

# **USR DRILLING**



## **INTRODUCTION TO ULTRA SHORT RADIUS DRILLING**

**July 2020**



# INTRODUCTION

Untapped oil and gas reserves can be accessed by combining a low-cost surface equipment package and unique Ultra-Short Radius (USR) sidetracking technology. This combination of fit for purpose equipment and USR technology provided by USR Drilling allows access to reserves in a cost-effective manner. The key deliverables are increased production and improved ultimate recovery.

We have the package to surgically remove these low volume left behind reserves by installing super perforations that are:

- ❑ **3-7/8" in diameter**
- ❑ **Up to 1500' drainholes**
- ❑ **At the desired depth**
- ❑ **In the desired direction**

# WHAT IS ULTRA SHORT RADIUS DRILLING?

A large offshore oil drilling rig is shown on a barge in a body of water. The rig has a tall derrick and various support structures. The background is a hazy, overcast sky.

## DEFINITION

BUR :  $100^{\circ}/100$  ft to  $230^{\circ}/100$  ft

ROC : 25 to 57 ft

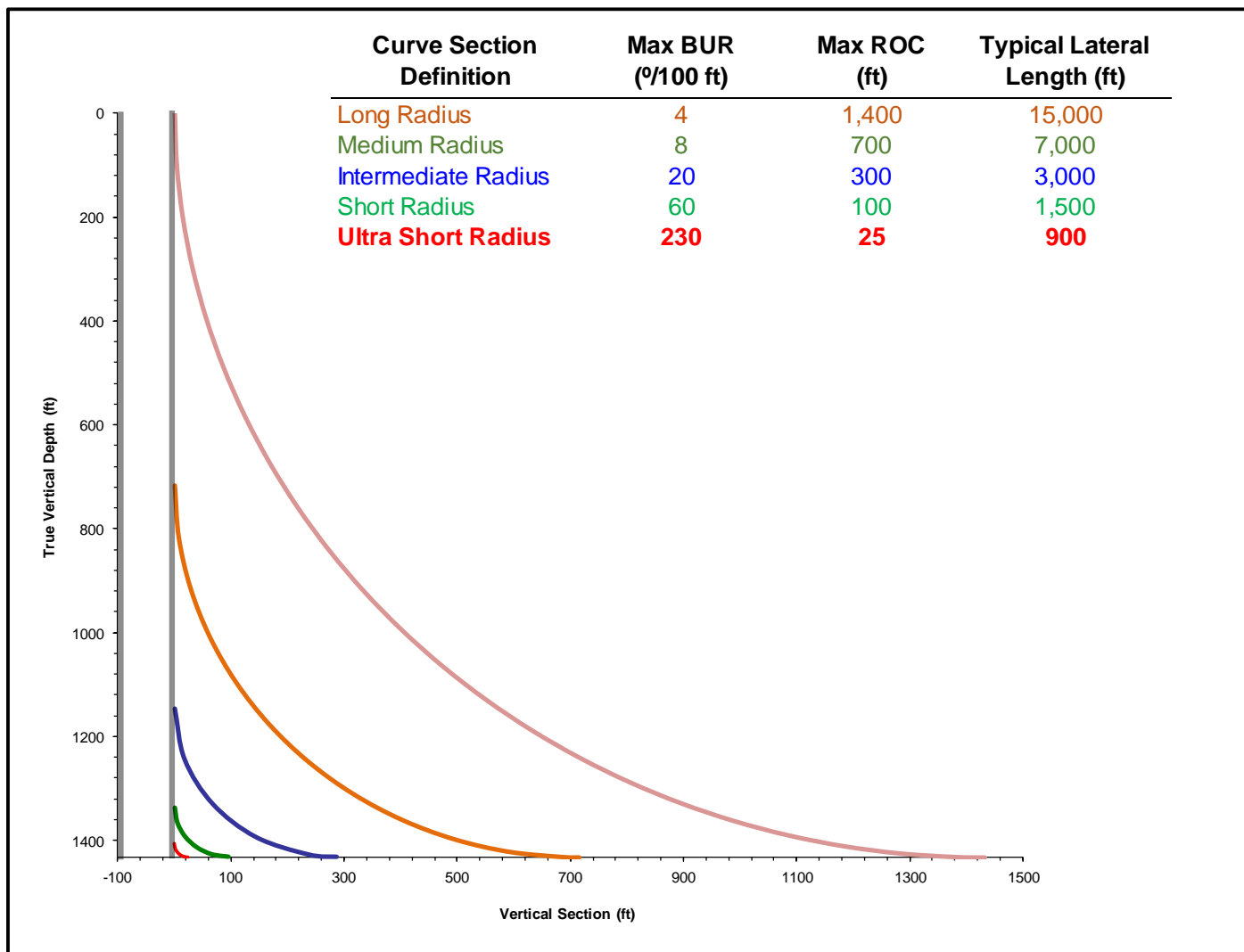
## OUR APPROACH

Slim Hole Drilling with hole sizes and down hole tools that permit

- High BUR
- Steering
- Directional Surveying
- Completion



# DEFINITION of USRD





# USR RESOURCES LLC

- ☐ Controls and manages USR Drilling and USR Energy.
- ☐ Owns all drilling equipment and the USR Technology.
- ☐ Grants exclusive territorial licenses to qualified companies to deploy the USR Technology.
- ☐ Holds a minority interest in the local joint venture licensee company and is involved in its management and development.
- ☐ Provides licensees with:
  - ☐ necessary drilling equipment,
  - ☐ on the job training and technical and engineering support required to evaluate, plan, drill and complete a USR well for a minimum of six months or until the licensee can function independently of USRR and
  - ☐ ongoing technical support when needed.



# DAQING CHENPING

- ❑ Daqing Chenping Drilling Technology Service Co. Ltd. ("Chenping") is the joint venture company established in 2019 by USRR and its partner Daqing Guoping Petroleum Engineering Technology Services Co., Ltd.
- ❑ Chenping holds an exclusive license to operate USR Equipment and utilize the USR Technology in drilling ultra-short radius wells in China.
- ❑ As of July 2020 Chenping has drilled more than 35 USR wells for PetroChina in the Daqing oilfield in Heilongjiang Province, China and has an ongoing contract to drill USR wells.
- ❑ Chenping plans to expand its operations to other fields.

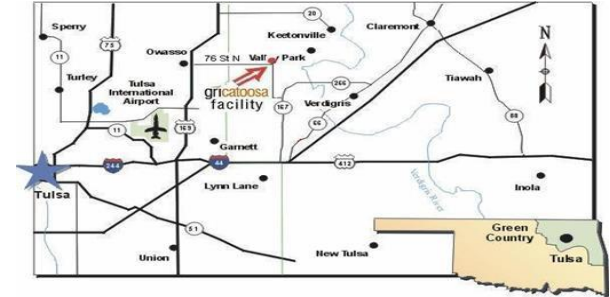






# USR DRILLING LLC

- ❑ USR DRILLING (USRD) is the premier provider of Ultra-Short Radius and Short Radius horizontal drilling services to the oil and gas industry.
- ❑ USRD personnel were directly involved in the development of USR prototype tools at Amoco Production Company Drilling Research Center near Catoosa, Oklahoma in the late 80's early 90's.
- ❑ USRD is the only directional drilling company in the world that provides Ultra Short Radius drilling services.
- ❑ USRD employs highly experienced drilling personnel and offers unique problem solving well intervention technologies.
- ❑ Over the past 30 years USRD personnel have drilled hundreds of wells in the US, Africa, India, Turkey, Oman, Indonesia, Myanmar and Pakistan. New drilling and completion technologies have been introduced to improve the Company's capabilities and operational efficiency.





# USR ENERGY LLC

USR ENERGY (USRE) participates with industry partners on a Drill for Equity basis by providing equipment and services in return for a working interest in a project.

USRE's focus is to:

- ❑ participate in the acquisition and development of producing and non-producing oil and gas properties in the USA and
- ❑ successfully and profitably re-develop these properties by applying USRR's proprietary Ultra-Short Radius sidetracking technology to exploit remaining reserves.





# USR OFFICES

**USR Group of Companies**  
Two Riverway, Suite 1710  
Houston, Texas 77056



**Daqing Chenping Drilling Technology Service  
Co. Ltd.**

Rm 300, Building C4  
Daqing Service Outsourcing Industrial Park  
No. 6-2 Xinfeng Road, Daqing Development Zone  
Heilongjiang Province, China



# OUR EXPERIENCE AND EXPERTISE

Management, drilling and engineering personnel possess, on average, more than 30 years of experience with USRD. This experience has led to several industry firsts:

- ☐ Drilling horizontal wells utilizing air hammers;
- ☐ Drilling with Titanium Drill Pipe (TDP);
- ☐ Running an articulated and rotatable sand screen through a 29' radius and 600' lateral;
- ☐ Drilling two world record wells.

Our expertise is the re-entry of existing wellbores to exploit bypassed reserves in mature fields. We deploy proprietary well-intervention technologies that were specifically designed to exploit remaining reserves, increase production from marginal wells, restore production from shut-in wells, and reduce water production.

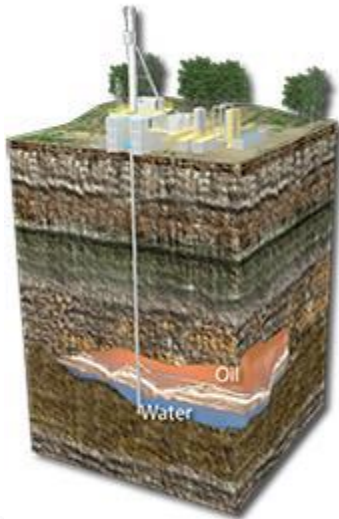


# HISTORY OF THE USR TECHNOLOGY

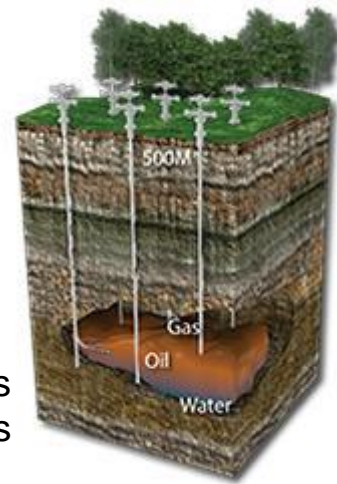
2016-2020	<ul style="list-style-type: none"> <li>Completed 8 wells in the USA and 30 wells in China. Developed more robust USR Motors and Steering Tools.</li> </ul>
2013-2016	<ul style="list-style-type: none"> <li>Completed 20<sup>th</sup> well in Gabon. Completed 8<sup>th</sup> well in Pakistan. Completed 5<sup>th</sup> well in Myanmar.</li> </ul>
2012	<ul style="list-style-type: none"> <li>Completed 8<sup>th</sup> Well in W. Africa for Perenco Gabon in OBA, Olende and Niungo Fields</li> <li>Drilled a World Record well with a Reach to Radius Ratio of 32:1 and Longest USR lateral length of 430 m (Gabon)</li> <li>Began development of new generations of Titanium DP and Composite DP</li> </ul>
2010-2011	<ul style="list-style-type: none"> <li>Drilled first two wells in Indonesia for Citic Seram. Drilled 2 wells for Pertamina Java EP.</li> <li>Drilled first First USR well in African Continent for Perenco Gabon. Drilled 8<sup>th</sup> well for Oxy Oman, Safah Field</li> </ul>
2009-2010	<ul style="list-style-type: none"> <li>Completed 7 well campaign for Oxy Oman, Safah field</li> <li>Drilled a World Record well with a Reach to Radius Ratio of 25:1</li> </ul>
2007 - 2008	<p>First USR well completed with articulated and rotatable sand screen "SnakeScreen™".</p> <p>Acquired TDP with two designs improvements based on USRD field data input.</p>
2007	<p>Developed USR mud motors to reduce drillpipe RPM's and to steer in thin targets. Began running a hybrid string combining S-135 and one or two joints of TDP as non-mag.</p>
2006 – 2007	<p>Drilled USR wells in Turkey and India. Replaced Composite Drill Pipe with Titanium Drill Pipe.</p>
2005 - 2006	<p>Drilled in Rima field of PDO Oman. Built 30 ft ROC fixture to fatigue test drill pipe to be run in USR wells.</p>
2004 – 2005	<p>Drilled multi-lateral "fishbone" wells for PDO, Oman. Introduced USR to Indonesian Operators.</p>
2001 - 2003	<p>Completed five well trial successfully for PDO, Oman. USR chosen as one of Five Mature Technologies for worldwide deployment by Shell's Global Implementation Team (GIT).</p>
1994 - 2001	<p>Drilled 170 USR wells in various fields in the United States with a number of milestones:</p> <ul style="list-style-type: none"> <li>2000 - First ever horizontal well drilled with air hammer</li> <li>1999 - First ever well drilled with Titanium Drill Pipe</li> <li>1995 - First USR well drilled Under Balanced using USRDS's Low Cost RSS tools</li> </ul>
1990 - 1994	<p>Drilled more than 200 Ultra Short Radius (USR) test wells at Amoco's Catoosa Drilling Research Center.</p>



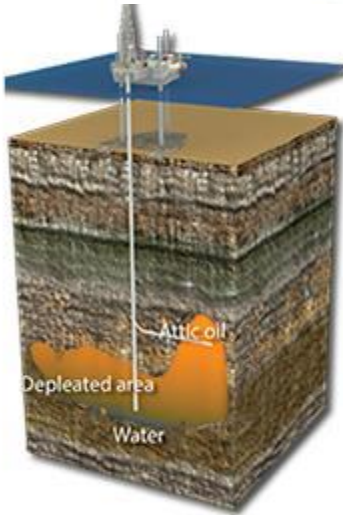
# APPLICATIONS



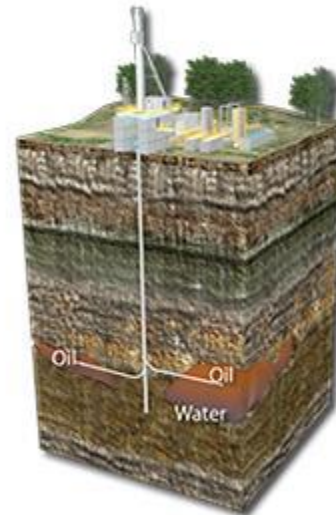
1. Sidetracks from Vertical Wells with Water Coning



2. Sidetracks from Vertical Wells in Tightly Spaced Fields



3. Exploitation of Attic Oil From Vertical or Horizontal Wells



4. Sidetracks into Channel Sands with Surrounding Shale

- 5. Sidetracks from Vertical Wells with Near Wellbore Damage
- 6. Alternative to Hydraulic Fracturing
- 7. Sidetracks from Water Injectors to Increase Injection Rates and Improve Sweep Efficiency
- 8. Sidetracks with conventional deviated well followed by USR drain hole to avoid water coning



# USR VS CONVENTIONAL SIDETRACK

## USR SIDETRACK

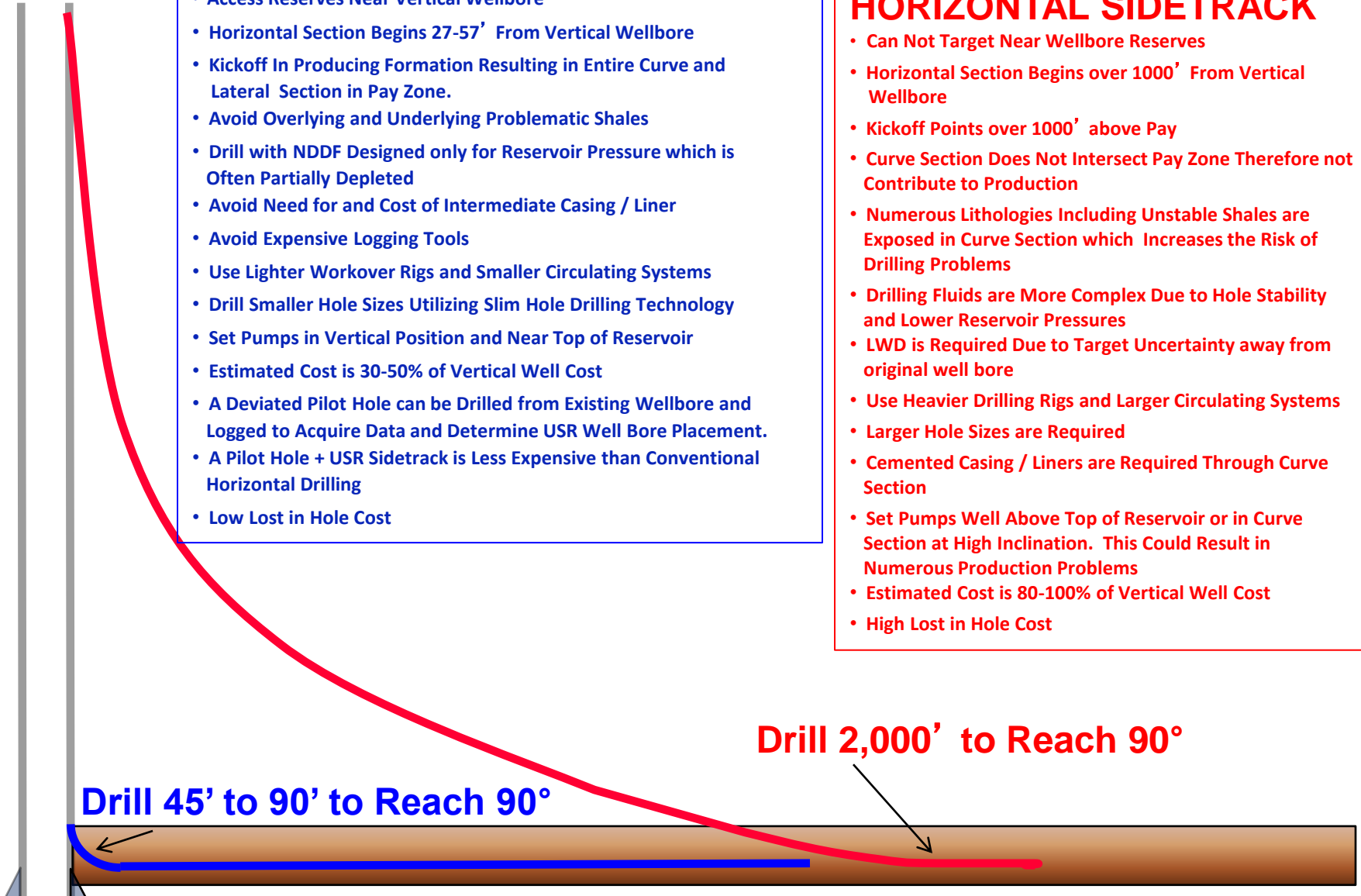
- Access Reserves Near Vertical Wellbore
- Horizontal Section Begins 27-57' From Vertical Wellbore
- Kickoff In Producing Formation Resulting in Entire Curve and Lateral Section in Pay Zone.
- Avoid Overlying and Underlying Problematic Shales
- Drill with NDDF Designed only for Reservoir Pressure which is Often Partially Depleted
- Avoid Need for and Cost of Intermediate Casing / Liner
- Avoid Expensive Logging Tools
- Use Lighter Workover Rigs and Smaller Circulating Systems
- Drill Smaller Hole Sizes Utilizing Slim Hole Drilling Technology
- Set Pumps in Vertical Position and Near Top of Reservoir
- Estimated Cost is 30-50% of Vertical Well Cost
- A Deviated Pilot Hole can be Drilled from Existing Wellbore and Logged to Acquire Data and Determine USR Well Bore Placement.
- A Pilot Hole + USR Sidetrack is Less Expensive than Conventional Horizontal Drilling
- Low Lost in Hole Cost

## CONVENTIONAL HORIZONTAL SIDETRACK

- Can Not Target Near Wellbore Reserves
- Horizontal Section Begins over 1000' From Vertical Wellbore
- Kickoff Points over 1000' above Pay
- Curve Section Does Not Intersect Pay Zone Therefore not Contribute to Production
- Numerous Lithologies Including Unstable Shales are Exposed in Curve Section which Increases the Risk of Drilling Problems
- Drilling Fluids are More Complex Due to Hole Stability and Lower Reservoir Pressures
- LWD is Required Due to Target Uncertainty away from original well bore
- Use Heavier Drilling Rigs and Larger Circulating Systems
- Larger Hole Sizes are Required
- Cemented Casing / Liners are Required Through Curve Section
- Set Pumps Well Above Top of Reservoir or in Curve Section at High Inclination. This Could Result in Numerous Production Problems
- Estimated Cost is 80-100% of Vertical Well Cost
- High Lost in Hole Cost

Drill 45' to 90' to Reach 90°

Drill 2,000' to Reach 90°







# WHAT CONSTITUTES A GOOD USR CANDIDATE

- ❑ LOW RECOVERY FACTOR = REMAINING RESERVES
- ❑ LOW WELL DENSITY = SUFFICIENT PRESSURE
- ❑ GOOD RESERVOIR DATA = BETTER TARGET IDENTIFICATION
- ❑ LOW PERMEABILITY = POOR CONNECTIVITY
- ❑ SUFFICIENT WELL RECORDS = LOWER RISK
- ❑ 5 1/2" CASING OR LARGER
- ❑ LESS THAN 10,000' DEPTH
- ❑ BAREFOOT COMPLETION



# **CASE HISTORIES**

## **SOME EXAMPLES**

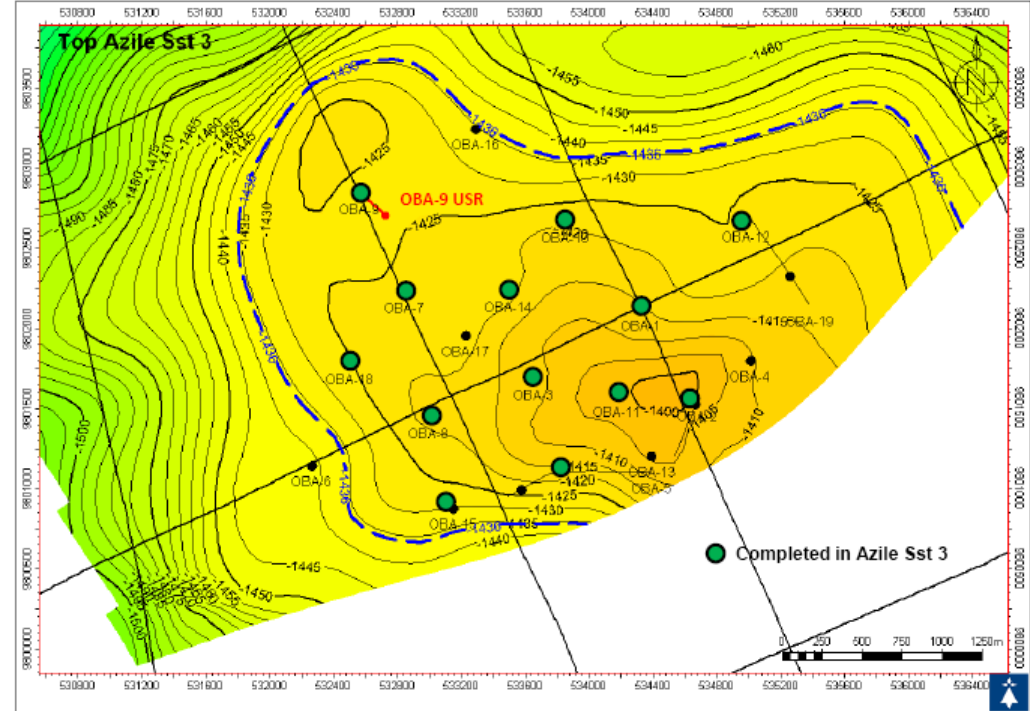
**CHINA CASE HISTORIES**  
**SEE SEPARATE PRESENTATION**



# Case 1 – Horizontal Drain Trial

## HISTORY :

- Appraisal well for the field northwestern extension
- 7 Workovers to test Dolomite and Sst
- Converted to water injector with disappointing 50 bwpd injecting rate
- Converted back to producer from Sst 3 and 4 with 130 bopd, 22% watercut
- Vertical well log shows 4 m net pay, 24% porosity, 60 mD perm







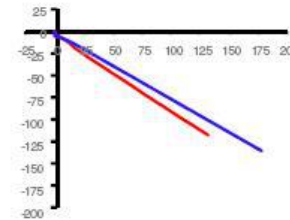
# Case 1 – Horizontal Drain Trial

## RESULTS :

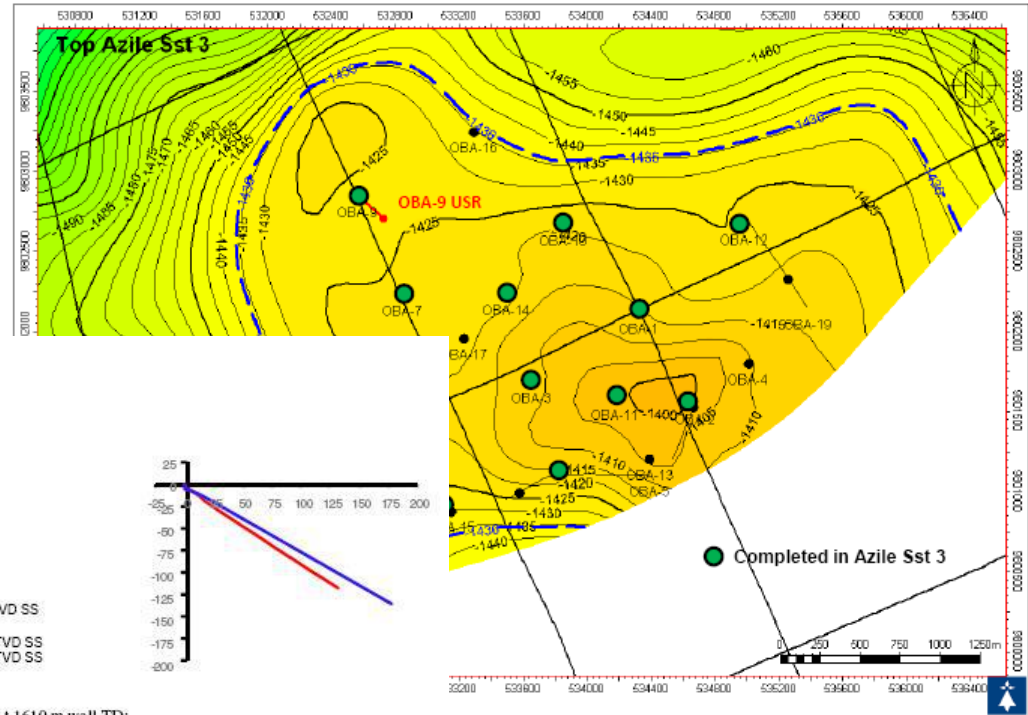
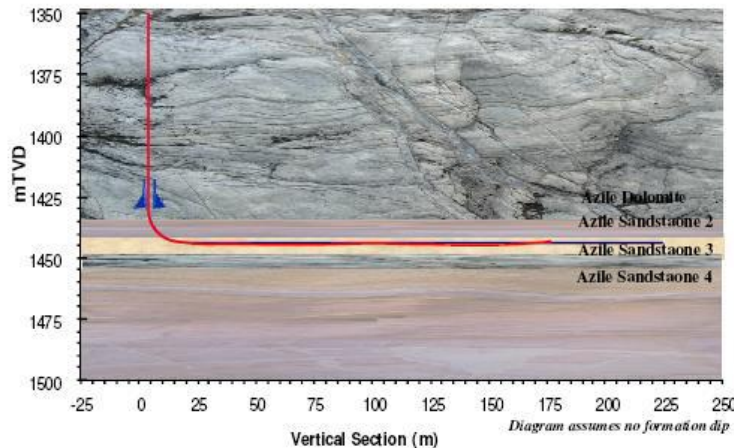
- Production increase from 130 bopd, 22% watercut to **750 bopd, nil Water**
- Total 620 bopd incremental oil at “flat” decline rate



Survey Type : DEFINITIVE  
 Vertical Section Origin : N 00.000 m., E 00.000 m.  
 Vertical Section Azimuth : 0°  
 Reference Datum TVD : RKB Original Drill Floor Elevation  
 Tie-in : Surface  
 Tie-in Surveys : Gyro Multishot  
 Top Azile Sandstone : 1428 m MD ORT, 1441 m TVD ORT, 1426 m TVD SS  
 Top 7" 28# Casing Section Window : 1428 m MD ORT  
 KOP - Start 4-1/2" Curve : 1430 m MD ORT  
 Top Azile Sst 3 : 1444 m MD ORT, 1441 m TVD ORT, 1426 m TVD SS  
 Radius of Curvature (DLS) : 12.5 m (140° / 30m)  
 Landing - End of 4-1/2" Curve : 1449 m MD ORT, 1443 m TVD ORT, 1428 m TVD SS  
 Well TD : 1610 m MD ORT, 1443 m TVD ORT, 1428 m TVD SS  
 Revision Date : 10-Oct-11  
 Report Date : 10-Oct-11



At 1610 m well TD:  
 1.4 m Above-, 13.1 m Right of Plan



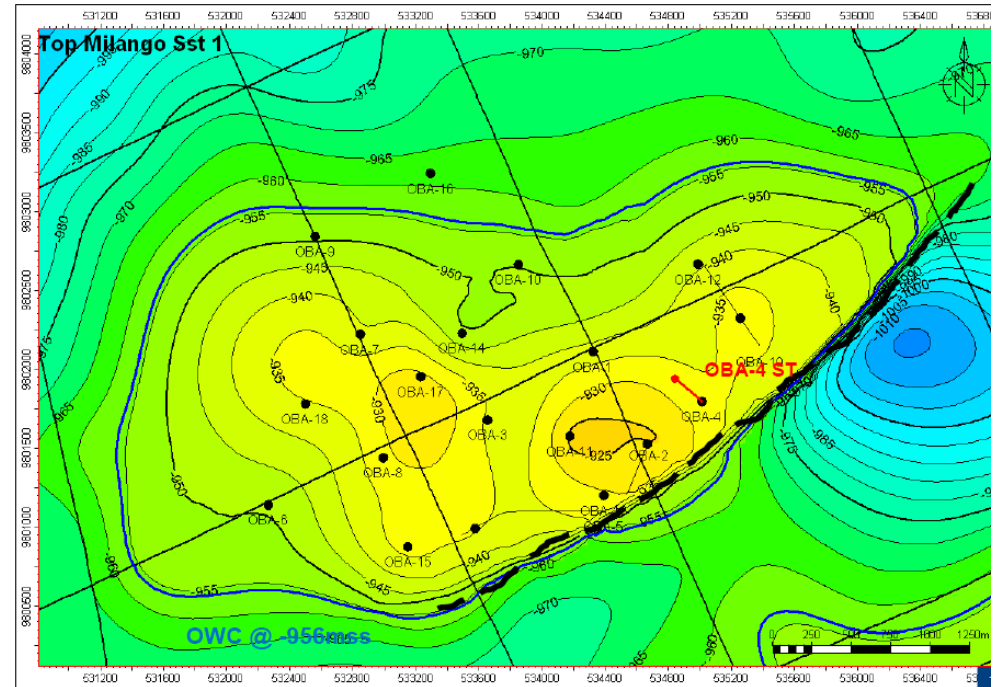




# Case 2 – Low Mobility Oil

## HISTORY :

- M Sst - high perm (vug), low mobility
- 18° API Oil with high viscosity 253 cP
- Very low PI in vertical well, 20 m perf
- Heavy oil limit production in vertical well - 40 bopd, low water from M Sst

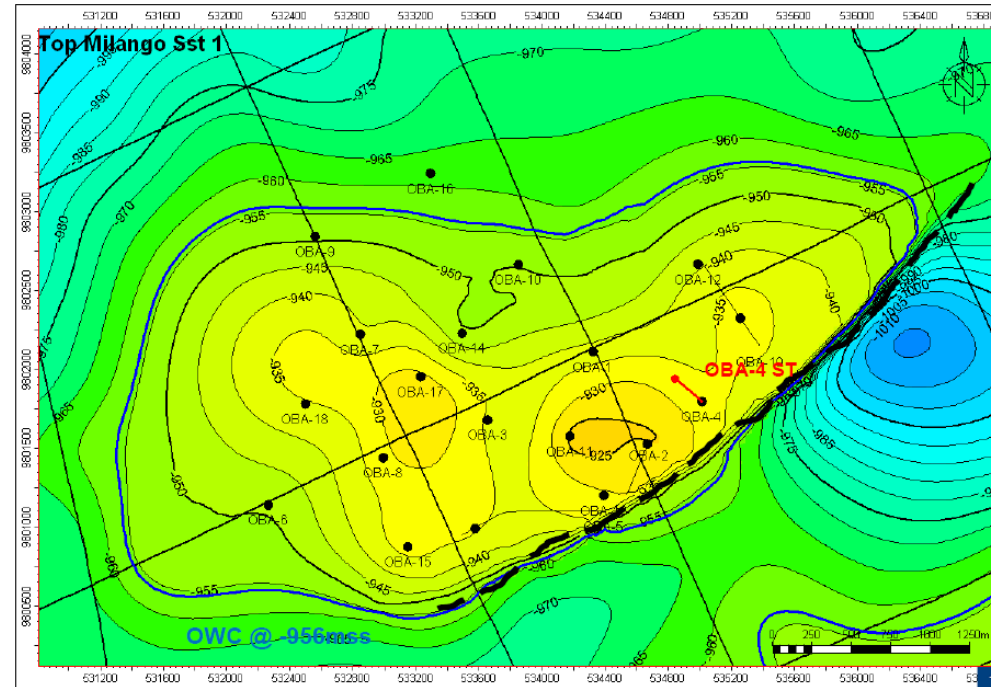




# Case 2 – Low Mobility Oil

## OBJECTIVES :

- Increase PI by increasing connectivity
- Monitor long term production and obtain dynamic data
- Support further development in M reservoir
- USRD trial with Operator's light rig

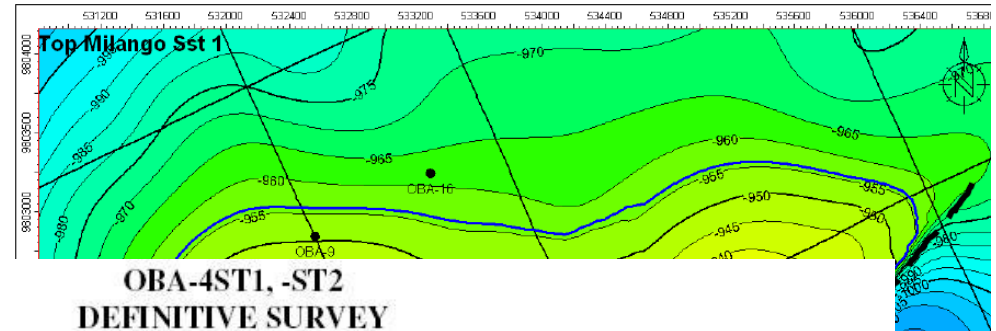




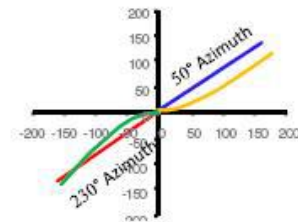
# Case 2 – Low Mobility Oil

## RESULTS :

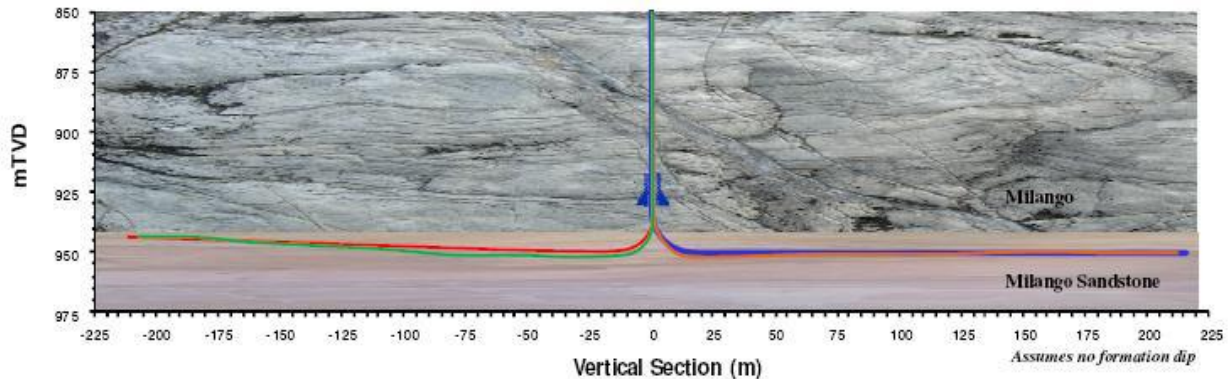
- **6 fold** increase in oil production
- “Open door” to **60 MMstb STOIP**



**Survey Type :** SURVEY  
**Vertical Section Origin :** N 00.000 m., E 00.000 m.  
**Vertical Section Azimuth :** 50°  
**Reference Datum TVD :** RKB Original Drill Floor Elevation  
**Tie-in :** Gyro Multishot Run Date 15-Oct-11  
**Top Milango :** 834 m MD ORT  
**9-5/8" Casing Shoe :** 894 m MD ORT  
**Top 4-1/2" Pilot Hole :** 930 m MD ORT  
**Top 7" 29# Casing Section Window :** 931 m MD ORT  
**ST1 KOP – Start 3-7/8" Curve :** 933 m MD ORT  
**ST1 Landing – Start 3-7/8" Lateral :** 962 m MD ORT, 952 m TVD ORT, 944 m TVD SS  
**ST1 ROC, BUR ACTUAL (PLAN) :** 17.7 m ROC, 100 deg/30m (17.0 m, 101 deg/30m)  
**ST1 TD :** 1162 m MD ORT, 950 m TVD ORT, 942 m TVD SS  
**Top 4-1/2" Bypass Pilot Hole :** 933 m MD ORT  
**ST2 KOP – Start 4-1/2" Curve :** 936 m MD ORT  
**ST2 Landing – Start 3-7/8" Lateral :** 959 m MD ORT, 951 m TVD ORT, 943 m TVD SS  
**ST2 ROC, BUR ACTUAL (PLAN) :** 15.8 m ROC, 123 deg/30m (13.8 m, 125 deg/30m)  
**ST2 TD :** 1159 m MD ORT, 943 m TVD ORT, 935 m TVD SS  
**Revision Date :** 9-Nov-11  
**Report Date :** 9-Nov-11



— Plan OBA-04ST1 ver 25-Oct-11  
 — Plan OBA-04ST2 ver 26-Oct-11  
 — Definitive Survey OBA-04ST1  
 — Definitive Survey OBA-04ST2

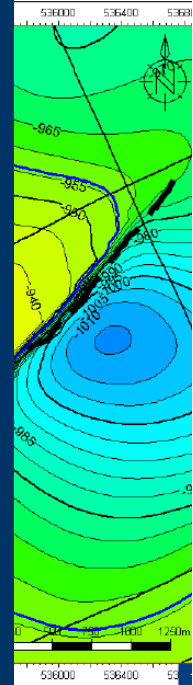
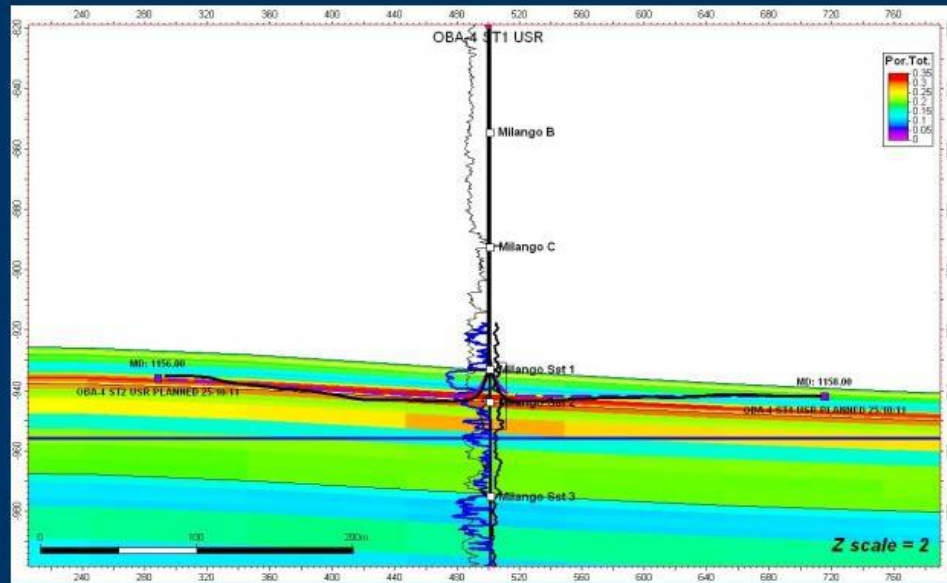




# Case 2 – Low Mobility Oil

## RESULTS :

- **6 fold** increase in oil production
- “Open door” to **60 MMstb STOIP**



## Perenco Gabon Conducts First Ultra Short Radius (USR) Re-Entry in Africa

Perenco Gabon is pleased to announce that wells OBA-09 and OBA-04 have successfully been worked over. Three side tracks, including one two leg multilateral re-entry drilling, were effectively executed using both the H40 rig and ultrashort radius technology.

Both wells are now back in production and showing encouraging results. OBA-4 heavy oil production has increased six fold in the same Milango formation, opening the door for a 60 MMstb STOIP field development.

USR technology allows the placing of multiple 200m horizontal drains by applying very high dog leg (excess of 150deg/30m). This was selected as the most appealing intervention technique as it did not require a powerful rig.

Several alternative applications have already been identified for Gabon where many existing wells are potential candidates for similar work over programmes where Perenco will again be able to improve recovery.

The next two USR wells will use the Perenco Schramm rig on the Olende Dome formation. The objective will be to validate a smaller footprint rig while testing horizontal wells in the Ozouri formation.

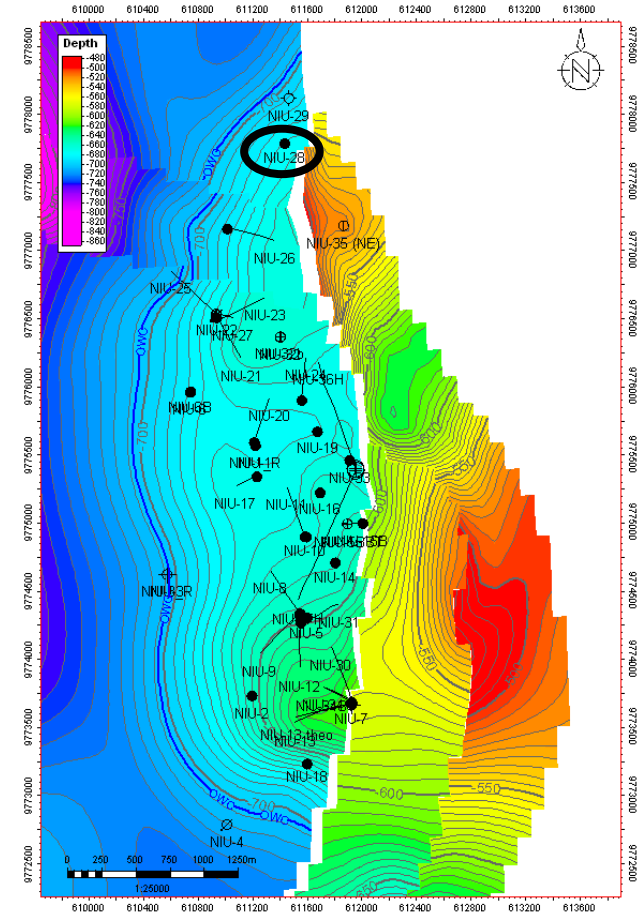
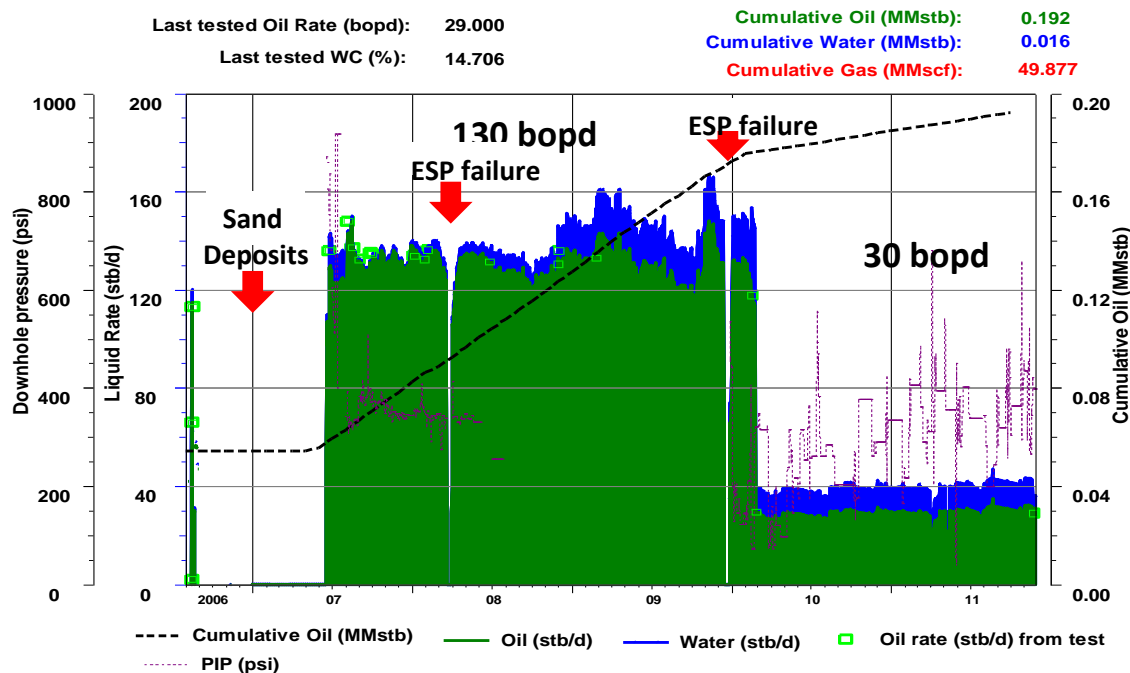
This project is a significant achievement for Perenco Gabon and demonstrates Perenco's ability to maintain production plateau by further developing brown field sites using cost effective and innovative methods.



# Case 3 - Improve Recovery

## HISTORY :

- Field – Active aquifer drive, constant increase in water cut
- High water encroachment tendency
- 23% Recovery factor suggests remaining field potential
- Well drilled as appraisal to assess field's north extension
- Low PI – 0.4 stb/d/psi (3 to 10+ stb/d/psi field average)
- 30 bopd the lowest producer in the field (decreased from 600 bopd initial)



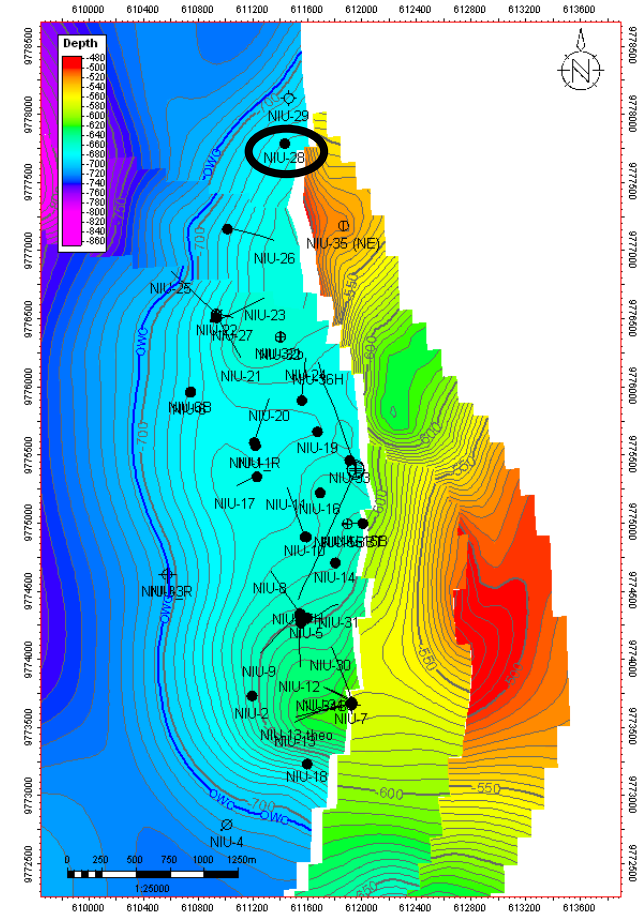




# Case 3 – Improve Recovery

## OBJECTIVES :

- To improve recovery with a horizontal drain hole
- To delay water piercing
- To monitor long term production



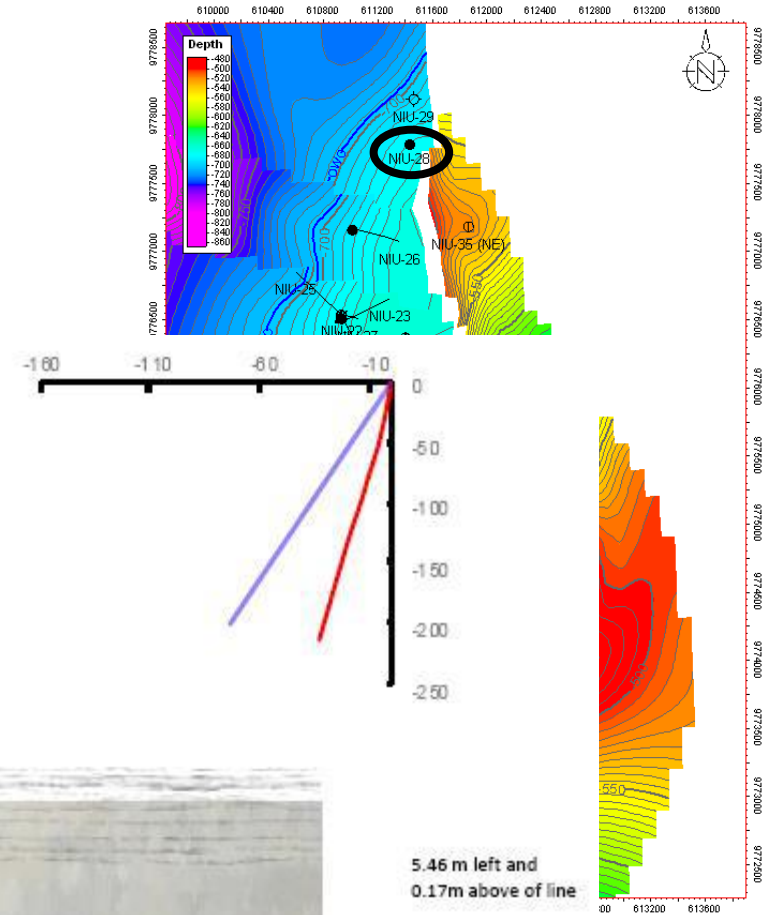
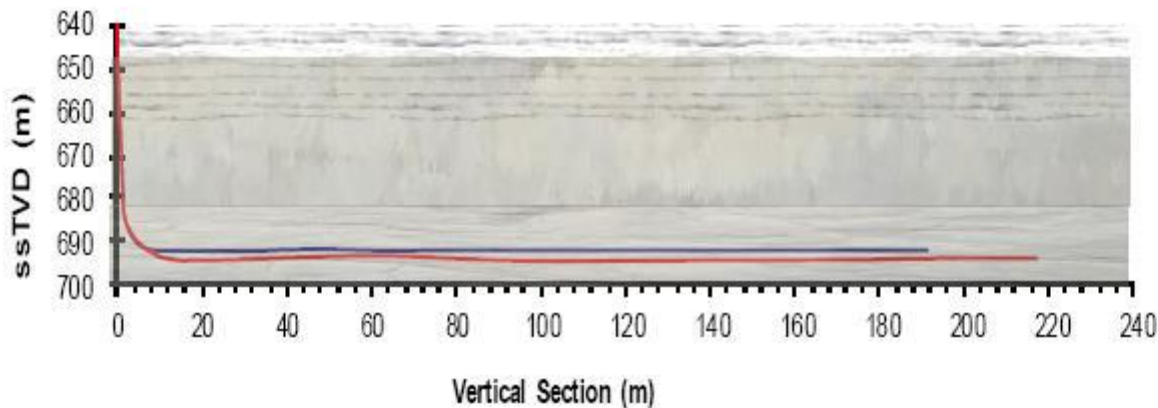


# Case 3 – Improve Recovery

## RESULTS :

- **600 bopd** pre-initial rate  
(at sub-optimal flow condition)

Survey Type : DEFINITIVE  
 Vertical Section Origin : N 00.000 m., E 00.000 m.  
 Vertical Section Azimuth : 190°  
 Reference Datum TVD : RKB Original Drill Floor Elevation  
 Tie-in : Surface  
 Tie-in Surveys : Gyro Multishot  
 Top Vembo Shale : 648.4 m ssTVD  
 7" 29# Casing Shoe : 681.3 m ssTVD  
 KOP – Start 4-1/2" Curve : 727.1m MD, 681.9 m ssTVD  
 Radius of Curvature : 12.0m Planned, 13.1m Actual  
 Dogleg Severity (DLS) : 4.76 deg/m  
 LP-Start of 3-7/8" Lateral : 747m MD, 694.3m ssTVD  
 Well TD : 950m MD, 693.84m ssTVD  
 Ending Azimuth & Inclination : 189° & 90°  
 Total USRD Drain hole : 222.9 m  
 Lateral Section Length : 200m  
 Report Date : 28-Sep-12

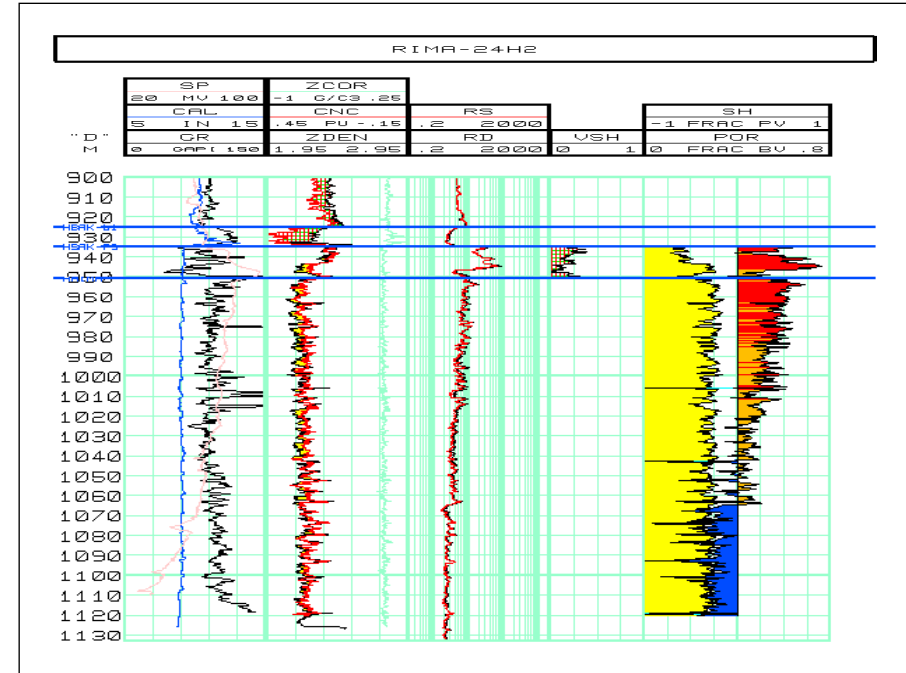




# Case 4 – Water Coning

## HISTORY :

- Water coning due to bottom water drive. Well is 100% watercut
- Bypassed oil in unswept area 15 m from reservoir top. Last interpretations est. 1.04 MMstb STOIP recoverable
- Not recoverable with conventional horizontal profile. Need 11 m TVD build section
- Densely faulted, structural compartments and faulted blocks requiring high degree of trajectory control. Need max 200 m lateral section
- Ideal application for USR horizontal drilling

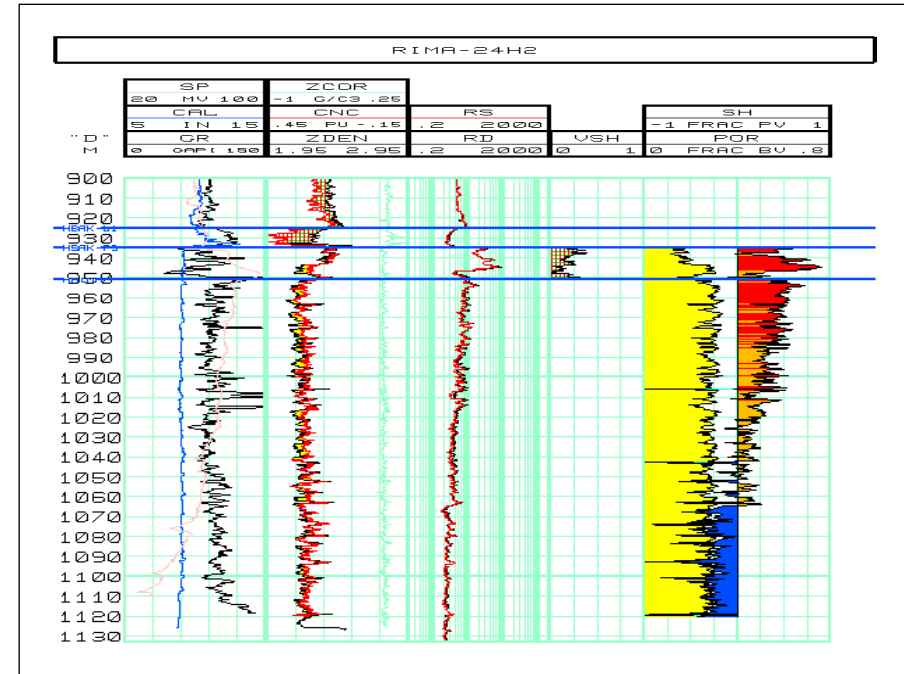




# Case 4 – Water Coning

## OBJECTIVES :

- Access bypassed oil from shut-in or high watercut wells using USR horizontal drilling technique
- Step away from coning radius (80 m)
- Replace existing infill wells with USR horizontal drain hole where possible
- Maximize oil delivery by reactivating shut-in wells

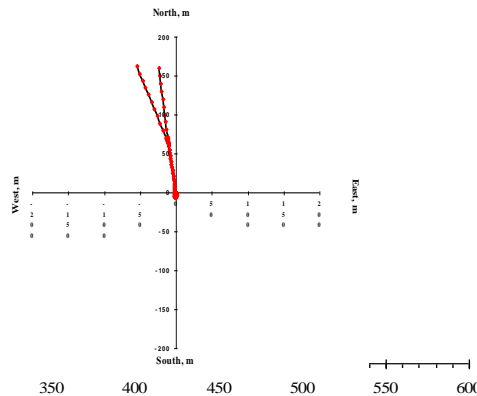
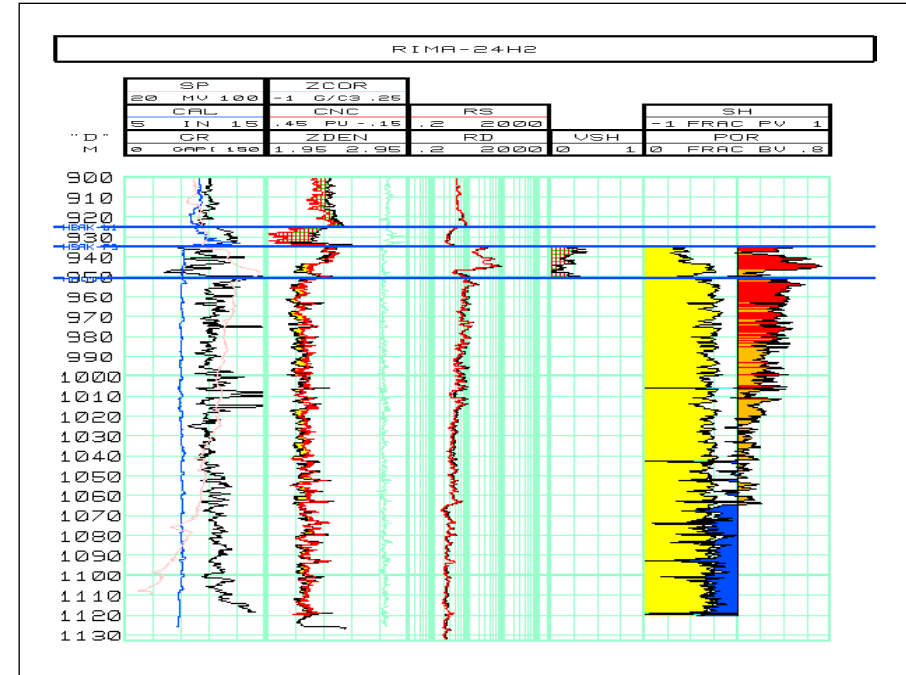
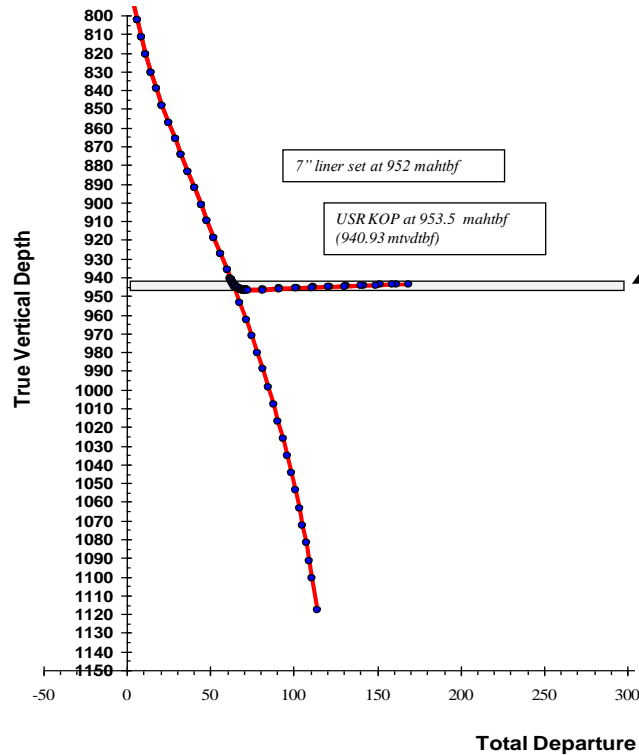




# Case 4 – Water Coning

## RESULTS :

- 310 bopd
- Low watercut
- Flat decline rate







- High perm (10 D) within highly fractured dome area, low perm and low fracture density in flank areas
- Extremely high oil viscosity 1,300 cP
- Strong edge aquifer drive
- High CO<sub>2</sub> content (highly corrosive when mixed with water)
- Low producing vertical well on the flank
- Challenge to increase or maintain current production plateau. USRD is seen fit to develop both dome and flank areas.

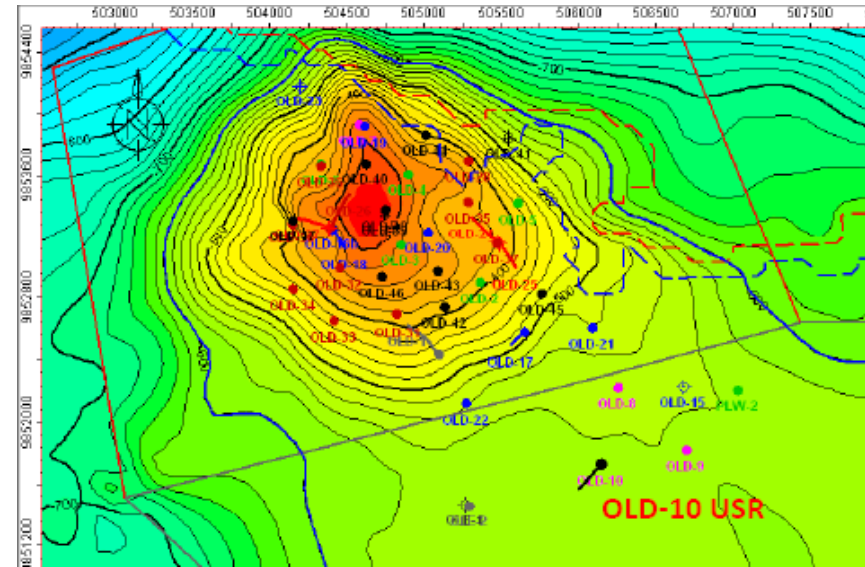




# Case 5 – Heavy Oil, High Watercut, Low Perm

## OBJECTIVES :

- To increase net reservoir exposure in the flank area with fewer wells
- To reduce water coning and/or fingering effect by reducing drawdown with a horizontal well
- To improve connectivity between the new horizontal wellbore and undrained fracture networks
- To access sweet spots a few meters from the vertical wellbore



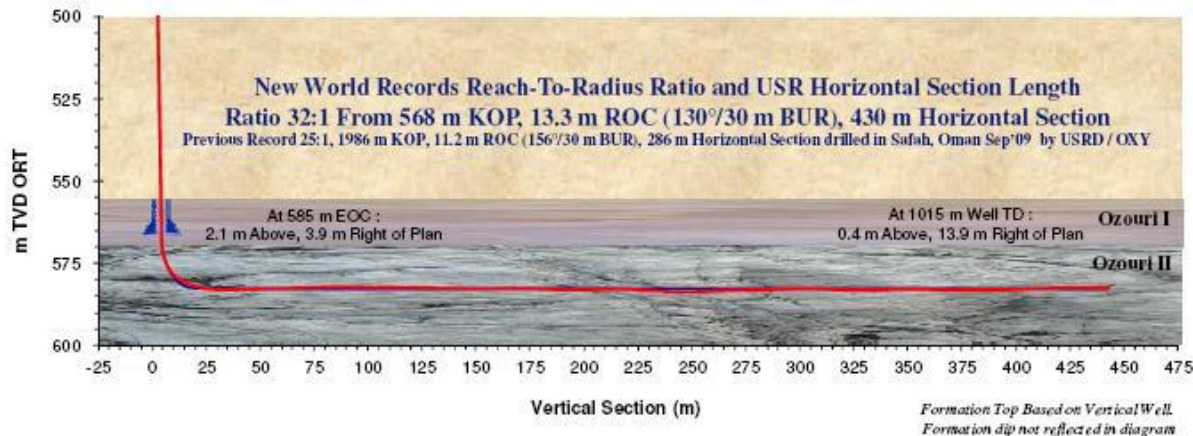
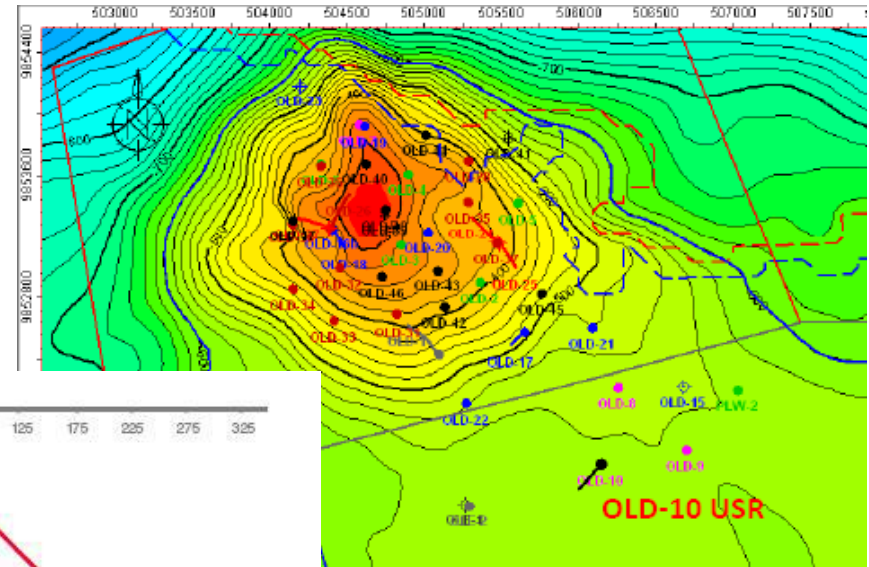
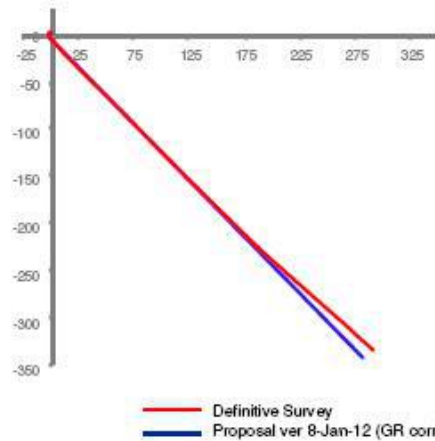


# Case 5 – Heavy Oil, High Watercut, Low Perm

## RESULTS :

- 185 bopd, low watercut from 35 bopd, 35 bwpd
- USRD trial wells increased from 2 to 5
- World record Reach-to-Radius Ratio

Survey Type : DEFINITIVE  
 Vertical Section Origin : N 00.000 m., E 00.000 m.  
 Vertical Section Azimuth : 140°  
 Reference Datum TVD : ORT - Original Rotary Table Elevation  
 Tie-in Surveys : Gyro Multishot 7-Jan-12 at 534 m MD  
 7" Casing Shoe : 566 m MD  
 KOP – Start 4-1/2" Curve : 568 m MD, 568 m TVD ORT, 561 m ssTVD  
 Radius of Curvature (BUR) : 13.3 m (131° / 30m)  
 End of 4-1/2" Curve : 585 m MD, 580 m TVD ORT, 573 m ssTVD  
 Well TD : 1015 m MD, 582m TVD ORT, 575 m ssTVD  
 Revision Date : 18-Jan-12  
 Report Date : 18-Jan-12

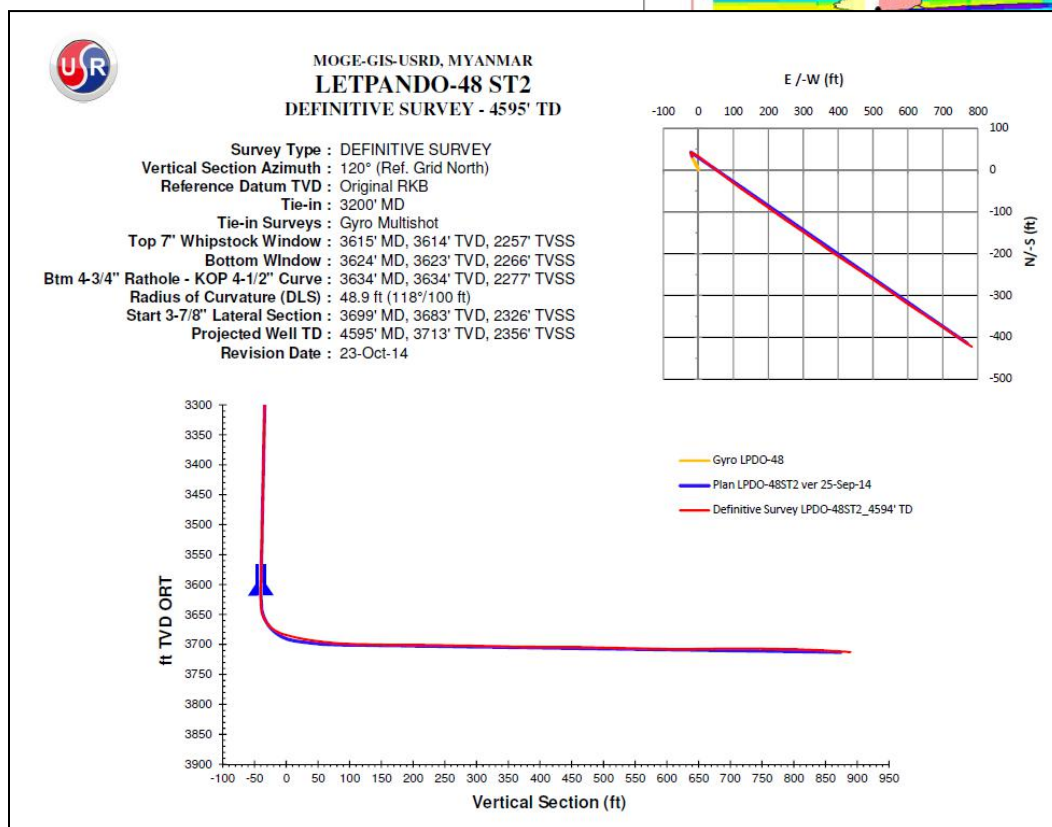
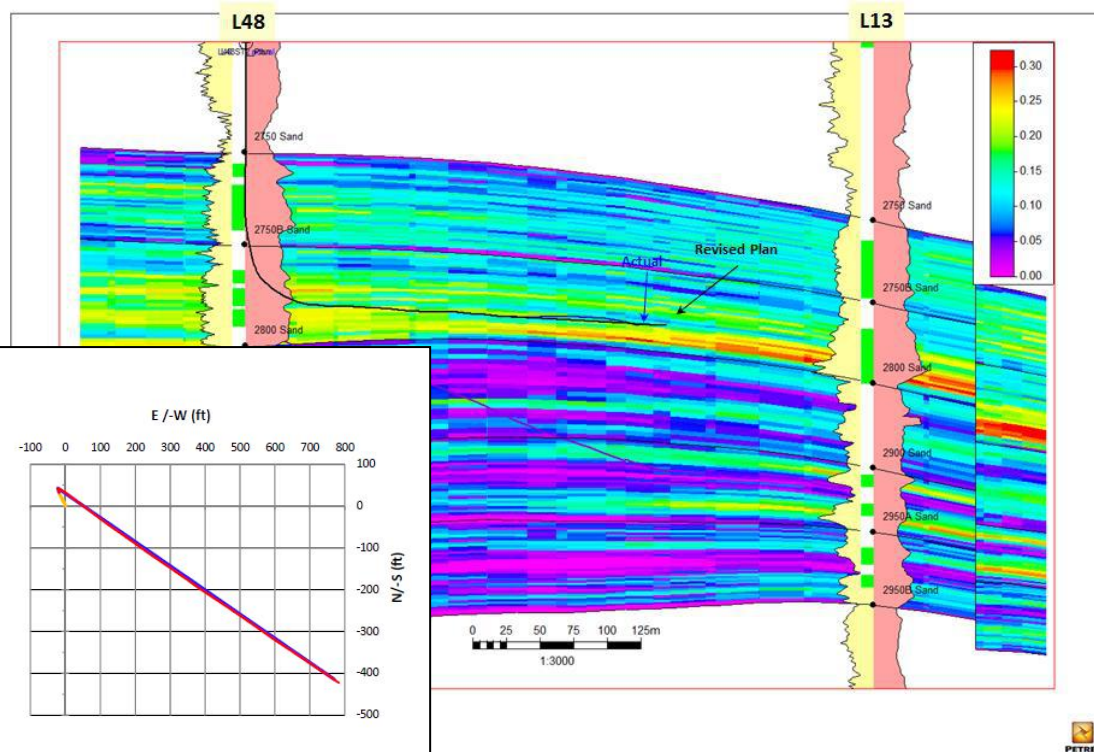




# Case 6 – Low Perm, Low Pressure

## RESULTS :

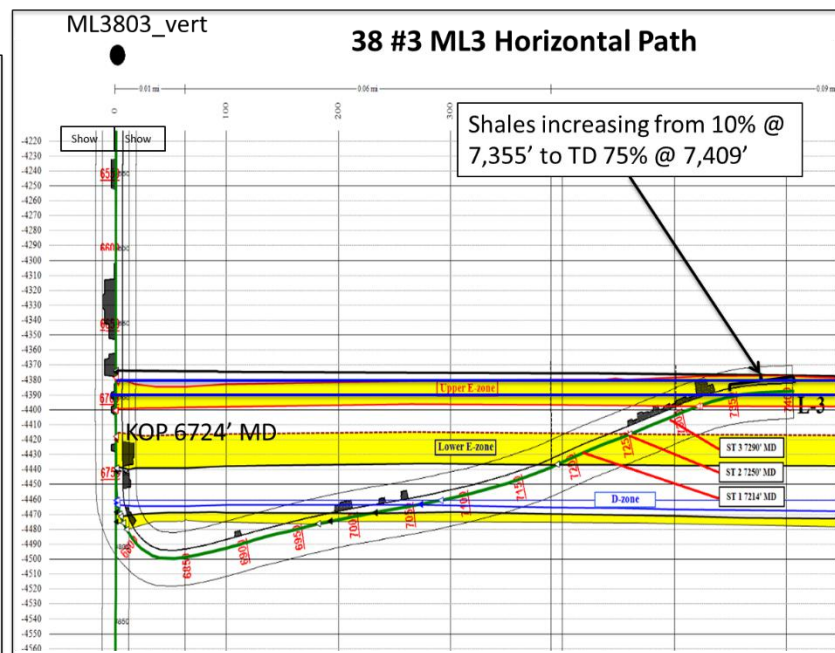
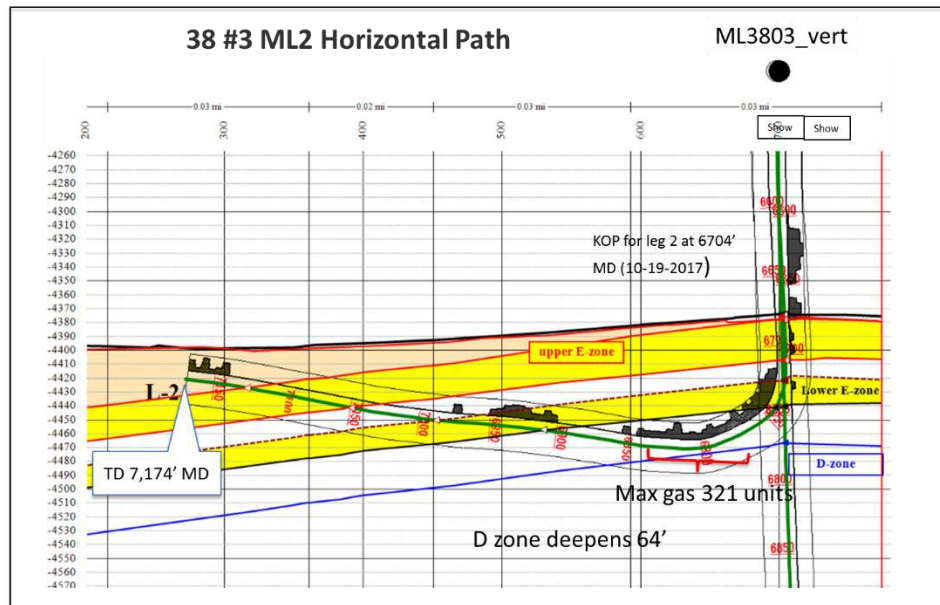
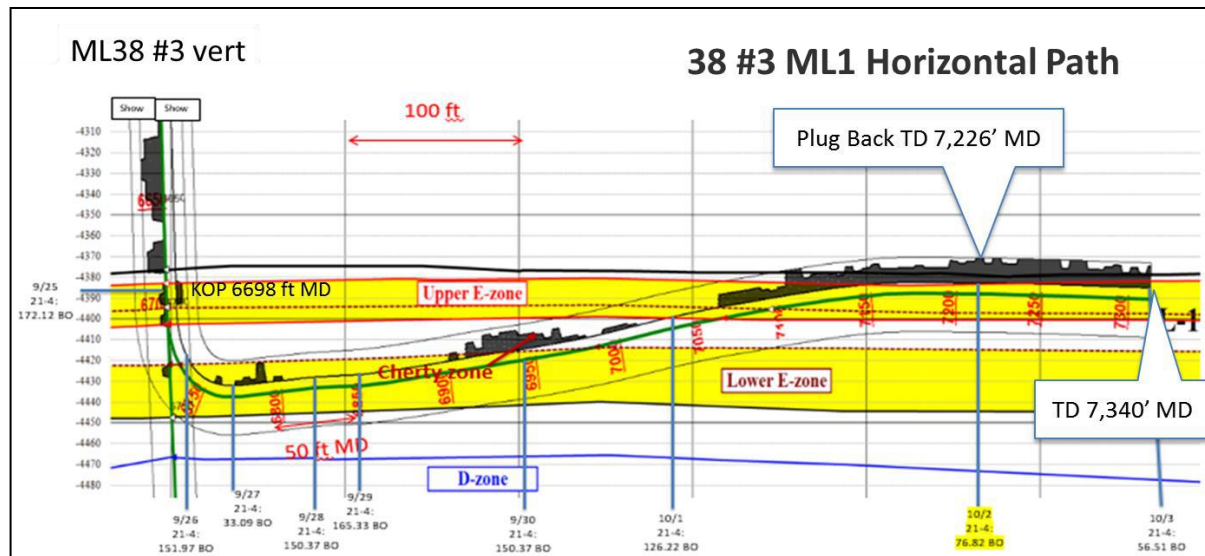
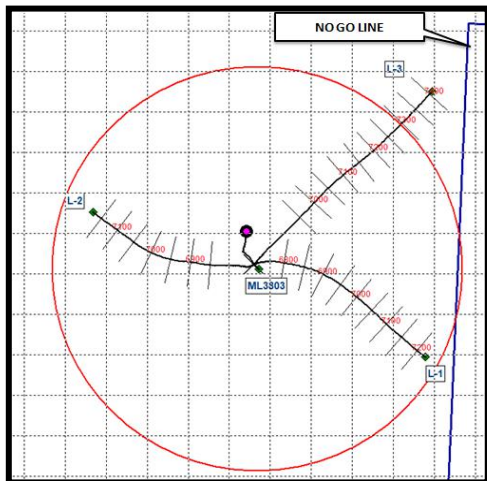
- Before- 0 bopd (shut-in)
- After- 31 bopd







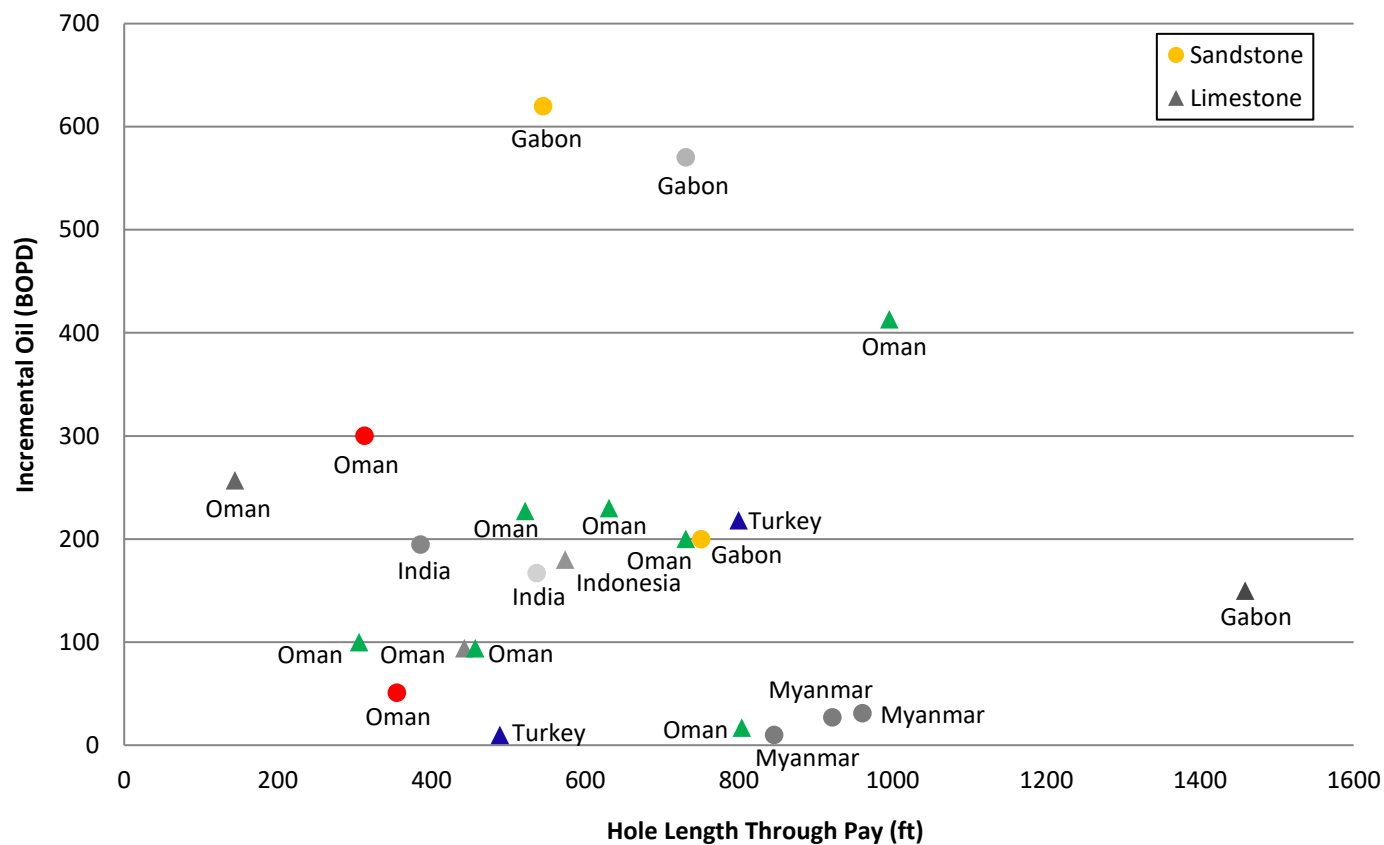
# Case 7 – Fractured Carbonate







## Incremental Oil (BOPD) vs Hole Length Thru Pay (ft)





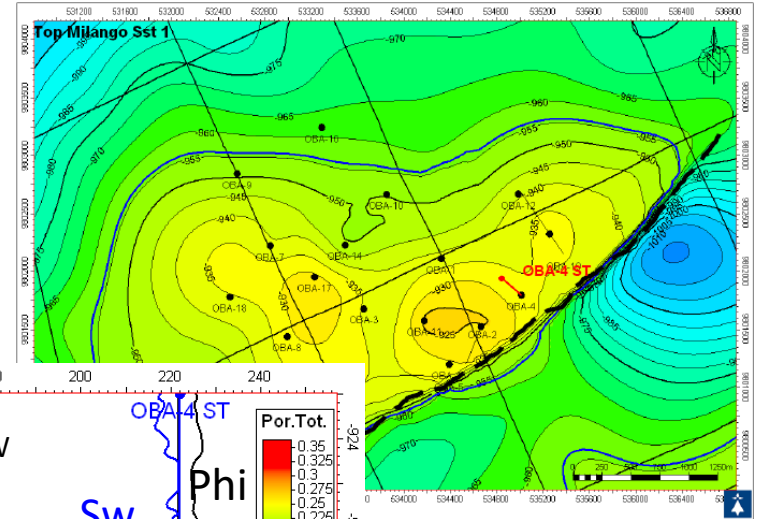
Well	Length Thru Pay (ft)	BOPD Increase	Lithology
Rima 14	355	51	Sst
Rima 24	313	300	Sst
Yibal 392	144	257	Lst
Daleel 4	443	94	Lst
Geleky 83	386	195	Sst
Balol 141	537	167	Sst
Selmo 22	800	218	Dol. Lst
Selmo 36	489	10	Dol. Lst
Safah 99	457	94	Lst
Safah 111	631	230	Lst
Safah 93	996	413	Lst
Safah 113	306	100	Lst
Safah 114	731	200	Lst
Safah 27	804	17	Lst
Safah-52	522	227	Lst
East Nief-1	574	180	Lst
OBA-9	545	620	Sst
OBA-4	751	200	Sst
OLD-10	1459	150	Sil. Cst, Dol. Lst
NIU-28	731	570	Sst
LPDO-7	846	10	Sst
LPDO-61	922	27	Sst
LPDO-48ST2	961	31	Sst



# **CANDIDATE SELECTION PROCESS**



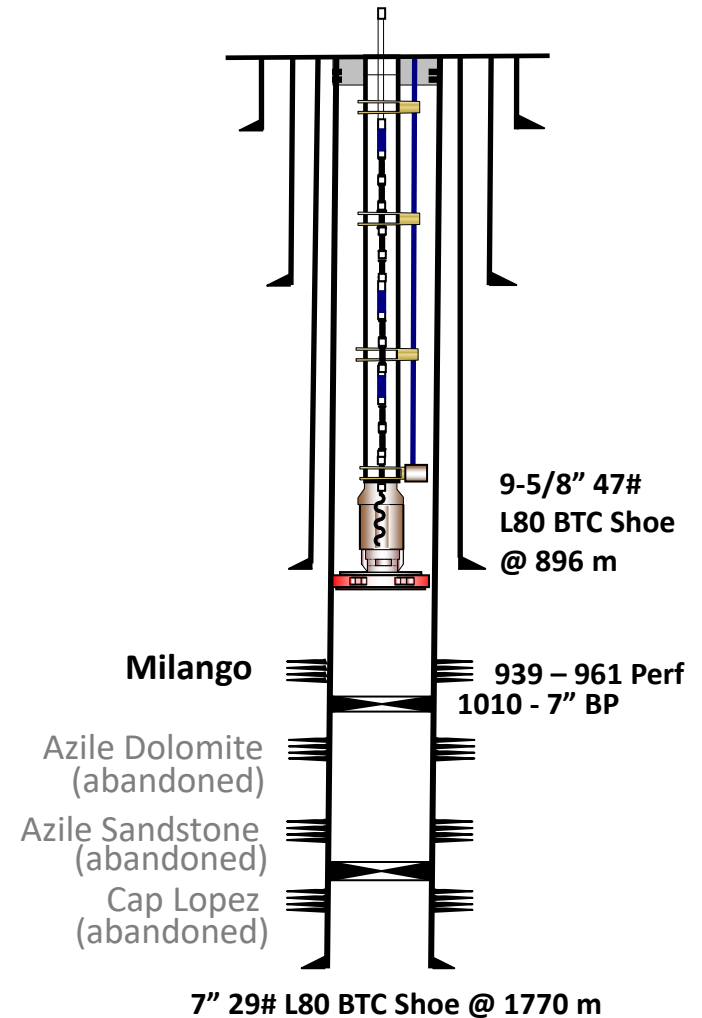
- Production History
- Structure & Reservoir Model
- Well Objective & Target Definitions
- Candidate Ranking





# MECHANICAL ASSESSMENT

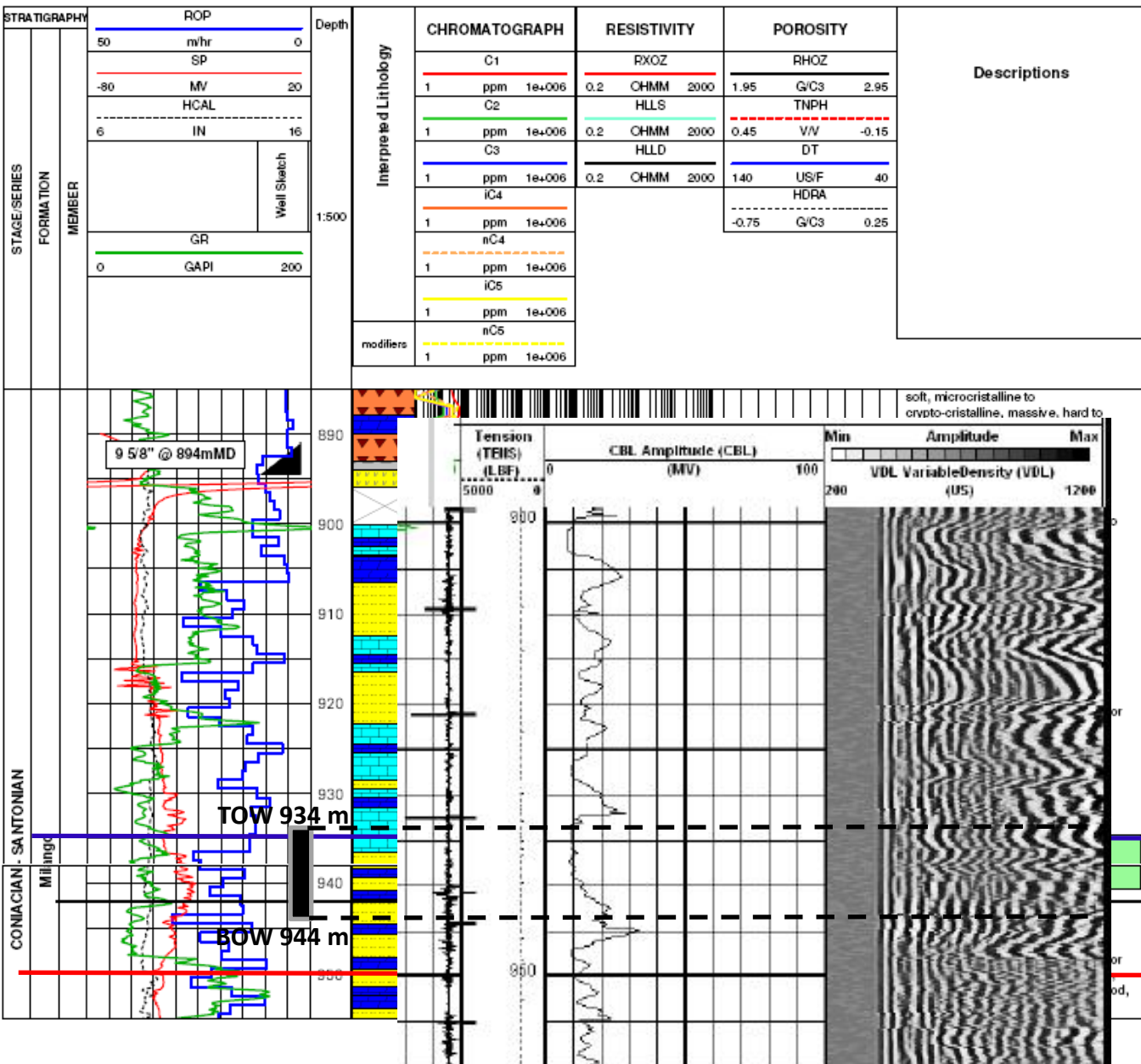
- 7" 29# Production Casing
- 3-1/2" PCP Completion
- Completed zones:
  - Milango Formation
    - Perforated 939 – 941.5 m
    - Abandoned 941.5 – 946.5 m
    - Perforated 941.5 – 961 m
- Abandoned zones:
  - Azile Dolomite
  - Azile Sandstone
  - Cap Lopez





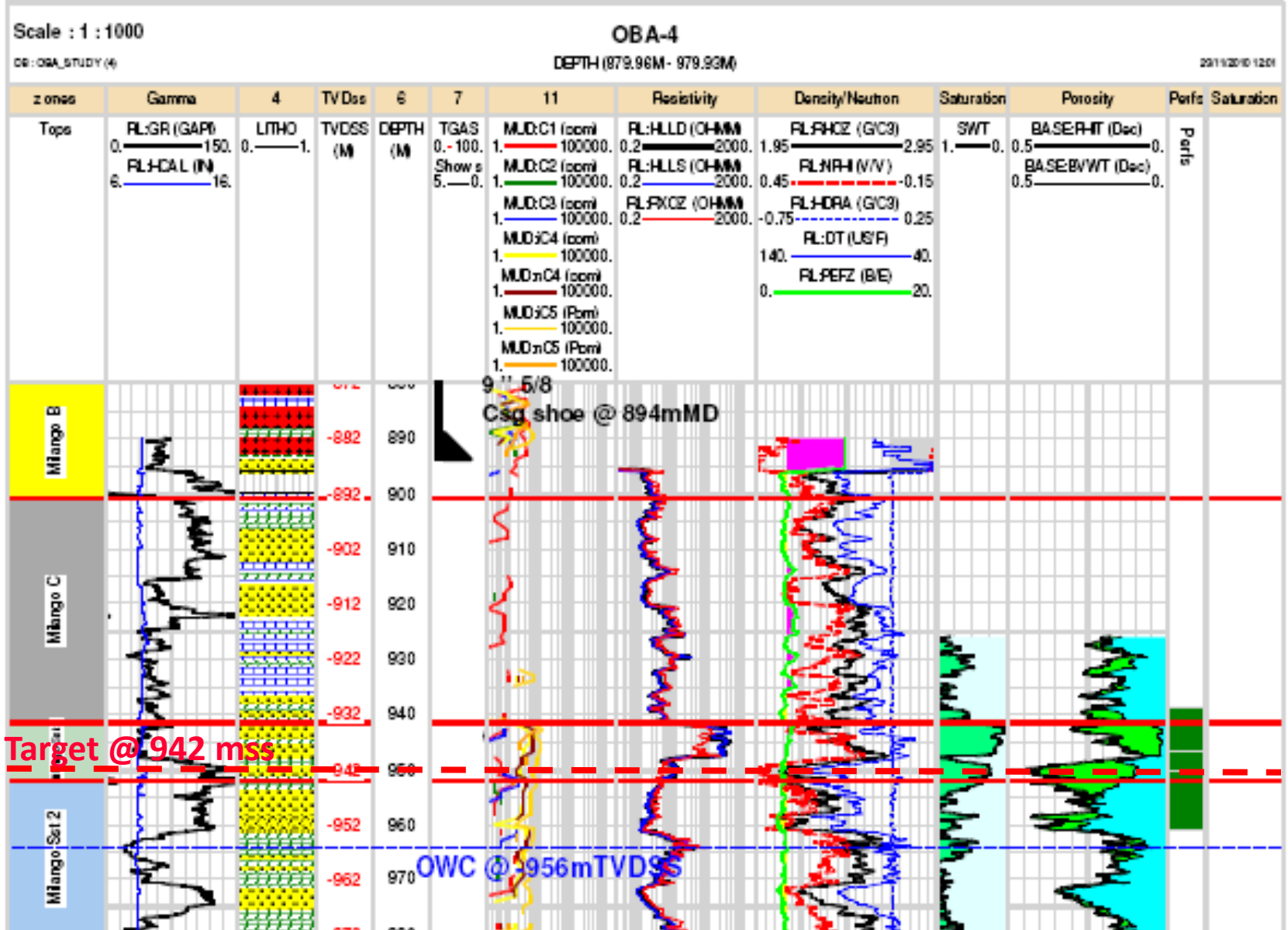


# CASING EXIT



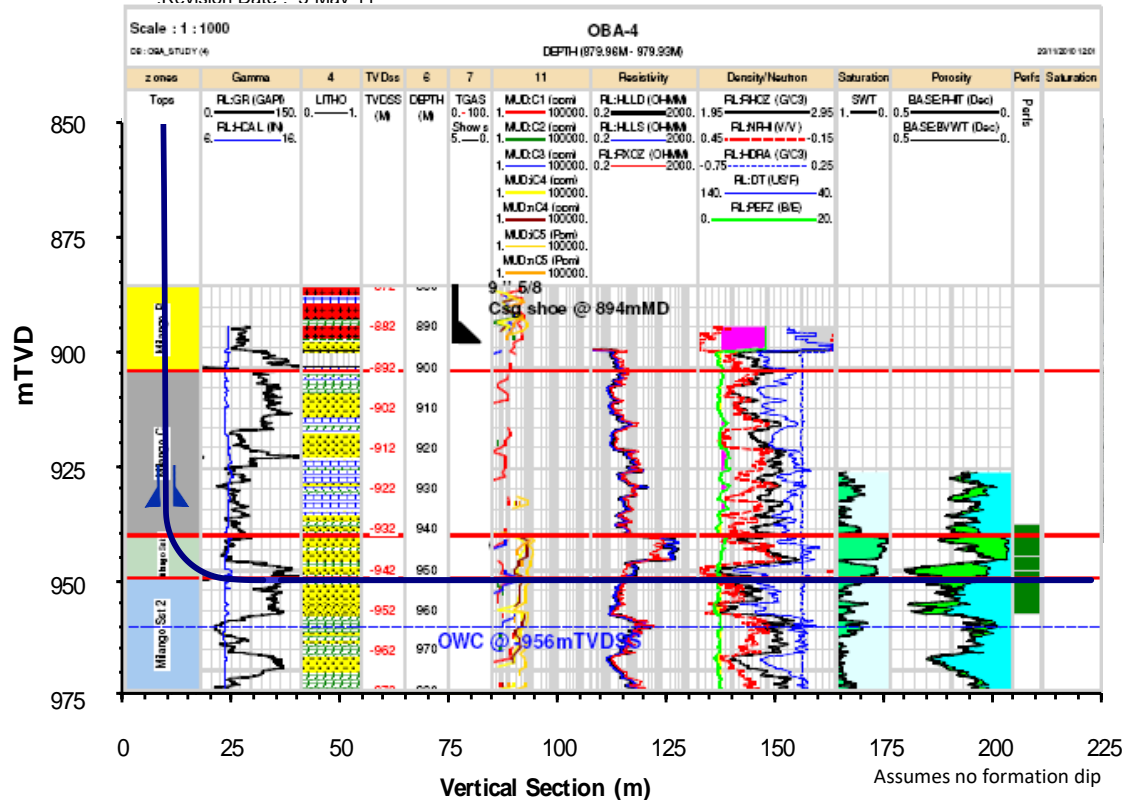


# DRILLING HAZARD ASSESSMENT





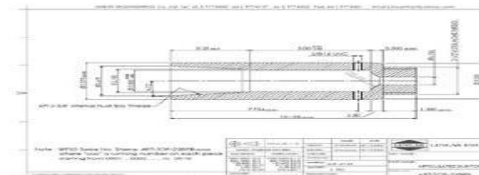
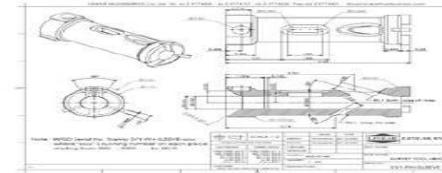
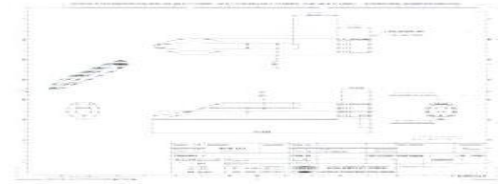
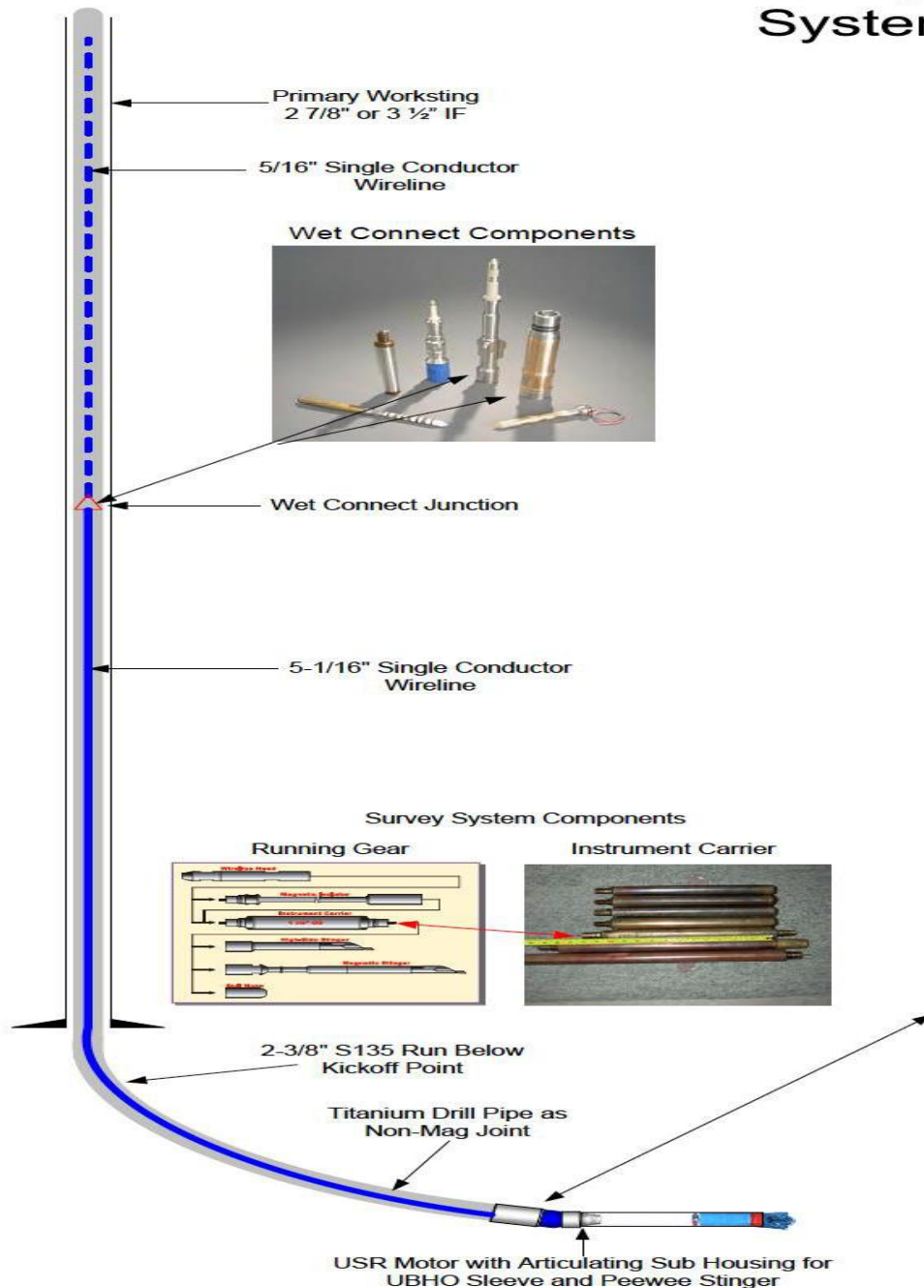
A graph showing the relationship between Azimuth and Elevation for a 50-degree Azimuth. The x-axis represents Azimuth from 0 to 200, and the y-axis represents Elevation from 0 to 200. A blue line starts at (0,0) and goes up to (175, 145). The line is labeled "50° Azimuth".





# **SUB-SURFACE EQUIPMENT PACKAGE**

# USR Lateral Drilling and Surveying System





## **FIRST “SNAKE SCREEN” COMPLETION RUN IN A USR WELL IN INDIA**





# **USRD SURFACE EQUIPMENT PACKAGE FOR MYANMAR**





# 350 HP RIG





# CARRIER ON RIG RAMP







# MUD PUMPS





## AGITATOR MOTORS ON MUD TANKS



## SOLIDS CONTROL AND SUCTION TANKS





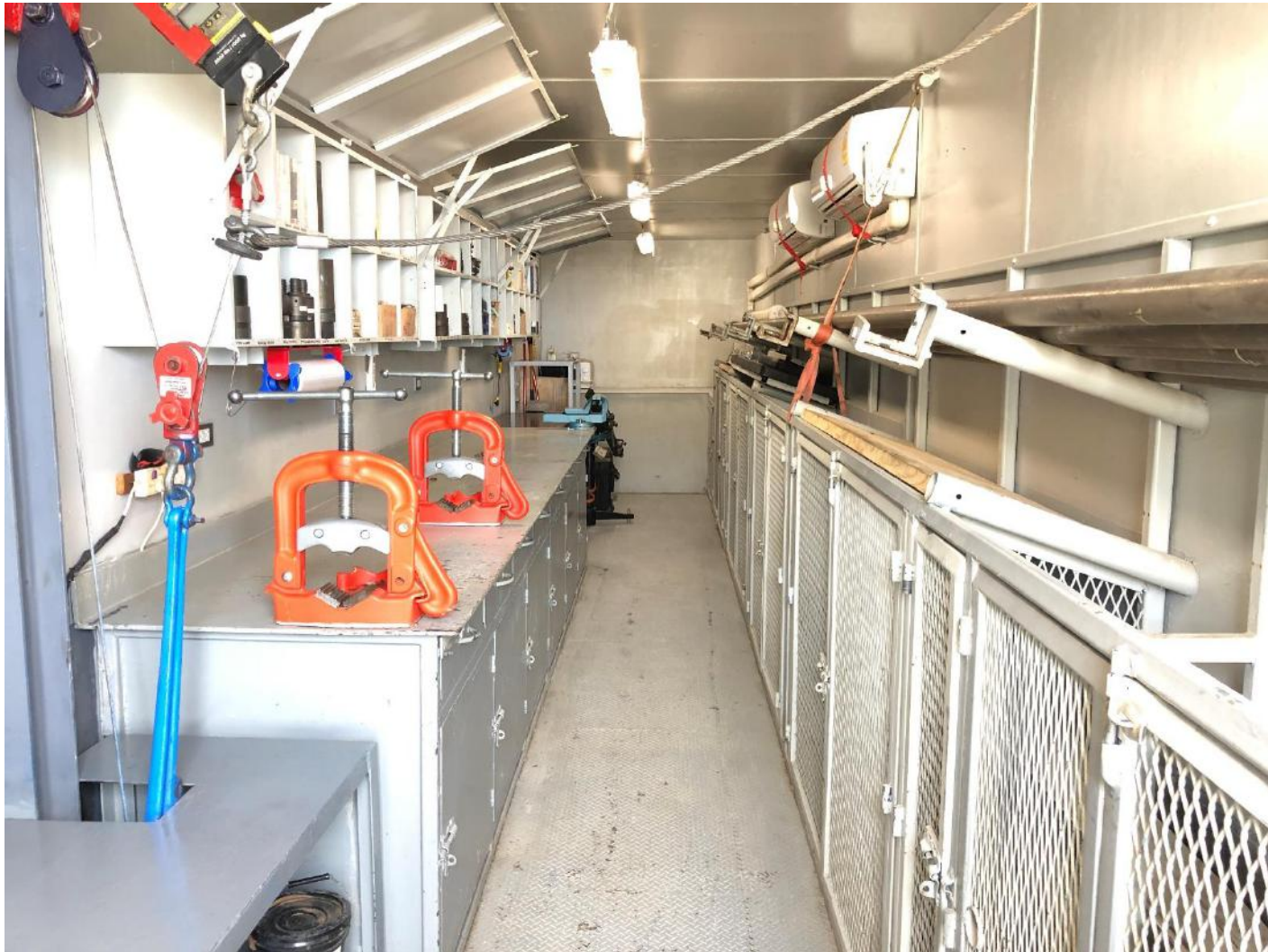


# SOLIDS CONTROL SYSTEM





# USRD WORKSHOP







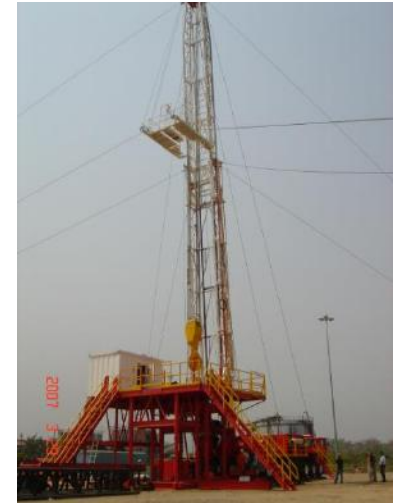
# LIGHT DUTY RIG



Schramm 94 klbs (750 HP Chain Drive) Single



Schramm with sub-structure (tiled, USRD from slant well)



ZJ20 350klbs 600 HP Double



Ideco H40 Rambler – 400 HP Double



Rig H40 with USRD Workshop



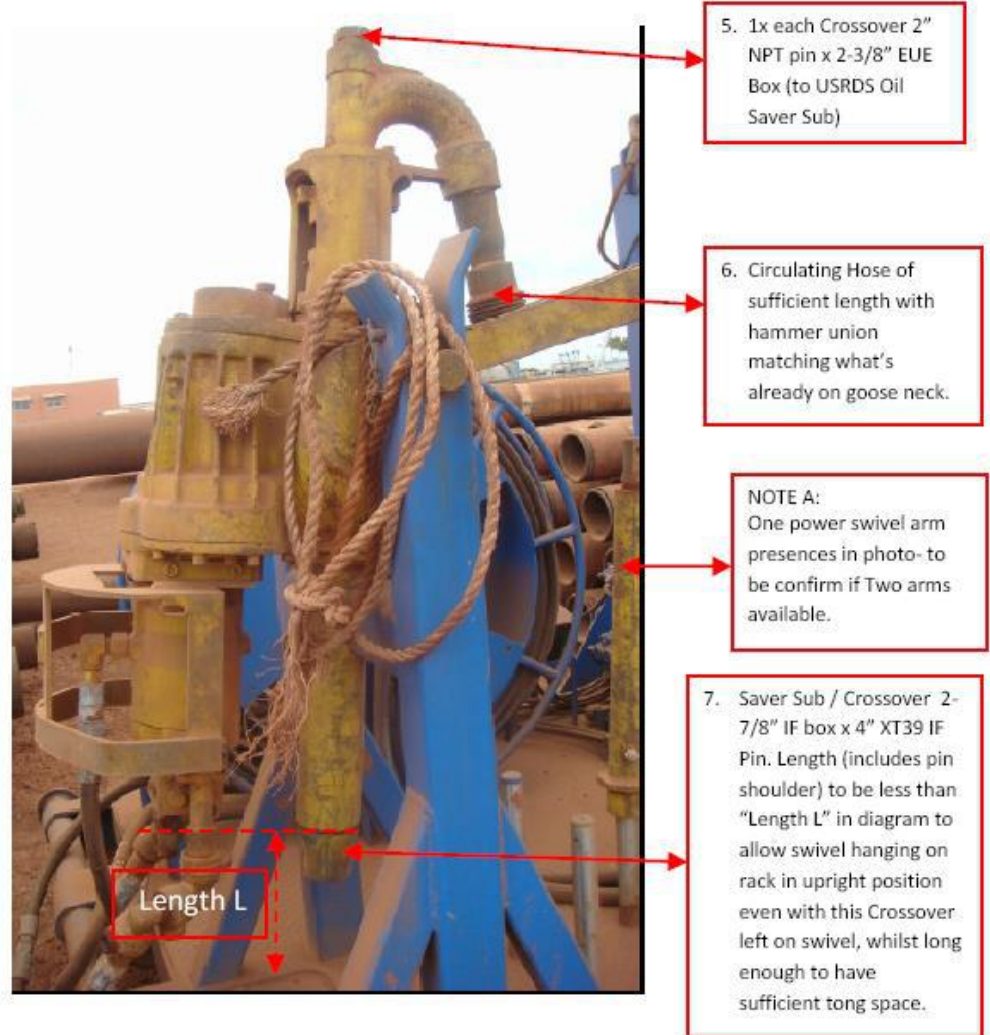
HRI 80T 350 HP Single



# DRILL STRING DRIVE

## POWER SWIVEL

- Bowen 2.5C
  - Static Load Rating 170,000 lbs
  - 100 RPM Rating 90,000 lbs
  - Max Torque 3,975 ft-lbs
  - Max Circ Press 5,000 psi
- Bowen S-3.5
  - Static Load Rating 240,000 lbs
  - 100 RPM Rating 130,000 lbs
  - Max Torque 8,000 ft-lbs
  - Max Circ Press 5,000 psi



# LPDO-7 DRILLING TIME LINE

SPUD 01/03/2014

COMPLETION 10/03/2014

LDPO-7 USRD Time (days) vs. Depth(ft)

