Wellsite Geology Report- Sidewinder 2ST1

Contents

Well Data Summary

Well Name:	SIDEWINDER 2ST1
Operator:	Tag Oil (NZ) Limited
Rig Name:	Ensign-19
Rig Type:	Land Rig (w/ Tesco Top Drive System)
Drilling Contractor:	Ensign Australia
Drilling Datum:	Rotary Table
Rotary Table Elevation:	295.15m AMSL
Ground Level Elevation:	290.53m AMSL
NZMG mE:	2613982.7 mE
NZMG mN:	6221027.4 mN
Block No:	PEP 38748
Well Class:	Exploration
Mud Type:	KCl Polymer Glycol Water Based Mud
Well Status:	Complete and Test

Sidewinder 2ST1 was drilled to test seismically defined submarine fan sands near vertically below the Sidewinder 2 surface location. The kick-off was from 349m AHBRT. The target was the same SW2, SW1 and Intra Mt. Messenger Sands of Sidewinder 2.

Data Acquisition

Mudlogging

A Baker Hughes mudlogging unit and crew were present and operational for the plugging back off Sidewinder 2 and the kick-off of Sidewinder 2ST1 at 349m AHBRT. The mudlogging unit included a complete data acquisition/alarm/storage system to permit accurate depth, drill rate and lag calculation as well as safety monitor the well.

Systematic sampling and gas monitoring commenced immediately and continued to TD at 1597m AHBRT. Samples were described on the Formation Evaluation Log prepared on the Advantage™ computer system using standard lithology description abbreviations. A Geological Society of America colour chart with Munsell colour chips was also used for descriptions. A Canstrat supplied grainsize comparator card was used to define the Sandstone descriptions.

A Hewlett Packard 6890 Gas Chromatograph and Total Gas Detector was used in conjunction with the QGM gas-trap for all gas analyses. A factory calibrated Drager Polytron IR sensor was used for monitoring CO2 levels which was checked with 10% CO2 gas. Oil shows were observed using UV light box and oil cut determined using Isopropyl alcohol.

Cuttings Sampling
Two types of sieves were used for catching the samples – fine (90µm) and medium (2mm). Cuttings samples were cleaned of water based drilling fluid by washing with fresh water. The washed samples were air dried and packed in geochemical paper envelopes. Unwashed samples were packed in synthetic (HUBCO) bags.

The Sidewinder 2ST1 drilling program required the following cuttings samples to be collected; two sets of 200g washed samples (Sets A, B), two sets of 500g unwashed samples (Sets C, D), one set of unwashed biostratigraphic sample and 1 set of washed Samplex Trays (Set E). Samples were to be collected at 5m intervals from kick-off to TD.

Sample quality due to clays dispersing into the mud system (creating excessively high mud weights) and a poor design at the shale shakers limited the ability for the samples to be collected to the volumes required. The majority of samples collected were not to the weight required. It wasn't possible to facilitate modifications to the shale shakes which may allow better sample collection onsite.

The samples were air dried, packaged and distributed as follows:

Tag Oil:
1 set of Washed Cuttings samples (Set B)
1 set of Samplex Trays (Set F)

NZ MoED:
1 set of Washed Cuttings samples (Set A)
2 sets of Unwashed Cuttings samples (Set C and Set D)

GNS
1 set unwashed Biostratigraphic Samples (Set E)

Samples were caught as follows:
5m intervals from 349m to 1597m (TD)

MWD

Swick Dynamics were contracted by Tag Oil Ltd., to provide Directional and Measurement While Drilling (MWD) services, Gamma Ray only, with mud pulse telemetry for the drilling of Sidewinder 2ST1 well for 8.5" hole section from the kick-off point at 349m to 1597m AHBRT. Directional surveys were taken once per stand (2 joints) of drillpipe drilled. Depth tracking and drilling rate was maintained via a WITS data transfer from the rigs Pason drilling data acquisition system.

Wireline Logging

Schlumberger were contracted by Tag Oil Ltd., to provide formation evaluation logging of the well after TD at 1597m AHBRT had been achieved. The following logging suites were run.

TOOL STRING	INTERVAL m MDRT
PEX-HRLA-BHC-SP	1596.69m AHBRT – Surface
VSI	1584m – 21m AHBRT

Lithology Summary

Sidewinder 2ST1 intersected a Tertiary sedimentary section ranging in age from Recent to Middle Miocene. This section, consisting entirely of clastic sediments was deposited in an open marine environment and represents a generally regressive depositional regime.

Lithological Tops Summary

Lithological and target tops encountered while drilling Sidewinder 2ST1 are listed in the table below.

Formation (Unit)	TOP m AHBRT	TOP m TVDSS	Series	Stage
KOP	339	44	Late Pliocene	Nukumaruan-Mangapanian Wn-Wm
Matemateonga Fm	522	226.56	Late Pliocene – Late Miocene	Nukumaruan-KapiteanWn-Tk
Urenui Fm	710	414.50	Late Miocene	Tongoporutuan Tt
SW2 Sand	1125	829.40	Late–Mid Miocene	Tongoporutuan-Waiauan Tt-Sw
SW1 Sand	1163	867.39	Late-Mid Miocene	Tongoporutuan-Waiauan Tt-Sw
Intra Mount Messenger	1400	1104.34	Late-Mid Miocene	Tongoporutuan-Waiauan Tt-Sw
Total Depth	1597	1301.27	Mid Miocene	Waiauan Sw

Lithologies observed in Sidewinder 2ST1 are described below, using the intervals between each of these tops. All depths referred to are along hole below Rotary Table (AHBRT) and true vertical depth below mean sea level (TVDSS). Rotary Table elevation was 295.15m AMSL.

Lithological Descriptions Summary

339m -522m AHBRT (44m-226.56m TVDSS)
This interval, starting at the kick-off point for Sidewinder 2ST1 was the **Tangahoe Formation**, made up predominantly of Claystone with minor interbedded Sandstone.

CLAYSTONE: The Claystone was medium light grey to medium grey and medium dark grey to olive grey in colour. The cuttings were generally very soft to soft and occasionally firm. They were dispersive and had a sub-blocky to blocky form. The Claystone was non calcareous and graded to argillaceous The Claystone commonly graded to Siltstone towards the bottom of the formation.
SANDSTONE: The Sandstone was predominantly composed of loose transparent to translucent quartz grains. The grains were very fine lower to fine upper in size. The Sandstone was moderately sorted with a sub-angular to sub rounded shape. There were a trace amount of friable light grey aggregates in a non calcareous argillaceous matrix was observed the sample. Abundant amounts of black lithics, common

amounts of mica and trace calcareous fragments were observed. No oil shows were observed.

The rate of penetration for this interval was:

ROP m/hr		
Maximum	**Minimum**	**Average**
119.1	3.6	39.6

Background gas was 0.00-0.08% composed principally of C1 only, though rare short intervals did also yield C2 and even less frequently C3.

There were no significant gas peaks observed in this interval:

522m -710m AHBRT (236.56m-414.50m TVDSS)
This interval was the **Matemateonga Formation** with the formation top at 522m AHBRT. This formation was composed of thickly interbedded Sandstone and Claystone.

CLAYSTONE: The Claystone ranged in colours from predominantly dark greenish grey to dark greenish grey, occasionally medium dark grey and olive grey, light grey to medium light grey occasionally medium bluish grey in colour. The cuttings were generally very soft to soft and dispersive in parts. They exhibited an amorphous to sub-blocky in form. The Claystone was non calcareous and graded to Siltstone towards in places.
SANDSTONE: The Sandstone was predominantly composed of loose transparent to translucent quartz grains. The grain sizes ranged between fine lower to fine upper, occasionally traces of coarse upper were also seen in the Formation. The Sandstone was moderately to very well sorted with grains that had an sub angular to sub round shape. The grains were also sub spherical to spherical. There was a trace amount of friable light grey aggregates in a non calcareous argillaceous matrix. Abundant amounts of black lithics and mica flakes were observed as accessories. There was a poor visual porosity in the aggregates. No oil shows were observed.

The rate of penetration for this interval was:

ROP m/hr		
Maximum	**Minimum**	**Average**
83.1	2	41.6

Background gas was 0.01-0.08% composed of C1 only.

There were no significant gas peaks observed in this interval.

710m -1125m AHBRT (414.50m-829.40m TVDSS)
710m AHBRT was the top of the **Urenui Formation** which was predominantly Claystone, which graded slightly to Siltstone in places. Minor Sandstone channel interbeds were present at the bottom of this interval, as the formation transitioned to the top of the **Mt. Messenger Formation**.

CLAYSTONE: The colour of the Claystone ranged from medium grey to medium dark grey and greenish grey to dark greenish grey and light grey in parts. The cuttings were predominantly very soft to soft, occasionally firm. It exhibited an amorphous to a sub-blocky form. The Claystone was non calcareous. The accessories included were minor carbonaceous specks, trace mica flakes and rare pyrite. The Claystone graded to Siltstone in places.
SANDSTONE: The Sandstone was composed of predominantly loose, transparent to translucent quartz grains. The grain size ranged from fine lower to fine upper, occasionally from fine lower to medium lower, and occasionally very coarse lower. The grains were poorly to moderately sorted, with a predominantly angular to sub-rounded form. There were trace amounts of very light grey to medium grey aggregates in an argillaceous matrix. The accessories included common to abundant grey lithics, common amounts of pyrite and traces of nodular pyrite. There was poor visual porosity. No oil shows were observed.

The rate of penetration for this interval was:

ROP m/hr		
Maximum	**Minimum**	**Average**
98.4	6	41.8

Background gas was 0.03-0.14% continued to be composed of C1 only, as in the previous interval till 753m AHBRT. Below this depth, C2 was also always present. Other gas components C3-nC5 were also intermittently present. Below 1122m AHBRT, the full detectable suite C1-nC5 were continuously present for the remained of this interval.

There were no significant gas peaks observed in this interval:

1125m–1163m AHBRT (829.40-867.39m TVDSS)
1125m AHBRT represented the top of the **SW2 Sandstone** of the **Mt. Messenger Formation**, a primary target for Sidewinder 2ST1. An encouraging sequence of Sandstone/Siltstone/Claystone interbeds where encountered in the cuttings samples from the top through to 1140m AHBRT. Below this depth, the interval was a dominantly a Claystone/Siltstone interbeded section till the next **SW1 Sandstone** member of the **Mt. Messenger Formation** started.

CLAYSTONE: The colour of the Claystone was medium grey to medium dark grey, greenish grey to dark greenish grey and olive grey in parts. The cuttings were predominantly very soft to soft, occasionally dispersive. They exhibited an amorphous to sub blocky form with a speckled texture. The Claystone was non calcareous. The accessories included were common amounts of carbonaceous specks, and traces of mica flakes. The Claystone graded to Siltstone.
SILTSTONE: The Siltstone was medium grey to medium bluish grey and greenish grey in parts. It was soft to firm and exhibited a speckled texture. The cuttings were amorphous to sub-blocky and were non calcareous. It graded to into very fine Sandstone in places.
SANDSTONE: The colour of the Sandstone was mottled off white to very light grey and brownish grey. It was composed of predominantly loose, transparent to translucent quartz grains. The grains were very fine lower in size, well sorted,

exhibiting a predominantly angular to sub-rounded form. The aggregates had a weak calcareous argillaceous matrix. The accessories included abundant amounts of black lithics. The porosity was poor and the sandstone graded to siltstone. Oil shows were observed, as described in the Hydrocarbon Show Summary.

The rate of penetration for this interval was:

ROP m/hr		
Maximum	**Minimum**	**Average**
37	13	25.4

Background gas was 0.12-0.29% with the full suite of detectable gases present, C1-nC5.

The significant gas peaks observed in this interval:

LAG DEPTH	TOT GAS / BGRND		C1	C2	C3	IC4	NC4	IC5	NC5	TYPE	MW
(m)	(%)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)		(ppg)
1129.5	1.84	0.20	10424	754	322	77	113	48	38	FMG	9.1
1138	14.02	0.20	34958	2401	1022	251	360	157	126	FMG	9.1

1163m-1400m AHBRT (867.39m-1104.34m TVDSS)
1163m AHBRT represented the top of the **SW1 Sandstone** of the **Mt. Messenger Formation**, a primary target for Sidewinder 2ST1. A thick sequence of Sandstone/Siltstone/Claystone interbeds was encountered in the cuttings samples and MWD GR through to 1995m AHBRT. Below this depth, a massive Claystone section dominated though to near top of the next interval and the **Intra Mt. Messenger Sandstone** member of the Mt**. Messenger Formation**. The cuttings samples and MWD GR from 1368m to 1400m AHBRT indicated a further interbedded Sandstone/Siltstone/Claystone zone.

CLAYSTONE: The Claystone was medium grey to medium dark grey, greenish grey to dark greenish grey in colour. The cuttings were predominantly dispersive to very soft and sticky. The Claystone exhibited an amorphous form and was non calcareous to slightly calcareous in nature.
SILTSTONE: The Siltstone was medium grey to medium bluish grey and greenish grey in parts. It was soft to firm and exhibited a speckled texture. The cuttings were amorphous to sub-blocky and were non calcareous. It graded to into very fine Sandstone in places. There were patchy shows, as describe in the Hydrocarbon Show Summary.
SANDSTONE: The colour of the Sandstone was mottled off white to very light grey and brownish grey. It was composed of predominantly loose, transparent to translucent quartz grains. The grains were very fine lower in size, well sorted, exhibiting a predominantly angular to sub-rounded form. The aggregates had a weak calcareous argillaceous matrix. The accessories included abundant amounts of black lithics. The porosity was poor and the sandstone graded to Siltstone. No oil shows were observed.

The rate of penetration for this interval was:

ROP m/hr		
Maximum	**Minimum**	**Average**
40.5	7.2	20.8

Background gas was 0.10-0.39% with the full suite of detectable gases present, C1-nC5 through the target SW1 Sand section. The gas composition and quantity slowly dropped so below 1270m AHBRT, the constituents higher than C1 while commonly present, are generally erratic.

The significant gas peaks observed in this interval:

LAG DEPTH	TOT GAS / BGRND		C1	C2	C3	IC4	NC4	IC5	NC5	TYPE	MW
(m)	(%)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)		(ppg)
1168.75	1.40	0.30	127084	7614	3268	760	1067	438	330	FMG	9.1
1176	11.34	0.30	104779	7100	2469	573	805	352	272	FMG	9.1
1179.5	13.09	0.30	112496	7100	3198	765	1118	476	410	FMG	9.1
1183.5	18.00	1.00	137205	11581	6469	1843	2815	1379	1183	FMG	9.1
1299.25	0.47	0.20	3779	4	2	6	0	3	1	FMG	9.1
13195	0.31	0.20	2519	25	12	1	1	-	-	FMG	9.1
1332	0.44	0.20	3875	84	50	1	5	1	1	FMG	9.1
1382.25	0.93	0.20	9291	191	13	1	2	1	1	FMG	9.1
1385.25	0.70	0.30	6941	75	4	0	1	-	-	FMG	9.1
1388.75	1.23	0.30	11871	295	40	3	8	2	2	FMG	9.1

1400m-1597m (TD) AHBRT (1104.34m-1301.27m TVDSS)

1400m AHBRT represented the top of the **Intra Mt. Messenger Sandstone** of the **Mt. Messenger Formation**, a primary target for Sidewinder 2ST1. This interval was in fact topped with a massive Claystone, but a very significant Sandstone/Siltstone interbed was encountered between 1495m to 1519m AHBRT. A further minor interbed was seen between 1545m and 1556m AHBRT.

CLAYSTONE: The Claystone was medium grey to medium dark grey, greenish grey to dark greenish grey in colour. The cuttings were predominantly dispersive to very soft and sticky. The Claystone exhibited an amorphous form and was non calcareous to slightly calcareous in nature.

SILTSTONE: The Siltstone was medium grey to olive grey and greenish grey in parts. It was soft to firm and exhibited a speckled texture. The cuttings were amorphous to sub-blocky and were non calcareous. It graded to into very fine Sandstone in places. There were patchy shows as described in the Hydrocarbon Shows Summary.

SANDSTONE: The colour of the Sandstone was mottled off white to very light grey and brownish grey. It was composed of predominantly loose, transparent to translucent quartz grains. The grains were very fine lower in size, well sorted, exhibiting a predominantly angular to sub-rounded form. The aggregates had a weak calcareous argillaceous matrix. The accessories included abundant amounts of black lithics. The porosity was poor and the sandstone graded to Siltstone. There were free

shows, presumed to have been zoned with the loose Sand grains. This oil show is described in the Hydrocarbon Show Summary.

The rate of penetration for this interval was:

ROP m/hr		
Maximum	**Minimum**	**Average**
34.6	7	20.3

Background gas was 0.13-0.22% with gases generally covering the full detectable suite, though occasionally with iC4 at level below the instruments measurable range.

The significant gas peaks observed in this interval:

LAG DEPTH	TOT GAS / BGRND		C1	C2	C3	IC4	NC4	IC5	NC5	TYPE	MW
(m)	(%)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)		(ppg)
1408	0.83	0.20	8242	56	14	1	2	-	-	FMG	9.1
1495	1.20	0.50	11365	159	69	2	8	1	1	FMG	9.1
1513	1.09	0.50	11082	76	17	1	3	0	1	FMG	9.1
1554	2.09	0.40	16823	814	431	61	108	15	27	FMG	9.2
1581.75	0.56	0.30	4868	128	56	10	15	4	7	FMG	9.2
1587	1.11	0.30	3050	117	20	52	10	23	5	FMG	9.2
1595.75	0.94	0.30	9493	242	32	5	10	3	6	FMG	9.2
1597	0.89	0.30	8262	147	59	11	20	7	8	FMG	9.2

Hydrocarbon shows

Trace to fair oil shows at 1128m-1145m AHBRT: Direct oil fluorescence was observed in the Siltstone cuttings. This was described as a 5 to 15% scattered to pin point bright yellow direct fluorescence. It exhibited a slow blooming bright bluish white cut fluorescence. It was clear in natural light. There was a faint to moderate hydrocarbon odour from the cuttings and at the shale shakers.
Excellent oil shows at 1165m-1184m AHBRT: Direct oil fluorescence was observed in the Siltstone cuttings. This was described as a 60-80% uniform to scattered bright yellowish green direct fluorescence. It exhibited a moderately fast streaming to blooming bright bluish white cut fluorescence. It was clear in natural light. It gave a moderate strong hydrocarbon odour. A petroliferous odour was also detected at the shale shakers.
Trace to good oil shows at 1184m-1205m AHBRT: Direct oil fluorescence was observed in the Siltstone cuttings. This was described as a trace to 30% scattered bright yellowish green direct fluorescence. It exhibited a moderate fast streaming to blooming bright bluish white cut fluorescence. It was clear in natural light. There was a faint to moderate hydrocarbon odour from the cuttings and at the shale shakers.
Trace to poor oil shows at 1365m-1400m AHBRT: Direct oil fluorescence was observed in the Siltstone cuttings. This was described as a trace to 5% scattered to pin point bright yellowish green direct fluorescence. It exhibited a very slow crush blooming white cut fluorescence. There was a faint bluish white residual ring which was clear in natural light. There was a faint to moderate hydrocarbon odour.

Trace to fair oil shows at 1490m-1520m AHBRT: Direct oil fluorescence was observed in the Siltstone and Sandstone cuttings. This was described as a 5 to 10% uniform intense bright yellow direct fluorescence. It exhibited a fast streaming bluish white cut fluorescence. There was a bright yellowish gold residual ring which was clear in natural light. There was a moderate hydrocarbon odour. There was free oil on the sample. A petroliferous odour was detected at the shale shakers.
Trace to poor oil shows at 1555m-1560m AHBRT: Direct oil fluorescence was observed in the Siltstone cuttings. This was described as a trace to 5% scattered to pin point dull yellowish green direct fluorescence. It exhibited a very slow crush cut fluorescence. There was a faint pale white residual ring which was clear in natural light. There was a faint to moderate hydrocarbon odour. There was free oil on the sample.

Conclusions/Learnings

Sidewinder 2ST1 encountered good commercially potential reservoir sands with all the targeted Mt. Messenger Sand members. The well was completed and later production tested.

For future drilling work, the set up of the shale shakers could be reviewed prior to the beginning of the drilling program, to optimise the capacity of the shale shakers for collecting cuttings samples.

3.2 Sample Manifest

Company: TAG OIL
Well: Sidewinder 2 ST1
Date: 26/6/2011
From: Ensign 19
Location: Sidewinder Field, Upper Durham Road, Taranaki

SAMPLE TYPE	**No. Of Sets**	**COMPOSITION**			**PACKING DETAILS & NOTES**
		Sample Box No.	**Depth Interval (m)**		
			From	**To**	
Set C & D: 500g Unwashed Bagged in Hubco Bags	2	1 2 3 4 5 6 7 8 9 10 11	349m 500m 585m 680m 810m 1050m 1125m 1200m 1275m 1375m 1470m	500m 585m 680m 810m 1050m 1125m 1200m 1275m 1375m 1470m 1597m	**Please note- samples underweight due to lack of cuttings at shakers, particularly when sliding**
Set E: 500g Biostratigraphy Bagged in Hubco Bags	1	1 2 3 4 5 6 7 8 9 10 11	349m 500m 585m 680m 810m 1050m 1125m 1200m 1275m 1375m 1470m	500m 585m 680m 810m 1050m 1125m 1200m 1275m 1375m 1470m 1597m	**Please note- samples underweight due to lack of cuttings at shakers, particularly when sliding**
Set A &B: 100g Washed / Dried Set In Paper envelopes	2	1 2 3 4 5 6 7 8	349 540 690 920 1090 1210 1320 1460	540 690 920 1090 1210 1320 1460 1597	
Set F: Samplex trays in wooden box	1	1	270m	1425m	

Distribution:
Sets A, C, D to:
MoED Core Stores,
31-41 Birdwood Street,
Featherston, New Zealand

Sets B, E, F to:
Tag Oil, Oil Field & Engineering