



Blue Gentoo

CASE STUDY 01

# Eliminated Need for Methanol Injection - Life of Field Extended

Client asked for help to maintain production in gas field with rising water cut.

The HydraCHEK® technology was key to continued gas production on the Nuggets field.

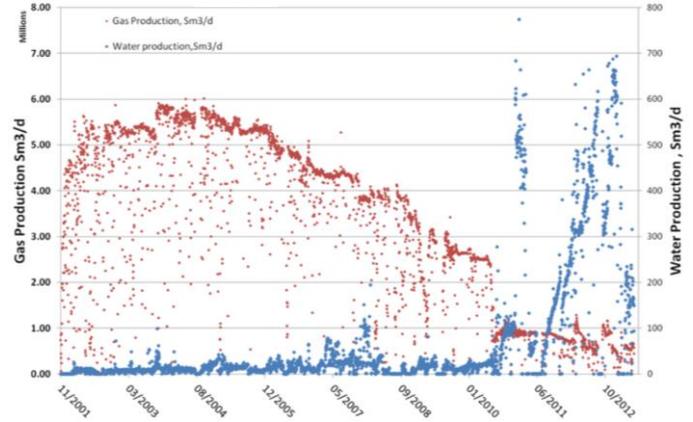
The field has since produced an extra 3.5 million BOE; generating more than \$230M (£175M) in extra revenue.

**SYSTEM** Gas producing asset, North Sea

**SITUATION** Unexpected water-cut production

Asset decided to be decommissioned

**OUTCOME** Inhibitor dosage rate reduced to zero



## SITUATION AND CHALLENGE

The NUGGETS subsea development in the Northern North Sea consists of 5 gas wells with 40 – 70 km tie-backs to the Alwyn platform. First gas was in 2001 and by 2010, production values had declined with water-cut unexpectedly increasing.

Methanol was used as a hydrate inhibitor and, based on initial design, the expected maximum water cut was 40 sm<sup>3</sup>/day. However, 9 years into production, the water cut increased to more than 100 sm<sup>3</sup>/d and the field was being prepared to be decommissioned. The client wanted to try something new to sustain production as there were significant gains arising from the fields' continuous production; gas from the field provided a useful blend premium for CO<sub>2</sub> rich fields that flowed into the platform. So, the client undertook a comprehensive review of its field management strategy from reservoir to well to flow assurance.

Flow assurance support was provided and, in addition to adjusting gas flow rates from each well (to limit water production), it was decided to operate pressures below turndown. This, however, would lead to loss of pressure control and frequent excursions into the hydrate zone. It was therefore necessary to implement an early warning system to allow the operator react responsively in case hydrate build-up occurs.

## SOLUTION

After examining a number of options for early warning systems the client chose HydraCHEK®, the world's first gas hydrates safety margin monitoring tool which simultaneously measures the salinity and chemical inhibitor concentration (THI and LDHI) in the aqueous phase. HydraCHEK® revealed the beneficial effect of high concentrations of salt in the system. Hydrates exclude salts from their structure, therefore, hydrate formation results in an increase of salt concentration in the free water, which acts as a natural inhibitor to further hydrate formation. The total average salt content measured by HydraCHEK® gave a typical value of ~ 4.8 mass %.

With HydraCHEK® in place, a programme to gradually reduce methanol injection rate was embarked upon and reached the point where the field operated with zero methanol while in hydrate zone due to the beneficial effect of the salt. After gathering further information and building confidence in the methodology, the trial continued and it established HydraCHEK® ability to provide ultimate peace of mind and give 24 hours advanced warning of any hydrate problems.

## RESULTS

The field, which has been planned for abandonment, continued production for another 7 years, producing an extra 3.5 million BOE and generating more than \$230M (£175M), in addition to eliminating product contamination and methanol costs.