



Rockhopper-1

FINAL WELL REPORT

Prepared by



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1.0 WELL DATA SUMMARY

Operator : Origin Energy Resources Ltd
 Well name : Rockhopper-1
 Basin : Bass
 Permit : T / 18P
 Operator : Origin Energy Resources Ltd
 Surface location : Latitude: 39° 47' 34.1828" S
 : Longitude: 145° 26' 21.4660" E

Bottom Hole Location : 907.5m North of Surface Location
 : 30.5m West of Surface Location

Total depth : 3522.0 mMDRT

Rotary Table Elevation. : 26 m above MSL
 Sea-water depth : 76 m
 Rig Arrived : 01:00 hr 29 November, 2009
 Spud Well : 23:30 hr 30 November, 2009
 Bit Reached TD : 19:00 hr 27 December, 2009
 Well Status : Plugged and Abandoned

Rig name : Kan Tan IV (semi-sub)
 Drilling Contractor : Maersk

Drilling Phases

Diameter (inch)	From (m)	To (m)	Mud Type
914(36")	76.0	158.0	Seawater / Bentonite sweeps
445(17½")	158.0	956.0	Seawater / Bentonite sweeps
31(12¼")	956.0	1972.0	KCl / Polymer
216(8½")	1972.0	3522.0	KCl / Polymer

Cased Hole

Casing Diameter (inch)	Casing Type	Shoe Depth (m)
762(30")	Conductor	157.0 MDRT
340(13¾")	Surface	961.0 MDRT
244(9⅝")	Intermediate	1965.0MDRT

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2.0 GENERAL INFORMATION

The proposed Rockhopper-1 exploration well is located in T/18P in the Bass Basin. The location is approximately 0.8km NE from Aroo-1 and 9.5km north from Trefoil-1. The nearest population bases are Melbourne (223km NNW) and Port Latta (117km to the south). The Yolla A platform is 34km ESE from the proposed Rockhopper-1 well location. Rockhopper-1 will test the crest of the Rockhopper-1 prospect. It is designed as a deviated well in the 8.5in hole section, drilled directionally parallel to the bounding fault in order to intersect all possible reservoirs that lie within the mapped closure in a near crestal position. The top of the primary target sands within the *lower L. balmei* are mapped as the P3 seismic marker or age equivalent to the Yolla Field top 2973 sand.

2.1 Geoservices Personnel

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ALS Engineers : Dmitriy Ilyin
: Gopesh Gopi
: Leigh Sack
: Lawrence Hannon

Mudloggers : Klaudyna Brzozowska
: Paul Currie
: Anthony Raimondo

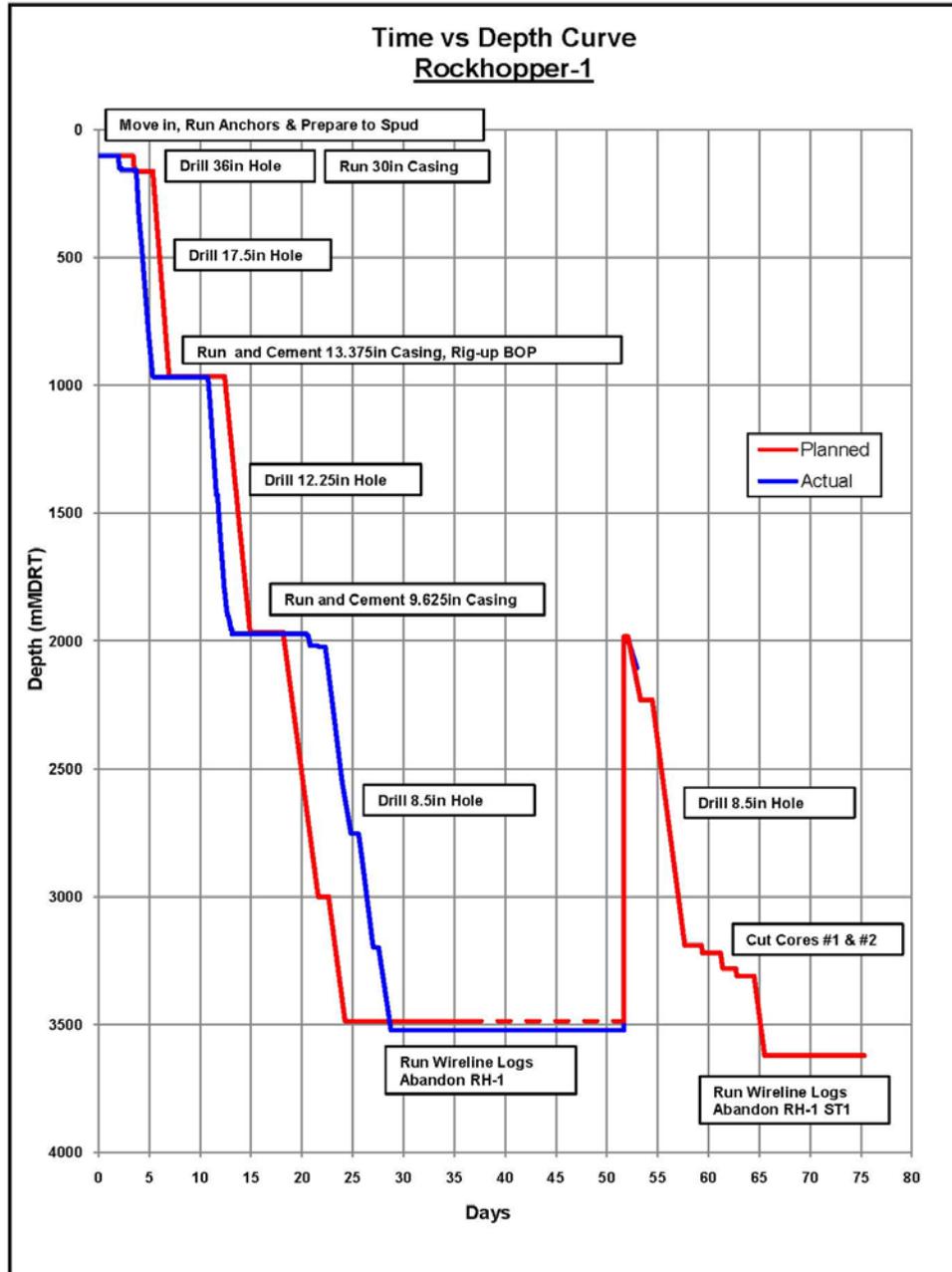
Sample Catchers : Eugene Miro
: Anthony Raimondo
: Aaron Heugh

2.2 Contractor Information

Drilling : Maersk Drilling Property
Rig name : Kan Tan 4
Rig type : Semi-submersible
Mud logging : Geoservices Australasia
Mud engineering : Halliburton -Baroid
MWD : Halliburton- Sperry Sun
Wireline logging : Schlumberger Wireline
Cementing : Halliburton Cementing
Well head completion : Dril-Quip
ROV : Fugro
Casing : Premium Casing Services
Helicopters : Bristows

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2.3 Days vs. Depth Progress Chart



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2.4 Sample Collection Summary

Sample Type	Number of sets	Quantity per set	Sampling interval	From (m)	To (m)
Unwashed	1	500 grams	10 meters	940.0	1700.0
Washed and Dried	1	300 grams	5 meters	1700.0	2050.0
Samplex Trays	2		3-6 meters	940.0	3522.0

Cuttings Distribution

Company	Unwashed and Dried Samples
Origin Australia	1

Company	Washed and Dried Samples
Origin Australia	1
Mineral Resources Tasmania	1
Geoscience Australia	1

Company	Set of Samplex Trays
Origin Australia	2

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3.0 GEOLOGICAL INFORMATION

3.1 Lithological Summary

All returns to the seabed prior to 966.0 mMDRT. Drilled 12¼" hole with a Riser from 966.0 mMDRT. Drilled 8½" hole from 1972.0 mMDRT.

INTERVAL: 102.0 to 390.0 mMDRT
ROP (Range): 11 to 85 m/h
Av. ROP: 48 m/h

No samples recovered returns at to sea through ported conductor

INTERVAL: 390.0 to 795.0 mMDRT
ROP (Range): 4 to 144 m/h
Av. ROP: 74 m/h

No samples recovered returns at to sea through ported conductor. Below 630m a notable increase in average ROP is observed after increasing the WOB.

INTERVAL: 795.0 to 965.0 mMDRT
ROP (Range): 3 to 80 m/h
Av. ROP: 42 m/h

No samples recovered returns to sea through ported conductor. Below 812m a notable decrease in average ROP is observed after decreasing the RPM.

INTERVAL: 965.0 to 1060.0 mMDRT
ROP (Range): 7 to 104 m/h
Av. ROP: 25 m/h

CALCILUTITE and interbedded CALCAREOUS CLAYSTONE

CALCILUTITE (80-95%): medium grey to medium dark grey, very soft to soft, blocky to sub-blocky, occasional

minor very fine sand, trace to minor corals, trace skeletal fragments, trace very fine grained pyrite.

CALCAREOUS CLAYSTONE (5-20%): medium bluish grey, very soft to soft, blocky to sub-blocky, 20-30% calcareous clay.

Show Details: No Hydrocarbon Shows

INTERVAL: 1060.0 to 1141.0 mMDRT
ROP (Range): 9 to 137 m/h
Av. ROP: 70 m/h

Interbedded CALCILUTITE, CALCAREOUS CLAYSTONE, CLAYSTONE and CALCAREOUS SILTSTONE

CALCILUTITE (15-100%): medium grey to medium dark grey and pale yellowish brown, very soft to soft, blocky to

sub-blocky, trace skeletal fragments, trace very fine grained pyrite.

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CALCAREOUS CLAYSTONE (0-20%): medium bluish grey to dark grey and dark greenish grey, very soft to soft,

blocky to sub-blocky, 20-30% calcareous clay.

CLAYSTONE (0-5%): medium bluish grey to dark greenish grey, very soft to friable, blocky to sub-blocky, 10% calcareous clay.

CALCAREOUS SILTSTONE (0-85%): dark grey to dark greenish grey, soft to friable, blocky to fissile, 20% calcareous clay.

Show Details: No Hydrocarbon Shows

INTERVAL: 1141.0 to 1295.0 mMDRT

ROP (Range): 16 to 115 m/h

Av. ROP: 65 m/h

CALCAREOUS SILTSTONE with minor CALCILUTITE and occasional SILTSTONE Interbeds

CALCAREOUS SILTSTONE (80-100%): dark grey to dark greenish grey, soft to friable, blocky to fissile, 30% calcareous clay.

CALCILUTITE (0-15%): medium grey to pale yellowish brown, very soft to soft, blocky, rare very fine grained pyrite.

SILTSTONE (0-5%): dark grey to dark greenish grey, soft to friable, blocky to fissile, 20% calcareous clay.

Show Details: No Hydrocarbon Shows

INTERVAL: 1295.0 to 1539.0 mMDRT

ROP (Range): 8 to 124 m/h

Av. ROP: 66 m/h

CALCAREOUS SILTSTONE interbedded with SILTSTONE and occasional CLAYSTONE
 CALCAREOUS SILTSTONE (0-100%): very light grey, medium light grey, medium dark grey, olive grey and dark

greenish grey in part, 20-30% calcareous clay, trace carbonaceous specks, trace to 3% glauconite grains, trace lithic fragments, trace shell fragments and forams, trace very fine grained pyrite.

SILTSTONE (0-100%): medium light grey to dark grey, olive grey and greenish grey in parts, soft to firm, friable in

part, blocky to subblocky, 0-10% calcareous clay, 0-15% clay, 0-5% very fine quartz grains, trace carbonaceous

material, trace glauconite grains, trace lithic fragments, trace mica flakes, trace corals, grading more arenaceous

with depth.

CLAYSTONE (0-10%): medium dark grey, soft to firm, blocky to subblocky, 10% calcareous clay, trace mica flakes, trace lithic fragments.

Show Details: No Hydrocarbon Shows

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INTERVAL: 1539.0 to 1587.0 mMDRT
ROP (Range): 6 to 170 m/h
Av. ROP: 66 m/h

CALCAREOUS SILTSTONE interbedded with occasional CALCILUTITE and SILTSTONE

CALCAREOUS SILTSTONE (85-100%): medium light grey to medium dark grey, olive grey in part, soft, sub-blocky, 20% calcareous clay, trace carbonaceous specks, trace lithic fragments and foraminifera.

CALCILUTITE (0-10%): light grey to medium light grey, very soft to soft, blocky to sub-blocky, 10% clay.

SILTSTONE (0-5%): olive grey to dark greenish grey, friable, sub-blocky.

Show Details: No Hydrocarbon Shows

INTERVAL: 1587.0 to 1735.0 mMDRT
ROP (Range): 10 to 143 m/h
Av. ROP: 75 m/h

CALCAREOUS SILTSTONE interbedded with occasional CALCILUTITE and SILTSTONE

CALCAREOUS SILTSTONE (85-100%): medium light grey to medium dark grey, olive grey in part, soft, sub-blocky, 20% calcareous clay, trace carbonaceous specks, trace lithic fragments and foraminifera.

CALCILUTITE (0-10%): light grey to medium light grey, very soft to soft, blocky to sub-blocky, 10% clay.

SILTSTONE (0-5%): olive grey to dark greenish grey, friable, sub-blocky.

Show Details: No Hydrocarbon Shows

INTERVAL: 1735.0 to 1825.0mMDRT
ROP (Range): 7 to 72 m/h
Av. ROP: 40 m/h

ARGILLACEOUS SILSTONE, thin interbeds of CALCAREOUS SILTSTONE

ARGILLACEOUS SILTSTONE (80-95%): brownish grey, soft, subblocky to blocky, 5% calcareous clay, 20% clay, trace lithic fragments, trace carbonaceous specks, trace glauconite grains, trace very fine grained pyrite.

CALCAREOUS SILTSTONE (5-20%): white, yellowish grey, brownish grey, trace greenish black, very soft to firm,

subblocky to subfissile, 20% calcareous clay, 10% clay, traces reworked crystalline

CALCILUTITE.

Show Details: No Hydrocarbon Shows

INTERVAL: 1785.0 to 1946.0 mMDRT
ROP (Range): 4 to 104 m/h
Av. ROP: 54 m/h

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ARGILLACEOUS SILTSTONE, minor interbeds of CALCAREOUS SILTSTONE and CALCILUTITE at top of section, minor interbeds of SILTSTONE at bottom of section.

ARGILLACEOUS SILTSTONE (0-100%): brownish black, dark greenish grey, very soft to soft, subblocky to blocky, 20% clay, 10-23% calcareous clay, 2-5% very fine quartz grains, trace lithic fragments, trace carbonaceous specks, trace micas, trace forams, trace feldspar, traces calcite crystals, grains sometimes show fine laminations.

CALCAREOUS SILTSTONE (0-25%): yellowish grey, brownish grey, greenish black, very soft to soft, subblocky to subfissile, 20% calcareous clay, 10% clay.

CALCILUTITE (0-5%): brownish grey, soft to firm, blocky to subblocky, in part crystalline, traces calcite crystals.

SILTSTONE (0-100%): brownish black, dark greenish grey, greenish grey, very soft to soft, subblocky to blocky, 15% clay, 5% calcareous clay, 5% very fine quartz grains, trace micas, trace very fine grained pyrite.

Show Details: No Hydrocarbon Shows

INTERVAL: 1946.0 to 2064.0 mMDRT
ROP (Range): 3 to 165 m/h
Av. ROP: 18 m/h

ARGILLACEOUS SILTSTONE

ARGILLACEOUS SILTSTONE (100%): brownish black, dark greenish grey to greenish black, very soft to soft, sub-blocky to blocky, 5% calcareous clay, 20% clay, 5% very fine quartz grains, trace micas, trace carbonaceous specks.

Show Details: No Hydrocarbon Shows

INTERVAL: 2064.0 to 2116.0 mMDRT
ROP (Range): 6 to 54 m/h
Av. ROP: 25 m/h

SANDSTONE interbedded with CLAYSTONE and occasional LIMESTONE

SANDSTONE (80%): clear, light grey, opaque, trace yellowish grey, loose quartz, 10% very fine, 10% fine, 20% medium, 30% coarse, 20% very coarse, 10% granular, angular (shattered) to sub-rounded, poorly sorted, sub spherical to sub-elongate, inferred fair visual porosity.

CLAYSTONE (10%): olive grey, brownish grey, soft to firm, sub-blocky, trace glauconitic.

LIMESTONE (20%): olive grey, mottled, friable to very hard, subblocky to subfissile, 15% clay, trace carbonaceous material.

Show Details: No Hydrocarbon Shows

INTERVAL: 2116.0 to 2160.0 mMDRT
ROP (Range): 7.5 to 56 m/h
Av. ROP: 24 m/h

ARGILLACEOUS SILTSTONE interbedded with occasional SANDSTONE and CLAYSTONE.

ARGILLACEOUS SILTSTONE (80%): brownish black, soft to firm, sub-blocky to finely interbedded, trace carbonaceous specks, trace mica.

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SANDSTONE (90%): clear, light grey, translucent, 10% fine, 40% medium, 40% coarse, 10% very coarse loose quartz grains, 10% clay matrix, sub-rounded to sub-angular (shattered), poorly sorted, sub-spherical to spherical, trace lithics fragments, good inferred visual porosity.

CLAYSTONE (60%): medium grey, greenish grey, very soft to soft, amorphous to sub-blocky, trace glauconitic, carbonaceous specks, lithics fragments, pyrite

Show Details: No Hydrocarbon Shows.

INTERVAL: 2160.0 to 2307.0 mMDRT
ROP (Range): 5 to 71 m/h
Av. ROP: 25 m/h

SILTSTONE and SANDSTONE.

SILTSTONE (100%): brownish grey, olive grey, soft to firm, sub-blocky to blocky, 10% clay, 15% very fine sand occurring as laminations and rare shattered coarse clear quartz crystals, trace carbonaceous specks, lithics fragments, micromicaceous.

SANDSTONE (80%): light olive grey, clear, loose to friable, 80% very fine, 15% fine, 5% coarse quartz grains, coarse fraction occurs as loose clear quartz crystals, 10% white clay matrix, sub-rounded to sub-angular (shattered), well sorted, sub-spherical, trace lithics fragments, pyrite, glauconitic, dolomite, 80% rock flour, poor inferred visual porosity.

Show Details: No Hydrocarbon Shows

INTERVAL: 2307.0 to 2381.0 mMDRT
ROP (Range): 11 to 32 m/h
Av. ROP: 19 m/h

ARGILLACEOUS SILTSTONE interbedded with SANDSTONE and minor CLAYSTONE.
 ARGILLACEOUS SILTSTONE (90%): brownish black, olive grey, soft to firm, sub-blocky, 30% clay, trace micromicaceous, thin coaly laminations.

SANDSTONE: light grey, clear, opaque, predominantly loose, in part friable, fine to medium grained, sub-angular to sub-rounded, well sorted, sub-spherical to sub-rounded, clay matrix washing out, good inferred visual porosity.

CLAYSTONE: olive grey, brownish grey, soft and sticky to firm, amorphous to sub-blocky, traces carbonaceous material as specks and thin laminas, trace micro micas.

Show Details: No Hydrocarbon Shows.

INTERVAL: 2381.0 to 2430.0 mMDRT
ROP (Range): 9 to 115 m/h
Av. ROP: 25 m/h

CLAYSTONE. Interbedded with minor SANDSTONE.

CLAYSTONE: olive grey, brownish grey, firm, sub-fissile to sub-blocky, traces carbonaceous material as specks and thin laminas, trace micro micas, in part as laminas.

SANDSTONE: light grey, friable to disaggregate in part, very fine to fine grained, sub-angular to sub-rounded, well sorted, sub-spherical to sub-elongate, no visible matrix, good inferred visual porosity.

Show Details: No Hydrocarbon Shows

INTERVAL: 2430.0 to 2565.0 mMDRT
ROP (Range): 5 to 36m/h
Av. ROP: 20 m/h

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ARGILLACEOUS SILTSTONE interbedded with CLAYSTONE and occasional SANDSTONE.

ARGILLACEOUS SILTSTONE (80%): light brownish grey, light grey, brownish black, very soft to firm, sub-blocky, 25% clay, trace carbonaceous and coaly material as laminas.
 CLAYSTONE (40%): olive grey, brownish grey, very soft to soft, amorphous to sub-blocky, traces carbonaceous material, traces micro micas.
 SANDSTONE (20%): light grey, translucent, friable, 60% very fine, 40% fine grained quartz crystals, sub-rounded, well sorted, sub-spherical, trace carbonaceous fragments, 2% dark lithics fragments, 20% rock flour, poor inferred visual porosity.
 Show Details: No Hydrocarbon Shows

INTERVAL: 2565.0 to 2606.0 mMDRT
ROP (Range): 6 to 106 m/h
Av. ROP: 25 m/h

SILTSTONE and ARGILLACEOUS SILTSTONE interbedded with minor of COAL.
 SILTSTONE (60%): brownish grey, brownish black, olive grey, soft to firm, sub-blocky to blocky, 20% clay, 10% very fine sand occurring in laminas, trace carbonaceous laminas, micro micas, lithics fragments, locally argillaceous.
 ARGILLACEOUS SILTSTONE (30%): brownish grey, brownish black, olive grey, in part light grey, soft to firm, sub-blocky to blocky, 20% clay, trace carbonaceous specks, micro micas.
 COAL: black, brownish black, firm, sub-fissile to conchoidal, bright.
 Show Details: No Hydrocarbon Shows

INTERVAL: 2606.0 to 2751.0mMDRT
ROP (Range): 2 to 43 m/h
Av. ROP: 17 m/h

Massive CLAYSTONE, minor interbeds of SANDSTONE at top of section, minor interbeds of SILTSTONE at bottom of section.
 CLAYSTONE: brownish grey, olive grey, light grey, soft to firm, sub-fissile to sub-blocky, trace carbonaceous specks.
 SANDSTONE: clear, polished, loose, clay matrix washing out, fine grained, rounded to sub-angular, well sorted, sub-spherical, good inferred visual porosity, 10% rock flour masking.
 SILTSTONE: olive grey, light olive grey, soft to firm, sub-blocky to blocky, 10% clay, traces carbonaceous material, traces pyrite.
 Show Details: No Hydrocarbon Shows

INTERVAL: 2751.0 to 2865.0 mMDRT
ROP (Range): 5 to 59 m/h
Av. ROP: 17 m/h

SILTSTONE, interbedded CLAYSTONE, SANDSTONE and COAL
 SILTSTONE (20-80%): brownish black, brownish grey, olive black, in part medium dark grey, firm to moderately

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hard, subblocky to subfissile, 10% clay, trace carbonaceous specks, micas, pyrite aggregates.
CLAYSTONE (20-40%): brownish black, brownish grey, in part light grey, soft to firm, subblocky to subfissile, 10% silt in laminae, trace carbonaceous specks and fine laminae.
SANDSTONE (0-40%): light grey, light olive grey, firm to moderately hard, 10% white clay, 30% very fine, 70% fine grained quartz crystals, subrounded, moderately sorted, subspherical, moderate siliceous cement, trace lithic fragments, bright coaly laminae, fair inferred visual porosity, except for thin sand from 2828-2830 mMDRT, no hydrocarbon fluorescence.
COAL (0-5%): black, firm, subfissile to conchoidal, trace finely disseminated pyrite, lithic fragments.

INTERVAL: 2865.0 to 2895.0mMDRT
ROP (Range): 9 to 32 m/h
Av. ROP: 18 m/h

Interbedded **SILTSTONE**, **CLAYSTONE** and **SANDSTONE**, minor **SANDY SILTSTONE**
SILTSTONE (30-80%): brownish black, brownish grey, olive black, firm to moderately hard, subblocky to subfissile, 10% clay, 5% very fine sand in laminae, trace carbonaceous laminae, micas.
CLAYSTONE (20-60%): brownish black, brownish grey, light grey, soft to firm, subblocky, trace fine carbonaceous laminae, lithic fragments.
SANDSTONE (0-40%): light grey, light olive grey, firm to moderately hard, 10% white clay, 10% very fine, 65% fine, 20% medium, 5% coarse clear quartz grains, subrounded, moderately sorted, subspherical, moderate siliceous cement, trace lithic fragments, thin coaly laminae, glauconite, good inferred visual porosity, no hydrocarbon fluorescence.
SANDY SILTSTONE (0-40%): brownish black, olive grey, brownish grey, firm to moderately hard, subblocky to subfissile, 10% clay, trace carbonaceous specks and laminae, micas.

INTERVAL: 2895.0 to 2958.0mMDRT
ROP (Range): 7 to 34 m/h
Av. ROP: 19 m/h

Interbedded **SILTSTONE** and **CLAYSTONE**, minor thin **SANDSTONE** interbeds
SILTSTONE (40-90%): brownish black, brownish grey, olive black, firm to moderately hard, subblocky to subfissile, 10% clay, 10% very fine sand in laminae, trace carbonaceous specks, micas, finely disseminated pyrite.
CLAYSTONE (10-40%): brownish black, brownish grey, soft to firm, subblocky to subfissile, 10% silt occurring as laminae, trace fine carbonaceous laminae, lithic fragments.

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SANDSTONE (0-40%): olive grey, light grey, friable, fine grained, 20% very fine, 10% white clay matrix, poor siliceous cement, subangular to subrounded, moderate to well sorted, subspherical, trace lithic grains, good visual porosity, no hydrocarbon fluorescence.

INTERVAL: 2958.0 to 2995.0 mMDRT
ROP (Range): 9 to 67 m/h
Av. ROP: 24 m/h

Interbedded CLAYSTONE, SILTSTONE and SANDSTONES

CLAYSTONE (10-70%): brownish black, brownish grey, soft to firm, subblocky to subfissile, trace carbonaceous material as specks and occasional laminae.
 SILTSTONE (20-85%): medium dark grey, olive black, firm to moderately hard, subblocky to subfissile, 15% clay, trace carbonaceous specks, trace to 1% micromicas, occasional pyrite.
 SANDSTONE (5-60%): olive grey, light grey, medium light grey, friable, fine grained, 20% very fine, 10% white clay matrix, poor siliceous cement, subangular to subrounded, moderate to well sorted, subspherical, trace lithic grains, good visual porosity, nil to 40% hydrocarbon fluorescence.

INTERVAL: 2995.0 to 3082.0 mMDRT
ROP (Range): 5 to 69 m/h
Av. ROP: 23 m/h

CLAYSTONE, minor SILTSTONE interbeds

CLAYSTONE (80-100%): brownish black, olive black, olive grey, firm subblocky to subfissile, 10% silt, trace carbonaceous specks, trace micromicas.
 SILTSTONE (0-20%): brownish grey, olive grey, firm, subblocky to subfissile, 15% clay, trace carbonaceous specks, trace micromicas, trace lithic fragments.

INTERVAL: 3082.0 to 3105.0 mMDRT
ROP (Range): 8 to 58 m/h
Av. ROP: 19 m/h

SILTSTONE with interbedded CLAYSTONE and SANDSTONE.

SILTSTONE (20-40%): olive grey, soft, subblocky to subfissile, 15% clay, 1% carbonaceous material as laminae, trace micromicas, trace lithic fragments.
 CLAYSTONE (0-20%): brownish grey, olive grey, olive black, soft to firm, subblocky to blocky, 10% silt occurring as laminae, trace micromica, fine carbonaceous laminae.
 SANDSTONE (40-80%): medium light grey, opaque, clear, yellowish grey, friable to loose, 10% white clay matrix, 40% fine, 20% medium, 20% coarse, 20% very coarse, angular (shattered) to subangular to subrounded, poor to

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moderately sorted, poor to fair siliceous cement, trace lithic fragments, 1% carbonaceous material/coal, good visual porosity, trace hydrocarbon fluorescence at 3090-3093mMDRT.

INTERVAL: 3105.0 to 3199.0 mMDRT
ROP (Range): 8 to 76 m/h
Av. ROP: 17 m/h

Interbedded SANDSTONE, SILTSTONE and CLAYSTONE, minor COAL
 SANDSTONE (30-70%): light grey, opaque, clear, yellowish grey, light olive grey, friable to moderately hard, 10% white clay matrix, 10% very fine, 75% fine, 10% medium, 5% coarse, subrounded to subangular (shattered), poor to moderately sorted, subspherical, poor to moderate siliceous cement, trace lithic fragments, 2% carbonaceous material/coal, good visual porosity, hydrocarbon fluorescence from 3132-3135,3144-3147,3153-3156,3162-3168mMDRT. Masked by 20-40% rock flour.
 SILTSTONE (40-70%): olive grey, brownish black, in part olive black, in part light grey, soft to firm, subblocky to subfissile, 15% clay, 1% carbonaceous material as laminae, trace micromicas, trace lithic fragments.
 CLAYSTONE (0-30%): brownish grey, olive grey, soft to firm, subblocky to blocky, 10% silt occurring as laminae, trace micromica, fine carbonaceous laminae.
 COAL (0-5%): black, firm, subfissile to conchoidal, bright.

INTERVAL: 3199.0 to 3311.0 mMDRT
ROP (Range): 4 to 55 m/h
Av. ROP: 15 m/h

Interbedded SANDSTONE, SILTSTONE, CLAYSTONE, minor COAL beds.
 SANDSTONE (10-70%): light grey, yellowish grey, light olive grey, clear, firm to friable, 10% white clay matrix, 0-20% very fine, 30-60% fine, 10-30% medium, 0-30% coarse, 0-20% very coarse quartz grains, mostly subrounded in part subangular to angular and shattered, poor to moderately to well sorted, subspherical to subelongate, poor to fair siliceous cement, trace carbonaceous specks, nil to trace to 2% lithic fragments, good to fair inferred visual porosity, trace hydrocarbon fluorescence from 3210-3216 and 3255-3261, masked by 10-40% rock flour.
 SILTSTONE (20-60%): light grey, olive grey, brownish black, olive black, firm to moderately hard, subblocky to blocky, 10-15% clay, trace - 1% carbonaceous specks and laminae, fine pyrite aggregates, micromicas.

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CLAYSTONE (10-30%): brownish grey, olive grey, light grey, soft to firm, subblocky to subfissile, 10% silt, trace carbonaceous specks and laminae, micromicas.
COAL (0-5%): black, brownish black, firm, subfissile to conchoidal, bright.

INTERVAL: 3311.0 to 3425.0mMDRT
ROP (Range): 3 to 50 m/h
Av. ROP: 19 m/h

Interbedded SANDSTONE, CLAYSTONE and SILTSTONE, thin COAL at 3411 mMDRT
SANDSTONE (10-85%): light grey, clear when disaggregated, 10-15% white clay matrix, 35% very fine, 80% fine grained, 10% medium, 5% coarse quartz grains, coarse fraction occurs as loose quartz grains, subrounded to subangular (shattered), poorly sorted, subspherical, poor to moderate siliceous cement, good inferred visual porosity, no hydrocarbon fluorescence, masked by 20-40% rock flour.
CLAYSTONE(0-70%): brownish black, brownish grey, olive grey, in part light grey, soft to firm, subblocky to subfissile, trace carbonaceous specks, micromicas, lithic fragments.
SILTSTONE (10-85%): brownish black, olive black, firm to moderately hard, subblocky to blocky, 10% clay, trace carbonaceous specks, micromicas.
COAL (0-5%): black, brownish black, subfissile, bright to earthy

INTERVAL: 3425.0 to 3438.0mMDRT
ROP (Range): 8 to 57 m/h
Av. ROP: 24 m/h

METAMORPHICS

METAMORPHICS (100%): multicoloured, very dusky red, light greenish grey, greenish grey, light grey, hard, blocky, siliceous and calcareous, altered siltstones and claystones, micro flow patterns and inter bedding evident.

INTERVAL: 3438.0 to 3522.0mMDRT
ROP (Range): 4 to 31 m/h
Av. ROP: 13 m/h

VOLCANICS

VOLCANICS (100%): medium bluish grey, greyish purple, mottled dusky blue green, blackish red, firm to hard, blocky, calcite veining, chloritic mottling.

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3.2 Gas Ratio Interpretation – Introduction Lithological Summary

Gas composition and total gas in mud at the possum belly were measured using the Geoservices Reserval™ that utilises a GZG degasser to extract gas from mud. The Reserval™ also measures the Gas-In values from active pits utilising a GZG degasser installed in the active pit. The Gas-Out/Gas-In was monitored at an 80:20 ratio in the chromatograph cycle. The GFF (coupled with a GZ11degasser) was used as a backup gas detection system. Both use the FID technique of measuring ions released when hydrocarbons are burnt in a pure hydrogen flame.

Gas is extracted from the mud at the shale shakers by a degasser that is essentially an agitator inside a chamber through which the mud continually passes. The gas is then drawn back to the unit through tubing to the gas analysis equipment. Independent sensors in the unit also measure H₂S and CO₂.

The composition of the gas in mud from the formation is significant in determining the geochemical origin and value of a show. There are several methods that can be used to determine whether the hydrocarbon gas in mud comes from a potential gas or oil zone. Amongst these methods are the Triangle Diagram (also known as the gas composition diagram), Pixler Diagram (also known as the gas ratios method), and the gas Wetness/Balance/Character plots.

3.3 Explanation of Gas Composition Diagrams

The Triangle or Gas Composition Diagram is used to graphically represent the hydrocarbon distribution in the gas and to determine whether it corresponds to a gas or oil reservoir. The triangular diagram is obtained by tracing lines on three scales at 120° to each other, corresponding respectively to the ratios of ethane, propane and normal butane to the total gas. The scales are arranged in such a way that if the apex of the triangle is upward, the diagram represents the analysis of gas from a gas zone, while if the apex points downwards, the diagram represents the analysis of gas from an oil zone. A large triangle diagram represents dry gas or low GOR oil, while small triangles represent wet gases or high GOR oils. The centre of the triangle should fall inside the area delineated by the dotted line, which encircles compositions that are regarded as 'normal'. If the triangle area is outside this area the gas indicates that the reservoir is not exploitable and that the heavier hydrocarbon composition is 'abnormal' i.e. hydrocarbons that are chemically altered or gases with special compositions which are not associated with oil.

The Gas Ratio Analysis Diagram is a plot of the ratio of C1 to the other gas elements. The magnitude of the methane to ethane ratio determines if the reservoir contains gas or oil or if it is non-productive. The following conclusions are possible:

Ratio C1/C2:	< 2	non-productive zone
	2 – 15	oil present
	15 – 65	gas present
	> 65	non-productive zone

The slope of the line of the ratio plot of C1/C2, C1/C3, C1/C4 and C1/C5 indicates whether the reservoir will produce hydrocarbons or hydrocarbons and water. Positive line slopes

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indicate production; negative line slopes indicate water-bearing formations. When using the Gas Ratio Diagram, the following points should be borne in mind:

1. Productive dry gas zones may show only C1, but abnormally high shows of C1 are usually indicative of saltwater zones.
2. If the ratio C1/C2 is low in the oil section and the ratio C1/C4 is high in the gas section, the zone is probably non-productive.
3. If any ratio (C1/C5 except in an oil based mud) is lower than the preceding ratio then the zone is probably non-productive.
4. The ratios may not be definitive for zones of low permeability.
5. Steep gas ratio plots may be indicative of tight zones.

3.4 Explanation of Wetness/Balance/Character Curves

Another method for evaluating gas zones plots against depth three ratios: hydrocarbon Wetness (W_h), hydrocarbon Balance (B_h) and hydrocarbon Character (C_h), where:

$$W_h = \frac{(C_2 + C_3 + C_4 + C_5)}{(C_1 + C_2 + C_3 + C_4 + C_5)} \times 100 (\%)$$

$$B_h = \frac{(C_1 + C_2)}{(C_3 + C_4 + C_5)}$$

$$C_h = \frac{(C_4 + C_5)}{C_3}$$

Wetness (W_h) is the primary zone indicator and provides a measure of the relative proportion of heavier gases in the overall gas show as follows:

$W_h < 0.5$	Light non-associated gas with low productivity potential or only geo-pressured methane.
$0.5 < W_h < 17.5$	Potentially productive gas with gas density increasing with W_h .
$17.5 < W_h < 40.0$	Potentially productive oil with gravity decreasing as W_h increases.
$W_h > 40.0$	Heavy or residual oil with low productivity potential.

As reservoir hydrocarbons become denser in the transition from gas to oil, Balance (B_h) and Wetness (W_h) values move closer together and eventually intersect. The zone guidelines for B_h combine with those for W_h to improve reliability of show evaluation as follows:

$W_h < 0.5$ And $B_h > 100$	Very light, dry gas that is almost certainly non-productive.
$0.5 < W_h < 17.5$ and $W_h < B_h < 100$	Productive gas with gas increasing in wetness and density as the two curves converge.
$0.5 < W_h < 17.5$	Productive gas condensate or a high gravity gas/oil ratio.

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And $B_h < W_h$

$17.5 < W_h < 40$ Productive oil with oil gravity decreasing – density
and $B_h < W_h$ increasing as the curves diverge.

$17.5 < W_h < 40$ Non-productive residual oil.
And $B_h > W_h$

Character (C_h) values serve to resolve ambiguities between oil or gas indications by defining the following:

$0.5 < W_h < 17.5$ Productive wet gas or condensate.
And $B_h < W_h$
and $C_h < 0.5$

$0.5 < W_h < 17.5$ Productive high gravity and/or high GOR oil.
And $B_h < W_h$
and $C_h > 0.5$

It is important to note that in the conclusion to each of the interpretive tools, the terms ‘productive’ and ‘non-productive’ are used in a geochemical sense. Ultimate production of a zone is dependent upon reservoir thickness and extent as well as other physical and economic factors that are not taken into account when analysing gas compositions. The methods discussed here are intended to assist the interpretive skills of the geologist or log analyst.

3.5 Gas Composition Discussion

Gas monitoring while drilling Rockhopper-1 commenced using the Geoservices Reserval™ and GFF gas systems from 966.0 mMDRT. Background gas was first observed from a depth of 967.0 mMDRT, where it was present in low concentrations of around 0.10 % solely as methane (C1), it remained at this low concentration until around 1050.0 mMDRT where the gas concentrations began to increase. Background gas increased to around 0.3% to end of the 12¼" hole with peaks reaching as high as 1.21%. There was no CO₂ or H₂S gas recorded in 12¼" hole .A trip gas peak of 0.39% was observed at 2019.0m after a bit trip. During the 8½" section background gas between 0.1% to 1.8% was observed. CO₂ background gas was first observed from a depth of 2034.0m MDRT,where it was present in very low concentrations of around 0.02% and gradually increased the level to 0.18%. There was no H₂S gas recorded in 8 ½" hole .Gas Peaks listed below are from the Reserval gas equipment. A GFF backup gas system was run as well and plotted the same trends. The Reserval gas is more analytical of gas readings and picks up more background gases and has a constant mud flow. The Backup GZ11 degasser has a higher mud flow through it and liberates more gas from the mud to the chamber and during gas zones. The calibrations of both gas equipment were checked during the well and were very accurate.

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3.6 Gas Peaks (From Reserval™ Gas Detection System)

The following gas peaks were recorded while drilling Rockhopper-1

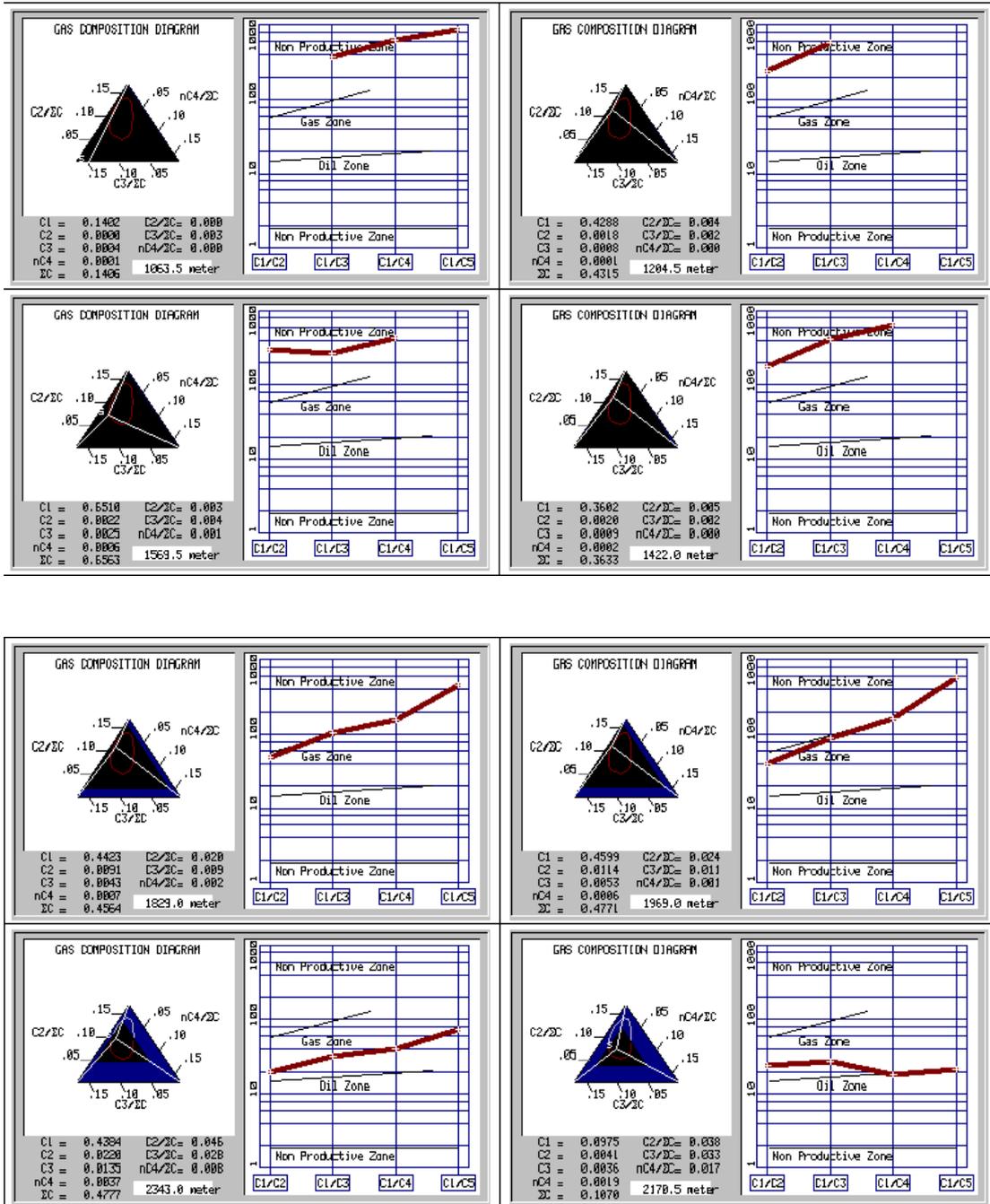
DEPTH METRES	TOTAL GAS PEAK / TRIP %	C1 %	C2 %	C3 %	IC4 %	NC4 %	IC5 %	NC5 %
1060.0	0.3012	0.2800	0.0012	0.0008	0.0004	0.0001	0.0002	0.0000
1108.0	0.6000	0.4282	0.0001	0.0007	0.0002	0.0001	0.0002	0.0001
1162.0	0.7010	0.6128	0.000	0.0007	0.0002	0.0001	0.0002	0.0001
1220.0	0.6401	0.5587	0.0017	0.0009	0.0003	0.0003	0.0002	0.0000
1368.0	0.4720	0.3478	0.0018	0.0009	0.0004	0.0002	0.0002	0.0001
1450.0	0.8203	0.5736	0.0029	0.0013	0.0005	0.0002	0.0003	0.0001
1566.0	1.1000	1.0084	0.0023	0.0036	0.0013	0.0007	0.0006	0.000
1675.0	0.7302	0.6700	0.0065	0.0027	0.0010	0.0004	0.0004	0.0001
1829.0	1.0502	0.8165	0.0611	0.0069	0.0029	0.0009	0.0009	0.0003
1951.0	0.5828	0.4375	0.0107	0.0049	0.0023	0.0006	0.0006	0.0002
1972.0	0.1600	0.1327	0.0041	0.0027	0.0016	0.0004	0.0011	0.0001
1997.0	0.4450	0.3876	0.0114	0.0072	0.0032	0.0010	0.0014	0.0001
2007.0	0.4815	0.3289	0.0104	0.0076	0.0040	0.0012	0.0016	0.0002
2023.0	0.1988	0.1282	0.0032	0.0029	0.0021	0.0015	0.0013	0.0003
2082.0	0.3141	0.1857	0.0048	0.0039	0.0030	0.0014	0.0022	0.0006
2167.0	0.3417	0.1661	0.0068	0.0050	0.0041	0.0022	0.0035	0.0014
2275.0	0.2086	0.0843	0.0067	0.0053	0.0040	0.0016	0.0032	0.0013
2342.0	0.7129	0.5113	0.0250	0.0155	0.0080	0.0042	0.0039	0.0015
2434.0	0.6317	0.4047	0.0219	0.0169	0.0082	0.0038	0.0042	0.0015
2522.0	0.7996	0.4612	0.0229	0.0154	0.0086	0.0035	0.0043	0.0012
2592.0	0.7602	0.4459	0.0251	0.0155	0.0076	0.0027	0.0039	0.0010
2653.0	1.8858	1.5717	0.0843	0.0375	0.0107	0.0060	0.0050	0.0016
2732.5	1.0878	0.5278	0.0335	0.0341	0.0118	0.0088	0.0070	0.0023
2751.0	1.3762	0.7220	0.0607	0.0543	0.0154	0.0122	0.0084	0.0031
2805.0	1.0506	0.6578	0.0656	0.0497	0.0110	0.0117	0.0067	0.0031
2831.0	5.4967	3.5007	0.4204	0.3683	0.0664	0.0946	0.0306	0.0254
2838.0	2.2576	1.7693	0.1593	0.0912	0.0138	0.0193	0.0078	0.0049
2853.5	1.5185	1.0651	0.1060	0.0764	0.0152	0.0194	0.0084	0.0054
2893.0	0.9931	0.4504	0.0378	0.0372	0.0095	0.0143	0.0071	0.0051
2962.0	8.6809	5.8736	0.6898	0.6341	0.0970	0.1511	0.0371	0.0342
2978.0	6.4136	3.7269	0.5631	0.5708	0.0906	0.1558	0.0414	0.0406
3077.0	1.1654	0.4998	0.0694	0.0655	0.0154	0.0229	0.0094	0.0087
3083.0	1.9049	1.0500	0.1436	0.1357	0.0300	0.0396	0.0149	0.0127
3091.0	3.4679	1.9764	0.2694	0.2586	0.0580	0.0708	0.0256	0.0213
3096.0	2.9112	1.6601	0.2290	0.2229	0.0511	0.0612	0.0231	0.0186
3104.5	3.0106	1.7911	0.2479	0.2469	0.0550	0.0702	0.0257	0.0213
3117.0	2.0525	1.2334	0.1441	0.1183	0.0235	0.0343	0.0133	0.0116
3125.5	3.0254	2.1619	0.2370	0.1854	0.0354	0.0503	0.0184	0.0151
3135.0	5.9254	3.3894	0.4978	0.5267	0.1232	0.1499	0.0550	0.0395
3144.0	2.7713	1.5050	0.2135	0.2152	0.0471	0.0651	0.0243	0.0203
3156.0	4.7373	2.7373	0.4058	0.3741	0.0784	0.1011	0.0342	0.0285
3167.0	4.1155	2.6888	0.3433	0.2864	0.0588	0.0815	0.0286	0.0247
3191.0	4.6420	2.8778	0.4041	0.3213	0.0619	0.0937	0.0317	0.0289

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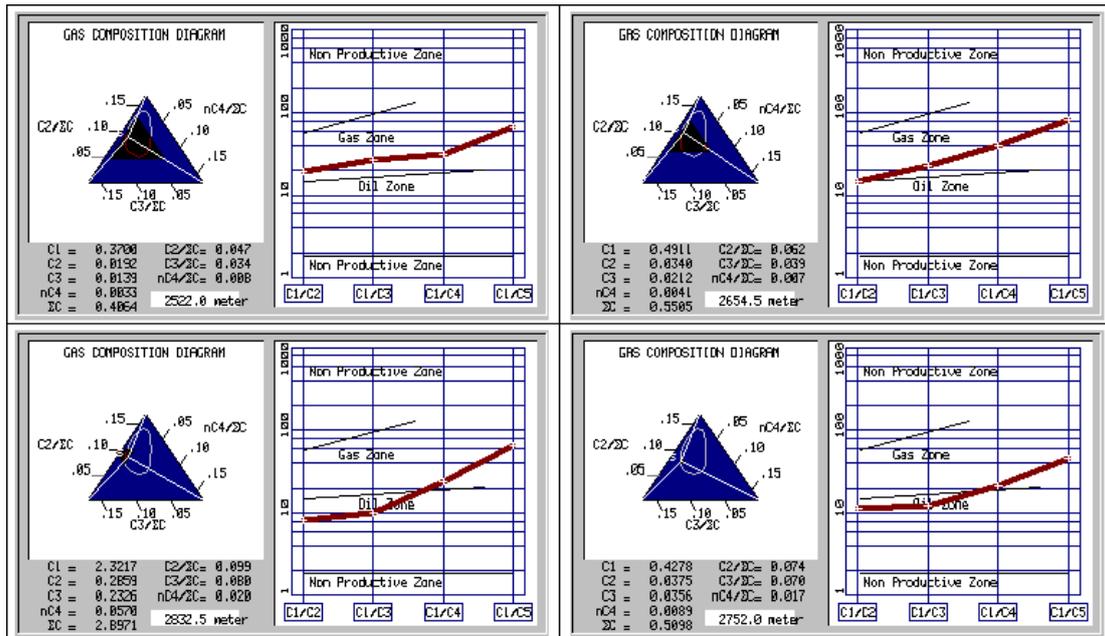
3196.0	13.6171	9.0374	1.2482	0.9513	0.1636	0.2447	0.0674	0.0622
3199.0	6.8964	4.5624	0.6342	0.4747	0.0850	0.1296	0.0399	0.0372
3209.0	3.6625	2.2436	0.3186	0.2539	0.0520	0.0810	0.0294	0.0276
3213.0	4.7775	2.8389	0.4273	0.3612	0.0741	0.1093	0.0374	0.0346
3225.0	2.4188	1.0993	0.1508	0.1096	0.0215	0.0368	0.0135	0.0132
3232.0	6.3466	3.4051	0.6059	0.5161	0.1039	0.1629	0.0534	0.0511
3240.0	7.5200	4.2962	0.6289	0.5109	0.0972	0.1456	0.0450	0.0428
3260.0	8.6292	4.1055	0.6072	0.5770	0.1189	0.1816	0.0584	0.0562
3269.0	11.3385	4.8447	0.7929	0.5648	0.0959	0.1588	0.0472	0.0486
3285.0	2.8468	1.0888	0.1688	0.1389	0.0334	0.0557	0.0235	0.0243
3321.0	9.6978	4.5441	0.7593	0.6649	0.1399	0.2071	0.0698	0.0673
3321.0	9.6978	4.5441	0.7593	0.6649	0.1399	0.2071	0.0698	0.0673
3331.0	11.0241	7.0004	0.8955	0.4977	0.0898	0.1264	0.0414	0.0394
3338.0	13.2976	8.3069	1.2492	0.6398	0.1165	0.1673	0.0547	0.0512
3344.0	11.0344	6.5798	0.9812	0.4805	0.0889	0.1265	0.0438	0.0411
3350.0	9.4488	5.8834	0.8484	0.3750	0.0673	0.0973	0.0341	0.0334
3360.0	4.6078	2.4229	0.3915	0.2254	0.0471	0.0747	0.0294	0.0295
3373.0	10.8787	6.5656	0.9400	0.4773	0.0917	0.1336	0.0471	0.0430
3379.0	7.9667	4.8559	0.6810	0.3494	0.0675	0.1058	0.0382	0.0369
3387.0	5.0156	2.9914	0.4312	0.2134	0.0405	0.0665	0.0261	0.0264
3393.5	3.7894	2.0445	0.3233	0.1694	0.0342	0.0579	0.0239	0.0246
3401.0	13.2133	8.6586	1.1946	0.5519	0.0953	0.1493	0.0489	0.0458
3401.5	13.4509	8.8921	1.2266	0.5625	0.0967	0.1517	0.0495	0.0465
3422.5	11.8634	7.7527	1.0272	0.4640	0.0888	0.1318	0.0467	0.0433
3443.0	1.7046	0.4792	0.0920	0.0700	0.0214	0.0369	0.0194	0.0202
3470.0	1.1162	0.4104	0.0296	0.0237	0.0111	0.0205	0.0137	0.0152
3513.0	0.7198	0.4757	0.0214	0.0066	0.0044	0.0079	0.0078	0.0090

3.7 Gas Ratio Diagram

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4.0 PRESSURE ANALYSIS

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4.1 Pressure Summary

Formation pressures were monitored throughout this well by recording a range of indicators. These indicators vary from direct observations of background gas and cuttings to drilling characteristics such as torque and tight hole, as well as quantitative methods like the D'exponent.

D'exponent: This is a normalized rate of penetration that takes into account mud weight, bit wear and hydraulics. It can be reliably used in shales and clean claystones; and as an indicator in siltstones, silty shales and calcareous claystones. A normal trend line is established through normally pressured shale points, representing a normal compaction trend, and any leftward deviation of subsequent shale points from this trend, representing relative under-compaction, indicates overpressure (plotted relative to depth) or increased porosity due to changes in the lithology.

The D'exponent calculation was not ideally suited for the detection of overpressure in this particular instance due to the fact that PDC bits were used. However Geoservices used both qualitative and quantitative techniques to monitor for abnormal pressure. The D-exponent plus close monitoring of gas levels, pit volumes, hole conditions and mud weights ensured that the well was drilled safely. Continuous consultation with well site Geologist and MWD/LWD operators ensured that Geoservices data was cross-referenced for accuracy and reliability.

Overpressure: The trend line was set for the Rockhopper-1 well from 1130.0 mMDRT to 2060.0 mMDRT in the 311mm (12¼") hole section, which drilled through formation dominantly consisted of a suitable Silt stone ,Claystone & Sandy Siltstone. The slope of the trend line is

$$a \text{ coeff} = 0.001304$$

$$b \text{ coeff} = -0.107314$$

The trend through this well follows a gradual increasing trend from 1900.0 mMDRT to TD o the well at 3522.0 mMDRT. The D'exponent trend seen was one of general compaction with occasional leftward shifts, due to formation changes. A slight leftward shift was noted in places with increasing amounts of Sand and Silt in the formations drilled. No overpressure was encountered in the Rockhopper-1 well.

Formation pressure evaluation using D'exponent was done using the Eaton method. The Eaton method states the relationship between the formation pressure and the Dcs/Dcn ratio depending on changes in the overburden gradient.

$$P = S - (S - P_n) * (D_{cs}/D_{cn})^{1.2}$$

- Where: P : formation pressure gradient
 S : overburden gradient
 Pn: normal pressure gradient
 Dcs: observed d'exponent
 Dcn: normalised d'exponent

D'exponent:

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Coefficients used for this well, results plotted in Geoservices Pressure Log.

Poisson : a = 0.26600 b = -2.66700
source : Santa Barbara (Soft)

Overburden : a = 0.01304 b = -0.17314 c = 1.43350
source : Santa Barbara (Soft)

The Rockhopper-1 well was drilled with water based mud.

Gas: No abnormality in gas ratios was observed.

Flow-line Temperature: There were no indications of abnormal pressures from temperature measurements of Rockhopper-1

Cuttings: There were no cuttings observed at the shakers that may have indicated an abnormally pressured zone in this well.

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5.0 DRILLING INFORMATION

5.1 Bit Records

BIT	Size	Type	Jets	In (m)	Out	Hour	Condition
1	26/36	Hughes CR-1	N/A	100.3	158.0	2.8	1-1-WT- A-1-I-NO-TD.
2	17½	Smith XR+VCPS	1 x 13/32, 3x22/3 2	158.0	966.0	30.2	1-1-WT-A-E-I-NO-TD
3	12¼	Reed RSR616M	6 x 15/32	966.0	1972. 0	35.2	4-4-LT-N-X-I-CT-TD
4	8½	PDC	6 x14	1972.0	1972. 0	6.5	2-3-BT-S-X-I-CT -PR
5 RR	8½	Hughes-Tricone	3 x 20	1972.0	2019. 0	4.7	2-2-WT-A-1-NO-BHA
6	8½	Reed-PDC	4 X 16	2019.0	2023. 0	0.8	0-0-NO-A-X-I-NO-DTF
6RR	8½	Reed-PDC	4 X 16	2023.0	3522. 0	89.4	6-6-BT-A-X-I-NO-PR

5.2 Mud Records

The 914 (36") section was drilled to 158.0 mMDRT with seawater and bentonite sweeps with returns to the seabed.

The 445 (17½") section from 158.0 to 966.0 mMDRT was also drilled with seawater and bentonite sweeps with returns on seabed.

The 311(12¼") section was drilled with KCL/Polymer mud from 966.0 to 1972.0 mMDRT with mud weight 9.0ppg to 9.5 ppg.

The 216(8½") hole section was drilled with KCL/Polymer mud from 1972.0 to TD of 3522.0 mMDRT with mud weight of 9.4 ppg to 9.6 ppg.

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5.3 Drilling Phase Summary

5.3.2 914 mm (36") Hole Section

Date : 30th November to 1st December 2009
 Measured depth : 100.3 mMDRT to 158.0 mMDRT
 Vertical depth : 100.3 mMDRT to 158.0 mMDRT
 Number of bits used : 1
 Mud type : Seawater with bentonite sweeps

Rockhopper-1 was spudded at 23:30hrs, on the 30th of November, 2009. A Hughes CR1 Tri-cone 26" Bit was used in conjunction with a 36" hole opener to drill the 36" Phase. The seabed was tagged at 100.3mMDRT and the 36" Phase was drilled to a depth of 158.0 mMDRT, in 2.8 on bottom hours, with no problems. The hole was displaced to 8.8ppg mud, and the 30" conductor pipe was run, and cemented.

5.3.3 445 mm (17½") Hole Section

Dates : 2nd December to 4th December 2009
 Measured depth : 158.0 mMDRT to 966.0 mMDRT
 Vertical depth : 158.0 mMDRT to 965.9 mMDRT
 Number of bits used : 1
 Mud type : Seawater with bentonite sweeps

A Smith 17½", XR+VCPS, was made up to the BHA, run in the hole, and the conductor cement drilled out. The 17½" phase was drilled to a depth of 966m, with no hole problems encountered. The phase was drilled in 30.2 on bottom hours, giving an average ROP of 26.7m/hr. A wiper trip was performed with no problems encountered. The drillstring was then pulled out of the hole. The 13 3/8" casing was run, and cemented, to a shoe depth of 961m.

5.3.4 311 mm (12¼") Hole Section

Dates : 9th December to 12th December 2009
 Measured depth : 966.0 mMDRT to 1972.0 mMDRT
 Vertical depth : 965.9 mMDRT to 1971.9 mMDRT
 Number of bits used : 1
 Mud type : KCL/Polymer

A Reed RSR616M-A21, 12¼" bit, in conjunction with the 9^{5/8}" Sperry Drill lobe 6/7-5.0,PDM bent housing (0.78°) with ported float installed, was run in the hole to drill out the

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shoe track, casing shoe and 12¼" rat hole to 971.0 m. A successful Formation Integrity test of 1400psi (17.5 ppg equivalent mud weight) with 9.0 ppg mud was performed at 961 m, prior to drilling ahead. Drilling continued from 971 m to 1972m. The drill string was pulled out of the hole for 9⁵/₈" casing. The 9⁵/₈" casing was run and cemented to a shoe depth of 1965.0m

5.3.5 216 mm (8½") Hole Section

Dates	: 19 th December to 27 th December 2009
Measured depth	: 1972.0 mMDRT to 3522 mMDRT
Vertical depth	: 1971.9 mMDRT to 3192 mMDRT
Number of bits used	: 3, 6 RR
Mud type	: KCL/Polymer

Bit #4, a Security FMF36532 8½" PDC bit was made up to RIH and encountered cement at 1938m. Attempted to drill out shoe track from 1938m to 1940m with various drilling parameters. Bit #4 drilled 0m in 6.5hrs. The drill string was pulled to surface and Bit #5RR, a Hughes Christensen, 8½" Milltooth bit was made up and drilled out remaining shoe track from 1940m to 1965m and clean out rat hole. New hole was drilled from 1972m to 1977m where the hole was circulated clean and the mud was conditioned. A successful leak off test was performed at 1977m, with 9.5ppg mud, achieving 1710psi, giving a mud weight equivalent of 14.6ppg. Continued drilling and sliding to 2019m. Bit #5RR drilled 47m in 4.7hrs, giving an average rate of penetration of 10 m/hr. The drill string was pulled to surface and Bit #6, a Reed 8½" PDC bit was made up to RIH and drilled from 2019m to 2023m. The rotary steerable tool GeoPilot failed to operate so the drill string was pulled to surface. Bit #6 drilled 4m in 0.3hrs, giving an average rate of penetration of 13.3 m/hr. Bit #6RR1 was RIH and drilled to 2753m, building to and holding inclination angle at 42°, where a wiper trip was performed. While POOH to the 9⁵/₈" casing shoe, tight spots were washed along the way. At 1946m it was not possible to move the pipe up, down or rotate, although circulation was possible. The drill pipe was freed with the use of light and slick pill combined with the use of Jars. 8½" Hole was drilled to 3199m where a problem with the top drive system was encountered. A decision was made to POOH to the previous casing shoe to repair. Once the top drive system was fixed, drill pipe was RIH and Rockhopper-1 was drilled to a total depth of 3522m where the following wireline logs were run;

- Run #1: PEX-HRLA-HNGS-CMR-GR
- Run #2: MDT-GR
- Wiper Trip
- Run #3: MDT-GR continued
- Wiper Trip
- Run #4: MDT-GR continued
- Run #5: VIS(Checkshots) HUD2555M
- Run #6: MSCT-GR
- Run #7: FMI-DSI-GR

Rockhopper-1 was Plugged and Abandoned after three attempts to set a plug at the casing shoe.

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6.0 ENCLOSURES

- A. ASCII Data Disc
- B. Formation Evaluation Log (Masterlog Measured Depth) 1:500
- C. Drilling Data Log 1:500
- D. Pressure Evaluation Log 1:500
- E. Gas Evaluation Log 1:500
- F. Cuttings Sample Manifest

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