ORGANIC
OIL RECOVERY

Scott Field North Sea Pilot

July 2020

BACKGROUND

- Operator – CNOOC Petroleum Europe Limited
- Asset – Scott Platform
- Location – UKCS
- Trap Type – Structural
- Pay Zone – Scott & Piper Formation
- Formation Age – Upper Jurassic
- Depth to Crest – 10,400ft
- Permeability – 0.1 to 6,500mD
- BHT – 96°C (205°F)

The Scott Field, located in the UK Central North Sea, is in a mature stage of development. The oil field is developed in the highly-productive Upper Jurassic Humber Group sandstones of Oxfordian to Kimmeridgian age. The field was discovered in 1983, sanctioned in 1990, and produced first oil in 1993.

Scott is located about 187 kilometres northeast of Aberdeen in 142 metres of water. The Scott Field reservoir exhibits elements of both stratigraphical and structural trapping. The field structure, effectively a large southward tilted fault block, is compartmentalised into a series of four main pressure isolated fault blocks by mid to late Jurassic faulting. Current modelling is aimed at targeting bypassed oil to increase ultimate recovery.

CNOOC Petroleum Europe Limited, a wholly-owned subsidiary of CNOOC Limited, is the operating partner of Scott (41.89%), with Dana Petroleum E&P Limited (20.64%), Edison E&P UK Ltd. (10.47%), NEO Energy Production UK Limited (5.16%) and MOL Operations UK Limited (21.84%).

>1,000% +
ROI*

>25,000
barrel incremental

4%
drop in water cut

< 1 week
payback

* Incremental revenue over pilot cost

CUSTOMER CHALLENGE

Identify an alternative, cost-effective EOR technology to increase oil production and recoverable reserves

Implement EOR technology with zero CAPEX outlay

Implement EOR technology with a minimal offshore footprint

PILOT INJECTION PROCEDURE

- 2,400 barrels of injection quality seawater and nutrient mix (>99% water, <1% nutrient) injected at 4 barrels/min directly at the wellhead
- Over-displacement of approxmately 400 barrels of injection quality seawater at 4 barrels/min
- Shut in Well for 7 days (Incubation period)
- Second over-displacement of approxmately 1000 barrels of injection quality seawater at 4 barrels/min to push newly formed near well-bore ecology further into reservoir
- Shut in Well for a further incubation period of 3 days
- Return to Production

OOR APPROACH

The application of the OOR Process® generally consists of the following steps:

Initial field screening

Well sampling and laboratory analysis

Pilot injection application

The application of the OOR pilot process for the Scott field consisted of the following steps:

Step 1 – Field Screening of Reservoir Characteristics and Well Specific Data - Completed

Step 2 – Target Well Sampling & Laboratory Analysis - Completed

Step 3 – Single Well Pilot Test (In-Situ Microbial Response Analysis - ISMRA®) - Completed July 2020

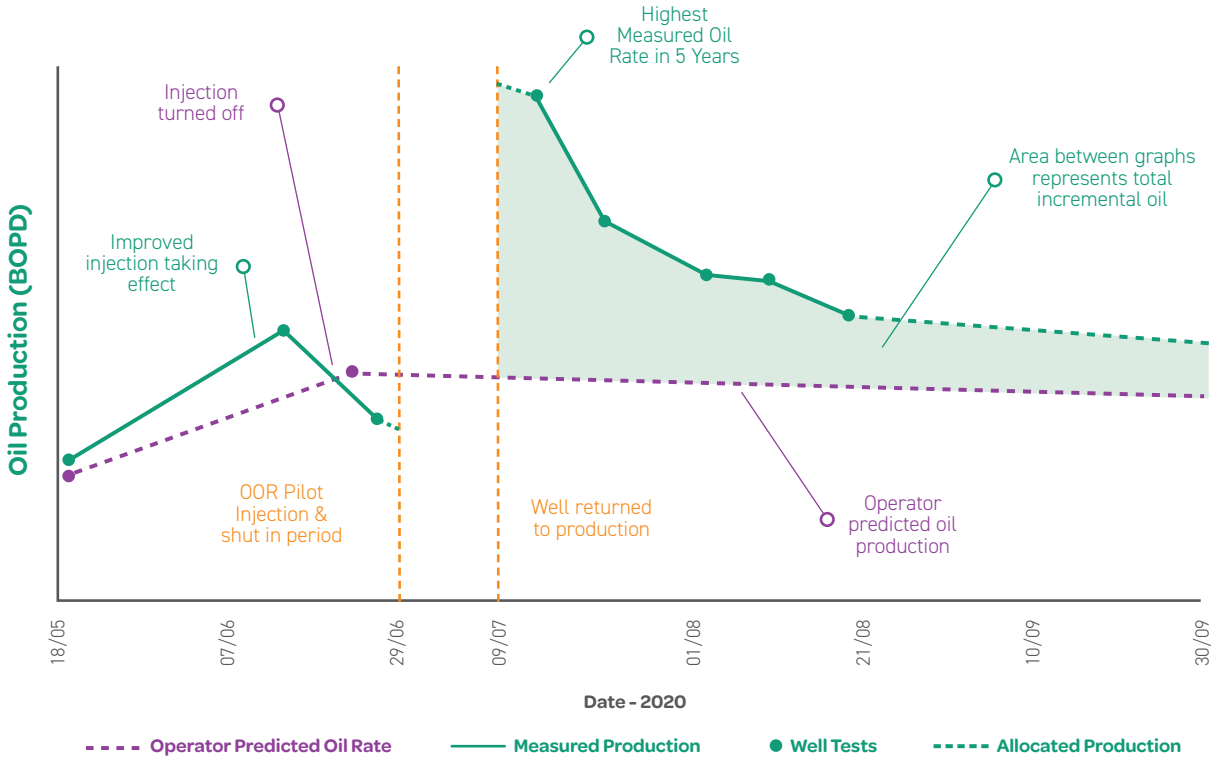
The In-Situ Microbial Response Analysis (ISMRA®) or Pilot Test is designed specifically to replicate the laboratory results in the reservoir. Produced water samples were taken pre OOR nutrient injection and just after Well flow back. A significant production response is often observed; however, the most important aspect to this step is the microbial response observed in the laboratory from samples taken upon return to production.

Step 4 – Targeted Water Flood Implementation

Progression to step 4 – Targeted water flood implementation – will be confirmed once the microbiology and the production impact has been assessed

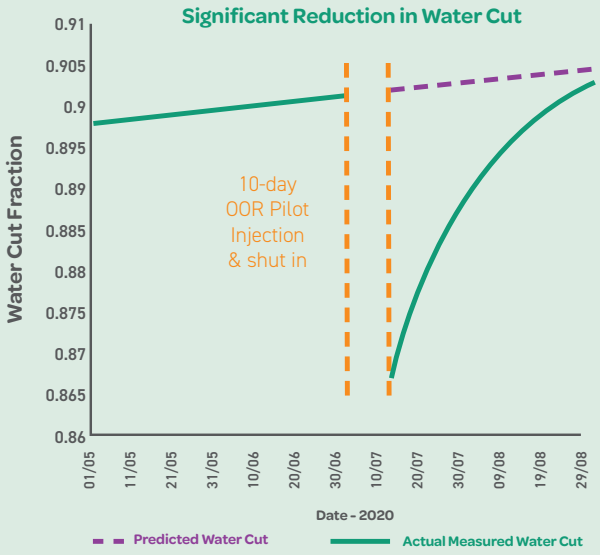
Step 5 – Full Field Implementation

RESULTS/INCREMENTAL OIL PRODUCTION



OBSERVATIONS

- Significant Incremental Oil gain
- Lowest water cut since May 2016
- No change to oil quality
- No change to separation efficacy (same oil-in-water content)
- Observed reduction in H_2S in oil and gas phase



WHAT OUR CUSTOMERS SAY

"Promising results from an elegant EOR technology that can be implemented without a large offshore footprint"

– Andy Bostock, CNOOC International

"For us, it was a basic pumping operation. Very similar to a scale squeeze, although smaller volumes and therefore slightly more straightforward."

– Nigel Wallace, Altus Intervention