Rig Activity

**Run 1**
- Pick Up BHA
- RIH
- Washdown

**Run 2**
- Pick Up and test Cutter BHA
- RIH
- Cut Casing
- POOH Rack BHA

**Run 3**
- Pick Up Spear and Pack Off
- RIH to Hanger
- Engage Spear, Attempt to Pull, Attempt to Circulate
- Release Spear, POOH and Rack BHA

**Run 4**
- Pick Up & test Cutter BHA
- RIH
- Cut Casing
- POOH Rack BHA

**Run 5**
- Pick Up Spear and Pack Off
- RIH to Hanger
- Engage Spear & Pack Off, Circulate
- Pull casing to surface

### Well Objective Summary

- Dress and weight test cement plug
- Cut 9 5/8", circulate annulus (using TRIDENT Packer) and pull 9 5/8" x 10 3/4" casing from 1,350m
- Recover to surface

**Section of casing recovered during the operation**

### TRIDENT Casing Recovery System - 100+ Runs

- TRIDENT Packer
- TRIDENT Anchor
- MAG Valve
- Motor & Cutter
- Cement Removal

**Case Study - 2019NOR023**

Access high overpull cutting up to 1 million lbs

**TRIDENT Casing Schematic**

- 36" x 30"
- 20"
- 9 5/8"
- 13 3/8"
- Cut 2 @ 715m
- Cut 1 @ 1,350m
- 20"