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Message: 2010/0572614**From:****To:****Cc:****Sent:** 18/11/2010 at 07:59**Received:** 18/11/2010 at 07:59**Subject:** FW: MW-1 HSE Notification Rev 1.1 17.11.2010 Northern Petroleum**Attachments:** Markwells Wood 1 HSE Notification-Rev1.1 17.11.2010.pdf (2 MB)

Material change for the well file L99/1-MW1

Ta

From:

Sent: 17 November 2010 15:43

To:

Cc:

Subject: MW-1 HSE Notification Rev 1.1 17.11.2010 Northern Petroleum

Following further engineering considerations and the DWOP we have decided to set the 18 5/8 casing deeper to circa 300ft MD BGL (to reduce tophole losses) against the circa 100ft written in our earlier HSE submission 1.0 for the subject well. The well is plan for a TD circa 6009ft MD to provide a sump for logging tools suite string. The revised 1.1 attached includes these changes to well design and the well plots etc. Other than this change in well design primarily to reduce the mud/water losses there is no other change in well design. The mud type and parameters, well pressures, well objectives remain unchanged.

If you have any questions or need clarifications please let me know.

I will be providing to our well examiner at NRG Ltd the details of this change in well design through a revised drilling programme.

Regards

Senior Drilling Engineer

Northern Petroleum Plc
Martin House, 5 Martin Lane
London UK EC4R 0DP

a.l.s. j. 1@northpet.com
www.northpet.com

Tel:-

Fax:+44 (0)

From:
Sent: 15 November 2010 11:36
To:
Subject: RE: Spud Notices

To answer your query -

Spud notification has to be done to DECC - I believe it is done through their
WONs system - sorry I am not familiar with it so can give no more details. When
DECC are advised the well is spudde they will inform the Executive of the new
well number

Other informations you must submit to the Executive include (but are not limited to) -

Material changes to the well design / construction - as you have said change to depth or hole size or any other change if it can materially effect the well design.

Riddor requires you as the well operator to advise us of certain well incidents. There is an official form for land operations - F2508

The ionisation regs may require notification to the Executive of movements or loss of radioactive sources

Regards

Tel

From:
Sent: 15 November 2010 10:31
To:
Cc:
Subject: Spud Notices

Good Morning

I am aware of the weekly reports that need to sent to HSE, can you also advise

on others such as:

i. Spud notifications (is any specific format , will be helpful if we can have an example)

ii. reports /notifications (such as changes in depth and hole size etc..) of top hole section. Will we need to send you the full HSE notification again or just the amended section .

Thanks for your assistance in advance .

Regards

Northern Petroleum Plc
Martin House, 5 Martin Lane
London UK.EC4R 0DP

Tel:+44

Fax:+44

From:
Sent: 27 October 2010 12:40
To:
Subject: FW: Safety Documents for Borehole Sites

I had a conversation with _____ earlier this morning and promised to send her some information I must have got the e mail address wrong and unfortunately did not get her telephone number.

Could you please forward this information to her with my apologies

Regards

Could you send me a message so that I can pick up the correct e mail address

From:
Sent: 27 October 2010 11:36
To: '
Subject: Safety Documents for Borehole Sites

Thanks for the call this morning - I have attached some old (probably out of date but still good stuff) guidance on Safety Documents.

As I said - what was produced was a good document but would not necessarily be picked up by the work force and read through --- I have seen, as I said, just an A3 sheet with the major pertinent issues - Risks, mitigation, escape routes, alarms etc and reference can be made to more detailed documentation -- this sheet can be given to all personnel and visitors to the site - truck drivers, Health and Safety Inspectorsetc and may even be read !

Hope this helps

Tel (

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Interested in Occupational Health and Safety information?

Please visit the HSE website at the following address to keep yourself up to date

www.hse.gov.uk

Or contact the HSE Infoline on 0845 345 0055 or email hse.infoline@natbrit.com

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NORTHERN PETROLEUM (GB) LTD

PEDL 126

DECC Well No. L99/01-MW1



Markwells Wood-1 appraisal well
HSE Notification Document – Rev 1.1

(It is a UK HSE requirement to submit the notification at least 21 days before the spud date)

NOTE: CURRENTLY REFERES TO THE RIG 'DRILLMASTER' FOR DRILLING MARKWELL'S WOOD-1 APPRAISAL WELL.

HSE NOTIFICATION

UNDER REGULATION 6(1) OF THE BOREHOLE SITES AND OPERATIONS REGULATIONS 1995 SCHEDULE 1, PART 1

1. Name and Address of Operator:

Operator for Licence and Supervising
Company

Northern Petroleum (GB) Limited
Martin House, 5 Martin Lane, London EC4R
ODP

Contact: .
Telephone: .

2. Particulars of the type of well, its number and its name:

Licence	PEDL 126
DTI Well Registration No.	L99/01-MW1
Operator Assigned Name.	Markwells Wood 1
Target Horizon	Great Oolite Formation
Classification	Deviated Appraisal
Participation	Northern Petroleum (GB) Ltd - 50%
	Magellan Petroleum (UK) Ltd - 40%
	Egdon Resources - 10%
Well Intent	Oil Well

3. Particulars of the Drilling Rig:

Note: Data for Rig Drillmaster (Larchford owner)

- Trailer mounted hydraulic rotary drilling rig, DRILLMEC model HH-220 driven by AC motors.
- Power – Independent Hydraulic Power Unit with two power trains. Total installed power 1,340 HP
- Mast – Telescopic Mast operates as a hydraulic hoist designed to handle API range 3 drill pipe, 30ft drill collars and API range 3 casing. The static hook load capacity is - 440,000lbs
- Substructure frame and drill floor are directly connected to the rig trailer.
- Topdrive HTD 220 – capacity – 440,000lbs

4. Particulars of Surface Equipment & Circulating Fluids for Pressure Control

Note: Data for Rig 'Drillmaster' (Larchford owner)

- Mud Pumps – 2 x Gardner Denver PZ-9 triplex pumps
- BOP – 1 x 3k annular, Cameron double U x 13.5/8" x 5k
- BOP Accumulator – Koomey 2.5 T.15-1000-3-S (air operated system with air and electrical charge pumps and A6 remote)
- Choke Manifold – Cameron 5k manual adjustable choke / Swaco 10k remote adjustable choke.
- Shale shakers – 2 x Thule VSM100 liner motion
- Mud pits – 740bbls total storage capacity

Drilling and Completion Fluids:

Tophole 24" to circa 300ft BGL will be drilled with Bentonite Mud/Water and Viscous Sweeps.

Hole Size	17.1/2"	12.1/14"	8.1/2"
Measured depth (ft)	1730	5380	6009
Fluid type	WBM	LTOBM	Water or WBM Polymer
Fluid density (ppg)	ALAP	9.0 to 10	ALAP / 8.8

5. Particulars of Well Location and Directional Control

a) National Grid Reference & c) Terminal Depth Location

Markwells Wood 1

Wellhead Co-ordinates: (Ref: National Grid, Airey Spheroid)

Latitude / Longitude N 50° 54' 48.0999" / W 00° 55' 16.9463"

Easting / Northing E475819.44 / N113270.35

Top Target Co-ordinates: (Ref: National Grid, Airey Spheroid)

Latitude / Longitude N 50° 54' 31.5871" / W 00° 55' 14.6364"

Easting / Northing E475872.00 / N112761.00

MDBRT/TVDBRT/TVDSS ft 5370 / 4595 /

Bottom Hole Location Co-ordinates: (Ref: National Grid, Airey Spheroid)

Latitude / Longitude N 50° 54' 26.8486" / W 00° 55' 13.9736"

Easting / Northing E475887.08 / N112614.84

MDBRT/TVDBRT/TVDSS ft 6010 / 4943 /

Depth Measurement units

Feet

Depth Reference

Rotary Table

Rotary Table – Ground level

Drillmaster – 25.0 feet

Ground level – Mean sea Level

369.91 feet

Rotary Table – Mean Sea Level

394.91 feet

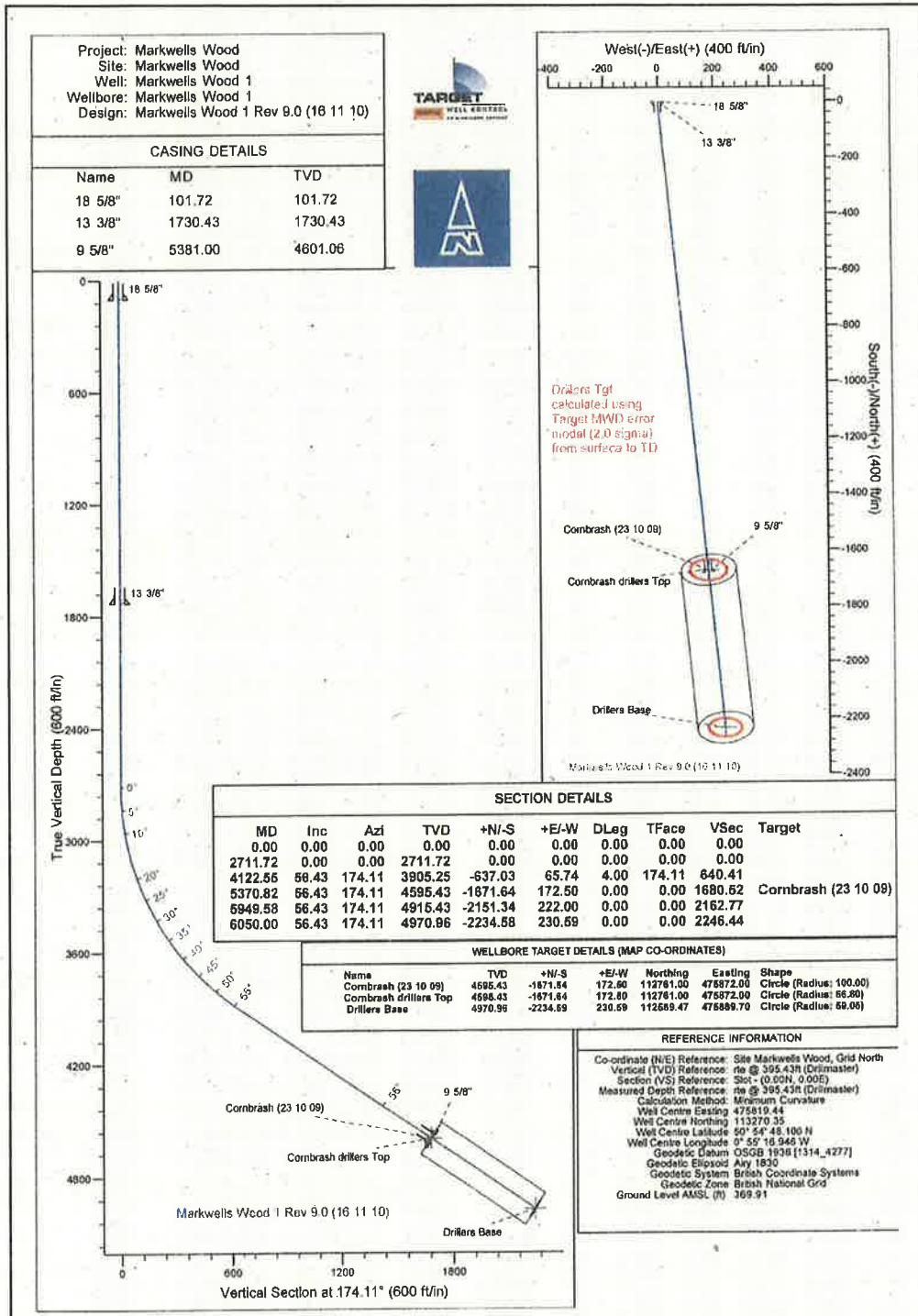
Planned Start Date

Late November 2010

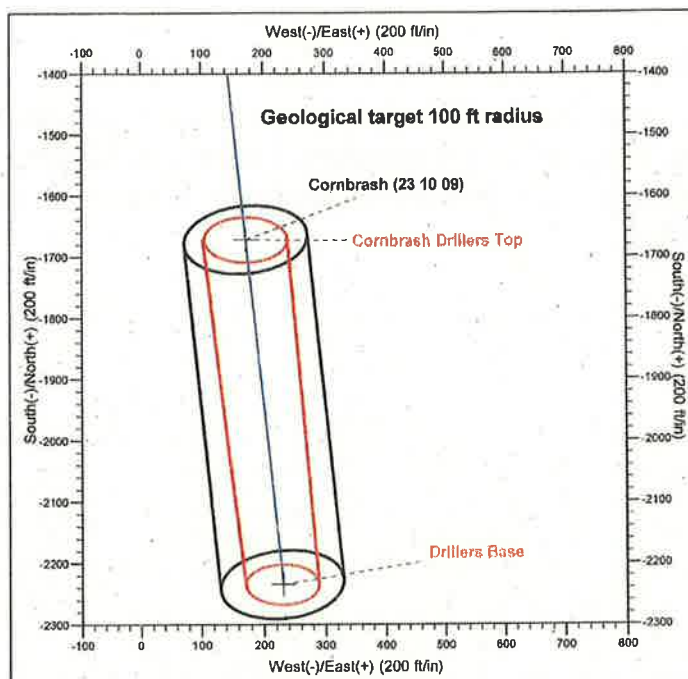
Markwells Wood 1 Planned Survey Listing

MD ft	INC deg	AZIMUTH deg	TVD ft	N(+) ft	E(+) ft	VS ft	DOGLEG "/100ft	EASTING m	NORTHING m	LATITUDE	LONGITUDE	TVDSS ft	COMMENTS
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	-385.43	
25.52	0.00	0.00	25.52	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	-369.91	Upper Chalk
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	-295.43	
101.72	0.00	0.00	101.72	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	-293.71	18 5/8"
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	-195.43	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	-95.43	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	4.57	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	104.57	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	204.57	
667.43	0.00	0.00	667.43	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	272.00	Top Middle Chalk
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	304.57	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	404.57	
889.43	0.00	0.00	889.43	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	494.00	Top Lower Chalk
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	504.57	
1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	604.57	
1100.00	0.00	0.00	1100.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	704.57	
1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	804.57	
1203.43	0.00	0.00	1203.43	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	808.00	Chalk/Top Upper Greensand
1282.43	0.00	0.00	1282.43	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	887.00	Top Gault Clay
1300.00	0.00	0.00	1300.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	904.57	
1400.00	0.00	0.00	1400.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1004.57	
1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1104.57	
1525.43	0.00	0.00	1525.43	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1130.00	Top Lower Greensand
1600.00	0.00	0.00	1600.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1204.57	
1657.43	0.00	0.00	1657.43	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1262.00	Top Wealden Beds
1700.00	0.00	0.00	1700.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1304.57	
1730.43	0.00	0.00	1730.43	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1335.00	13 3/8"
1800.00	0.00	0.00	1800.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1404.57	
1900.00	0.00	0.00	1900.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1504.57	
2000.00	0.00	0.00	2000.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1604.57	
2100.00	0.00	0.00	2100.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1704.57	
2200.00	0.00	0.00	2200.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1804.57	
2300.00	0.00	0.00	2300.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	1904.57	
2400.00	0.00	0.00	2400.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	2004.57	
2500.00	0.00	0.00	2500.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	2104.57	
2600.00	0.00	0.00	2600.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	2204.57	
2615.43	0.00	0.00	2615.43	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	2220.00	ain Fault - Upper Purbeck
2682.43	0.00	0.00	2682.43	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	2287.00	Middle Purbeck
2700.00	0.00	0.00	2700.00	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	2304.57	
2711.72	0.00	0.00	2711.72	0.00	0.00	0.00	0.00	475819.44	113270.35	50° 54' 48.0999 N	0° 55' 16.9463 W	2316.29	
2798.48	3.47	174.11	2798.43	-2.61	0.27	2.63	4.00	475819.52	113289.55	50° 54' 48.0741 N	0° 55' 16.9427 W	2403.00	Lower Purbeck
2800.00	3.53	174.11	2799.94	-2.71	0.28	2.72	4.00	475819.53	113289.53	50° 54' 48.0732 N	0° 55' 16.9426 W	2404.51	
2854.67	5.72	174.11	2854.43	-7.09	0.73	7.13	4.00	475819.66	113268.19	50° 54' 48.0299 N	0° 55' 16.9366 W	2459.00	Purbeck Anhydrite
2885.86	6.97	174.11	2885.43	-10.52	1.09	10.57	4.00	475819.77	113267.15	50° 54' 47.9960 N	0° 55' 16.9318 W	2490.00	Portland Beds
2900.00	7.53	174.11	2899.46	-12.29	1.27	12.38	4.00	475819.83	113266.61	50° 54' 47.9785 N	0° 55' 16.9294 W	2504.03	
3000.00	11.53	174.11	2998.06	-28.76	2.87	28.91	4.00	475820.34	113261.59	50° 54' 47.8158 N	0° 55' 16.9066 W	2602.63	
3033.12	12.86	174.11	3030.43	-35.72	3.69	35.91	4.00	475820.56	113259.47	50° 54' 47.7471 N	0° 55' 16.8970 W	2635.00	Upper Kimmeridge Clay
3100.00	15.53	174.11	3095.26	-52.03	5.37	52.30	4.00	475821.08	113254.50	50° 54' 47.5860 N	0° 55' 16.8744 W	2699.83	
3200.00	19.53	174.11	3190.60	-81.99	8.46	82.42	4.00	475822.02	113245.37	50° 54' 47.2900 N	0° 55' 16.8330 W	2795.17	
3269.41	22.31	174.11	3255.43	-106.64	11.00	107.20	4.00	475822.79	113237.86	50° 54' 47.0465 N	0° 55' 16.7990 W	2860.00	Middle Kimmeridge Clay
3300.00	23.53	174.11	3283.60	-118.48	12.23	119.11	4.00	475823.17	113234.25	50° 54' 46.9295 N	0° 55' 16.7826 W	2888.17	
3400.00	27.53	174.11	3373.82	-161.35	16.65	162.21	4.00	475824.51	113221.19	50° 54' 46.5061 N	0° 55' 16.7234 W	2978.39	
3500.00	31.53	174.11	3460.81	-210.37	21.71	211.49	4.00	475826.05	113206.25	50° 54' 46.0218 N	0° 55' 16.6556 W	3065.38	
3600.00	35.53	174.11	3544.15	-265.30	27.38	266.71	4.00	475827.78	113189.51	50° 54' 45.4792 N	0° 55' 16.5797 W	3148.72	
3653.92	37.69	174.11	3587.43	-297.29	30.68	298.87	4.00	475828.79	113179.77	50° 54' 45.1632 N	0° 55' 16.5355 W	3192.00	Lower Kimmeridge Clay
3700.00	39.53	174.11	3623.44	-325.89	33.63	327.62	4.00	475829.69	113171.05	50° 54' 44.8807 N	0° 55' 16.4960 W	3228.01	
3800.00	43.53	174.11	3698.28	-391.83	40.43	393.91	4.00	475831.76	113150.96	50° 54' 44.2294 N	0° 55' 16.4049 W	3302.85	
3900.00	47.53	174.11	3768.32	-462.80	47.76	465.26	4.00	475833.99	113129.34	50° 54' 43.5283 N	0° 55' 16.3068 W	3372.89	
3992.34	51.22	174.11	3828.43	-532.51	54.95	535.34	4.00	475836.18	113108.10	50° 54' 42.8397 N	0° 55' 16.2105 W	3433.00	Corallian
4000.00	51.53	174.11	3833.21	-538.46	55.56	541.32	4.00	475836.37	113106.28	50° 54' 42.7809 N	0° 55' 16.2022 W	3437.78	
4100.00	55.53	174.11	3892.84	-618.44	63.82	621.72	4.00	475838.89	113081.91	50° 54' 41.9909 N	0° 55' 16.0917 W	3497.21	
4122.55	56.43	174.11	3905.25	-637.03	65.74	640.41	4.00	475839.47	113078.25	50° 54' 41.8072 N	0° 55' 16.0660 W	3509.82	
4200.00	56.43	174.11	3948.07	-701.22	72.38	704.95	0.00	475841.49	113058.69	50° 54' 41.1731 N	0° 55' 15.9773 W	3552.64	
4300.00	56.43	174.11	4003.36	-784.11	80.91	788.27	0.00	475844.09	113031.43	50° 54' 40.3544 N	0° 55' 15.8628 W	3607.93	
4400.00	56.43	174.11	4058.66	-866.99	89.47	871.59	0.00	475846.70	113006.18	50° 54' 39.5356 N	0° 55' 15.7482 W	3663.23	
4500.00	56.43	174.11	4113.95	-949.87	98.02	954.92	0.00	475849.31	112980.92	50° 54' 38.7169 N	0° 55' 15.6337 W	3718.52	
4504.49	56.43	174.11	4116.43	-953.60	98.40	958.66	0.00	475849.42	112979.79	50° 54' 38.6801 N	0° 55' 15.6286 W	3721.00	Oxford Clay
4600.00	56.43	174.11	4169.24	-1032.76	106.57	1038.24	0.00	475851.91	112955.67	50° 54' 37.8981 N	0° 55' 15.5192 W	3773.81	
4700.00	56.43	174.11	4224.53	-1115.84	115.12	1121.57	0.00	475854.52	112930.41	50° 54' 37.0794 N	0° 55' 15.4047 W	3829.10	
4800.00	56.43	174.11	4279.82	-1198.53	123.68	1204.89	0.00	475857.12	112905.16	50° 54' 36.2606 N	0° 55' 15.2901 W	3884.39	
4900.00	56.43	174.11	4335.11	-1281.41	132.23	1288.21	0.00	475859.73	112879.90	50° 54' 35.4419 N	0° 55'		

Markwells Wood 1 – Section and Plan Views

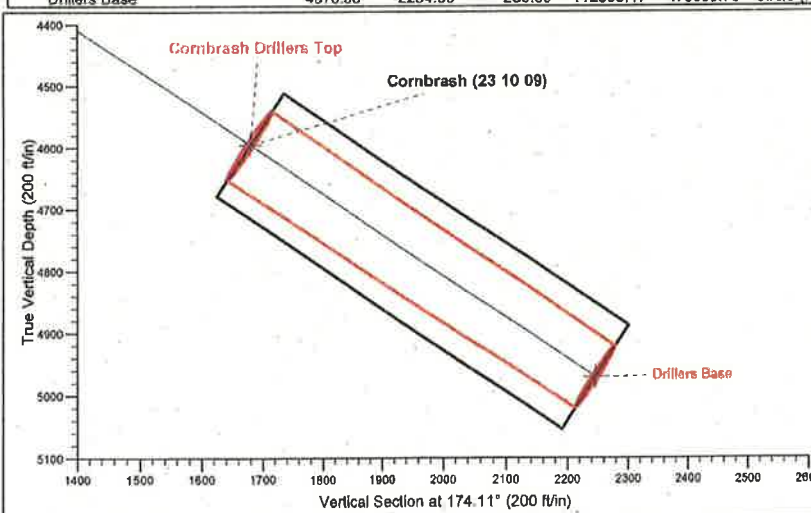


Markwells Wood 1
Rev 9.0 (16 11 10)



Drillers target calculated using Target MWD error model
(2.0 sigma) from surface to TD 6050.0 ft MD

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
Cornbrash (23 10 09)	4595.43	-1671.64	172.50	112761.00	475872.00	Circle (Radius: 100.00)
Cornbrash drillers Top	4595.43	-1671.64	172.50	112761.00	475872.00	Circle (Radius: 66.80)
Drillers Base	4970.86	-2234.69	230.69	112589.47	475889.70	Circle (Radius: 59.05)



Anti Collision

There are no other wells within the vicinity of the Markwells Wood well site and therefore there is no risk of a sub surface collision with existing wells. However, the directional path of the well bore will be monitored at all times using an MWD tool for directional control.

6. Description of Operations, Start & Finish Dates and Final Completion

Timing:

Anticipated spud date	-	3 rd Week Nov 2010
Anticipated duration	-	38 Days (including demobilisation)

Note: The drilling for top hole and conductor setting will be carried out on a normal day rate contract and not on turnkey basis (as stated in Rev1.0). Subsequent to further engineering considerations to reduce tophole losses the 18.5/8" conductor pipe will be set circa 300ft BGL. The total well duration including rig mobilisation will be ca. 46 days.

Description:

Drilling:

The proposed well, Markwells Wood-1, is designed to be drilled in a structurally high position to maximize oil saturation and be as close to the predicted location of the bounding fault as possible while remaining on the northern, up-thrown side. The surface location restriction and down-hole target necessitates a deviated well profile. The hole angle through the reservoir section is programmed to be approximately 56° which, together with proximity to the fault zone, will increase the chance of intersecting reservoir effective fractures.

The Markwells Wood 1 well will be drilled from a newly constructed cellar located at the Markwells Wood well site. The well is designed to penetrate the Great Oolite Formation. Following the mobilisation of the drilling rig an 18.5/8" conductor pipe will be run to circa 300ft BGL and cemented in place. A 17.1/2" hole will then be drilled vertically to a depth of ca. 1730 feet penetrating the top Wealden Beds where 13.3/8" casing will be run and cemented in place. After drilling 10 feet of new hole below the 13.3/8" casing shoe, an FIT to 12.5ppg EMW will be performed. The 12.1/4" hole section will be drilled vertically with LTOBM to a depth of ca. 2798 feet where the well will be kicked off. Hole inclination will be increased from ca. 2798 feet resulting in 56.4 degrees at section TD which will be in the Cornbrash formation at ca. 5380 feet MD. Having recovered the drilling assembly a set of logs will be run in the 12.1/4" hole section before 9.5/8" casing is run and cemented. Before drilling out of the 9.5/8" casing shoe the well will be displaced to a WBM system. A 30 feet core length is plan to be cut below the 9 5/8" casing shoe in the Great Oolite reservoir, the core plan is contingent upon good hole conditions and the core cutting depth will be finalised based on the cuttings samples, mud log data and other related The 8 1/2" bit assembly will be re-run and Oolite reservoir section will be drilled maintaining a hole inclination of 56.4 degrees and an azimuth of 174.11 degrees. Well TD is planned for ca. 6,009 feet. Having recovered the assembly a set of logs will be run to evaluate the reservoir. Based on the results and analysis of the logs, cut core a formation pressure measurement and formation testing (downhole reservoir sample collection) programme may be carried out.

Dependent of log results, (contingent pressure measurement and formation sample collection) the well will be tested, for which a separate notification will be submitted.

Data Acquisition

Cutting Sampling

sample interval	wet sample	dry sample	other
17½" hole	2 samples every 10 ft	2 samples every 10 ft	-
12¼" hole	2 samples every 10 ft	2 samples every 10 ft	-
8½" Reservoir Section	2 samples every 5 ft	2 samples every 5 ft	

Electric logging Program:

12-1¼" hole – GR (to surface), Sonic, Density suite, Induction suite.

8-1½" hole - GR, Sonic (Array Sonic), Density – Neutron suite, Resistivity suite.
Formation Micro-Scanner (Bore-hole image and Dipmeter mode)

Coring Program:

1 x 30 foot core is plan to be cut within the Great Oolite formation. This plan will be contingent upon hole conditions and mud logs and actual pressure data when the well is actually being drilled.

Formation Testing

Depending on electric logs and coring results formation testing may be carried by downhole pressure measurement and fluid sample collection programme.

Well Testing

Dependant on log / core results and formation testing the well will be tested. A separate notification will be presented to cover well testing.

Outline Drilling Program:

Days Versus Depth Projection: Markwells Wood 1

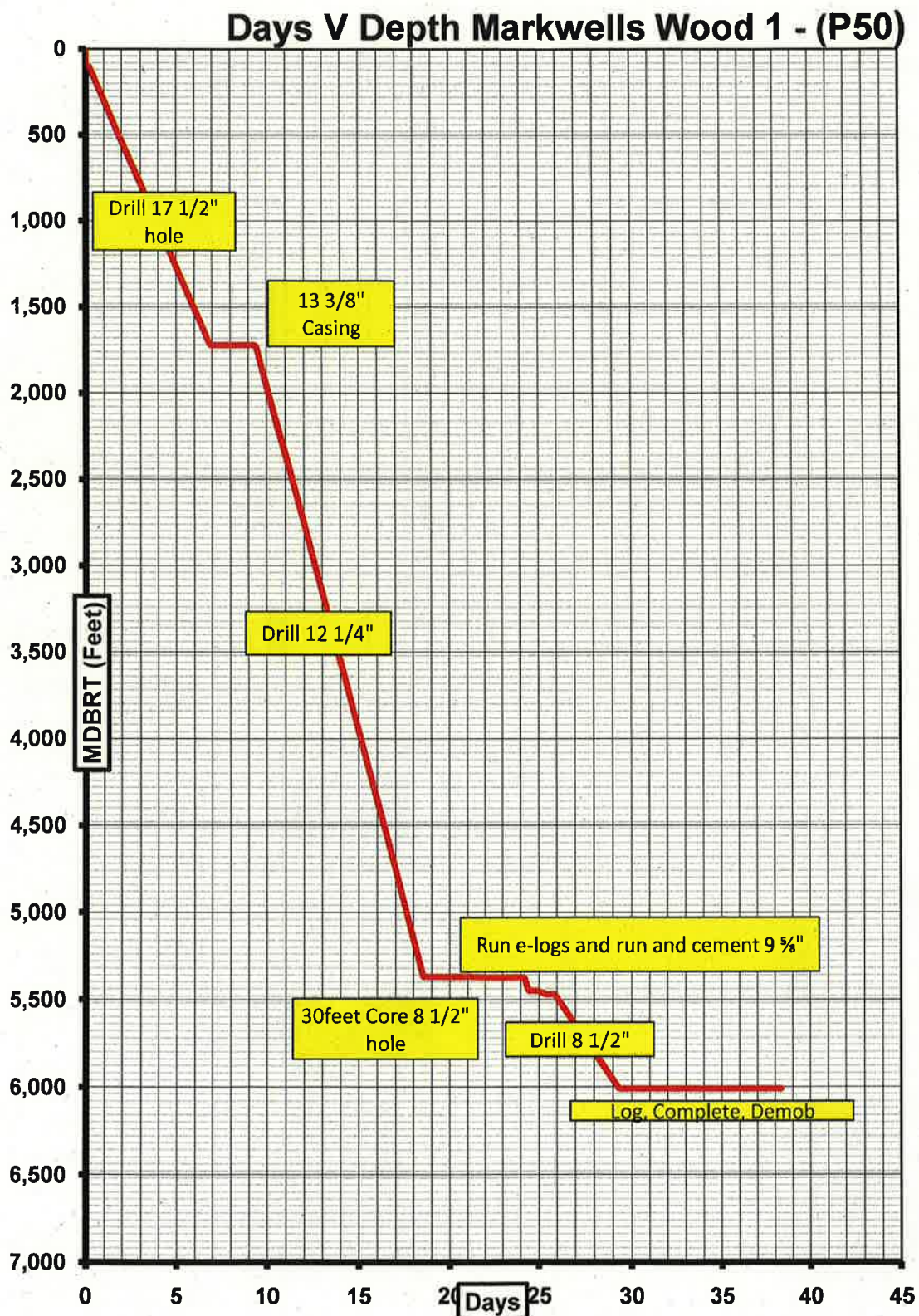
WELL DURATION for A.F.E.

P 50 Factor

0.15

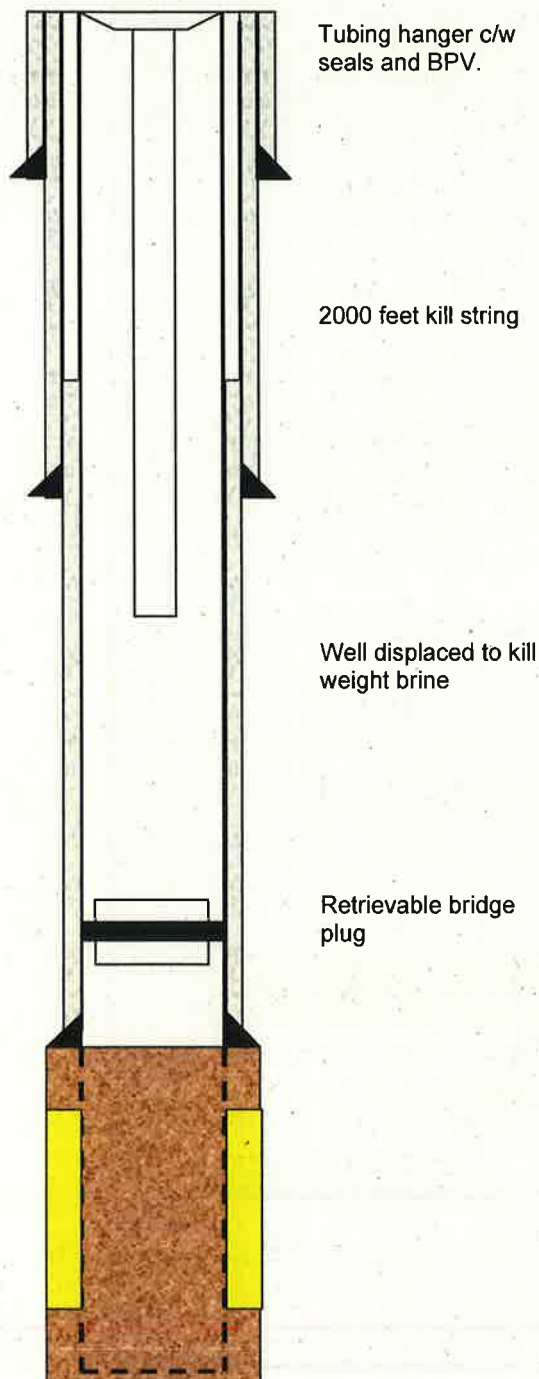
	Depth/	P10	P10	P50 AFE	P50 AFE
Activity	ft	Hours	Cum Days	Hours	Days
Well Operations Start	0	0.0	0.0	0.0	0.00
Move Rig On To Location	0	0.0	0.0	0.0	0.0
Acceptance Test	0	0.0	0.0	0.0	0.0
Install Mousehole	0	0.0	0.0	0.0	0.0
Drill / set 18.5/8" (Turnkey operation)	100	0.0	0.0	0.0	0.0
Make up and run 17.1/2" BHA (Day rate)	100	4.0	0.2	4.6	0.2
Drill 17.1/2" hole (potential losses)	1,720	140.0	6.0	161.0	6.9
Circ, Wiper Trip, Circ, POOH	1,720	5.0	6.2	5.8	7.1
Run 13.3/8" csg c/w starter head	1,720	8.0	6.5	9.2	7.5
Run inner string	1,720	4.0	6.7	4.6	7.7
Circ and cement casing (top up job)	1,720	5.0	6.9	5.8	8.0
Nipple Up & Test BOPs	1,720	15.0	7.5	17.3	8.7
Make up and run 12.1/4" BHA	1,720	8.0	7.9	9.2	9.1
Displace to OBM	1,720	6.0	8.1	6.9	9.3
Drill 10 ft hole, circ, FIT	1,730	2.0	8.2	2.3	9.4
Drill 12.1/4" hole	5,370	190.0	16.1	218.5	18.5
Circ, Wiper Trip, Circ, POOH	5,370	12.0	16.6	13.8	19.1
Rig up and run logs	5,370	18.0	17.4	20.7	20.0
Run and land 9.5/8" csg	5,370	16.0	18.0	18.4	20.7
Circ and cement casing	5,370	6.0	18.3	6.9	21.0
Wait on cement	5,373	24.0	19.3	27.6	22.2
Lift BOP and install slip/seal assy	5,373	4.0	19.5	4.6	22.4
Test slip/seal and BOP	5373	8.0	19.8	9.2	22.8
Make up and run 8.1/2" BHA	5373	10.0	20.2	11.5	23.2
Displace to WBM / backload OBM	5373	16.0	20.9	18.4	24.0
Drill shoe track	5373	4.0	21.0	4.6	24.2
Drill 8.1/2" hole	5450	5.0	21.3	5.8	24.4
Circ clean, wiper, circ, POOH	5450	10.0	21.7	11.5	24.9
Run in core head and cut 30 feet core.	5480	10.0	22.1	11.5	25.4
Break core , POOH and recover core.	5480	10.0	22.5	11.5	25.9
Run in 8.1/2" BHA, dress core interval and drill to Terminal Depth	6009	72.0	25.5	82.8	29.3

	Depth/	P10	P10	P50	P50
Activity	ft	Hours	Cum Days	Hours	Days
Circulation clean, wiper trip, circ, POOH	6009	16.0	26.2	18.4	30.1
Rig up and run logs	6009	24.0	23.1	27.6	31.2
Run completion	6009	24.0	24.1	27.6	32.4
Nipple down BOP & nipple up tree	6009	16.0	24.8	18.4	33.2
Clean Pits	6009	12.0	25.3	13.8	33.7
Demob & Move Rig	6009	96.0	29.3	110.4	38.3



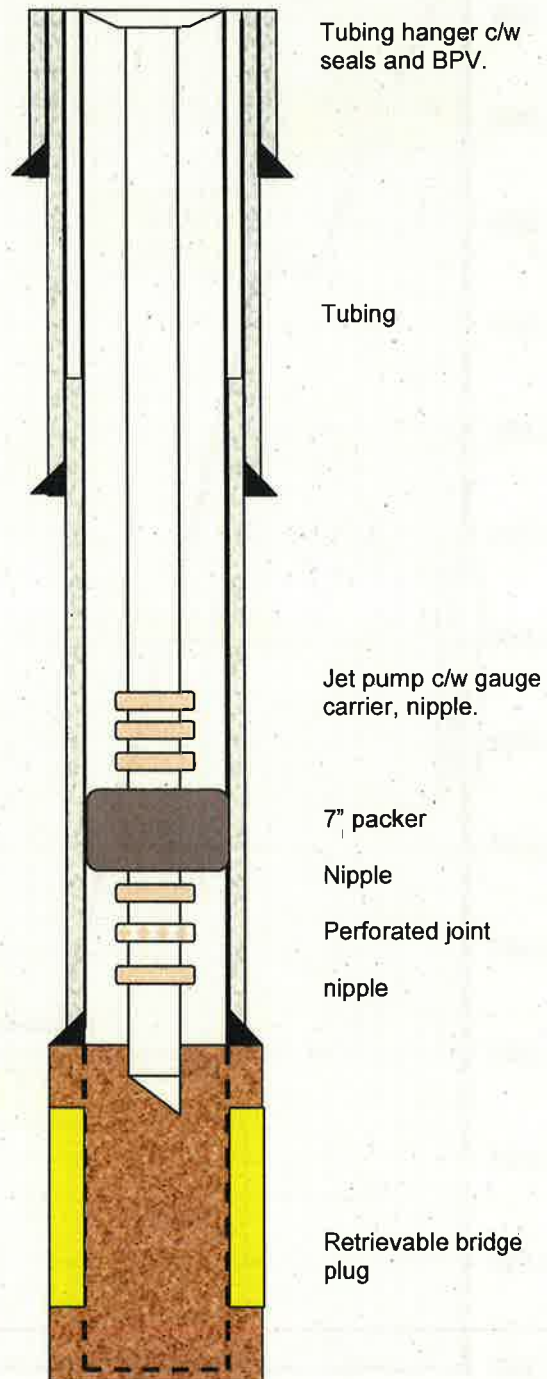
Completion / Suspension Schematic (Theoretical)

Suspension Schematic



Theoretical Jet Pump Completion

(for illustration only – other suitable design/s ongoing)



7. Description of activities involving risk of release of fluids and such hazards.

- **Shallow Gas** – No shallow gas is anticipated in the Markwells Wood 1 well. No offset wells have encountered this.
- **Displacing Wellbore Fluids** – The programmed drilling fluids have been specified formulated to control any formation pressures. Any displacement will be fully monitored for losses or gains and done with BOP controls in place.
- **Swabbing on Connections / Tripping** – Standard oilfield drilling practices, including precautions for cleaning and tripping in high angle wells will be in place. All trips will be monitored for gains and the well bore will be monitored at all times it is open.
- **Abnormal Pressures** – No abnormal pressures are anticipated, as supported by the offset data below.
- **Potential losses** – Losses are anticipated whilst drilling through the surface Chalk formations, which are known to highly fractured. In addition, losses are also anticipated in the Cornbrash and Oolite reservoir. All necessary suitable LCM materials will be held on location.
- **H2S / CO2** – No H2S or CO2 is anticipated.

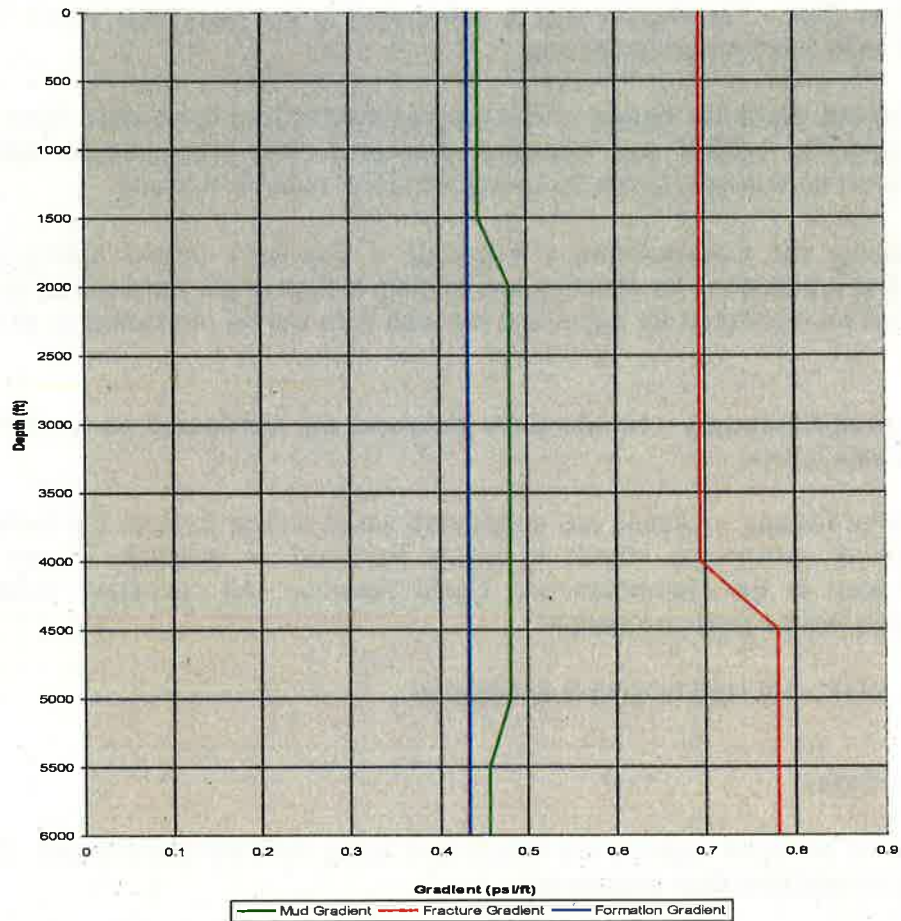
Pressure Data:

No abnormal pressure regimes are anticipated during the drilling of the well. Offset data indicates normal formation pressures.

FIT Data from offset wells:

Parameter	Horndean-1A		Horndean-B2/B2z		Singleton 1	
Date	Dec 1982	Jan 1983	Jan 1995	Jan 1995	Dec 1988	Dec 1988
Depth (ft BRT)	1364	3821	1595	4669	1317	6506
Casing Size	13 $\frac{3}{8}$ "	9 $\frac{5}{8}$ "	9 $\frac{5}{8}$ "	7"	13 $\frac{3}{8}$ "	9 $\frac{5}{8}$ "
Shoe Depth (ft BRT)	1336	3786	1580	4516 (TVD)	1292	6496
Pump Pressure (psi)	NR	1150	NR	NR	NR	830
Mud Weight (ppg)	NR	9.2	NR	NR	NR	9.6
Leak off pressure at formation (psi)	930	2959	985	2940	873	4070

Anticipated Pressure Profile:



Notwithstanding the above:

- Full well control equipment as detailed in section 4 of this document will be used.
- Stab-in valves will be located on the drill floor at all times. Crossovers to the relevant threads will also be available on the rig floor.
- Gas detectors will be located in the drilling areas, mud pits, shale shaker header box and bell nipple.
- A risk assessment of all programmed activities will be carried out prior to drilling.
- Regular well control drills will be conducted.
- Weekly safety meetings will be held throughout the operation.

8. In the Case of a Well to be Drilled

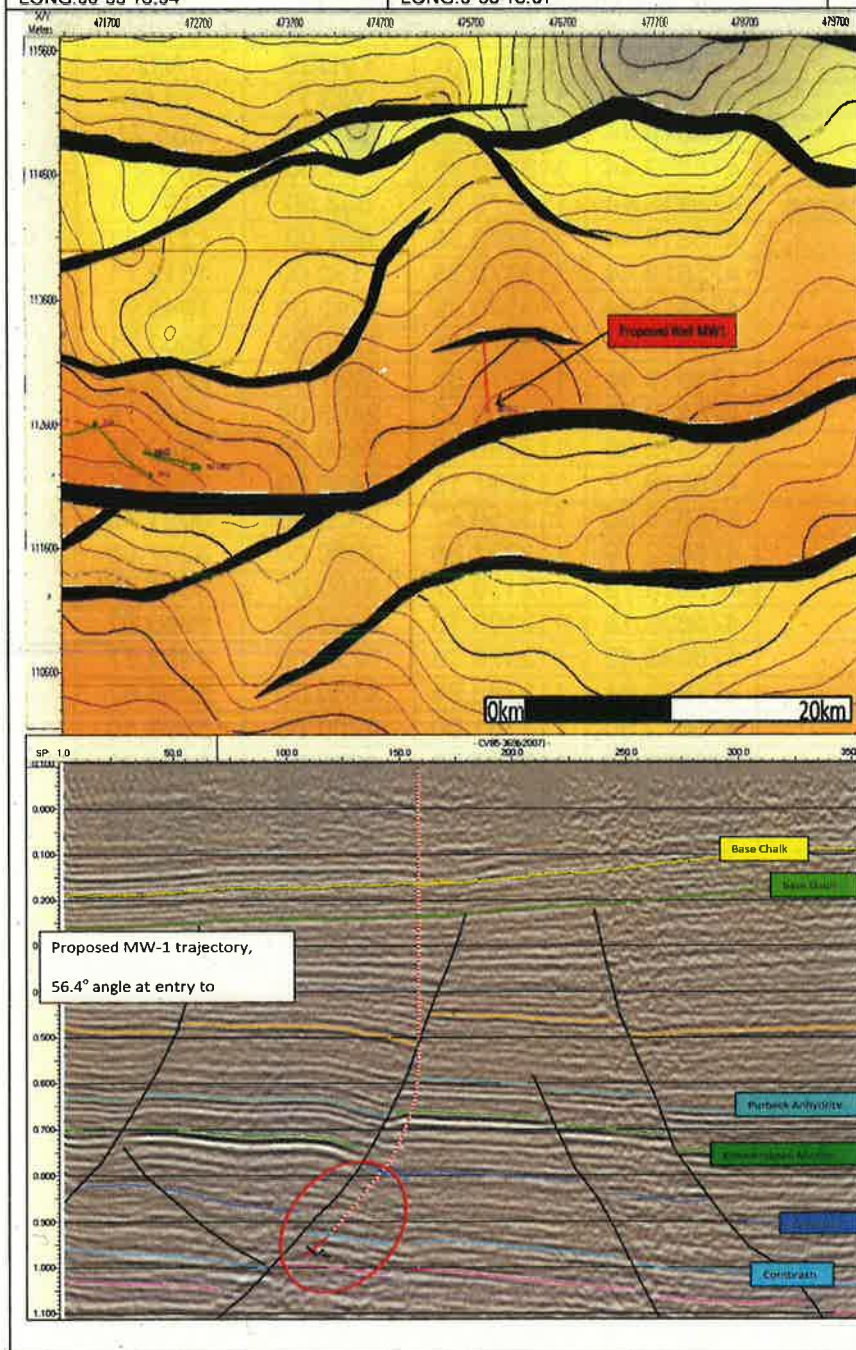
Geological Strata:

RT to MSL = 394.91 feet (Ref: Drillmaster and Directional Plan Rev 7.0)

Surface	Easting	Northing	TVDSS	MD
Upper Chalk	475819.44	113270.35	-383.71	13.80
Top Middle Chalk	475819.44	113270.35	272.00	655.71
Top Lower Chalk	475819.44	113270.35	494.00	877.71
Base Chalk/ op Upper Greensand	475819.44	113270.35	808.00	1191.71
Top Gault Clay	475819.44	113270.35	887.00	1270.71
Lower Greensand	475819.44	113270.35	1130.00	1513.71
Top Wealden Beds	475819.44	113270.35	1262.00	1645.71
Main Fault – Upper Purbeck	475819.44	113270.35	2220.00	2603.71
Middle Purbeck	475819.44	113270.35	2287.00	2670.71
Lower Purbeck	475819.52	113269.55	2403.00	2786.76
Purbeck Anhydrite	475819.66	113268.19	2459.00	2842.95
Portland Beds	475819.77	113267.15	2490.00	2874.14
Upper Kimmeridge Clay	475820.56	113259.47	2635.00	3021.40
Middle Kimmeridge Clay	475822.79	113237.86	2860.00	3257.69
Lower Kimmeridge Clay	475828.79	113179.77	3192.00	3642.20
Corallian	475836.18	113108.10	3433.00	3980.62
Oxford Clay	475849.42	112979.79	3721.00	4492.77
Kellaways Beds	475869.64	112783.84	4150.00	5268.67
Cornbrash	475872.00	112761.00	4200.00	5359.10
Forest Marble	475873.18	112749.58	4225.00	5404.31
Great Oolite	475873.41	112747.30	4230.00	5413.36
Fullers Earth	475884.73	112637.67	4470.00	5847.43
Proposed TD	475887.08	112614.84	4547.00	6009

DECC PROSPECT SUMMARY SHEET

OPERATOR: Northern Petroleum Plc	LICENCE/ROUND PEDL 126	WELL INTENT (LEAVE BLANK)	WELL NAME & QUAD/BLOCK Markwell's Wood-1, L99/01- MW1
SURFACE LOCATION LAT: 50°54'48.09" LONG: 00°55'16.94"	BOTTOM HOLE LOCATION LAT: 50°54'26.84" LONG: 0°55'13.97"	TARGET REF: Great Oolite	STRATIGRAPHIC COLUMN-As below



MARKWELL'S WOOD-1: GEOLOGICAL PROGNOSIS

AGE	FORMATION	LITHOLOGY	PROPOSED DEPTHS	DEPTH METER PL
CRETACEOUS	Upper Chalk	100 METER 100 TISS		100
	Lower Chalk	100 METER 100 TISS		100
	Base Chalk	100 METER 100 TISS		100
	Lower Oolite	100 METER 100 TISS		100
	Lower Oolite	100 METER 100 TISS		100
	Lower Oolite	100 METER 100 TISS		100
	Lower Oolite	100 METER 100 TISS		100
	Lower Oolite	100 METER 100 TISS		100
	Lower Oolite	100 METER 100 TISS		100
	Lower Oolite	100 METER 100 TISS		100
JURASSIC	Upper Jurassic	100 METER 100 TISS		100
	Lower Jurassic	100 METER 100 TISS		100
	Base Jurassic	100 METER 100 TISS		100
	Lower Jurassic	100 METER 100 TISS		100
	Lower Jurassic	100 METER 100 TISS		100
	Lower Jurassic	100 METER 100 TISS		100
	Lower Jurassic	100 METER 100 TISS		100
	Lower Jurassic	100 METER 100 TISS		100
	Lower Jurassic	100 METER 100 TISS		100
	Lower Jurassic	100 METER 100 TISS		100
MIDDLE	Upper Middle	100 METER 100 TISS		100
	Lower Middle	100 METER 100 TISS		100
	Base Middle	100 METER 100 TISS		100
	Lower Middle	100 METER 100 TISS		100
	Lower Middle	100 METER 100 TISS		100
	Lower Middle	100 METER 100 TISS		100
	Lower Middle	100 METER 100 TISS		100
	Lower Middle	100 METER 100 TISS		100
	Lower Middle	100 METER 100 TISS		100
	Lower Middle	100 METER 100 TISS		100

18 5/8" 100 ft

13 3/8" 1730 ft

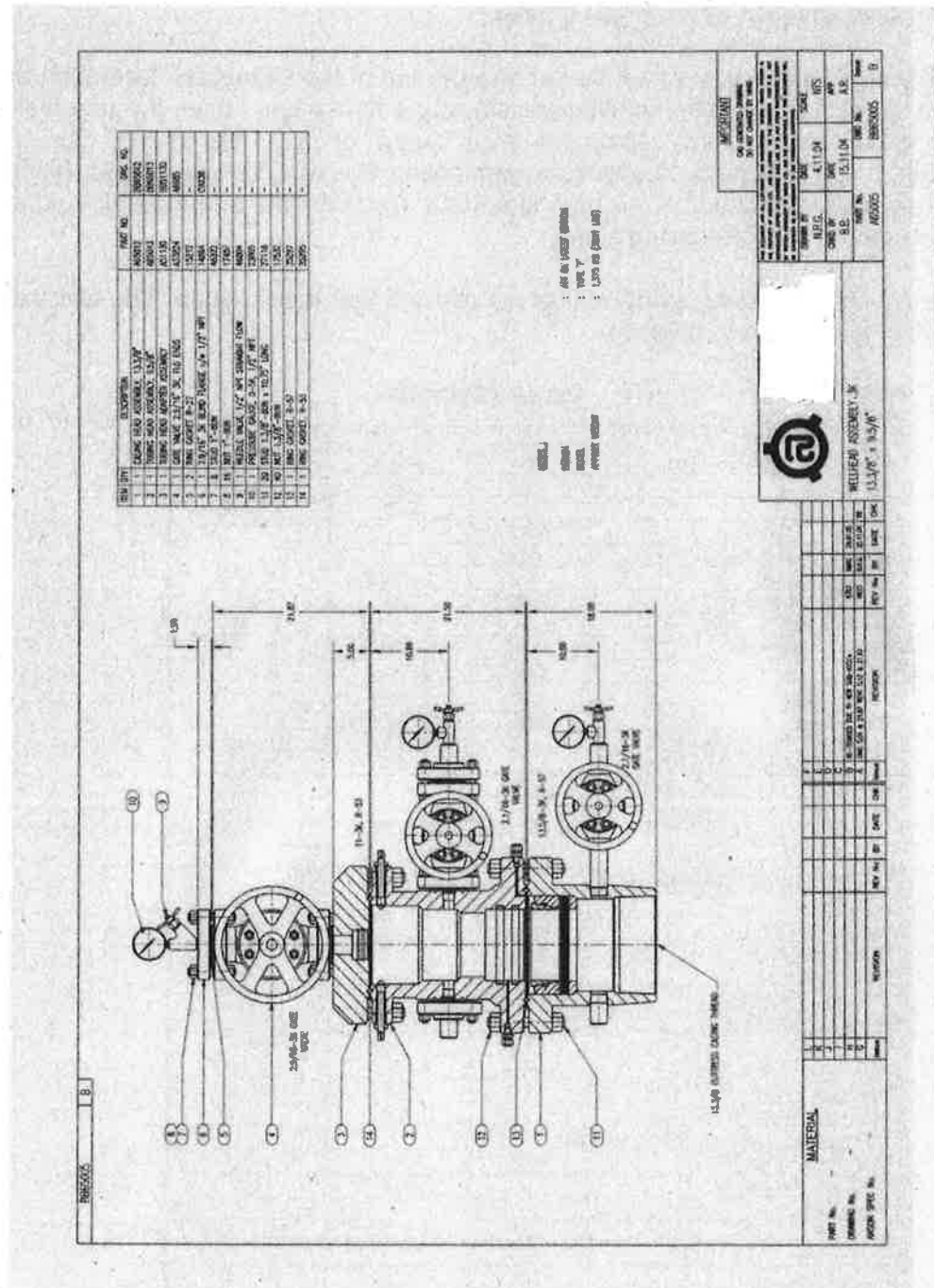
9 5/8" 5370 ft

TO 5940 ft

Particulars of Well Design

Wellhead – The wellhead to be utilised on this well is supplied by two bowl 13.5/8" by 9.5/8" x 3k wellhead system.

It is a



Casing Design

Surface Conductor – An 18.5/8" conductor pipe will be set and grouted to surface to a depth of approximately 300 feet BGL (325 ft BRT)

Surface Casing – 13.3/8" casing will be set into the Wealden Beds at a depth of ca. 1730 feet providing isolation of the Chalk aquifer.

Production Casing – 9.5/8" casing will be set into the top of the Cornbrash formation at a depth of ca. 5381 feet, thereby isolating the claystone formations above the reservoir interval. The lower section of this casing string will consist of 2,500 feet of BTC casing, with the upper 2,500 feet being a premium connection thread. The use of gas block slurry will be considered based on the mud logs data, mud returns, and E-wireline logs and core when cementing this casing string.

8.1/2" Hole – No liner or casing string will be run in the 8.1/2" hole section. The well will be completed as a barefoot completion.

Well: Markwells Wood 1			
Casing Design			
Ref RTE			
Hole Diameter:	in	17 1/2	12 1/4
Elevation: RTE - GL	m	4.20	4.20
Shoe MD:	m	525	1637
Shoe TVD:	m	525	1399
Top of Liner MD	m		
Top of Liner TVD	m		
Casing Size:	in	13 3/8	9 5/8
Casing Weight:	lb/ft	68	47
Casing ID:	in	12.415	8.681
Drift Diameter	in	12.259	8.525
Burst:	psi	3,450	6,870
Collapse:	psi	1,950	4,760
Tensile:	lbs	1,069,000	1,086,000
Casing Connection	-	BTC	N VAM
Casing Grade (minimum)	-	J55	L80
TD Mud Weight Equivalent	ppg	8.5	8.5
TD Pore Pressure	psi	761	2029
Casing Capacity:	bbbls/m	0.4914	0.2403
Casing / OH Capacity:	bbbls/m	0.4061	0.1831
Operational Parameters			
Mud Type:	-	WBM	OBM
Mud Weight:	ppg	8.5	9.0
Pressure test:	psi	2500	3000
Max. Dogleg:	°/30m	0	4
Running Speed:	m/min	12	12
Burst Pressure:			
Gas to surface press:	psi	1959	2093
pressure test @shoe	psi	2500	3036
Design Factor-GTS	-	1.8	3.3
Design Factor -PTS	-	1.4	2.3
Collapse: casing evacuated			
Collapse pressure:	psi	232	655
Design Factor	-	8.4	7.3
Tensile:			
Self weight:	lbs	117,132	252,437
Pressure Test Load:	lbs	302,638	177,562
Shock Load	lbs	22,968	16,031
Cement Load:	lbs	51,848	56,505
Bending Load:	lbs	0	113,999
Available Overpull:	lbs	597,382	485,497
Design Factor	-	2.3	1.8

Cementing Requirements

18.5/8" conductor pipe – grouted to surface.

13.3/8" surface casing – cemented to surface (lead slurry using inner string cementing technique).

9.5/8" production casing – Cemented back up inside the 13.3/8" casing shoe.

Kick Tolerance

Note: the spreadsheet is in meters.

ALL DEPTHS IN Metres				
Hole Size	17 1/2	12 1/4	8 1/2	in
Casing Size	13 3/8	9 5/8	8 1/2	in
MD Casing Shoe / Window	525	1,637	1,820	m
TVD Casing Shoe	525	1,399	1,495	m
FIT Mud Wt Equiv	12.5	12.5	12.5	ppg
Mud Weight for FIT	9.0	8.5	8.5	ppg
NEXT SECTION				
Hole Diameter	12 1/4	8 1/2	6	in
Measured Depth (Top Pay, Worst Case)	1,637	1,820	0	m
TVD	1,399	1,495	0	m
Hole Angle Below Shoe	1	56	0	
Average Hole angle above TD	56	56	0	
Mud Weight Drilling	9.5	8.5	0.0	ppg
Formation Pressure MWE	8.1	8.1	0.0	ppg
BHA OD	8	6 1/2	0	in
Drill Pipe OD	5	5	0	in
Length BHA	100	100	0	m
Frac (FIT) Pressure	1120	2984	3188	psi
Surface Pressure for FIT	313	955	1020	psi
Temp Deg C at Shoe	29	53	56	°C
Temp Deg C at TD	53	56	15	°C
Gradient Mud =mwX 0.052	1.62	1.45	0.00	psi/m
Gas Gradient at Shoe	0.073	0.196	0.209	psi/m
Gas Gradient at TD	0.127	0.136	0.000	psi/m
Formation Pressure psi	1933	2066	0	psi
Hydrostatic Pressure at TD	2268	2168	0	psi
Overbalance at TD	334	102	0	psi
Req'd HH Below Shoe bit at TD	814	GTS	GTS	psi
TVD TD to Shoe	874	GTS	GTS	m
TVD Gas below Shoe	390	GTS	GTS	m
MD Gas below Shoe	390	GTS	GTS	m
Kick Volume When Gas at Shoe Opposite Drill Pipe	155.4	GTS	GTS	bbl
Minimum Kick Tolerance (Volume Influx For Above)	97.1	GTS	GTS	bbl
TVD Gas at TD	404	GTS	GTS	m
MD Gas at Shoe	496	GTS	GTS	m
Volume around BHA	27.4	9.6	0.0	bbl
Volume around Drillpipe	157.8	GTS	GTS	bbl
Maximum Kick Tolerance, Shut in Kick at TD)	185.3	GTS	GTS	bbl

Pressure Testing

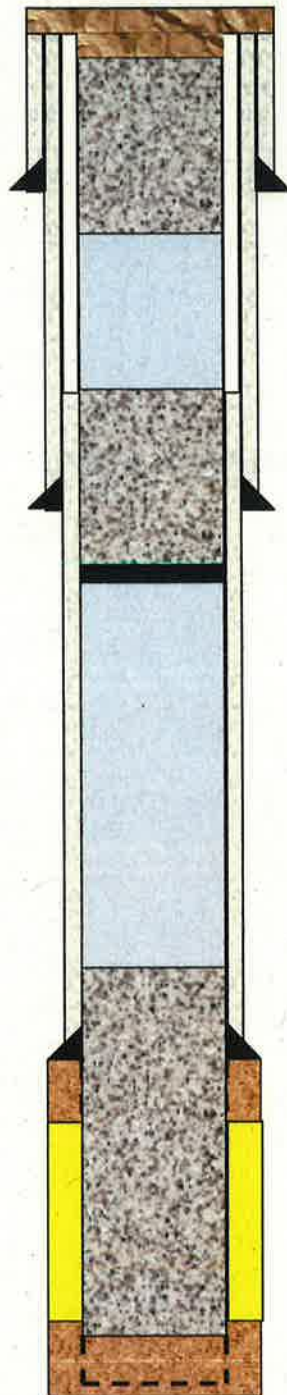
Item	Low Pressure	High Pressure
13 7/8" casing	250psi / 5mins	2,500psi / 10mins
9 5/8" casing	250psi / 5mins	3,000psi / 10mins
Wellhead	250psi / 5mins	3,000psi / 10mins
BOP: Annular	250psi / 5mins	3,000psi / 10mins
BOP: Rams	250psi / 5mins	3,000psi / 10mins
Choke manifold	250psi / 5mins	3,000psi / 10mins
Kill line	250psi / 5mins	3,000psi / 10mins
Standpipe, Kelly cocks, swivel, associated hoses and lines	250psi / 5mins	3,000psi / 10 mins

9.0 In the Case of an Existing Well

The Markwells Wood 1 well is a new well drilled from surface and therefore no existing well data is applicable.

10. Abandonment (Theoretical)

The schematic below represents the way in which the well would be abandoned should it be deemed non commercial.



Surface cement plug (500 feet)

18-5/8" conductor shoe @ 300 feet

500 feet cement plug weight tested

13-3/8" casing shoe @ 1730 feet

Permanent bridge plug @ ca. 1920 feet

9-5/8" casing shoe @ 5380 feet

Micro bond cement plug below, across and above Oolite up inside 9-5/8" casing. Weight and pressure tested.

8-1/2" open hole through the reservoir

TD open hole @ 6009 feet MD

4

Jennifer Donaldson

From:
Sent: 30 December 2010 09:12
To:
Subject: FW: Markwells Wood Suspension Programme
Attachments: 2010-12-22 Drlg Prog addendum 2_Markwells Wood 1 Rev 1.2.docx

Material change from Northern Petroleum [L99/01-MWA]

Cheers

From:
Sent: 23 December 2010 15:43
To:
Cc:
Subject: Markwells Wood Suspension Programme

Following drilling to TD and logging (still underway), Northern wish to suspend the well pending a well test programme which will be worked up in the New Year using another rig.
This programme in effect replaces the original P&A section included in the original submission
Regards

This e-mail has been scanned for all viruses by Star. The service is powered by MessageLabs. For more information on a proactive anti-virus service working around the clock, around the globe, visit:
<http://www.star.net.uk>

This email was received from the INTERNET and scanned by the Government Secure Intranet anti-virus service supplied by Cable&Wireless Worldwide in partnership with MessageLabs. (CCTM Certificate Number 2009/09/0052.) In case of problems, please call your organisation's IT Helpdesk.
Communications via the GSi may be automatically logged, monitored and/or recorded for legal purposes.



NORTHERN PETROLEUM (GB) LTD

MARKWELLS WOOD-1 **PEDL 126**



Markwells Wood-1 Appraisal Well

Addendum 2 to Drilling Programme **Temporary Suspension of the Well.**

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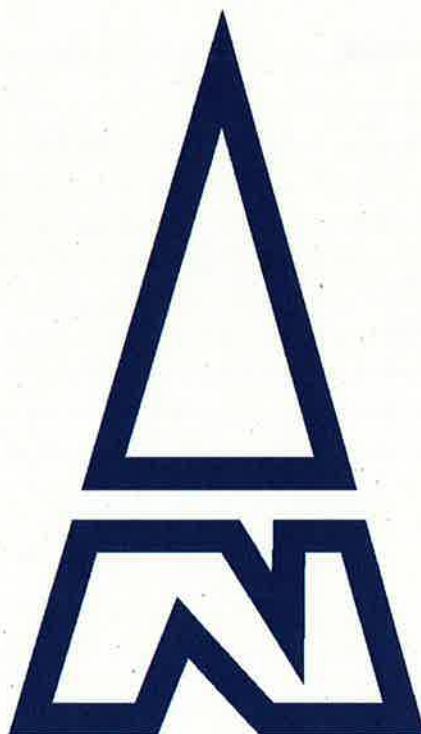
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SECTION 1 – SUSPENSION ACTIVITIES



INTRODUCTION

This addendum replaces addendum # 1 (Running Completion) to the programme.

The Markwells Wood – 1 well (MW-1) is to be suspended using the Larchford Drillmaster 1 rig immediately after the end of drilling and evaluation operations.

The suspension activities are an addition to the scope of work under the original Drilling Programme. This addendum provides the programme for suspending the well.

Operations at the Wellsite will continue under the management and safety systems as defined in the original Drilling Programme and Health and Safety Document.

The Northern Petroleum Drilling Supervisor will continue to have overall responsibility for downhole operations.

In addition Service Company Representatives will be on site and will be responsible for:-

- The safe operation and installation of their equipment as per their company's approved operating procedures
- Checking their equipment promptly and informing the Northern Petroleum Drilling Supervisor of their equipment status and any equipment shortfalls
- Obtaining the relevant work permits from the Northern Petroleum Company Rep.

All questions or concerns relating to this Programme should be addressed to:

Name:		
Position:		
Tel:		
Email:		

SUSPENSION OBJECTIVES

- To provide a means to suspend the well with two tested barriers.
- To execute this programme safely, with no HSE incidents or environmental spills
- To execute this programme with no equipment failures.
- To execute the programme on time and on budget.



WELL STATUS

8 ½" hole has been drilled to TD at 5988 ft. md.

The well will have been logged and evaluated for hydrocarbons. Pressure data may become available from the logging programme.

H₂S and CO₂ are not expected to be present.

9 ⅝" casing has been set into the top of the Cornbrash at 5443 ft.

An 11" 3K NOV wellhead spool has been installed on the top of the 9 ⅝" casing.

The 11" Wellhead and the 9 ⅝" casing has been tested to 3000 psi.

The well is to be filled with suspension brine. The density of the suspension brine will be ca. 8.9 ppg or as required depending on drilling results and pressure readings from logging operations.

The Larchford Drillmaster 1 is rigged up over the well complete with BOPs tested to 3000 psi. Pipe rams are dressed with 2 ⅞" – 5" VBRs.

SUSPENSION OVERVIEW

The well will be suspended with a downhole bridge plug set at ca. 2,200 ft. and pressure tested to 3000 psi. This bridge plug will be the first tested barrier.

A kill string complete with an X nipple and tubing hanger with a backpressure valve (BPV) profile will be run to ca. 600 ft. The kill string will be plugged either with a plug and prong seated in the X nipple, or with a BPV in the tubing hanger. Both the tubing hanger and the tubing string will be pressure tested to 3000 psi. This will be the second tested barrier while the BOPs are removed.

After the BOPs have been removed a tubing bonnet and suspension valve will be installed on the wellhead and tested to 3000 psi. The wireline plugs may be removed, in which case the tubing bonnet and suspension valve will become the second tested barrier.



SUSPENSION STRING

	2 7/8" Landing joint (to be retrieved)
Sub Assembly 3	NOV 11" X 2 7/8" tubing hanger with BPV profile & BPV installed, 2 7/8" EUE pup joint
Tubing	2 7/8" 6.5 ppf. K55 EUE Tubing (20 joints)
Sub Assembly 2	2 7/8" EUE 6.5 lbs. K55 / L80 Pup Jt. 2.313 X nipple profile 2 7/8" EUE 6.5 lbs. K55 / L80 Pup Jt.
Tubing	2 7/8" 6.5 ppf. K55 EUE Tubing (1 joint)
Sub Assembly 1	2 7/8" 6.5 ppf. K55 EUE pup joint with WEG

In the event that a 2.313 nipple is not available, sub-assemblies 1 and 2 can be substituted with a 1.875 nipple, 2 3/8" tubing and pup joints, and with a 2 3/8" X 2 7/8" crossover above.

SUSPENSION PREPARATION

1. The Northern Petroleum Drilling Supervisor is responsible for ensuring proper preparation. He should personally witness all measurements and checks, and have them verified by the appropriate service company or contractor representative.
2. Visually inspect the sub-assemblies to ensure that they have not been damaged during transport. Check the tubing and crossover threads.
3. Ensure all tubing joints have been drifted with the appropriate API drift. Drift all sub-assemblies to 2.347" (2 7/8" assemblies), or to the profile ID.
4. Measure each module/ module component (Lengths and O.D).
5. Measure the tubing to be used as a kill string and prepare the tubing tally.
6. Check for damage to seals and threads and drift tubing hanger and running tool.
7. Check the tubing bonnet, nuts, studs and seal ring.
8. Check the suspension valve nuts, studs and seal ring.
9. Ensure copy of certification is available for all components, including pressure tests charts of individual valves. Check off the suspension modules against the module release sheets and ensure each component part number and serial number has been recorded.
10. Make a document package of the certificates, record of part numbers / serial numbers and tallied lengths.



11. Check that all required wireline running and pulling tools are of the correct size and on site and that adequate re-dress kits are available.
12. Check that all required plugs, including the tubing hanger BPV are dressed and ready to run.
13. The relevant well control crossovers to be made up to the rig TIW valve and on the rig floor in case of back-flow.
14. Check the distance from the top of the 11" wellhead spool to the drill floor and ensure that the tubing hanger landing joint is of a suitable length to work with at the drill floor (ca. 3 ft. stick up).
15. Make up the required landing joint and make a dummy run with tubing hanger and landing joint. The tubing hanger will have been shipped made up with a EUE pup joint below and the 2 7/8" EUE tubing hanger running tool above. This will have been pressure tested on makeup.
16. Land the tubing hanger in the wellhead. Make sure it is properly landed by checking the engagement of the hold down screws. Mark the landing joint at the floor with the hanger in place.
17. Ensure the hold down bolts have been backed out and retrieve the tubing hanger sub-assembly, standing it back for pick up at the appropriate time.
18. Ensure a casing scraper, brush and gauge ring with appropriate crossovers are available for use in the event the wireline gauge ring will not pass.

DISPLACEMENT TO SUSPENSION BRINE.

1. In the pits prepare sufficient suspension brine to displace the hole plus a small excess. Estimated requirement is 500 bl, to be verified on rig.
2. The brine to be made up as follows:

Function	Product	Concentration	Estimated Quantity
Base Fluid	Produced water or 8.8ppg NaCl brine	1 bbl	500 bbl
Clay Inhibition	KCl	10 ppb (3%)	5000 lb / 2267 Kg
Biocide	Safecide	0.5 ltr/ bbl	250 litres
Oxygen Scavenger (Optional)	Safescav NS	0.04 ltr/Bbl	20 litres
Corrosion Inhibitor (Optional)	Safecor 220X	1.0 ltr/bbl	500 litres

3. Make up BHA consisting of:



- a. 8 ½" drift mill
 - b. Bit sub
 - c. 2 X 6 ½" Drill collars
 - d. Jars
 - e. 1 X 6 ½" drill collar
 - f. 1 X HWDP
 - g. 5" Drill pipe to place scraper at just above to just above the 9 ⅝" casing landing collar at 5363'.
 - h. Casing scraper
 - i. Crossover as required
 - j. Casing brush if available
 - k. 5" drill pipe to surface.
4. Take care not to catch the tools in the BOP when tripping past and exercise care when running in hole in case any become jammed in a tight section of casing. Pull up to appropriate depth to scrape casing. RIH, break circulation and tag bottom.
 5. Take extra care to scrape the packer setting area (5343') 5 times. Circulate minimum of 1 BU.
 6. Tag bottom again and displace the hole to suspension brine while rotating the pipe. Note that the fluid in the hole and the suspension brine are completely compatible. Pipe rotation and an over displacement of ca. 40 bbl. will ensure an effective displacement and no spacers are required.
 7. POOH.

SUSPENSION PROCEDURE

1. The Driller is to monitor the trip tank volumes as per Northern Petroleum procedures.
2. Hold a pre job safety meeting with all participants prior to suspending the well.
3. Rig up to run wireline. E-Line is preferred as the setting wire, but the bridge plug may be set on slick line. Consult the supplier for the preferred method. The Eline / wireline can be run through the rig BOPs without a lubricator.
4. Make a gauge ring run in the 9 ⅝" casing to 2800 ft. POOH with the wireline.
5. Make up the bridge plug to the wireline setting tool, RIH to ca. 2,200 ft. Position the bridge plug in the middle of a casing joint using the CCL if available, otherwise based on the casing tally. After setting the bridge plug, providing there is no risk to the running tool becoming



stuck on the bridge plug, pull up and then lower slowly to tag and confirm the bridge plug is set in the casing

6. Set the bridge plug and POOH with the wireline.
7. Line up the test pump to the tubing by casing annulus. Ensure that the 13 $\frac{3}{8}$ " Annulus valve is open. Close the blind rams and using the test pump pressure test the bridge plug to 3000 psi. Record pressure vs. volume and watch carefully for any leaks from the blind rams and surface leaks around the wellhead.
8. Open the blind rams and recover the wear bushing.

Option A: Using BPV in the Tubing Hanger.

9. Ensure that the BPV is installed in the tubing hanger. If not pre-installed, remove the running tool from the hanger, install the BPV and re-install the running tool. If a test cap is available for the 2 $\frac{7}{8}$ " tubing test from below to 3000 psi taking all precautions.
10. Pick up and run in sub-assembly #1, the Half Mule Shoe / Wireline entry guide and 2 $\frac{7}{8}$ " EUE pup joint. Use chain tongs to check that the mule shoe has been made up. Dog Collar to be used on all sub-assemblies.
11. Run one joint 2 $\frac{7}{8}$ " tubing as per tally.
12. Run sub-assembly #2, the 2.313 X Nipple complete with 2 $\frac{7}{8}$ " pup joints.
13. Run 20 joints 2 $\frac{7}{8}$ " EUE tubing as per tally.
14. Check that the casing is full of brine and top up if required.
15. Change out the tubing hanger seals for new ones from the spare seals box
16. Pick up sub assembly #3, the tubing hanger and landing joint, and RIH. Check and record up and down weights and land the tubing hanger in the wellhead. Check the mark on the landing joint to ensure the hanger is fully seated in the wellhead.
17. Tighten the tubing hanger hold down bolts to the NOV Anson's torque recommendations and test the tubing hanger seals to 3,000 psi through its test port per the manufacturer's instructions. Carry out an over pull to 5,000 lbs.
18. Fill the landing joint with water to monitor for a leak in the BPV.
19. With the test pump lined up on the casing annulus valve, pressure test the tubing annulus via the 9 $\frac{5}{8}$ " annulus valve to 3000 psi for 10 min. Monitor the tubing for any returns/pressure build up. Bleed down annulus.
20. Remove the tubing hanger landing joint.
21. Rig down the Rig BOPS.



22. Make up the tubing bonnet and the suspension valve and independently pressure test the tubing bonnet and the suspension valve to 250 psi/ 5 min and 3000 psi / 10 min.
23. Install a blind flange with 0 – 5,000 psi pressure gauge and needle valve on the suspension valve.
24. Demob the rig and clean up the site.
25. Secure the cellar and suspension valve with a proper cellar cover and protection cage.
26. Record the well details and status on the well handover certificate and hand over the well to the responsible party.

Option B: Using Plug and Prong in the X Nipple.

27. Ensure that the plug and prong are installed in the X nipple. If a test cap is available for the tubing test from below to 3000 psi taking all precautions.
28. Pick up and run in sub-assembly #1, the Half Mule Shoe / Wireline entry guide and 2 7/8" EUE pup joint. Use chain tongs to check that the mule shoe has been made up. Dog Collar to be used on all sub-assemblies.
29. Run one joint 2 7/8" tubing as per tally.
30. Run sub-assembly #2, the 2.313 X Nipple complete with 2 7/8" pup joints.
31. Run 20 joints 2 7/8" EUE tubing as per tally.
32. Check that the casing is full of brine and top up if required.
33. Change out the tubing hanger seals for new ones from the spare seals box
34. Pick up sub assembly #3, the tubing hanger and landing joint, and RIH. Check and record up and down weights and land the tubing hanger in the wellhead. Check the mark on the landing joint to ensure the hanger is fully seated in the wellhead.
35. Tighten the tubing hanger hold down bolts to the NOV Anson's torque recommendations and test the tubing hanger seals to 3,000 psi through its test port per the manufacturer's instructions. Carry out an over pull to 5,000 lbs.
36. Fill the kill string and landing joint with water to monitor for a leak in the tubing.
37. With the test pump lined up on the casing annulus valve, pressure test the tubing annulus via the 9 5/8" annulus valve to 3000 psi for 10 min. Monitor the tubing for any returns/pressure build up. Bleed down annulus.



38. Remove the tubing hanger landing joint.

39. Rig down the Rig BOPS.

40. Make up the tubing bonnet and the suspension valve and independently pressure test the tubing bonnet and the suspension valve to 250 psi/ 5 min and 3000 psi / 10 min.

41. Rig up the wireline, open the suspension valve and pull the prong and plug from the X nipple. A Lubricator is not required, but in the unlikely event that the bridge plug fails and the well flows, be prepared to cut the wireline and close the suspension valve.

42. Close the suspension valve.

43. Install a blind flange with 0 – 5,000 psi pressure gauge and needle valve on the suspension valve.

44. Demob the rig and clean up the site.

45. Secure the cellar and suspension valve with a proper cellar cover and protection cage.

46. Record the well details and status on the well handover certificate and hand over the well to the responsible party.



SUSPENSION LOAD OUT LISTS

Personnel Required

Qty	Description
4	Wireline Crew

Slick Line

Qty	Description
1 set	Wireline unit c/w diesel power pack
1 set	lubricator set 5" x 3" ID
1 set	Dual wireline BOPs 5" ID c/w control panel/pumps
1	Side entry sub to fit under BOPs
1	Test cap to fit BOPs
1	Hydraulic operated stuffing box
1	Tubing xovers 2 7/8" EUE x Bowen lubricator connection
1	Tubing xovers 2 9/16" 3K Flange x Bowen lubricator connection
2	Tubing xovers *** x Bowen lubricator connection
2 set	120 ft. hoses and connections for above
1	Workshop Container :- hand tools, spare parts, tool strings, overshots, LIBs, gauge cutters – Tool list TBC

Power Tongs

Qty	Description
2	Power units – electric & Back-up diesel (already on rig)
2	Power Tongs c/w low stress jaws
2	Side door elevators (100 ton)
2	Single joint elevator
2	Rotary hand slips c/w low stress dies and webbing removed
1	Safety clamp
2	Stab in guides
2	Drifts
2	Xover
1	Xover
1	Single joint compensator
1	Set bails for above



Wellhead & Suspension Valve

Qty	Description
1	Bolt Torque Equipment
1	10 Ton chain block
1	Workshop container with all required spares, pumps, chart recorders etc.
1	Tubing hanger running tool
1	Tubing hanger Sub Assembly.
1	Back-up tubing hanger C/W pup joint
3	Hanger BPV
2	BPV Running tools (if available)
1	Tubing Head Adaptor Assembly 11" 3K X 2 ⁹ / ₁₆ "
1	2 ⁹ / ₁₆ " 3K Gate Valve
	Studs / Nuts as required for Tubing Head Adaptor
1	2 ⁹ / ₁₆ " 3k Blind Flange with 2 X 1/2" NPT
2	Ring Gaskets R27
8	Studs 8UN
16	Nuts 1" 8UN
1	Needle valve 1/2" NPT straight flow
1	Pressure gauge 0 -5K 1/2" NPT
1	Ring Gasket R-53

Kill String

Qty	Description
20 jts	Ft 2 7/8" 6.5 ppf. K55/L80 EUE tubing
4	10 Ft 2 7/8" 6.5 ppf. K55/L80 EUE tubing
1	Landing Joint 2 7/8" 6.5 ppf. K55/L80 EUE tubing Length TBA
1	2.313 X nipple with 2 7/8" EUE pup joints either end
1	WEG made up to 2 7/8" pup joint.

Note that the Tubing pup joints will be made up in the sub-assemblies prior to shipment to the rig. Sub-assemblies are to be pressure tested in the shop and sent with test certificates.

The required length of the landing joint is to be advised by the rig.

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