ExxonMobil

Esso Australia Pty Ltd

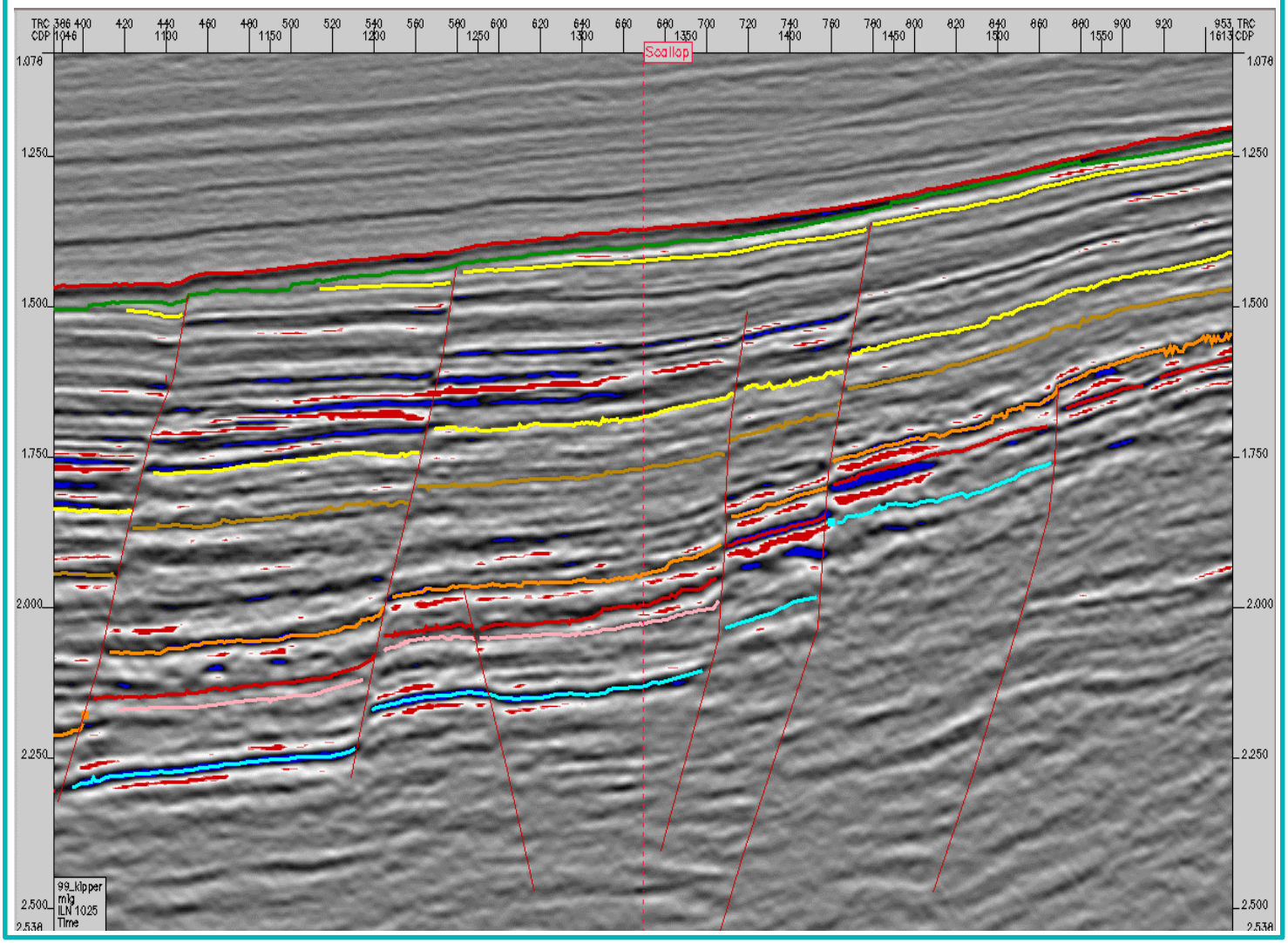
Exploration Department

SCALLOP-1

WIRELINE FORMATON TESTING

KUMAR KUTTAN

August 2003



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SUMMARY

Schlumberger's MDT was used in obtaining formation pressures and fluid samples in Scallop 1. A total of 66 pressure and 7 fluid tests were attempted. All the pressure tests were successful and hydrocarbon samples from 4 zones (2 gas and 2 oil) were successfully recovered.

The pressure data suggests that there are at least 8 aquifer and 4 hydrocarbon pressure systems. There are several other hydrocarbon zones, which have been identified by shows and petrophysical analysis, but they are not easily identifiable on the pressure data.

The pressure data indicates that above 2700m SS the aquifers are drawn down from the original basin gradient as a result of production in the basin. Below 2850m SS the aquifer pressures are above the original basin gradient and this depth is approximately the base of the main series of volcanic layers.

The calculated water gradient of 1.42psi/m matches the established water gradient for the basin. Only one of the gas sands had sufficient spread of pressure data for determining a gas gradient. The calculated gas gradient of 0.518 psi/m appears to be higher than the measured values (0.42psi/m) from PVT analysis of recovered gas samples. It was not possible to determine the oil gradient from the pressure data. PVT analysis of recovered oil samples indicate a gradient of 0.83psi/m.

The pressures in the shallower of the two oil zones, which occurs within the uppermost part of the main series of volcanic layer, are below almost all of the water gradients, an anomaly that is difficult to explain. The second of the two oil zones could have a column between 17.1m and 58m thick depending on the water gradient chosen to determine the OWC.

An analysis of the fluid gradients of the main gas and water sands below the deepest volcanic layer suggests that these gas systems are clearly separate and appear to have a base seal.
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1.0 Operational Summary

Schlumberger's MDT (Modular Dynamic Tester) was used to obtain formation pressures and fluid samples in the Scallop 1 exploration well. The tool was run with the following modules:

Single large area probe with large area packer (Original plan - two probes)
Pump-out
Optical Fluid Analyser (OFA)
2 X Multi-chamber module (MRMS)
One 1-gallon chamber

One run with the MDT run was made. When the MDT was being assembled on the surface it was found it was not possible to power up the tool and establish communication between the modules (10 modules total). By eliminating the second probe and testing the tool after adding each probe, a workable string was finally assembled and run in the hole.
A total of 66 pressure tests were attempted and all were successful and the results are listed in Table 1.1. "Pump-outs" at 7 different depths were attempted for fluid identification and obtaining fluid samples. The results of the "pump-outs" and fluid sampling are shown in Table 1.2. A total of 5 fluid samples from 4 zones (2 gas and 2 oil) were obtained.

2.0 Pressure Data Observations and Interpretation

Fig.2.1 is a plot of the all the pressure data from 1780mRT (1754mSS) down to 3162mRT (3135.6mSS). Fig. 2.2 is a plot of the pressure data below 2575mRT(2549mSS).
The pressure data indicates that there are at least 8 aquifer and 4 hydrocarbon pressure systems. There are several other hydrocarbon zones that have been identified by petrophysical analysis but these zones are not easily identifiable on the pressure plot. Above 2700m the data indicates that the reservoirs are drawn down below the original basin aquifer gradient and this could be easily ascribed to production in the basin. The only apparent "anomaly" is the reservoirs in the interval from approximately 2300m SS to about 2650m SS, which appear to be more drawn down than the reservoirs above. Below 2850mSS the aquifer gradients of the reservoirs are above the original basin gradient and this depth happens to approximate the base of the main series of volcanic layers.
The calculated water gradient over the interval 1780 - 2180m SS is 1.42 psi/m and this is the same as the established basin gradient and this has been used for drawing all other aquifer gradients shown on the pressure plot.

The fluid sampling identified two oil zones. The pressures from the shallower of the oil zones (Intra-volcanic Oil Sand 2630 - 2635mRT) appear to be "anomalous" in that they lie below all most all the water gradients. There is indication from sidewall core data that the "intra-volcanic" sand could be water bearing below 2635mRT.
With respect to the deeper oil sand (Oil Sand 2840mRT), there are two possible positions for an interpreted OWC. If the aquifer gradient from the water sands in the interval 2714 - 2740mRT and 2754 - 2767mRT and an oil gradient of 0.83psi/m (determined from PVT analysis of the recovered oil samples) are used, an OWC could be interpreted at 2870.3mSS (2896.2mRT) and this would yield a 58m oil column from the top of sand in the well. If however, the water gradient from the sands in the intervals 2914 - 2930mRT and 2941-2948mRT were used, an OWC could be interpreted at 2829.4mSS(2855.3mRT) resulting in a 17.1m oil column.

Clearly there are 3 gas systems below the base of the deepest volcanic layer at 3093mRT(3067.1mSS). Gas was recovered during the “pump-outs” from the two upper systems (Gas sand 3101 - 3109mRT and Gas sand 3120-3129mRT). Gas gradient determined from the PVT analysis of the gas samples recovered from these sands is 0.42psi/m.
In the deepest of the three systems (Gas sand 3140 - 3146.5mRT) only water with some gas was recovered during “pump-out” and subsequent sampling. The pressure data, mud log

shows and the petrophysical analysis clearly show this sand to be gas bearing. The calculated gas gradient of 0.518psi/m in this sand appears to be higher than that determined from PVT analysis from the recovered gas samples
"Pump-outs" for fluid identification were also carried out at 3059mRT and 2983.2mRT and only water was recovered. The poor reservoir quality and the low mobility in both these zones more than likely prevented sufficient volume of mud filtrate being removed by the pump-outs and hence the lack of recovery of any gas from the formation.

An estimate of a possible GWC contact was made for the deepest of the gas systems (Gas sand 3140 – 3146.5mRT) using a gas gradient of 0.42pai/m and the aquifer gradient of the water sands in the in the interval 3155 – 3162mRT. The calculated GWC contact occurs at 3118.3mSS (3144.2mRT). With GALA being interpreted at 3247.1mRT for this gas system, this analysis suggests that the shale separating this gas sand from the water sands below is probably a base seal.

SCALLOP 1

PERMANENT DATUM (m AMSL):			0			DATE:		24-Feb-03		BIT DIAMETER (in):	12.25"			
DF ELEVATION (m AMSL):			25.9			GEOLOGISTS:		Glen Smith / Gordon Wakelin-King						
TOOL STRING CONFIGURATION:														
RUN	**TEST**	**DEPTH (m)**		**PRE-TEST DATA (CQG)**			**HYDROSTATIC PRESSURE (CQG)**			**TEMP**	**COMMENT**	**Mobility**	**Slope**	**Intercept**
		MDBDF	TVDSS	VOL cc	SIP psia	EMW ppge	BEFORE	AFTER	EMW ppge	°C		md/cp		
1	1	1780.0	1754.01	20	**2491.5**	8.33	3167.4	3173.0	10.43	81	Good Pretest	6242.4	1.42146	
1	2	1860.0	1833.99	20	**2620.2**	8.37	3312.9	3309.1	10.44	82	Good Pretest	8429.2		
1	3	1950.0	1923.96	20	**2747.8**	8.37	3467.7	3466.6	10.42	83	Good Pretest	633.0		
1	4	2140.0	2113.90	20	**3018.3**	8.37	3801.2	3800.6	10.41	86	Good Pretest	6014.4		
1	5	2180.0	2153.89	20	**3074.7**	8.37	3871.1	3870.7	10.41	87	Good Pretest	920.4		
1	66	1780.0	1754.01	20	**2492.7**	8.33	3167.6	3167.6	10.43	88	Good Pretest(Repeats)	6139.6		
1	65	1950.0	1923.96	20	**2748.8**	8.37	3467.0	3466.9	10.42	92	Good Pretest(Repeats)	496.3		
1	64	2180.0	2153.89	20	**3075.2**	8.37	3872.0	3871.9	10.41	96	Good Pretest(Repeats)	2157.1		
1	6	2300.0	2273.86	20	**3242.7**	8.36	4081.62	4081.50	10.40	89.5	Good Pretest	383.4		
1	63	2426.5	2400.32	20	**3371.7**	8.23	4305.5	4305.6	10.40	99	Good Pretest	576.2		
1	62	2427.0	2400.82								Tight Test - aborted			
1	61	2450.0	2423.81	20							Tight Test - aborted			
1	60	2555.0	2528.78	20	3580.89	8.30	4531.2	4531.40	10.29	101.3	Good Pretest	495.3		
1	59	2564.0	2537.78	20	**3593.4**	8.30	4546.9	4547.2	10.40	102	Good test	1402.7		
1	58	2595.0	2568.78	20	**3641.7**	8.31	4601.2	4601.4	10.39	102	Good Test	28.2		
1	56	2630.0	2603.77	20	**3669.9**	8.26	4663.2	4663.1	10.39	103	Pressure did not stabilise	1.9		
1	57	2630.2	2603.97	20	**3668.3**	8.26	4663.5	4662.7	10.39	103	Good test	150.4		
1	55	2635.5	2609.27	20	**3675.3**	8.26	4673.3	4673.3	10.39	104	Good Pretest	952.5		
1	54	2715.0	2688.75	20	**3888.3**	8.48	4812.5	4812.2	10.39	105	Good Pretest	3.7		
1	53	2740.5	2714.25	20	**3922.2**	8.47	4856.9	4857.0	10.39	105	Good Pretest	408.8		
1	52	2754.5	2728.25	20	**3941.9**	8.47	4881.3	4881.5	10.39	106	Good test	521.8		
1	51	2760.0	2733.75	20	**3946.6**	8.46	4891.1	4891.1	10.39	106	Good test	230.8		
1	50	2764.5	2738.25	20	**3952.9**	8.46	4898.7	4898.9	10.39	106	Good test	132.1		
1	49	2767.5	2741.25	20	**3957.1**	8.46	4904.3	4904.3	10.39	107	Good test	15.4		
1	48	2840.0	2813.73	20	**4093.0**	8.53	5031.5	5030.8	10.39	108	Good test	131.1	0.83	-2117.6
1	47	2840.0	2813.73	20	**4093.1**	8.53	5030.4	5029.7	10.38	107	Good test, pretest taken after 70min pumping for 1 gall sample	33.5		
1	46	2891.0	2864.72	20	4172.2	8.54	5120.5	5120.6	10.38	110	Tight test	0.9		
1	45	2898.5	2872.22	20	4184.9	8.54	5133.5	5133.5	10.38	111	Poor to fair test slightly tight	0.0		
1	44	2914.0	2887.71	20	**4190.7**	8.51	5160.5	5160.4	10.38	111	Good Pretest	161.8		
1	43	2918.0	2891.71	20	**4195.0**	8.50	5167.5	5167.6	10.38	111	Good Pretest	283.7		
1	42	2923.0	2896.71	20	**4202.8**	8.50	5176.2	5176.2	10.38	111	Fair Pretest	12.3		
1	41	2930.5	2904.21	20	**4213.0**	8.50	5189.5	5189.2	10.38	111	Good Pretest	101.4		
1	40	2941.0	2914.71	20	4227.5	8.50	5207.5	5207.6	10.38	112	Good Pretest	353.0		
	39	2944.0	2917.71	20	**4231.6**	8.50	5212.6	5213.6	10.38	112	Good Pretest	77.6		
1	38	2948.0	2921.71	20	**4237.1**	8.50	5219.6	5219.6	10.38	112	Good Pretest	607.3		
1	37	2955.0	2928.70	20			5231.8	5231.8	10.38	113	Tight no test			
1	36	2981.0	2954.70	20	**4290.7**	8.51	5277.3	5277.2	10.38	113	Good Pretest	2.7		
1	35	2983.2	2956.89	20	**4297.3**	8.52	5281.3	5280.9	10.38	114	Fair Pretest	6.5		
1	34	2984.0	2957.69	20			5282.6	5282.7	10.38	114	Tight no test			
1	33	2986.8	2960.49	20			5287.4	5287.5	10.38	114	Tight no test			
1	32	2987.0	2960.69	20			5287.8	5287.8	10.38	114	Tight no test			
1	31	3029.5	3003.18	20	**4400.3**	8.59	5362.0	5361.8	10.38	115	Fair Pretest	2.9		
1	30	3031.5	3005.18	20	**4396.8**	8.58	5365.6	5365.5	10.38	115	Good Pretest	21.6		
1	29	3046.5	3020.17	20	**4406.6**	8.55	5391.7	5391.8	10.37	115	Good Pretest	7.5	1.42	
1	28	3059.5	3033.17	20	**4450.0**	8.60	5413.9	5414.3	10.37	116	Good pretest - pump out - water	3.2	1.42	
1	27	3063.2	3036.87	20			5420.4	5420.4	10.37	116	Tight no test			
1	26	3063.5	3037.17	20			5420.7	5420.9	10.37	116	Tight no test			
1	25	3101.5	3075.15	19.9	**4540.2**	8.65	5487.5	5487.4	10.37	117	Good Pretest	32.4		
1	24	3109.0	3082.65	19.9	**4541.3**	8.63	5500.0	5499.6	10.37	117	Good pretest samples 5 and 6 taken	879.4	0.420	-7729.98
1	23	3105.5	3079.15	19.9			5493.7	5493.7	10.37	117	Tight no test			
1	22	3106.0	3079.65	19.9	4543.9	8.65	5494.7	5494.6	10.37	117	Poor to fair test slightly tight	2.9		
1	21	3120.5	3094.14	19.8	**4562.4**	8.64	5519.3	5519.3	10.37	117	Good pretest samples 3 and 4 taken	2396.8	0.420	-7768.7
1	18	3124.5	3098.14	20	4570.8	8.65	5526.3	5526.3	10.37	117	Good Pretest-lost feel at end of test	0.8		
1	17	3129.5	3103.14	19.8	4645.8	8.78	5535.2	5534.9	10.37	117	Good Pretest - possible super charge	10.7		
1	20	3123.0	3096.64	19.8			5523.8	5523.8	10.37	117	Tight no test			
1	19	3124.0	3097.64				5507.1	5507.0	10.33	117	Tight no test			
1	14	3140.0	3113.6	20	**4584.2**	8.63	5532.9	5532.9	10.368	117.9	Good Pretest	2.9	0.518	2972.36
1	16	3141.2	3114.8	20	**4585.4**	8.63	5536.2	5536.1	10.368	117.8	Good Pretest	2.6		
1	13	3143.5	3117.1	20	**4584.6**	8.62	5538.4	5538.4	10.367	117.3	Good Pretest	4.2		
1	15	3144.0	3117.6	19.8	**4585.9**	8.62	5540.3	5540.5	10.367	117.4	Good Pretest	11.8		
1	12	3146.5	3120.1	20	**4587.4**	8.62	5545.1	5543.6	10.368	118.2	Good Pretest	39.1	0.420	-7802.28
1	10	3146.0	3119.6	20	**4588.1**	8.62	5543.7	5543.6	10.367	116.3		4.8		
1	11	3146.5	3120.1								Seal failure and reset			
1	9	3155.5	3129.13	20	**4603.0**	8.62	5580.5	5580.4	10.37	116	SIPq minimum 4603.00	25.9		
1	8	3157.0	3130.63	20	**4604.1**	8.62	5582.8	5560.7	10.37	116	Good Pretest	13.3		
1	7	3162.0	3135.63	20	**4610.4**	8.62	5591.2	5591.5	10.37	115	Good Pretest	41.3	1.420	-111.7
	Basin gradient		1700.00		**2493.6**									
			3200.00		**4623.6**									

Table 1.1

SCALLOP 1														
PERMANENT DATUM (m AMSL):			0.0			DATE:	25-Feb-03		BIT DIAMETER (in):	12.25"				
DF ELEVATION (m AMSL):			25.9			GEOLOGISTS:	Glen Smith / Gordon Wakelin-King							
TOOL STRING CONFIGURATION:			MRPS-MRHY-OFA-PO-SC(1gal)-MRMS-MRMS-MRDP											
RUN	Sample	DEPTH (m)		PRE-TEST DATA			PUMP-OUT DATA			SAMPLE DATA				COMMENTS
	#	MDBDF	TVDSS	SIP psia	EMW ppge	md/cp	VOL cc	TIME min	DD psia*	VOL cc	TIME min	DD psia*	°C	
1	1	3146.5	3120.14	4598.77	8.64	39.1	18135	39.9	3970	450	1.9	3540	117.9	chamber# MPSR-1591 OFA gas/water
1	2	3146.5	3120.14	4598.77	8.64	39.1		40.0	3970	450	1.8	3950		Duplicate sample: chamber# MPSR-1584 OFA:- gas/water
1	3	3120.5	3094.14	4562.37	8.64	2396.8	17100	15.2	4532	450	1.5	4540	117.4	chamber# MPSR-1590 OFA:- gas
1	4	3120.5	3094.14	4562.37	8.64	2396.8		15.2	4532	450	1.5	4540		dupicate chamber# MPSR-1583 OFA = gas
1	5	3109.0	3082.65	4541.34	8.63	879.4	26910	36.0	4493	450	2.1	4523	118.5	chamber# MPSR-1581 OFA = gas
1	6	3109.0	3082.65	4541.34	8.63			36.0	4493	450	1.9	4522		chamber# MPSR-1582 OFA = gas
1	*	3059.5	3033.2	4449.99	8.60	3.2	5850	35.7	1936.7				116.2	pump out to ID fluids- OFA = water?
1	*	2983.2	2956.89	4297.31	8.52	6.5	4880	29.4	2280.66				113.7	pump out for id fluid (filtrate 0.031ohmm)
1	7	2840.0	2813.7	4092.69	8.53	131.1	29755	29.1	3967.85	3785	10.5	4045	107.9	1 gallon chamber # MRSC-036, oil, ?plus gas
1	8	2840.0	2813.7	4093.00	8.53	33.5	19890	40.2	2860	450	2.0	2900	108.1	Oil, 10% gas, +/- filtrate chamber # MPSR-186
1	9	2840.0	2813.7	4093.07	8.53	33.5	2950	5.5	2870	450	2.0	2895	107.9	Oil, 10% gas, clean sample, chamber # MPSR-316
1	10	2630.2	2604.0	3668.26	8.26	150.4	47000	57.0	3415	450	1.2	3660	102.8	OFA results, 60%oil, 30%gas, 10% water, Res 0.20, Chambe # MPSR-477
1	11	2630.2	2604.0	3668.26	8.26	150.4	3510	5	3435	450	1	3661	102.7	OFA as above, res 0.23, FSIP 3665.1, building slowly, Chamber # MPSR-501
REMARKS:		All chambers were over-pressured to 3900 psi above hydrostatic.												
		* depths were pump-outs only to identify formation fluid type. No sample taken.												

Table 1.2

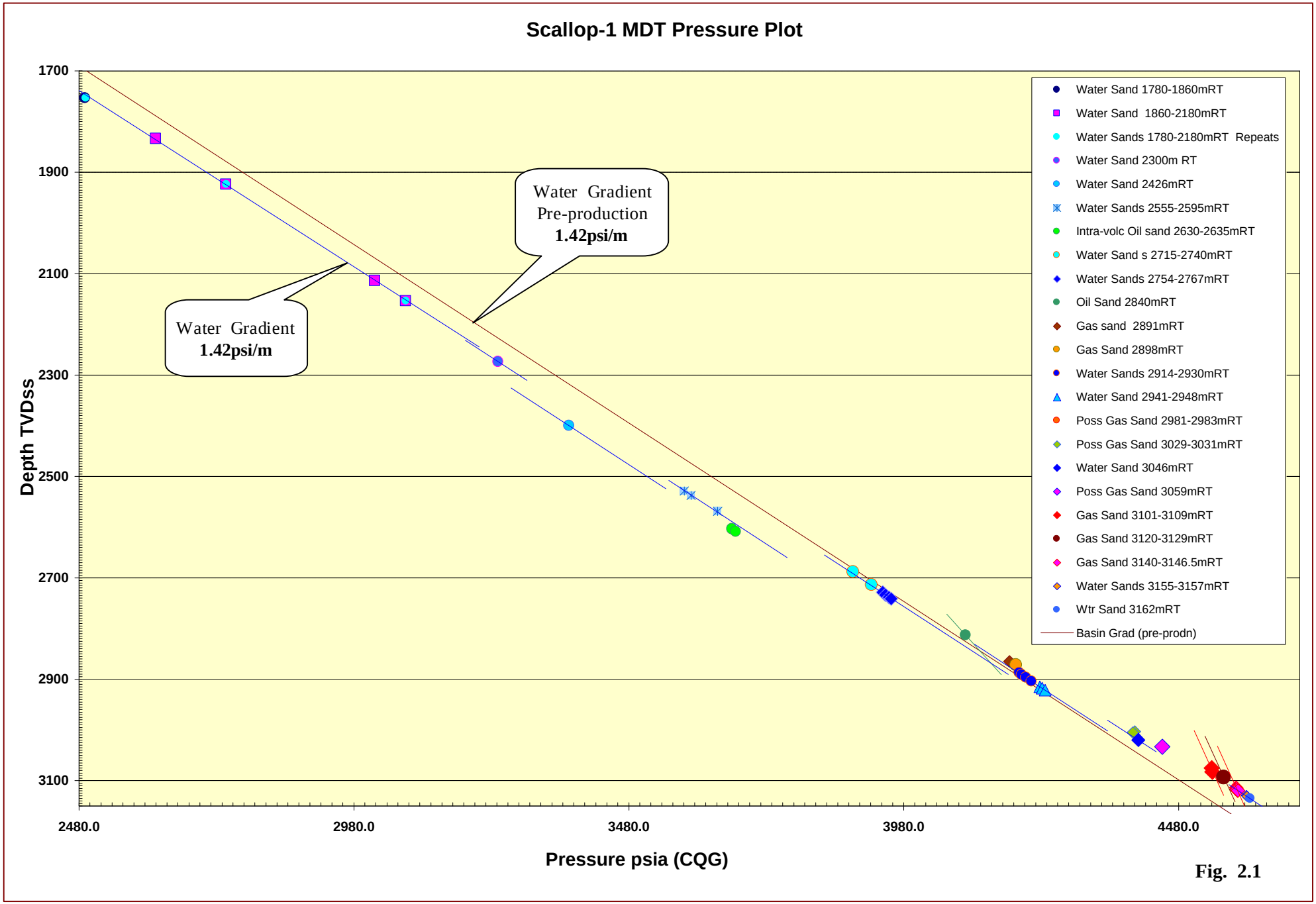
Scallop-1 MDT Pressure Plot
Depth TVDss
1700
1900
2100
2300
2500
2700
2900
3100
2480.0
2980.0
3480.0
3980.0
4480.0
Pressure psia (CQG)
Water Gradient
Pre-production
1.42psi/m
Water Gradient
1.42psi/m
Water Sand 1780-1860mRT
Water Sand 1860-2180mRT
Water Sands 1780-2180mRT Repeats
Water Sand 2300m RT
Water Sand 2426mRT
Water Sands 2555-2595mRT
Intra-volc Oil sand 2630-2635mRT
Water Sand s 2715-2740mRT
Water Sands 2754-2767mRT
Oil Sand 2840mRT
Gas sand 2891mRT
Gas Sand 2898mRT
Water Sands 2914-2930mRT
Water Sand 2941-2948mRT
Poss Gas Sand 2981-2983mRT
Poss Gas Sand 3029-3031mRT
Water Sand 3046mRT
Poss Gas Sand 3059mRT
Gas Sand 3101-3109mRT
Gas Sand 3120-3129mRT
Gas Sand 3140-3146.5mRT
Water Sands 3155-3157mRT
Wtr Sand 3162mRT
Basin Grad (pre-prodn)

Fig. 2.1

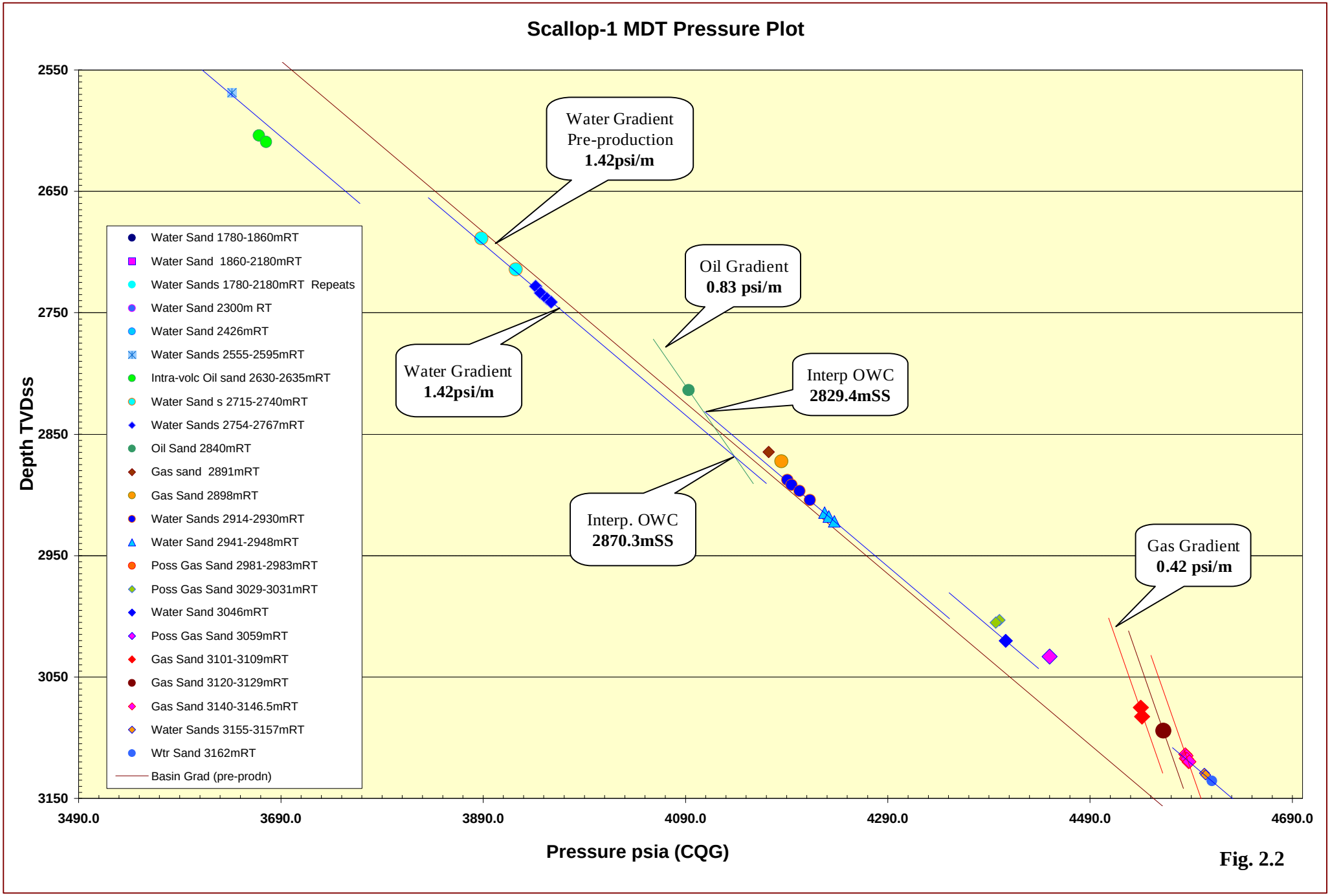
Scallop-1 MDT Pressure Plot
Depth TVDss
2550
2650
2750
2850
2950
3050
3150
3490.0
3690.0
3890.0
4090.0
4290.0
4490.0
4690.0
Pressure psia (CQG)
Water Gradient
Pre-production
1.42psi/m
Oil Gradient
0.83 psi/m
Water Gradient
1.42psi/m
Interp OWC
2829.4mSS
Interp. OWC
2870.3mSS
Gas Gradient
0.42 psi/m
Water Sand 1780-1860mRT
Water Sand 1860-2180mRT
Water Sands 1780-2180mRT Repeats
Water Sand 2300m RT
Water Sand 2426mRT
Water Sands 2555-2595mRT
Intra-volc Oil sand 2630-2635mRT
Water Sand s 2715-2740mRT
Water Sands 2754-2767mRT
Oil Sand 2840mRT
Gas sand 2891mRT
Gas Sand 2898mRT
Water Sands 2914-2930mRT
Water Sand 2941-2948mRT
Poss Gas Sand 2981-2983mRT
Poss Gas Sand 3029-3031mRT
Water Sand 3046mRT
Poss Gas Sand 3059mRT
Gas Sand 3101-3109mRT
Gas Sand 3120-3129mRT
Gas Sand 3140-3146.5mRT
Water Sands 3155-3157mRT
Wtr Sand 3162mRT
Basin Grad (pre-prodn)

Fig. 2.2