



Dana Petroleum (E&P) Limited

**LICENCE RELINQUISHMENT REPORT
UKCS LICENCE P.0001
BLOCK 42/29a MONKWELL**

**DANA PETROLEUM (E&P) LIMITED
UK EXPLORATION**

MARCH 2011

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1. LICENCE INFORMATION

Table 1: Licence Information & Work Programme Commitments

Licence Number:	P.0001
Licence Round:	1
Licence Type:	Traditional
Block Number(s):	Block 42/29a MONKWELL
Operator/Partner %:	Dana Petroleum (E&P) Limited (op); 50%, Dyas UK Limited; 15%, GasPlus E&P UK Limited; 15%, Sorgenia E&P (UK) Limited; 20%
Work Programme:	<p>(1) To drill a well in the “Monkwell” Prospective Area. The specified deadline for this Related Work Element is 17th October 2010.</p> <p>(2) To apply for a consent pursuant to Clause 15(1) for the “Monkwell” Prospective Area in accordance with the most recent Guidelines issued by the Department from time to time. The specified deadline for this Related Work Element is 31st December 2010.</p>
Drill-or-drop decision deadline (if any):	N/A

2. SYNOPSIS

The P.0001 licence was initially awarded to BP in the 1st licensing round, commencing on 17th September 1964, and expiring on 17th September 2010. Dana Petroleum (E&P) Limited purchased part of blocks 42/29a, 42/30a and 47/5c, named the “Colden Parva / Monkwell Area” in June 2005 from BP. This area included the Monkwell gas discovery (drilled by wells 42/29-6 and 42/29-8), the Monkwell South West gas discovery (drilled by well 42/29-7) and the Colden Parva exploration lead. Dana generated a new PreSDM 3D seismic data set to evaluate the exploration acreage (Colden Parva/Whittle PreSDM, 2007). Unfortunately, this new seismic dataset downgraded the exploration potential of the licensed area and a partial relinquishment of the exploration acreage was undertaken on 1st January 2008. The 42/29a “Monkwell Prospective Area” was retained.

A two year license extension (from 17th September 2010) for the Monkwell Prospective Area was agreed by DECC, providing that an appraisal well was drilled by 17th October 2010, and that an FDP was submitted by 31st March 2011. The 42/29a-10 Monkwell appraisal well was spudded on 17th May 2010 and reached a total depth of 9,473 feet, measured depth. The well failed to encounter gas, downgrading the Monkwell discovery to a sub-commercial pool.

There are five wells within the Monkwell Prospective Area.

Table 2: Wells located in sub-block 42/29a “Monkwell”

Monkwell:	Well	Year	Comment
	42/29- 1	1969	P&A, Dry
	42/29- 6	1989	Suspended, Gas Discovery (Monkwell)
	42/29- 7	1990	Suspended, Gas Discovery (Monkwell South West)
	42/29- 8	1990	Suspended, Gas Discovery (Monkwell)
	42/29a- 10	2010	P&A, Dry

Monkwell is located on the north-western edge of the Sole Pit Basin, approximately 9km north-west of BP’s Cleeton Field (Fig.1). The Monkwell gas discovery is interpreted to be a dip and fault closed structure, however, the failure of the 42/19a-10 well to find gas reinforces the critical risk of structural interpretation of the discovery, and the adjacent blocks, due to depth conversion difficulties.

After thorough evaluation, Dana proposes to relinquish the licence, and permanently abandon the 42/29-6, 42/29-7 and 42/29-8 wells.

3. EXPLORATION ACTIVITY

Seismic:

- 3D survey acquired 1991; 105 km², line spacing 12.5m, shot parallel to strike, 48 fold cover
- Time and post stack depth migrated volumes interpreted mid-late 1994
- 6-layer overburden model used in depth conversion. TWT picks tied to 5 wells, velocity model based on a further 23 nearby wells, but weighted to block 42/29
- Top reservoir map created by stacking Silverpit isopach onto Top Rotliegendes depth structure
- 30km² of MC 3D SNS Mega Survey acquired from PGS
- In 2007 interpretation started on the 3D Colden Parva /Whittle PreSDM.
- The Monkwell Field was mapped using both a time migrated 3D dataset and a Post Stack Depth Migrated 3D dataset. Seismic data quality is good but velocity variations in the overburden cause problems in accurately defining the depth structure of the low relief traps. This is the biggest single uncertainty to the size of the Monkwell Field.
- Depth conversion performed by isopaching down to the Top Rotliegendes, tying 14 surrounding wells at each level. In time, the Rotliegendes is mapped on a NW trending 'nose' which may be velocity induced. Depth conversion does not take proper account of the velocity contrast across the listric fault in the overlying Triassic creating a false depth closure.

Wells:**42/29-1:**

The 42/29-1 well was drilled by BP in 1968. The well was drilled with water based mud and logged with a Schlumberger laterolog suite in 8-1/2" hole. Hole conditions were excellent, with log quality in the Lower Lemman Sandstone reservoir very good. The logs indicated that the reservoir was water bearing, and this was corroborated by the absence of any indications of gas on the mud logging sensors.

The reservoir encountered comprises an inter-bedded sequence of sands with excellent porosity, and tighter sandstones and shales. Core data from other Monkwell wells indicate the facies of these excellent porosity units are aeolian dunes, with the tighter facies interpreted as sabkha and water-lain deposits.

42/29-6:

Well 42/29-6 was drilled by BP in 1989. The well was planned as a vertical hole, although a hole angle of approximately 8° was measured through the reservoir. The well was drilled without incident in 32 days followed by 24 days of testing. The well was drilled with oil-based mud, resulting in good hole quality. Core was cut over most of the Lemman Sandstone formation into the Top Carboniferous. The well was logged in 8-1/2" hole using a Schlumberger induction log suite. Gas shows were seen in the Zechstein carbonates, the target Lower Lemman Sandstone and in the Carboniferous section. Both logs and gas shows clearly indicate that the Lower Lemman Sandstone is gas bearing at a number of intervals. Formation pressure data were obtained and a drill-stem test performed. The well tested at a rate of 27.2mmscf/d.

As in 42/29-1, the Lower Lemman Sandstone reservoir comprises high porosity, high permeability aeolian streaks, inter-bedded with poorer quality sandstones and shales. Interestingly, the reservoir contains (at least) two gas zones, separated by a clear water zone and a shale. The perforated interval of the drill-stem test straddled both gas zones but left the water zone unperforated. Formation pressure data show that the upper and lower gas zones are not in pressure communication, with the lower gas zone relatively overpressured by 49psi.

42/29-7:

Well 42/29-7 was drilled as a deviated S-shaped hole from a well template positioned on the 42/29-6 well. The well was drilled by BP in 1990 to test a satellite structure to the southwest of the main Monkwell field. The well discovered gas in the Lower Lemman Sandstone formation and this accumulation is now known as Monkwell South West.

Both hole conditions and subsequent wireline log quality were very good. The well was continuously cored from near top reservoir through to the Carboniferous. The Lower Lemman Sandstone encountered in the well was thinner, compared to the wells on the main Monkwell Field, but the reservoir present showed an excellent correlation with the upper part of the main Monkwell reservoir.

Core from the underlying Carboniferous indicates a depositional (rather than faulted) boundary, suggesting that the 42/29-7 well location was a palaeo-high during deposition of the lower part of the Lemman Sandstone reservoir.

Gas shows were encountered in the Lower Lemman Sandstone reservoir and in the underlying Carboniferous. The log data clearly indicate that the upper part of the Lemman Sandstone reservoir is gas bearing. Pressure data were obtained (indicating ca.80psi of depletion), and the well drill-stem test flowed at a rate of 23.9mmscf/d.

42/29-8:

The 42/29-8 well was drilled by BP in 1990. The well was drilled as a deviated hole from the well template positioned on the 42/29-6 well. The aim of this well was to test the down-dip extent of the column of gas discovered ca. 1km to the north-east by the 42/29-6 well. The well encountered the Lower Lemman top reservoir slightly shallower than in the 42/29-6 well.

The well was drilled with OBM, resulting in a good hole condition. The 8-½” hole was logged with a Schlumberger DIT suite and the reservoir was cored from just below top reservoir to the top Carboniferous. Log correlation with the other wells on the field is excellent. However, core permeabilities in the aeolian intervals are significantly lower than that in the 42/29-6 or 42/29-7 wells; due primarily to authigenic clays, particularly illite. The controls and lateral distribution of this illitisation are unknown.

Gas shows were seen in the Lower Lemman Sandstone and Carboniferous sections and the logs clearly demonstrate that the upper part of the Lemman Sandstone is gas-bearing. Wireline formation pressure points were attempted and a drill-stem test performed at a rate of 3.8mmscf/d. This disappointing flow rate is believed to be mainly due to the presence of cemented fractures in the productive sandstone (the top reservoir location is near the tip line of a mapped fault). The illitisation of the reservoir at this location may also be a factor, although reservoir plugs still display air permeabilities of up to 1 Darcy. The well was suspended as a gas discovery.

42/29a-10:

The 42/29a-10 well was drilled by Dana in 41 days in May 2010. The well, drilled as a very slightly deviated appraisal well, intended to prove gas reserves in the north-west corner of the Monkwell structure. The main risk recognised pre-drill was depth uncertainty.

The well was drilled with WBM and logged using an LWD/MWD combination. Although good quality reservoir units were encountered, similar to that found in 42/29-6 well, the formations encountered were deeper than prognosed and water-bearing.

The well was plugged and abandoned in accordance with Oil & Gas UK Guidelines.

4. PROSPECTIVITY

No additional prospectivity is recognised on block 42/29a “Monkwell” outside of the Monkwell and Monkwell South West gas discoveries.

5. RESOURCES SUMMARY

Monkwell:

Pre-drill reserves for Monkwell were estimated at 41bcf (P50). First gas production was expected in Q1, 2012, with a plateau rate of 41mmscfd and a field life of 6 years.

Top Reservoir Depth mapping uncertainty remains high despite the addition of the 42/29a-10 well data point. It is apparent from the results from 42/29a-10 that the pre-drill depth conversion in the north-west area of Monkwell was in error, and that the depth structure is much flatter than interpreted. Consequently, the in-place volumes for the entire discovery are significantly reduced. More importantly, the distribution of the revised in-place gas volumes is over a much larger area, and likely to be in shallow relief traps. Several wells would be needed in a field development scenario to reach a commercial recovery threshold. In addition, the concept of a simple gas-water contact across Monkwell is considered unlikely; a stacked pay model with different free-water levels being more realistic. The lack of relief above the potential free-water level within any individual pay layer means that the chance of producing an interval without very rapidly coning water is very small.

The combination of low predicted reserves, with high residual depth map uncertainty, leads Dana and its partners to the conclusion that Monkwell is a sub-commercial accumulation.

Table 3: Monkwell Discovery Reserves Summary

Monkwell:	Discovery Area	P90	P50	P10	Risked P50	Units
	Monkwell North East	4.7	8.9	15.4	4.5	10 ⁶ bbls
	Monkwell South	5.6	10.4	16.8	5.2	10 ⁶ bbls
	Monkwell South East	3.0	5.4	8.8	2.7	10 ⁶ bbls
	Total	13.3	24.7	41.0	12.4	10⁶ bbls

Monkwell South West:

In-place estimates of gas for Monkwell Southwest range from 5.0 to 10.0bcf, with P50 reserves of 5.0bcf. There is no depth conversion scenario that allows for the calculation of a significantly larger in-place volume. The accumulation is not commercially viable, despite encouraging well test flow rates (23.8mmscf/d).

6. FIGURES

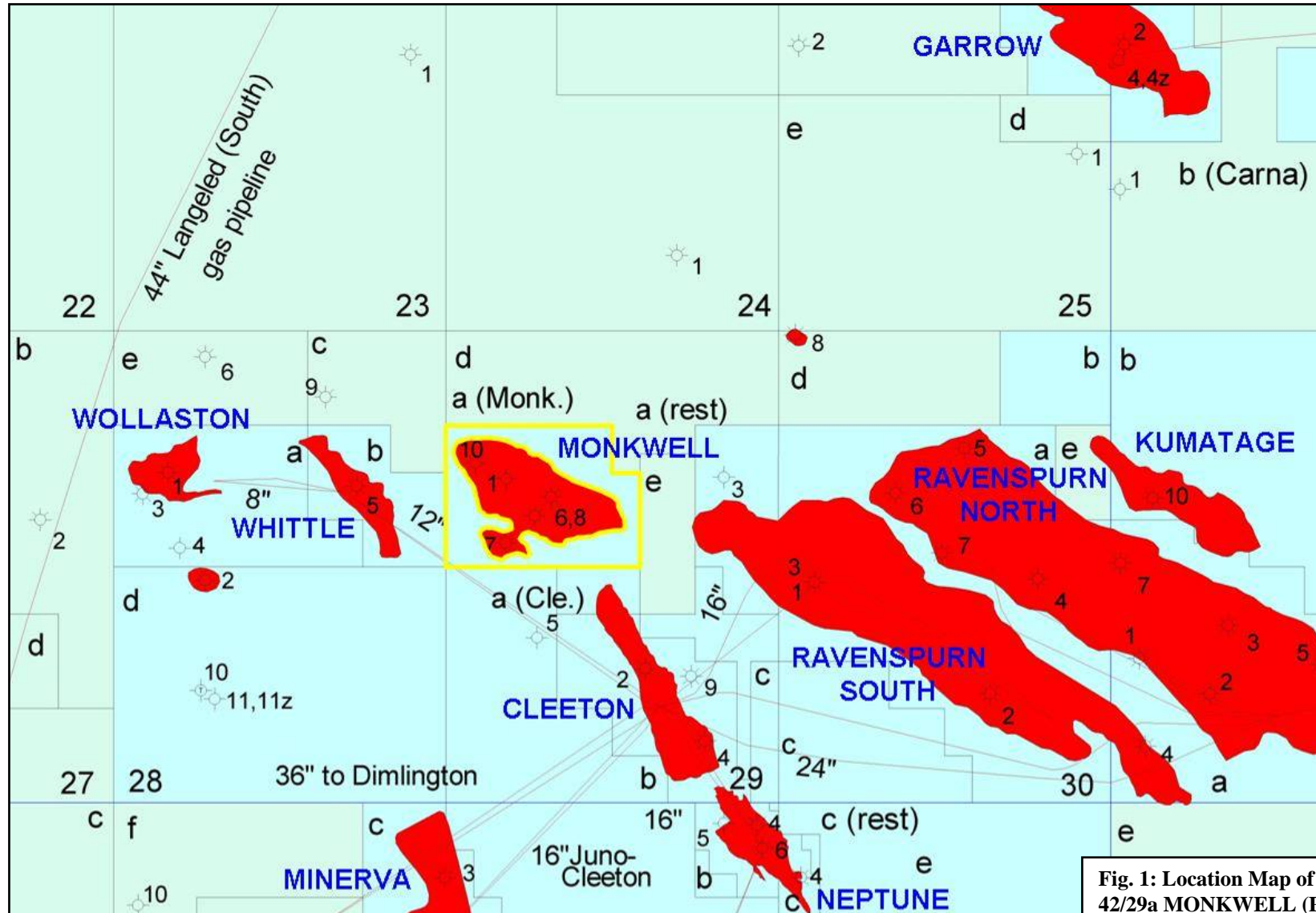


Fig. 1: Location Map of Block 42/29a MONKWELL (P.0001)

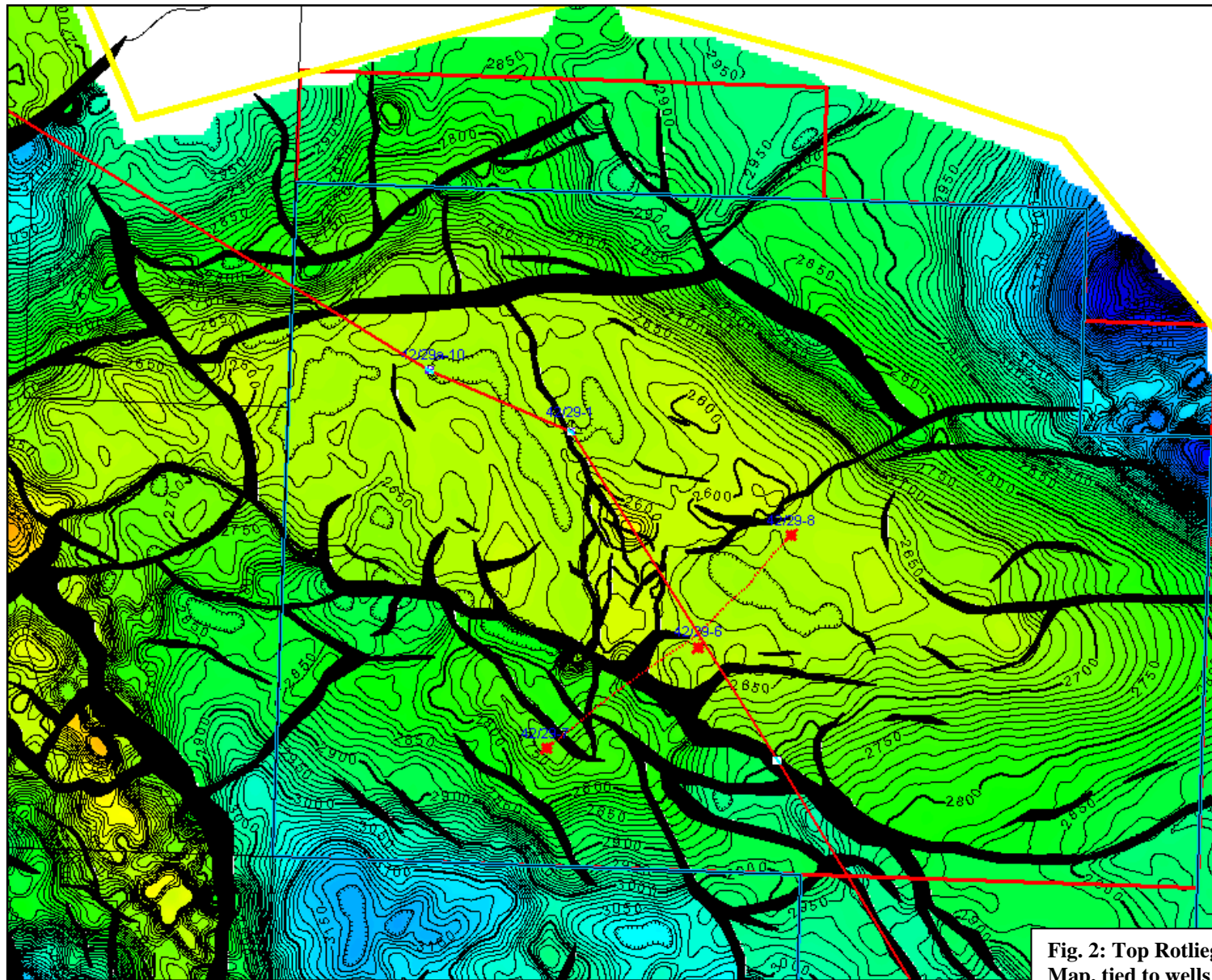
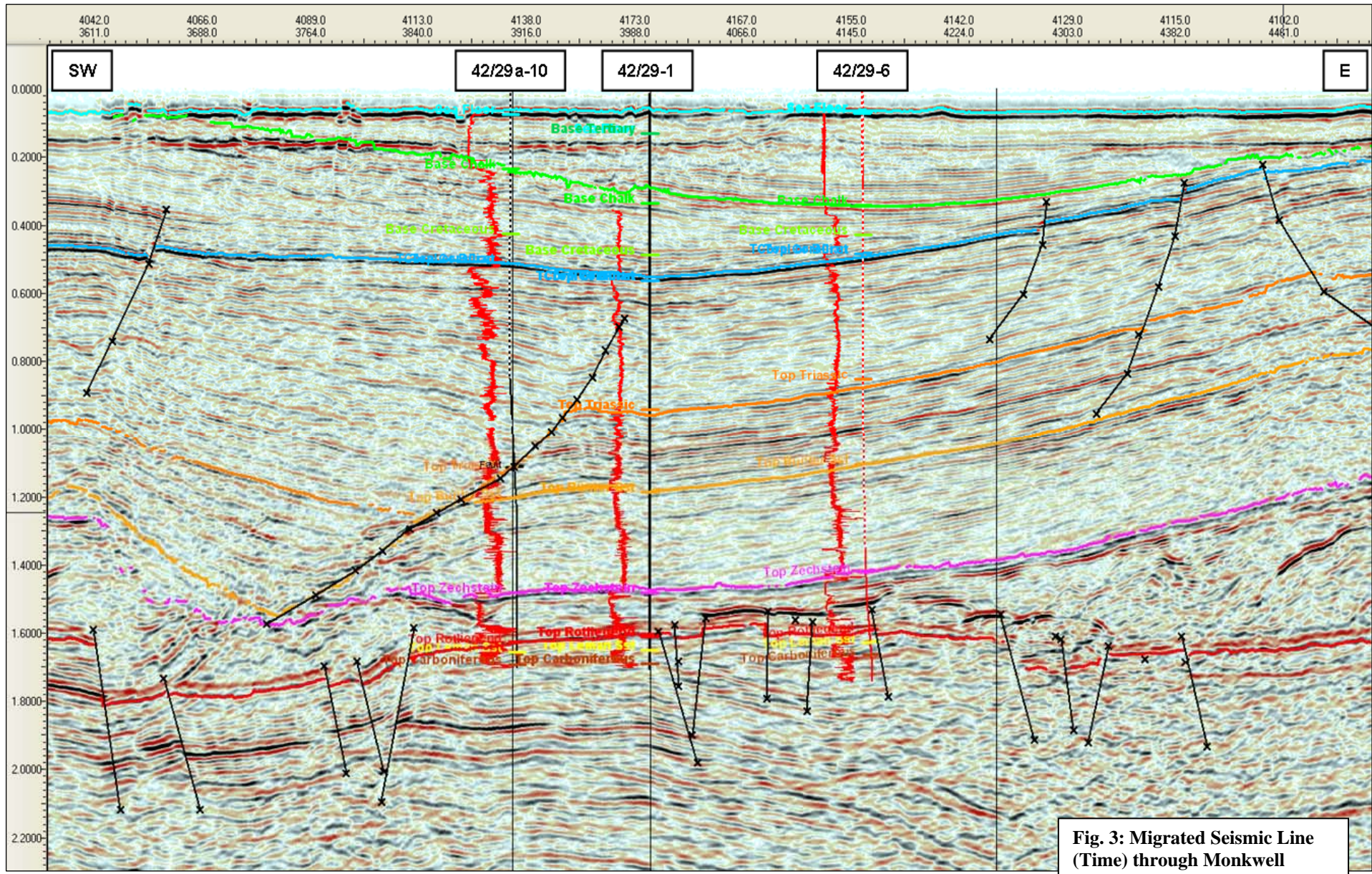


Fig. 2: Top Rotliegende Depth Map, tied to wells (CI: 20m)



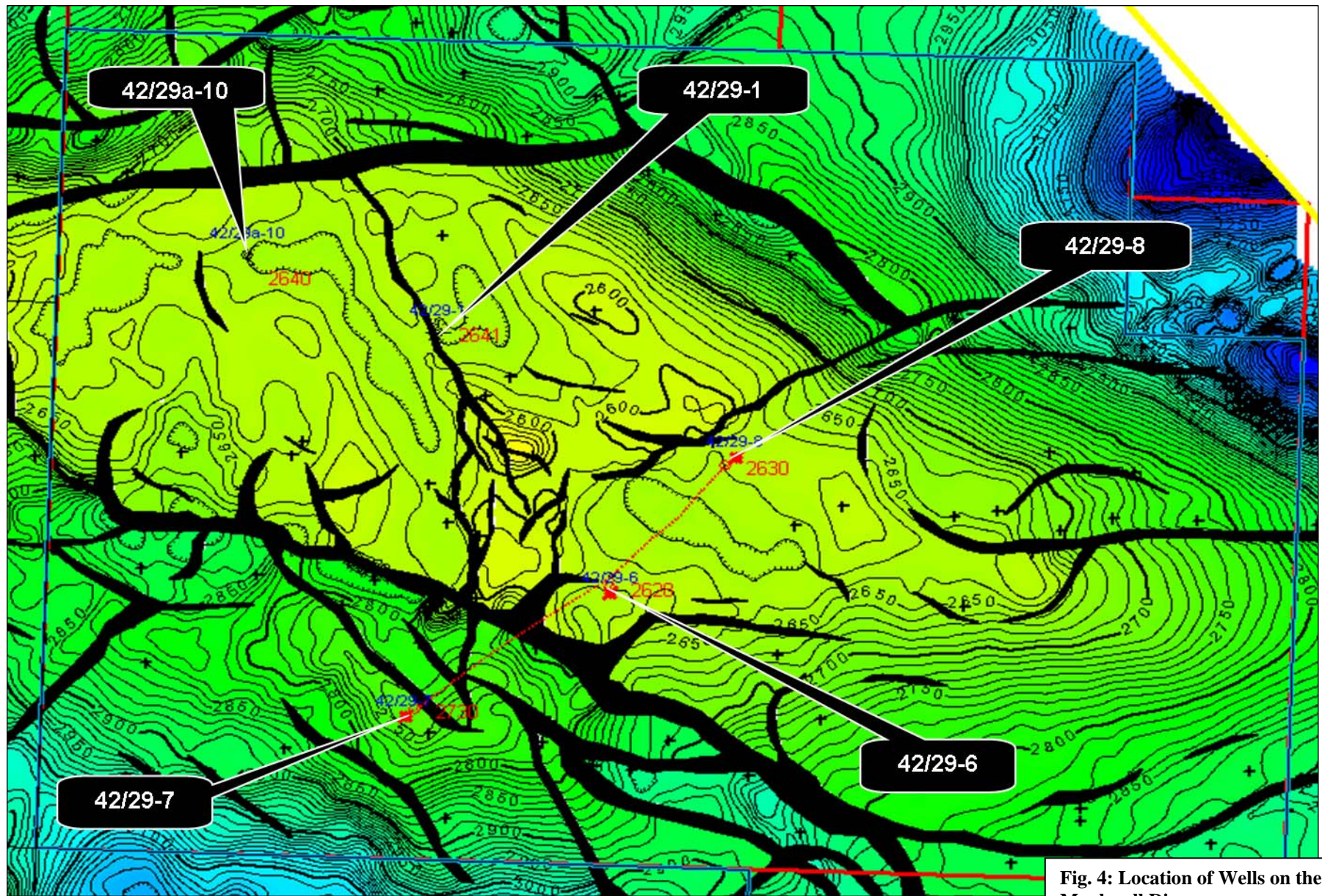


Fig. 4: Location of Wells on the Monkwell Discovery

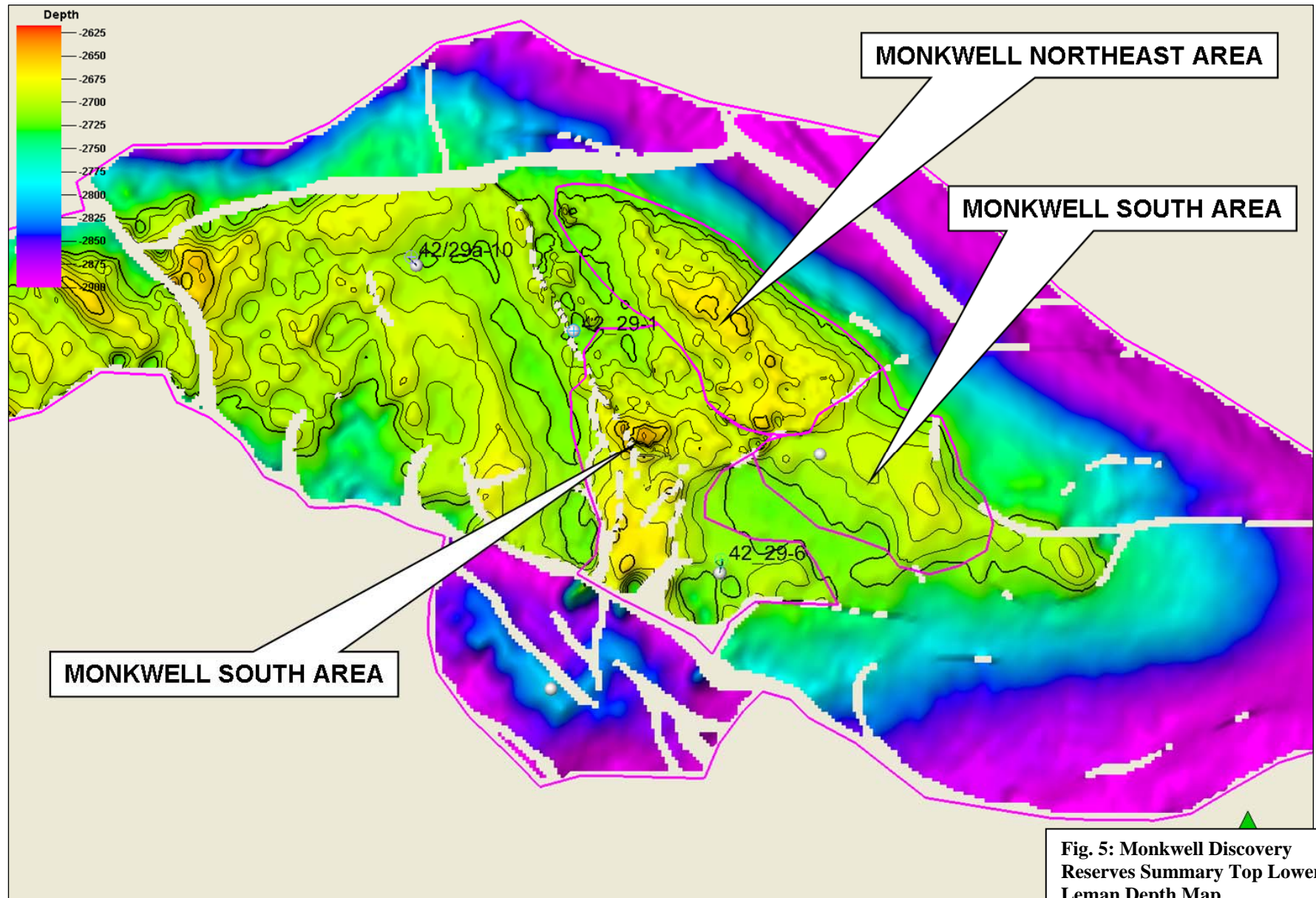


Fig. 5: Monkwell Discovery Reserves Summary Top Lower Leman Depth Map

7. CLEARANCE

Dana Petroleum (E&P) Limited confirms that the Department of Energy & Climate Change is free to publish the contents of this report.