CASE STUDY:
1010/01

PRODUCT:
LONG TERM PARAGON

DATE:
MAY 2012

FIELD APPRAISAL
WIRELESS RESERVOIR DELINEATION

LOCATION:
East Africa

SERVICE:
Exploration and Appraisal

BENEFITS:
Accurate decision making

Fast accurate reservoir profiling

Minimal installation time

Optimise rig time

Increase safety

METROL®
APPLIED INTELLIGENCE

CASE STUDY: 1010/01

PRODUCT:	LONG TERM PARAGON
DATE:	MAY 2012

BY INSTALLING WIRELESS GAUGES THE CLIENT CONFIRMED RESERVOIR CONNECTIVITY AND CONTINUITY IN OFFSET WELLS AT DISTANCES OF OVER 3 KILOMETRES. SUBSEQUENT WELL TESTING ALSO PROVED THE RESERVOIRS HAD HIGH PERMEABILITY, MEETING THE QUALITY SPECIFICATIONS FOR THE PARTNERSHIP'S DEVELOPMENT PLANS. IMPORTANTLY RESERVOIR ANALYSIS WAS CONDUCTED USING GAUGES OF IDENTICAL SPECIFICATION THROUGHOUT ALL WELL TESTING AND LONG TERM OBSERVATION WELLS.

CHALLENGE

In 2012 a deep-water exploration and appraisal campaign was conducted in over 4000ft of water off the east coast of Africa. To help prove the commercial viability of the new discoveries Metrol were contracted to provide wireless data during the well testing and long term observation phases of the project.

Gauges deployed within long term observation wells were required to withstand high temperatures for extended periods, have long battery life and have ultra high resolution, to observe extremely small pressure pulses transmitted from adjacent wells. Operations took place in a remote location with limited infrastructure. The offshore location was hostile in nature and stringent security measures were employed to ensure the safety of personnel and equipment.

METHOD

The wells were batch drilled using a dedicated deep water drilling rig, while a second rig was mobilised to carry out the well testing and completion operations. This schedule allowed 11 wells to be tested or observed within a 12 month period.

Metrol's long term wireless gauge systems were deployed in 7 observation wells, within 14 discrete zones, all requiring multiyear monitoring.

The long term gauge deployments were followed by well tests, performed in either the well with the observation gauges, or in an offset well, to create a pressure pulse for interference testing between wells. This allowed Metrol to;

- Successfully install multiyear, high resolution wireless downhole gauges at the perforations in 14 isolated intervals.
- Integrate and wirelessly transmit across standard completion equipment, allowing the client to save costs by using existing tool inventory.
- Increase the safety case for temporary abandonments, with real time reservoir monitoring, while ensuring no potential leak paths were introduced across downhole barriers.
- Provide short term (well test) and long term (observation) reservoir data using gauges of repeatable and identical specification, calibrated using the same procedures using the same ovens.
- Simultaneously collect near real time data from multiple discrete zones, during well testing, allowing immediate interference analysis.
- Perform multi-well interrogations after testing operations using sonar. The resulting data was used to check for communication and connectivity between the wells and reservoirs.
- Verify the integrity of 14 downhole barrier elements during installation using a wireless processor installed on the workstring.
- Securely host and distribute the downhole data from Merol's Data Centre in Aberdeen.

METROL Wireless Relay Stations

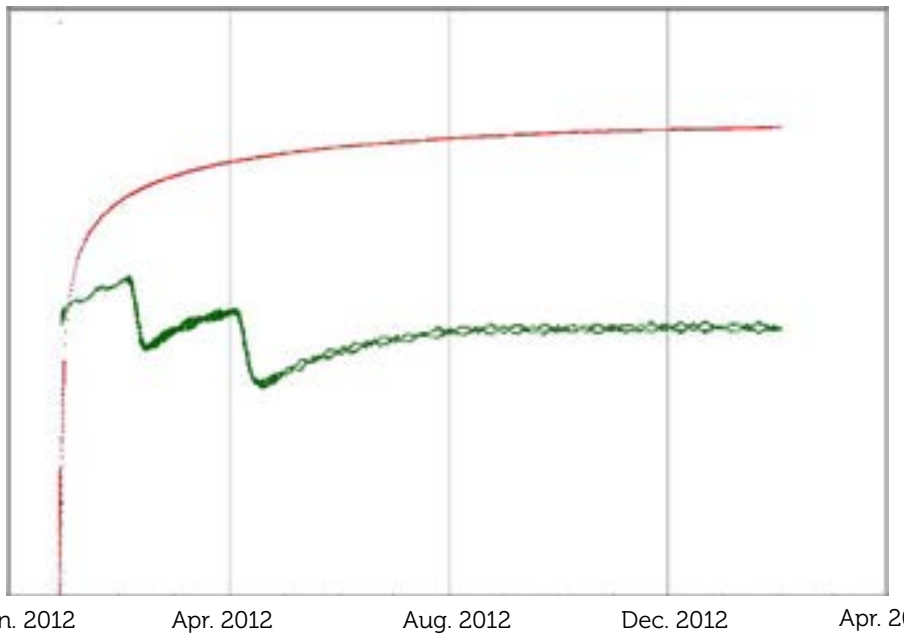
METROL Temporary Abandonment Cap

RESULTS

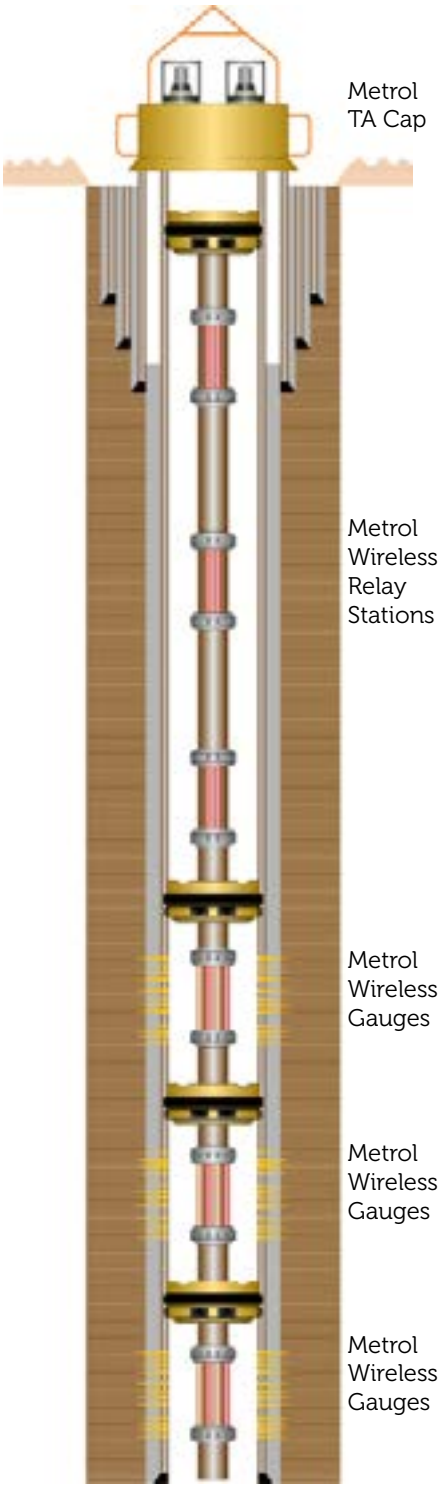
Throughout well testing operations significant time savings were made using the data provided from multiple wireless gauges installed throughout the well test string. Rig time was saved using diagnostic information that included confirmation of valve positions and verification of displacement fluid weights. At the same time reservoir data provided validation of pressure build-ups, allowing well testing operations and rig time to be optimised.

The Metrol Data Centre, in Aberdeen, securely hosted and distributed the wireless well test data as it was being retrieved. This allowed the client's subsurface team to analyse the reservoir data as operations developed. The project scope was changed during the campaign and additional wireless long term systems were required at short notice.Metrol successfully delivered the extra systems on accelerated lead times through a modular design philosophy and ability to easily interface with industry standard completion equipment.

Positioning high resolution, high accuracy wireless gauges directly across the perforations enabled rapid interference analysis and reservoir profiling. Metrol's data acquisition systems are "live as soon as they're landed", meaning there's no waiting for subsea infrastructure to be installed before communicating with the gauges. This quick delivery of reservoir data allowed the client to confirm connectivity and continuity over several kilometres, which helped ratify one of the largest gas fields ever discovered in East Africa.



Long Term Observation Gauge Data in Offset Well



Metrol System Schematic

TECHNOLOGY DEVELOPMENT

Since project completion Metrol have developed an advanced electromagnetic (PARAGON-EM) telemetry system capable of monitoring from below cement plugs, without requiring a string to surface, in permanently abandoned wells.

Other new wireless technologies include a high resolution thermal imaging system (PRO-LOG), intelligent TCP actuation (CROSS-FIRE), wireless string depth correlation (DEPTH-LOC) and down-hole flow control (FLOW-SURE).

METROL®
APPLIED INTELLIGENCE

CASE STUDY INDEX

Howe Moss Place
Kirkhill Industrial Estate
Dyce, Aberdeen
AB21 0GS, Scotland, UK

T +44 (0)1224 772771
E sales@metrol.co.uk
www.metrol.co.uk