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# Gas Field Development and Production – State of Play

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# Successful Implementation of PMCD in Drilling The Longest Horizontal Section in Granite Basement In Vietnam

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# Well Summary

**Location:** CuuLong Basin Offshore Vietnam

**Production Focus:** Crude Oil Extraction from Basement Reserves

**Horizontal Production Section Features:**

- Enables Drilling of Longest 8 ½" Horizontal Section in Fractured Granite Basement
- Encounters 3 Major Fault Targets

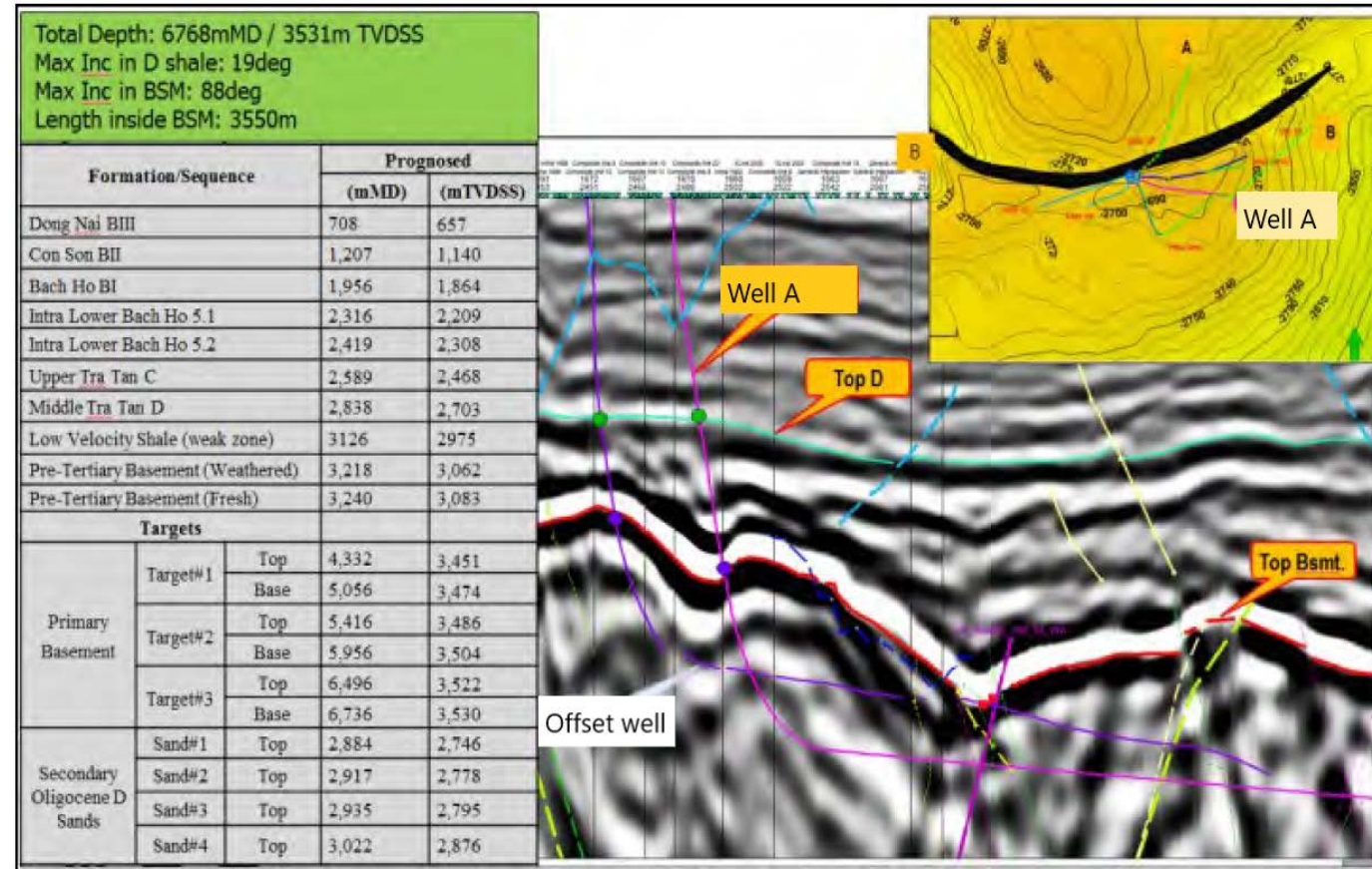
**Technological Achievement: Pressurized Mud Cap Drilling (PMCD)**

**Application**

- Total Length: 2146m (PMCD) within a 3542m Interval in Basement

# Drilling Plan Overview

- Target Zone: Basement targets defined into three intervals name Target#1, Target#2 and Target#3.
- Inclination: 88°C
- Drilling Fluid: Brine Mud System 9.7-9.8ppg
- Contingency Plan: Mud Cap Drilling with seawater (no PMCD)



# Drilling Challenges with Mud Cap Drilling and Conventional

## Mud Cap Drilling with SW LAM:

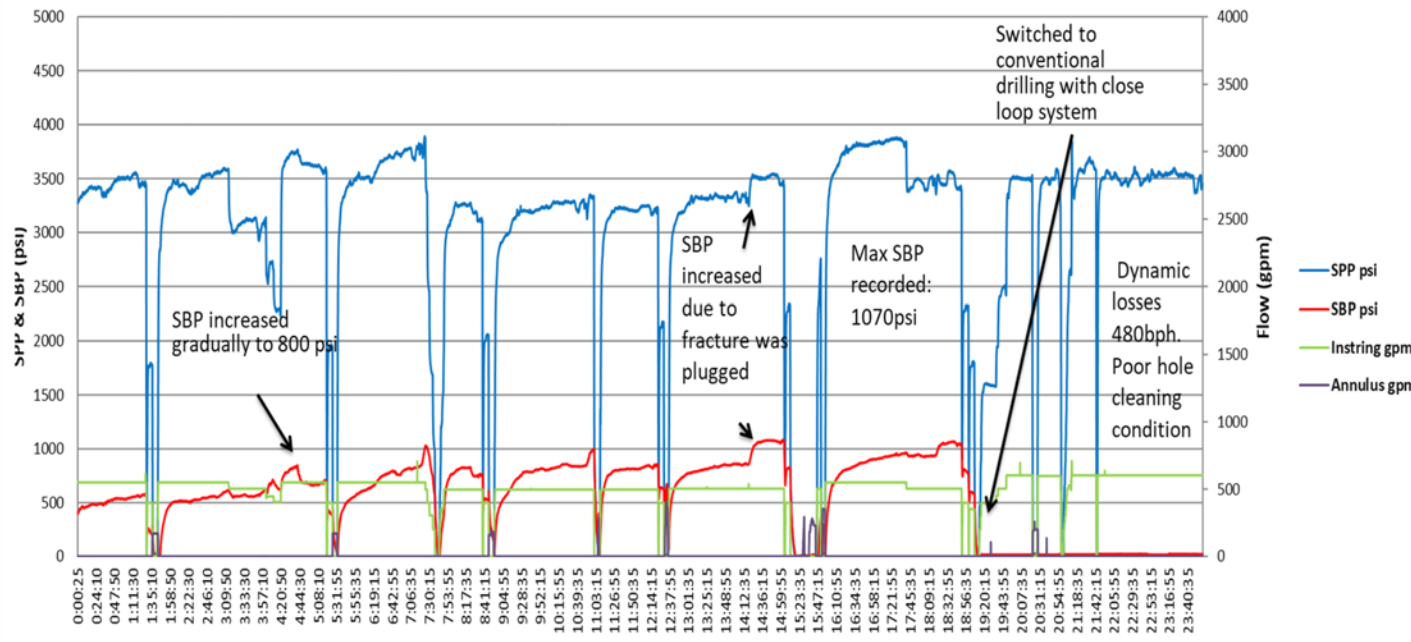
- High Casing Pressure
- Difficult to control drilling parameter

Parameter	Conventional Drilling with massive loss
Off Bottom Torque (Kips)	27-30
On Bottom Torque (Kips)	35-42
Pick up weight (Klbs)	523
Slack off weight (Klbs)	255
Rotating weight (Klbs)	-
Loss rate (bbl/hr)	530
Max circulating gas	8.09%

## Conventional drilling with massive loss:

- Very poor hole cleaning in horizontal section
- High drilling/ connection gas
- Extremely high torque and drag
- High Chemical consumption

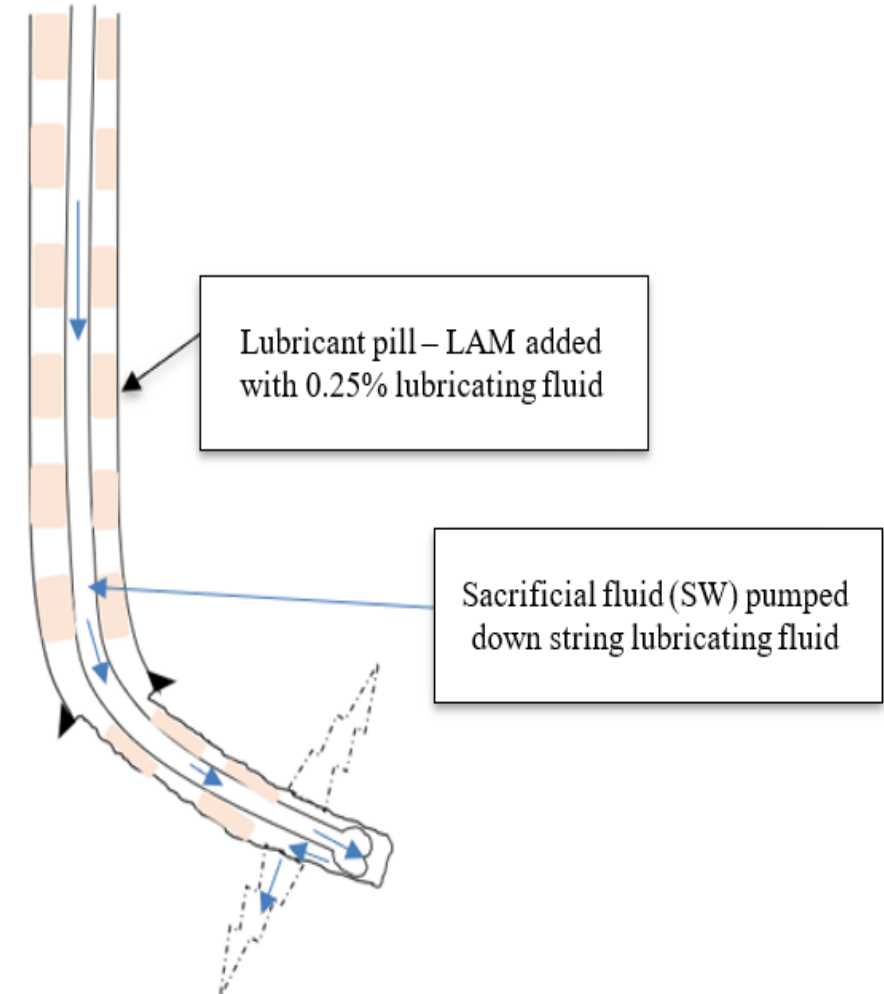
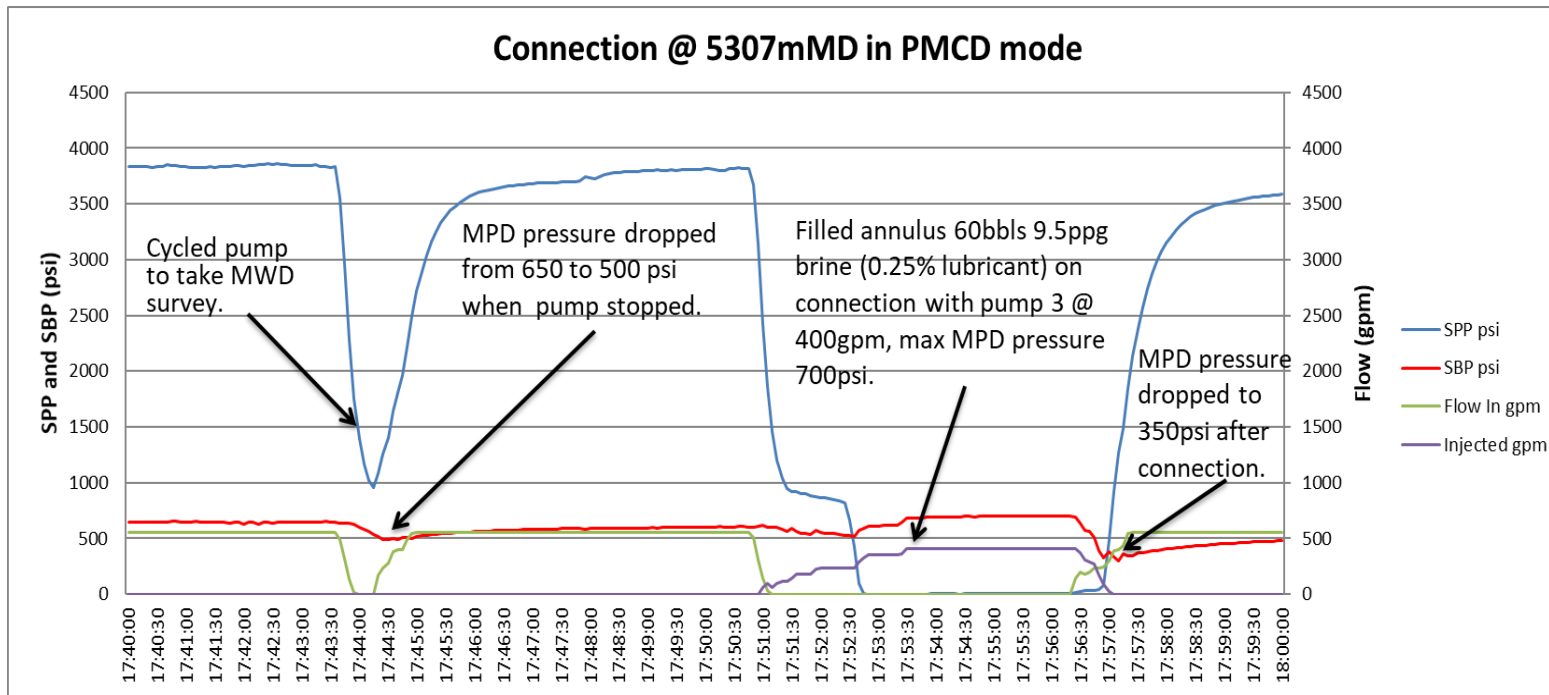
SPP and SBP behavior while Drill/Slide with PMCD from 4896m to 5048m





# Drilling with PMCD Utilizing High Mud Weight LAM

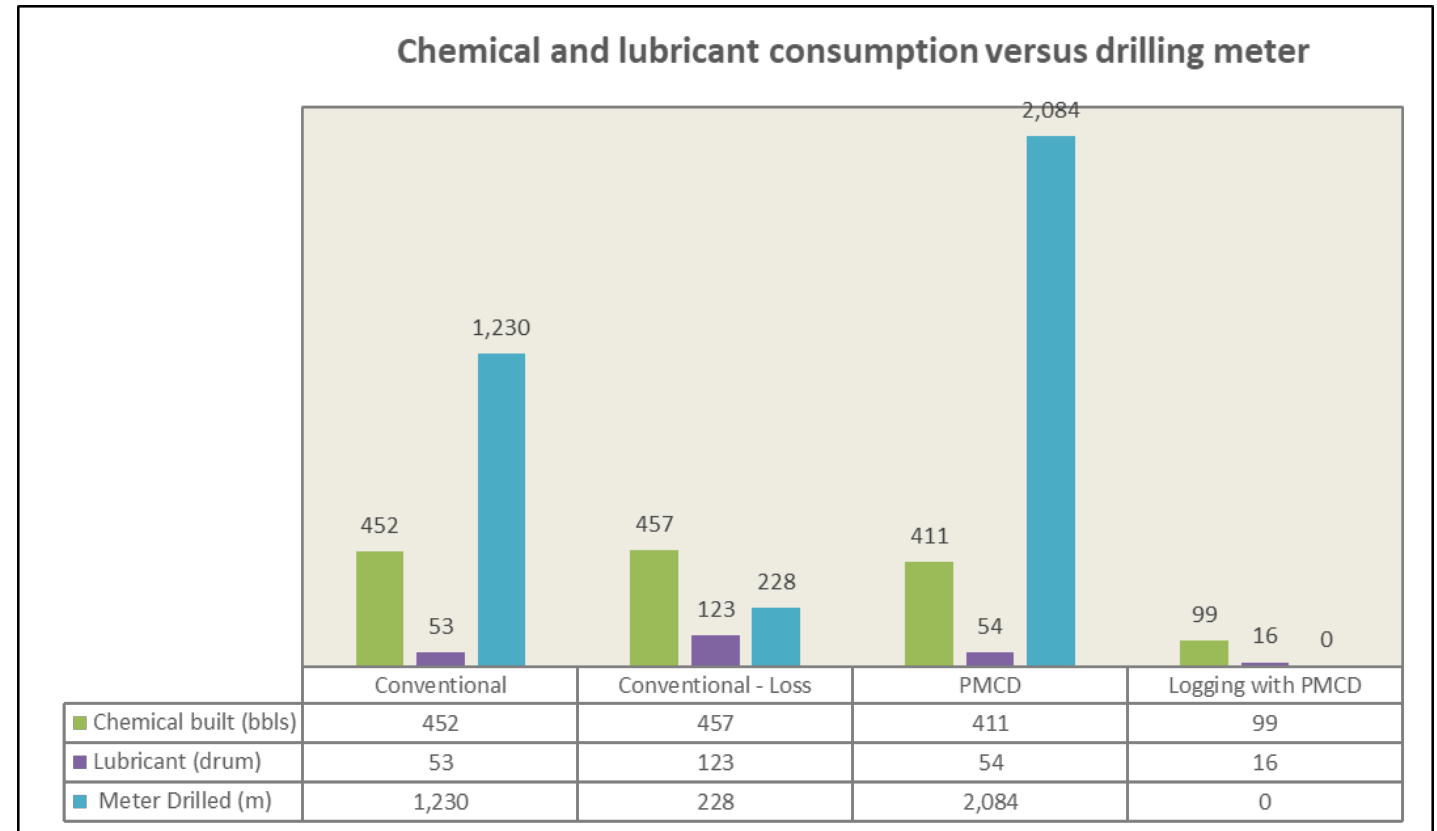
- Utilizing 9.2-9.9 ppg brine for LAM instead of SW.
- 0.25% Lubricant Fluid (Radiagreen) added into LAM for reducing torque-drag.
- The LAM pill with Lubricant was intermitted injecting into the annulus every connection.



# Drilling Performance Comparison

Parameter	Conventional Drilling with massive loss	PMCD
Off Bottom Torque (Kips)	27-30	20-21
On Bottom Torque (Kips)	35-42	24-25
Pick up weight (Klbs)	523	480
Slack off weight (Klbs)	255	368
Rotating weight (Klbs)	-	406
Loss rate (bbl/hr)	530	-
Max circulating gas	8.09%	0

*Drilling parameter comparison*

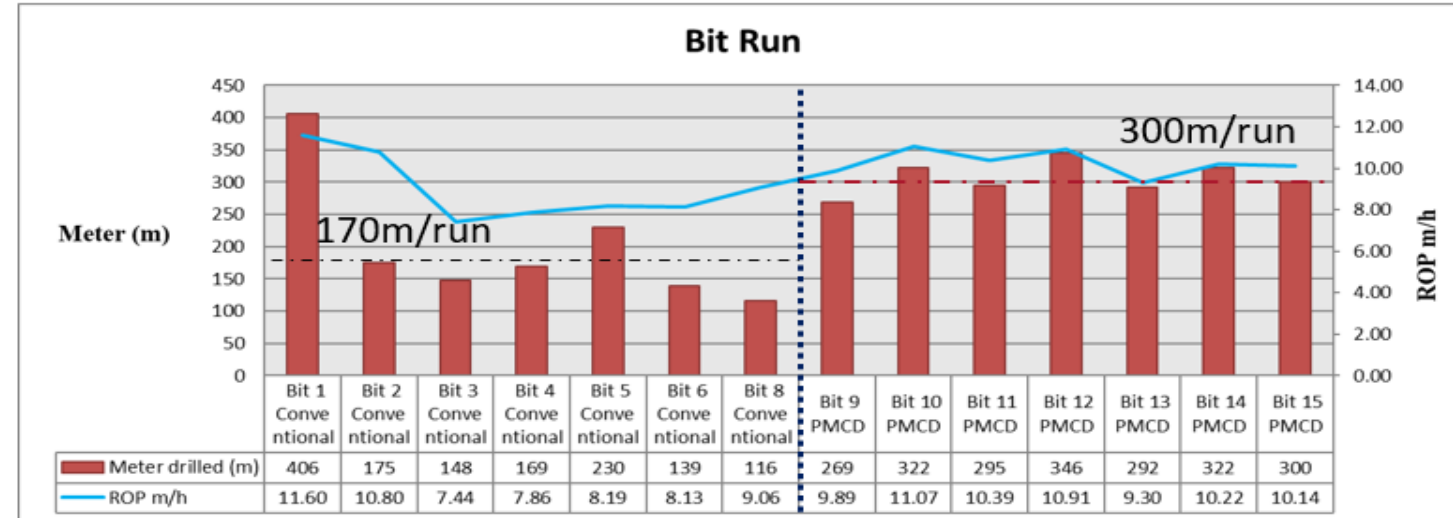


*Chemical consumption comparison*

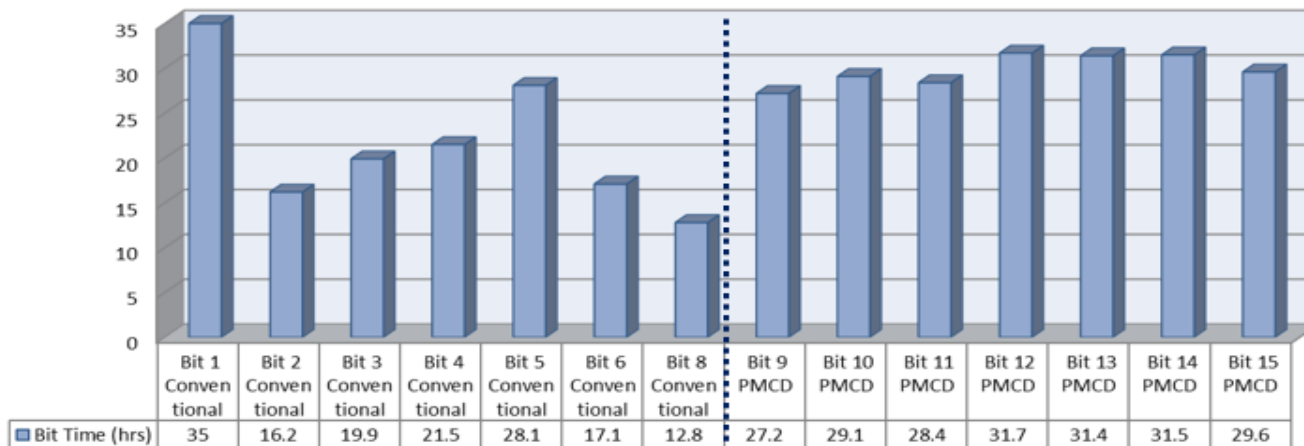
# Bit Run Performance Comparison

## Conventional drilling:

- *Total Run: 8 run*
- *Total interval: 1383m*
- *Average bit run: 173m*
- *Average bit time: 18.8 hour*



## **Bit Time (hrs)**



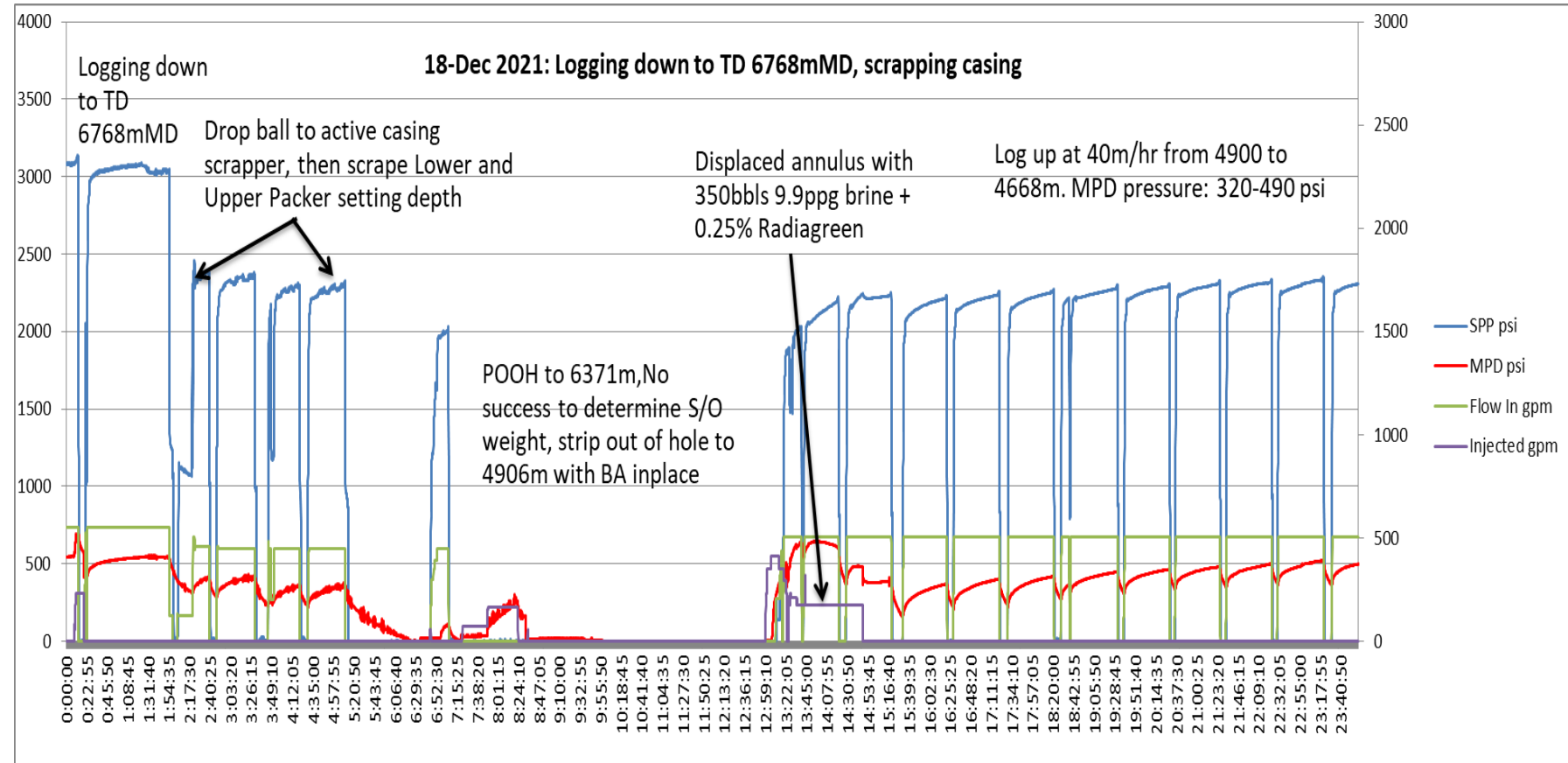
## PMCD drilling:

- *Total Run: 7 run*
- *Total interval: 2146m*
- *Average bit run: 306m*
- *Average bit time: 29.8 hour*



# Pressurize Mud Cap Logging (PMCL) Performance

- Logging type: Logging with drill pipe
- Logging interval: 4268m
- Operation time: 7 days
- Number of BA run: 1
- Chemical built: 99 bbls
- Lubricant Fluid consumption: 16 drums
- 9-5/8" casing scraper run included



# What We Learned From The Success

- Drilling with seawater pumped from the well top into the annulus – a common technique in the Cuulong basin will cause unfavorable drilling conditions in an extended horizontal section.
- PMCD is an effective method to cope with the massive loss in the granite basement.
- PMCD provides means to place lubricant pills efficiently in the annulus.
- The technique saved remarkably drilling fluid and chemical consumption.

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# Q&A



Thank You/ Questions

