

GEOCHEMICAL SCREENING ANALYSIS

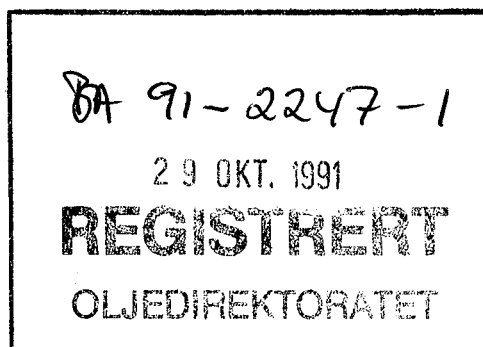
OF WELL NOCS 34/10-2

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SUMMARY

The best source rock unit of the analysed section of this well is suggested to be the dark shales from Units 1 and 2. The Unit 1 shales have good potentials for mixed oil and gas generation, while the shales from Unit 2 are thought to have fair to good potential for mixed gas and oil generation. The shales from Units 3 and 4 are suggested to have poor to good, but generally fair, potentials for generation of gas and probably some heavy oil.

The production index data indicate that all samples from the analysed interval contain small amounts of free hydrocarbons that are thought to be either early in-situ generated or migrated. Follow up analysis is required to confirm the origin of these free hydrocarbons.

The proposed maturity depth trend suggests most of the analysed interval to be immature or at best early mature. The top of the oil window is thought to occur at about 3500 m and the base of the oil window below TD of the well.

INTRODUCTION

The well NOCS 34/10-2 is situated in the Gullfaks South oil/gas field, located at 61°06'07.92"N, 02°13'39.96"E (Figure 1). The well was drilled in 1978 to a total depth of 3730 m and plugged/abandoned as an oil/gas/condensate discovery.

A total of ninety-four samples was supplied by A/S Norske Shell covering the depth interval 2885 - 3548 m. The samples were washed, lithologically described and all potential source rock lithologies analysed for Total Organic Carbon (TOC) content. Of the eighty-six lithologies having TOC > 1 % twenty-four were further analysed by Rock-Eval.

A sample list and tabulated analytical data are displayed in Appendix 1.

For discussion purposes the analysed section of the well was subdivided into four units termed Units 1 - 4. The units are defined by samples from the following depths:

Unit 1	2885 - 2948 m
Unit 2	2957 - 3116 m
Unit 3	3125 - 3386 m
Unit 4	3404 - 3548 m

LITHOLOGY, TOC AND ROCK-EVAL

A total of ninety-four samples was lithologically described and all potential source rock lithologies analysed for Total Organic Carbon (TOC) content, while twenty-four of these were subjected to Rock-Eval analysis. Full lithological descriptions for all samples are given in Table 1, while the results from the Rock-Eval analysis are shown in Table 2. Figure 2 is a generalized lithological column with relevant stratigraphic data and TOC contents over the analysed section of the well. Figures 3 and 4 show production index and Tmax plotted versus depth, while Figure 5 shows a hydrogen index - Tmax crossplot.

Source Rock Potential

(TOC, Hydrogen Index, Petroleum Potential)

Unit 1 (2885 - 2948 m)

The prominent lithology of the eleven samples from Unit 1 is a medium grey and brownish grey to brownish black shale with rich TOC contents (2.0 - 5.06 %). Evaporites (i.e. gypsum) and carbonate are found in most samples from this unit. Coal is also prominent in several samples (see Table 1 for details). One coal sample was analysed and found to have 39.5 % TOC. Three dark shale samples were further analysed by Rock-Eval. These have hydrogen and oxygen indices in the range 144 - 293 mg HC/g TOC (downward decreasing) and 19 - 20 mg CO₂/g TOC respectively, indicating organic matter of type II/III (the two upper samples) and III kerogen with good potentials (6.7 - 8.5 mg HC/g rock) for generation of oil and gas.

Unit 2 (2957 - 3116 m)

The prominent lithology of the sixteen samples from Unit 2 is a medium grey to brownish grey and brownish black, partly carbonaceous, shale with good to very rich TOC content (1.69 - 15.5 %). White to light orange grey sandstone, pale yellowish brown shale and coal are also prominent in several samples from this unit. The Pale yellowish brown shale has good TOC content (1.31 %) while the coals have TOC in the range 42.1 - 50.8 %. The four dark shales analysed by Rock-Eval have hydrogen indices in the range 127 - 260 mg HC/g TOC and oxygen indices ranging 23 - 31 mg CO₂/g TOC. These data suggest the samples from Unit 2 to contain a mixture of type II/III and III kerogen with fair to good potential (4.5 - 8.1 mg HC/g rock) for both oil and gas.

Unit 3 (3125 - 3386 m)

The dominant lithology of the fifty samples from this unit is a brownish grey to medium grey and brownish black micaceous shale. These shales have good to rich TOC contents ranging 1.03 - 4.21 %, while a light brown to light olive-brown and dark brown shale have good TOC contents (1.46 - 1.69 %). Light orange-grey to light grey coarse grained sandstone and coal are also found in some samples. The coal has a TOC content of 72.2 %. Sixteen brownish grey to medium grey and brownish black shales were further analysed by Rock-Eval. These samples have hydrogen indices in the range 101 - 241 mg HC/g TOC and oxygen indices ranging 15 - 73 mg CO₂/g TOC, indicating a mixture of type II/III (3 samples) and III kerogen (13 samples). The samples are suggested to contain organic matter of type II/III kerogen and are interpreted to have good potential (6.6 - 10.5 mg HC/g rock) for generation of mixed oil and gas, while the samples containing organic matter of type III kerogen are suggested to have poor to good, but generally fair potential (1.7 - 6.1 mg HC/g rock) for generation of gas and probably some heavy oil.

Unit 4 (3404 - 3548 m)

The seventeen samples from this unit contain mainly white to light grey coarse grained sandstone. Minor amounts of brownish grey and dark grey micaceous shale and dark reddish brown siltstone are also described in several samples. Ten shale samples, including three composite samples, were analysed for TOC content. The shales have fair to good TOC contents ranging 0.71 - 1.70 % showing a general downward decreasing trend (Figure 2). One sample (3449 m) was further analysed by Rock-Eval, having hydrogen and oxygen indices of 121 mg HC/g TOC and 38 mg CO₂/g TOC respectively. These data indicate the sample to contain organic material classified as type III kerogen with a fair potential (2.1 mg HC/g rock) for generation of gas.

Generation and Migration

(S₁, production index)

The production index data, Figure 3, shows that there is a slight positive trend as a function of depth over the analysed interval. The samples from Units 1 and 2 have production index data generally ranging 0.05 - 0.13 while Units 3 and 4 have production index data in the range 0.06 - 0.16 (generally increasing downwards). These values indicate the presence of small amounts of free hydrocarbons. To confirm whether these hydrocarbons are early in-situ generated or migrated requires follow up analysis, i.e. thermal extraction - gas chromatography.

Maturity (Tmax)

The Tmax data, Figure 4, defines a possible maturity depth trend for the samples containing type III kerogen. This proposed maturity depth trend suggests most of the analysed section of the

well to be immature to early mature. The top of the oil window (440°C for type III kerogen, corresponds roughly to 0.65 % R_o) is thought to occur around 3500 m and base of the oil window below TD of the well.

CONCLUSIONS

Based on the TOC and Rock-Eval analyses performed, the following conclusions have been made for well NOCS 34/10-2.

Source Rock Potential

The best source rock lithology of the analysed section of this well is suggested to be the dark shales from Unit 1. These have rich TOC contents and contain organic matter classified as type II/III and III kerogen with good potentials (7 - 9 mg HC/g rock) for mixed oil and gas generation. The shales from Unit 2 are good to rich in TOC content and contain organic matter of both type II/III and III kerogen, and are thought to have fair to good potential (5 - 8 mg HC/g rock) for mixed gas and oil generation.

The shales from Units 3 and 4 have fair to rich TOC contents and contain organic matter generally classified as type III kerogen (a few samples contain type II/III kerogen), and are suggested to have poor to good, but generally fair, potentials (2 - 10 mg HC/g rock) for generation of gas and probably some heavy oil.

Generation and Migration

The production index data indicate that all samples from the analysed interval contain small amounts of free hydrocarbons that are thought to be either early in-situ generated or migrated. Follow up analysis is required to confirm this.

Maturity

The proposed maturity depth trend suggests most of the analysed interval to be immature or at best early mature. The top of the oil window is thought to occur at about 3500 m and the base of the oil window below TD of the well.

Figure 1. Location Map showing Well NOCS 34/10-2.

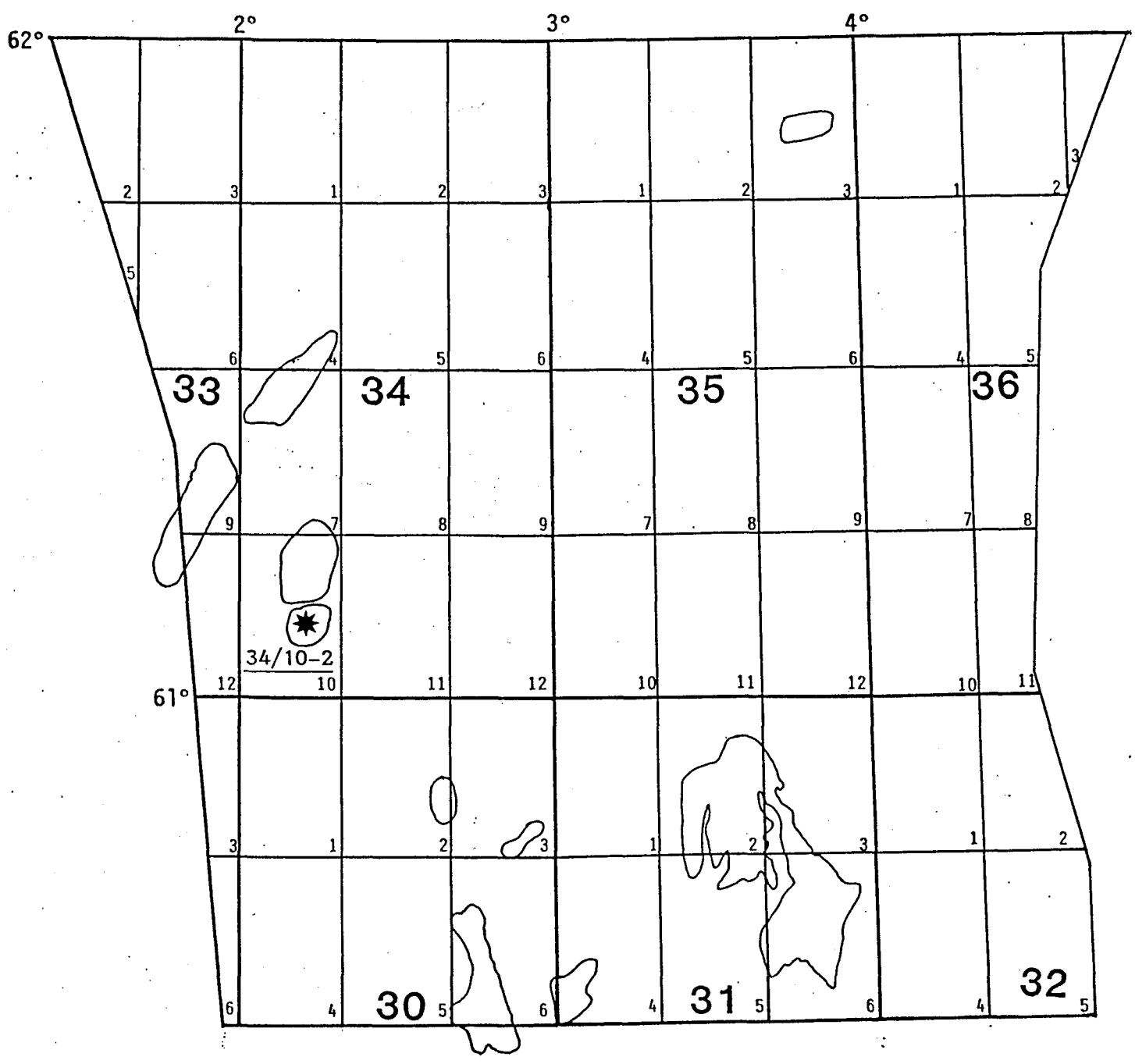


Figure: 2

Client: SHELL

TOC Data for Well NOCS 34/10-2

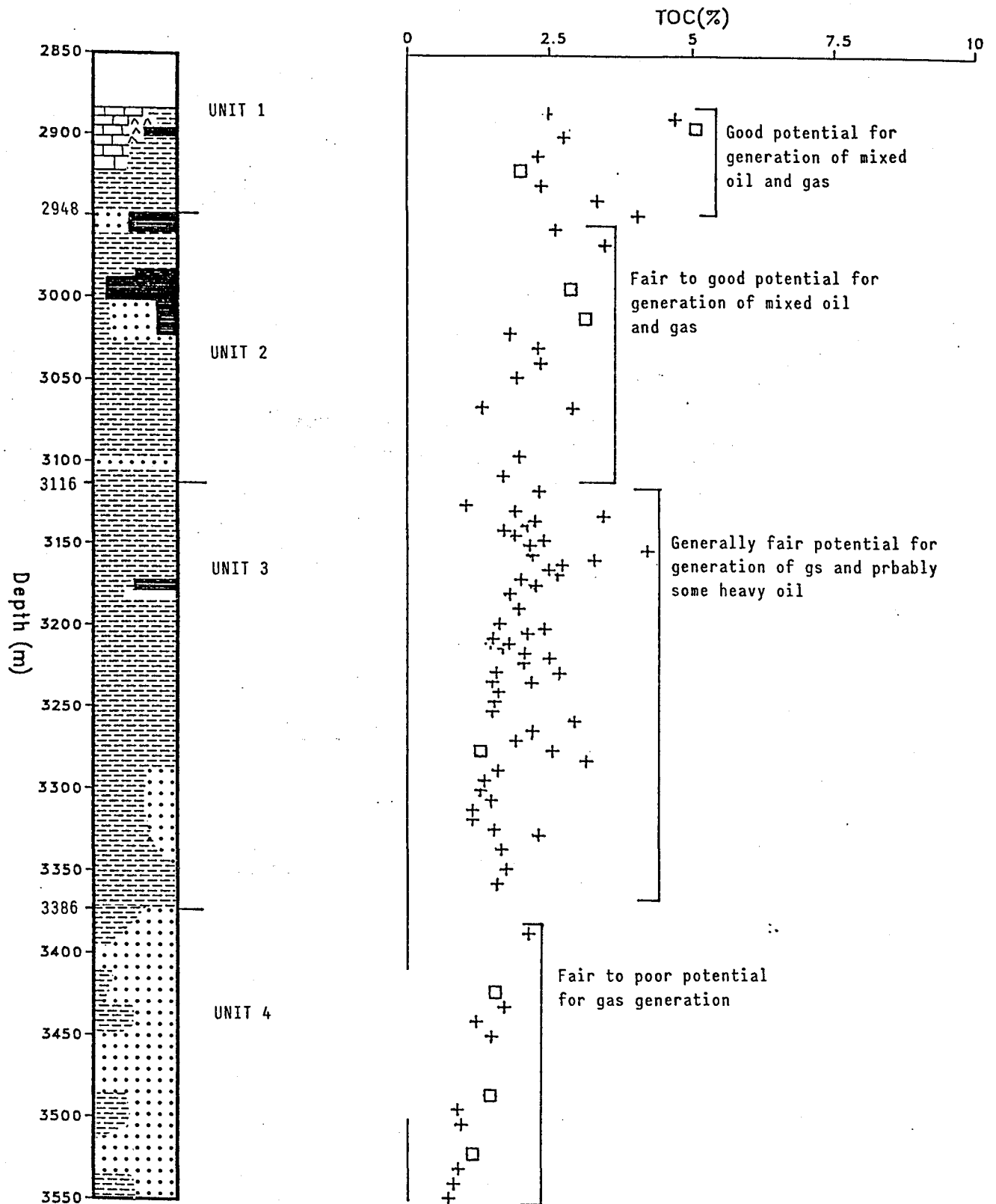


Figure: 3

Client: SHELL

Production Index Data for Well NOCS 34/10-2

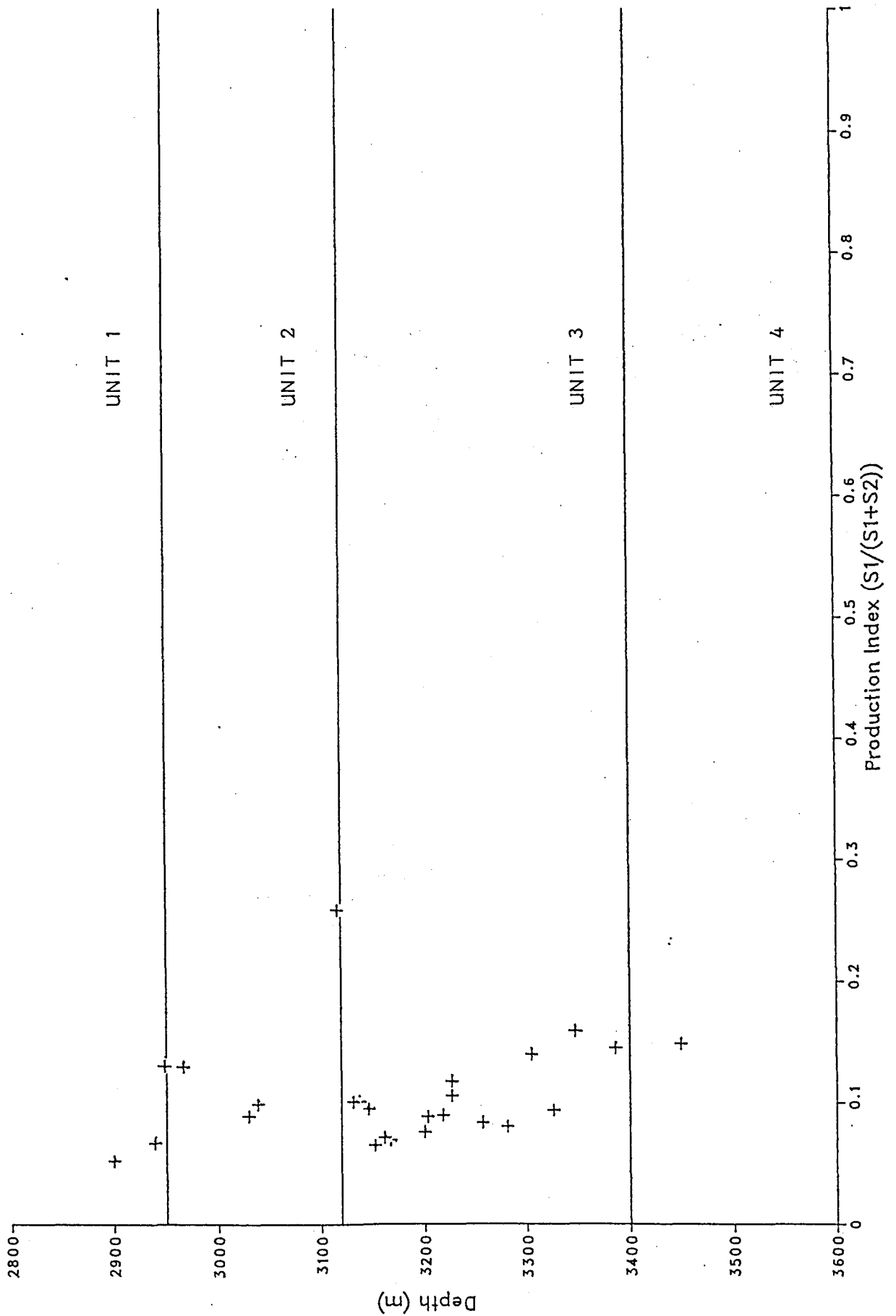


Figure: 4

Client: SHELL

Tmax Data for Well NOCS 34/10-2

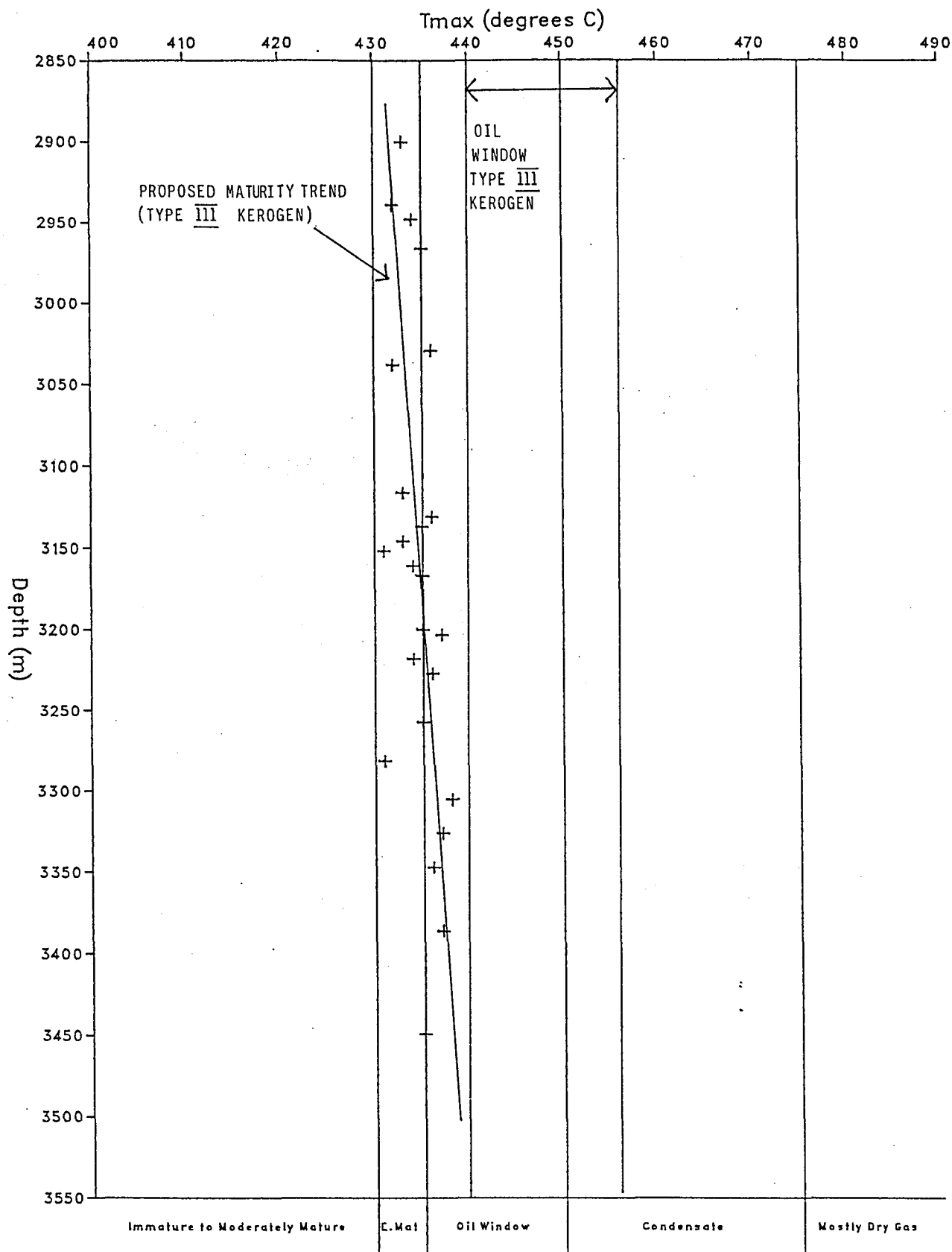
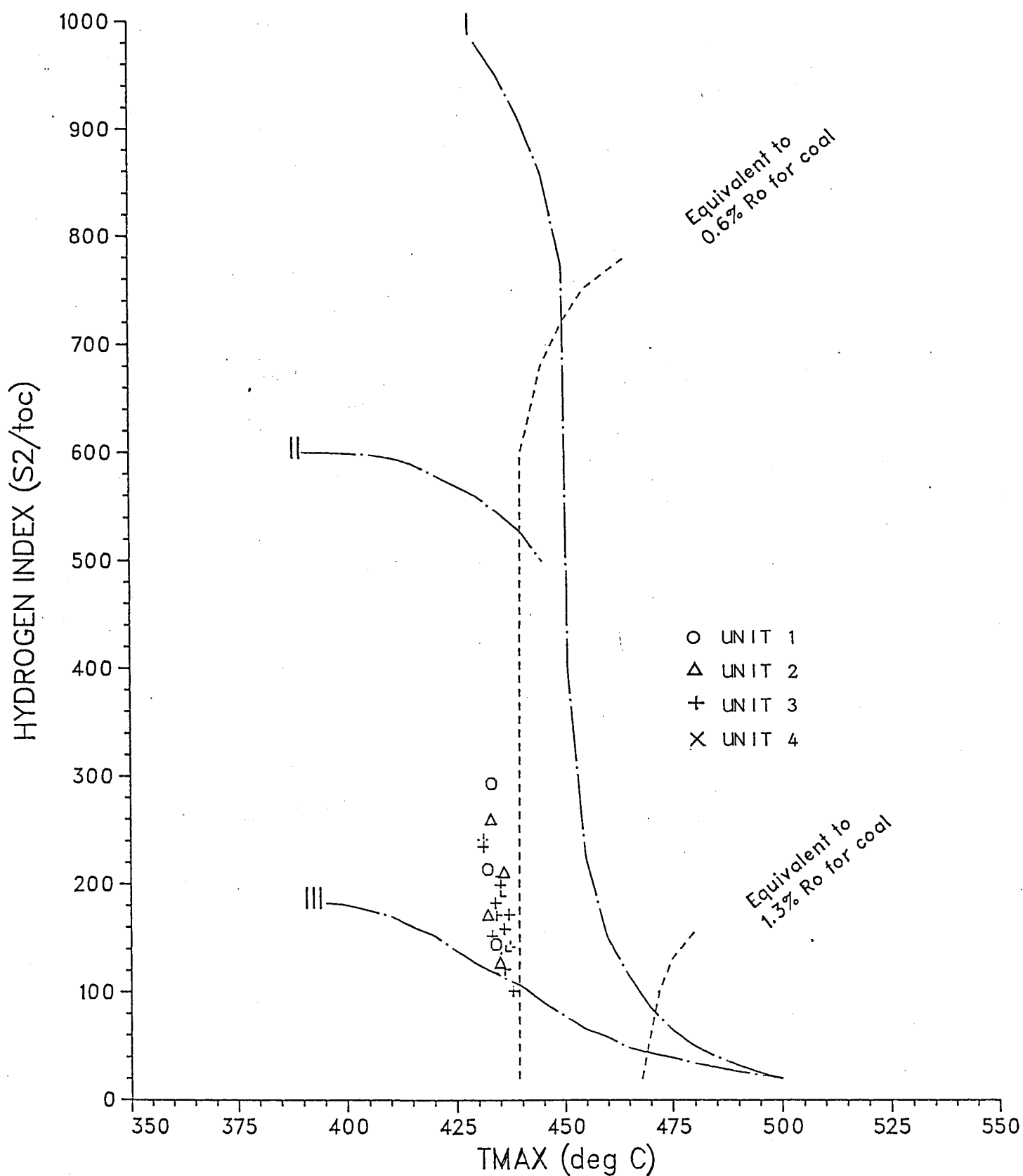


Figure 5 : Hydrogen Index v.s. Tmax values
Well NOCS 34/10-2



APPENDIX 1

TABLES

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample	
Int	Cvd	TOC%	%	Lithology description	
2885.00					0001
	2.49		50 Ca	: or gy	0001-2L
			40 Sh/Clst:	m gy to brn gy, fis	0001-1L
			10 Sh/Clst:	gy red, calc	0001-3L
			tr Coal	: blk	0001-4L
2888.00					0002
	4.69		60 Other	: drk y brn, evap	0002-1L
			20 Sh/Clst:	lt brn gy to brn gy to m brn gy, mic	0002-2L
			20 Coal	: blk	0002-3L
			tr Ca	: or gy	0002-4L
2891.00					0003
			35 Ca	: or gy	0003-4L
			30 Sh/Clst:	m gy to lt brn gy to brn gy, mic	0003-2L
			25 Other	: drk y brn, evap	0003-1L
			10 Coal	: blk	0003-3L
2894.00					0004
			50 Coal	: blk	0004-3L
			30 Sh/Clst:	m gy to drk gy to brn gy, mic	0004-2L
			20 Ca	: or gy	0004-4L
			tr Other	: drk y brn, evap	0004-1L
			tr Cont	: prp	0004-5L
2900.00					0005
	2.76		95 Sh/Clst:	brn gy to brn blk, wx	0005-2L
			5 Other	: drk y brn, evap	0005-1L
			tr Coal	: blk	0005-3L
			tr Ca	: or gy	0005-4L
			tr Sh/Clst:	m brn to pl brn, slt	0005-5L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
2906.00				0006
		55 Sh/Clst: brn gy to brn blk, wx		0006-2L
		40 Ca : or gy		0006-4L
		5 Other : drk y brn, evap		0006-1L
		tr Coal : blk		0006-3L
		tr Sh/Clst: m brn to pl brn, slt		0006-5L
2912.00				0007
	2.30	75 Sh/Clst: brn gy to drk brn gy, wx		0007-2L
		25 Ca : or gy		0007-3L
		tr Other : drk y brn, evap		0007-1L
2921.00				0008
		75 Sh/Clst: brn gy to drk brn gy, wx		0008-2L
		25 Ca : or gy to lt or		0008-3L
		tr Other : drk y brn, evap		0008-1L
		tr Sh/Clst: m brn to pl brn		0008-4L
2930.00				0009
	2.36	50 Sh/Clst: brn gy to drk brn gy, wx		0009-2L
		50 Sh/Clst: or gy		0009-3L
		tr Other : drk y brn, evap		0009-1L
		tr Sh/Clst: m brn to pl brn		0009-4L
2939.00				0010
	3.35	75 Sh/Clst: brn gy to drk brn gy to drk gy, wx, mic		0010-2L
		25 Sh/Clst: or gy		0010-3L
		tr Other : drk y brn, evap		0010-1L
		tr Sh/Clst: m brn to pl brn		0010-4L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
2948.00				0011
	4.04	85 Sh/Clst: brn gy to drk brn gy to drk gy, wx, mic		0011-1L
		15 Sh/Clst: or gy		0011-2L
		tr Coal : blk, wx		0011-3L
		tr S/Sst : pl red gy, f, kln		0011-4L
2957.00				0012
	66.90	50 Coal : blk, wx		0012-3L
		35 S/Sst : pl red gy, f, kln		0012-4L
	2.61	10 Sh/Clst: brn gy to drk brn gy to drk gy, wx, mic		0012-1L
		5 Sh/Clst: or gy		0012-2L
		tr Cont : prp, dd		0012-5L
2966.00				0013
	3.48	85 Sh/Clst: brn gy to drk brn gy to brn blk, wx, mic		0013-1L
		15 Sh/Clst: or gy to pl y brn		0013-2L
		tr S/Sst : pl red gy, f, kln		0013-3L
		tr Cont : prp, dd		0013-4L
2975.00				0014
		95 Cont : dd		0014-1L
		5 Sh/Clst: brn gy to brn blk, mic, wx		0014-2L
2984.00				0015
		60 Sh/Clst: brn gy to drk brn gy to brn blk, mic, wx		0015-1L
		25 S/Sst : w to lt or gy, crs, l, f, kln		0015-2L
		15 Coal : blk, wx		0015-3L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type	Trb	Sample
Int Cvd	TOC%	%	Lithology description
2993.00			
	50.80	85	Coal : blk, wx
		10	Sh/Clst: brn gy to drk brn gy to brn blk, mic, wx
		5	S/Sst : w to lt or gy, crs, l, f, kln
3002.00			
	42.10	60	Sh/Clst: brn gy to drk brn gy, mic, wx
		25	S/Sst : w to lt or gy, crs, l, f, kln
		15	Coal : blk, wx
		tr	Cont : prp
3011.00			
		70	S/Sst : or gy to pl y brn, f, kln
		25	Sh/Clst: brn gy to drk brn gy, mic, wx
		5	Coal : blk, wx
		tr	Cont : prp
3020.00			
	1.81	75	S/Sst : or gy to pl y brn, f, kln
		15	Sh/Clst: m gy to lt brn gy to brn gy, mic, wx
		10	Coal : blk, wx
3029.00			
	2.30	70	S/Sst : w to or gy, crs, l, f, kln
		25	Sh/Clst: m gy to lt brn gy to brn gy, mic, wx
		5	Coal : blk, wx

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Lithology description	Trb	Sample
Int	Cvd	TOC%	%		
3038.00					0021
		2.35	100	Sh/Clst: m gy to brn gy to drk brn gy, mic, wx	0021-1L
				tr S/Sst : w to or gy, crs, l, f, kln	0021-2L
				tr Coal : blk, wx	0021-3L
3047.00					0022
		1.93	55	Sh/Clst: m gy to brn gy to drk brn gy, mic, wx	0022-1L
			25	S/Sst : w to or gy, crs, l, f, kln	0022-2L
			10	Coal : blk, wx	0022-3L
			10	Cont : prp, dd	0022-4L
3056.00					0023
		15.50	65	Sh/Clst: drk brn gy to brn blk, mic, wx	0023-1L
			20	S/Sst : w to or gy, crs, l, f, kln	0023-2L
			15	Sh/Clst: pl y brn	0023-3L
3065.00					0024
		2.91	55	Sh/Clst: lt brn gy to brn gy, mic, wx	0024-1L
			35	Sh/Clst: pl y brn	0024-3L
			10	S/Sst : w to or gy, crs, l, f, kln	0024-2L
			tr	Coal : blk	0024-4L
3095.00					0025
		1.97	75	S/Sst : w to or gy, crs, l, f, kln	0025-2L
			20	Sh/Clst: m gy to brn gy, mic, wx	0025-1L
			5	Sh/Clst: pl y brn	0025-3L
			tr	Coal : blk	0025-4L
			tr	Cont : prp, dd	0025-5L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample	
Int	Cvd	TOC%	%	Lithology description	
3107.00					0026
	1.69	60	Sh/Clst: m gy to brn gy, mic, wx		0026-1L
		30	Ca : lt or to or gy		0026-4L
		5	S/Sst : w to or gy, crs, l, f, kln		0026-2L
		5	Coal : blk		0026-6L
		tr	Sh/Clst: pl y brn		0026-3L
		tr	Cont : prp, dd		0026-5L
3116.00					0027
	2.32	70	Sh/Clst: m gy to drk gy		0027-1L
		30	Cont : dd, prp		0027-2L
		tr	Sh/Clst: m brn to drk brn		0027-3L
3125.00					0028
	1.03	90	Sh/Clst: brn gy to m gy to drk gy, mic, wx		0028-1L
		10	S/Sst : w to or gy, f, kln		0028-4L
		tr	Cont : dd, prp		0028-2L
		tr	Sh/Clst: m brn to drk brn, calc		0028-3L
		tr	Coal : blk		0028-5L
		tr	Other : pl y brn, evap		0028-6L
3128.00					0029
	1.90	90	Sh/Clst: brn gy to m gy to drk gy to brn blk, mic, wx		0029-1L
		10	S/Sst : w to or gy, f, kln		0029-4L
		tr	Cont : dd, prp		0029-2L
		tr	Sh/Clst: m brn to drk brn, calc		0029-3L
		tr	Coal : blk		0029-5L
		tr	Other : pl y brn, evap		0029-6L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int	Cvd	TOC%	%	Lithology description
3131.00				0030
	3.46	95	Sh/Clst: brn gy to m gy to drk gy, mic, wx	0030-1L
		5	S/Sst : w to or gy, f, kln	0030-4L
			tr Cont : prp	0030-2L
			tr Sh/Clst: m brn to drk brn, calc	0030-3L
3134.00				0031
	2.25	85	Sh/Clst: brn gy to drk brn gy to drk gy, mic, wx	0031-1L
		10	Cont : dd	0031-2L
		5	Other : pl y brn, evap	0031-4L
			tr Sh/Clst: m brn to drk brn, calc	0031-3L
3137.00				0032
	2.11	90	Sh/Clst: brn gy to m gy to drk gy, mic, wx	0032-1L
		5	Cont : dd, prp	0032-2L
		5	Other : pl y brn, evap	0032-4L
			tr Sh/Clst: m brn to drk brn, calc	0032-3L
3140.00				0033
	1.70	95	Sh/Clst: brn gy to m gy to drk gy, mic, wx	0033-1L
		5	Cont : dd, prp	0033-2L
			tr Sh/Clst: m brn to drk brn, calc	0033-3L
			tr Other : pl y brn, evap	0033-4L
			tr Coal : brn blk to blk	0033-5L
3143.00				0034
	1.89	95	Sh/Clst: brn gy to gy brn to m gy to drk gy, mic, wx	0034-1L
		5	Cont : dd, prp	0034-2L
			tr Sh/Clst: m brn to drk brn, calc	0034-3L
			tr Other : pl y brn, evap	0034-4L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample	
Int	Cvd	TOC%	%	Lithology description	
3146.00					0035
	2.40	70	Sh/Clst:	brn gy to gy brn to m gy to drk gy, mic, wx	0035-1L
		15	Other :	or gy to pl y brn, evap	0035-4L
		5	Cont :	dd, prp	0035-2L
		5	Sh/Clst:	m brn to drk brn, calc	0035-3L
		5	Sh/Clst:	drk y brn to pl y brn	0035-5L
3149.00					0036
	2.16	85	Sh/Clst:	brn gy to gy brn to m gy to drk gy, mic, wx	0036-1L
		10	Sh/Clst:	drk y brn to pl y brn	0036-5L
		5	Cont :	dd, prp	0036-2L
		tr	Sh/Clst:	m brn to drk brn, calc	0036-3L
		tr	Other :	or gy to pl y brn, evap	0036-4L
3152.00					0037
	4.21	90	Sh/Clst:	brn gy to drk brn gy to brn blk, mic, wx	0037-1L
		5	Other :	or gy to pl y brn, evap	0037-4L
		5	Sh/Clst:	drk y brn to pl y brn	0037-5L
		tr	Cont :	dd, prp	0037-2L
		tr	Sh/Clst:	m brn to drk brn, calc	0037-3L
3155.00					0038
	2.20	90	Sh/Clst:	brn gy to drk brn gy, mic, wx	0038-1L
		10	Sh/Clst:	m brn to drk brn to m y brn, calc	0038-3L
		tr	Cont :	dd, prp	0038-2L
		tr	Other :	or gy to pl y brn, evap	0038-4L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
3158.00				0039
	3.29	85 Sh/Clst: brn gy to drk brn gy, mic, wx 10 Sh/Clst: m brn to drk brn to m y brn, calc 5 Other : w to or gy, evap tr Cont : dd, prp		0039-1L 0039-3L 0039-4L 0039-2L
3161.00				0040
	2.72	70 Sh/Clst: m gy to brn gy to drk gy, mic, wx 10 Other : w to or gy, evap 10 Ca : lt gy, dol 5 Cont : dd, prp 5 Sh/Clst: m brn to drk brn to m y brn		0040-1L 0040-4L 0040-5L 0040-2L 0040-3L
3164.00				0041
	2.49	85 Sh/Clst: m gy to brn gy to drk gy, mic, wx 10 Sh/Clst: m brn to drk brn to m y brn 5 Other : w to or gy, evap tr Cont : dd, prp		0041-1L 0041-3L 0041-4L 0041-2L
3167.00				0042
	2.64	80 Sh/Clst: drk gy to drk brn gy to brn blk, mic, wx 10 Sh/Clst: m brn to drk brn to m y brn 10 Other : w to or gy, evap tr Cont : dd, prp tr Ca : lt gy, dol		0042-1L 0042-3L 0042-4L 0042-2L 0042-5L
3170.00				0043
	2.00	85 Sh/Clst: m gy to brn gy to gy blk, mic, wx 10 Other : w to or gy, evap 5 Cont : dd, prp tr Sh/Clst: m brn to drk brn to m y brn		0043-1L 0043-4L 0043-2L 0043-3L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample		
Int	Cvd	TOC%	%	Lithology description		
3174.00						0044
	72.20		50	Coal : blk		0044-5L
	2.26		25	Sh/Clst: lt brn gy to brn gy, mic		0044-1L
			15	Other : w to or gy, evap		0044-4L
			10	Sh/Clst: m brn to drk brn to m y brn		0044-3L
				tr Cont : dd, prp		0044-2L
3179.00						0045
	1.80		60	S/Sst : lt or gy to lt gy, crs, l		0045-1L
			40	Sh/Clst: drk gy to drk brn gy, mic		0045-2L
				tr Sh/Clst: m brn to drk brn		0045-3L
				tr Cont : prp		0045-4L
3188.00						0046
	1.96		85	Sh/Clst: drk gy to drk brn gy, mic		0046-2L
			15	Sh/Clst: lt brn to m brn		0046-3L
				tr S/Sst : lt or gy to lt gy, crs, l		0046-1L
				tr Cont : prp		0046-4L
3197.00						0047
	1.62		100	Sh/Clst: brn gy to drk brn gy to drk gy, mic		0047-1L
				tr Sh/Clst: lt brn to m brn		0047-2L
				tr Cont : prp		0047-3L
3200.00						0048
	2.41		85	Sh/Clst: brn gy to drk brn gy to drk gy, mic		0048-1L
			10	Sh/Clst: drk brn, wx		0048-2L
			5	Other : or gy to pl y brn, evap		0048-4L
				tr Cont : prp, dd		0048-3L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	%		
Lithology description				
3203.00				0049
	2.11	80	Sh/Clst: brn gy to drk brn gy to drk gy, mic	0049-1L
		10	Sh/Clst: drk brn, wx	0049-2L
		5	Cont : prp, dd	0049-3L
		5	Other : or gy to pl y brn, evap	0049-4L
		tr	Sh/Clst: m brn to pl brn	0049-5L
3206.00				0050
	1.50	85	Sh/Clst: brn gy to drk brn gy to drk gy, mic	0050-1L
		10	Sh/Clst: drk brn, wx	0050-2L
		5	Sh/Clst: m brn to pl brn to pl y brn	0050-4L
		tr	Cont : prp, dd	0050-3L
3209.00				0051
	1.79	85	Sh/Clst: brn gy to drk brn gy, mic	0051-1L
	1.46	15	Sh/Clst: drk brn, wx	0051-2L
		tr	Cont : prp, dd	0051-3L
		tr	Sh/Clst: m brn to m y brn	0051-4L
		tr	S/Sst : lt or gy to lt gy, f, kln	0051-5L
3212.00				0052
	1.78	70	Sh/Clst: m gy to brn gy to drk brn gy, mic	0052-1L
	1.68	30	Sh/Clst: drk brn, wx	0052-2L
		tr	Cont : prp, dd	0052-3L
		tr	Sh/Clst: m brn to m y brn	0052-4L
		tr	Other : w to lt or, evap	0052-5L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	%		
Lithology description				
3215.00				0053
	2.06	100	Sh/Clst: m gy to brn gy to gy brn to drk brn, mic, wx	0053-1L
			tr Cont : prp, dd	0053-2L
			tr Sh/Clst: m brn to m y brn	0053-3L
			tr Other : w to lt or, evap	0053-4L
3218.00				0054
	2.50	100	Sh/Clst: m gy to drk gy to drk brn to gy brn, mic, wx	0054-1L
			tr Sh/Clst: m brn to m y brn	0054-2L
			tr Other : w to lt or, evap	0054-3L
			tr Cont : prp, dd	0054-4L
3221.00				0055
	2.05	95	Sh/Clst: drk gy to brn gy to drk brn to gy brn, mic, wx	0055-1L
		5	Sh/Clst: m brn to m y brn	0055-2L
			tr Other : w to lt or, evap	0055-3L
			tr S/Sst : lt gy to lt or gy, f, kln	0055-4L
			tr Cont : prp, dd	0055-5L
3227.00				0056
	2.68	90	Sh/Clst: drk gy to brn gy to drk brn gy to drk brn, mic, wx	0056-1L
	1.56	10	Sh/Clst: m brn to m y brn	0056-2L
			tr Other : w to lt or, evap	0056-3L
			tr Coal : blk, wx	0056-4L
			tr Cont : prp, dd	0056-5L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample	
Int	Cvd	TOC%	%	Lithology description	
3233.00					0057
	2.18	80	Sh/Clst:	drk gy to brn gy to drk brn gy to drk brn, mic, wx	0057-1L
	1.49	10	Sh/Clst:	m brn to m y brn	0057-2L
		5	Coal	: blk, wx	0057-4L
		5	Cont	: prp, dd	0057-5L
			tr Other	: w to lt or, evap	0057-3L
3239.00					0058
	1.60	95	Sh/Clst:	m gy to drk gy to brn gy to drk brn, mic	0058-1L
		5	Sh/Clst:	lt brn to m brn to pl brn	0058-2L
			tr Cont	: prp, ns	0058-3L
3245.00					0059
	1.53	100	Sh/Clst:	drk gy to brn gy to drk brn, mic	0059-1L
			tr Sh/Clst:	lt brn to m brn to pl brn	0059-2L
			tr S/Sst	: lt or gy, f, kln	0059-3L
3251.00					0060
	1.49	95	Sh/Clst:	drk gy to brn gy to drk brn, mic	0060-1L
		5	Sh/Clst:	lt brn to m y brn t	0060-2L
			tr Cont	: dd	0060-3L
3257.00					0061
	2.94	85	Sh/Clst:	drk gy to brn gy to drk brn, mic	0061-1L
		10	Sh/Clst:	lt brn to m y brn	0061-2L
		5	Other	: lt or gy to m y brn, evap	0061-4L
			tr Cont	: dd	0061-3L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type	Trb	Sample
Int Cvd	TOC%	%	Lithology description
3263.00			0062
	2.20	85	Sh/Clst: m gy to drk gy to brn gy to drk brn, mic, wx 0062-1L
		10	Sh/Clst: lt brn to m brn to m y brn, calc 0062-2L
		5	Other : lt or gy to m y brn, evap 0062-3L
		tr	Ca : lt gy, dol 0062-4L
3269.00			0063
	1.91	75	Sh/Clst: m gy to drk gy to brn gy to drk brn, mic, wx 0063-1L
		10	Sh/Clst: lt brn to m brn to m y brn, calc 0063-2L
		10	Cont : prp, ns, dd 0063-4L
		5	Other : lt or gy to m y brn, evap 0063-3L
3275.00			0064
	2.55	70	Sh/Clst: m gy to drk gy to brn gy to drk brn, mic, wx 0064-1L
		15	Sh/Clst: lt brn to m brn to m y brn, calc 0064-2L
		10	Cont : prp, ns, dd 0064-4L
		5	Other : lt or gy to m y brn, evap 0064-3L
3281.00			0065
	3.15	80	Sh/Clst: m gy to drk gy to brn gy to drk brn, mic, wx 0065-1L
		15	Sh/Clst: lt brn to or gy to lt ol brn 0065-2L
		5	Cont : prp, ns, dd 0065-4L
		tr	Other : lt or gy to m y brn, evap 0065-3L
3287.00			0066
	1.59	90	Sh/Clst: m gy to drk gy to brn gy, mic, wx 0066-1L
		5	Sh/Clst: lt brn to m brn to lt or gy 0066-2L
		5	Cont : prp, ns, dd 0066-4L
		tr	Other : lt or gy to m y brn, evap. 0066-3L
		tr	Coal : blk 0066-5L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description	---	-----
3293.00				0067
	1.35	70 Sh/Clst: m gy to drk gy to brn gy, mic 20 S/Sst : lt gy to lt or gy, f, kln, l 5 Sh/Clst: lt brn to m brn, calc 5 Cont : dd, prp		0067-1L 0067-3L 0067-2L 0067-4L
3299.00				0068
	1.28	65 Sh/Clst: m gy to drk gy to brn gy, mic 25 S/Sst : lt gy to lt or gy, f, kln, l 5 Coal : blk 5 Cont : dd, prp tr Sh/Clst: lt brn to m brn, calc		0068-1L 0068-3L 0068-4L 0068-5L 0068-2L
3305.00				0069
	1.47	55 Sh/Clst: brn gy to dsk brn, mic 30 S/Sst : lt gy to lt or gy, f, kln, l 15 Cont : dd, prp tr Sh/Clst: lt brn to m brn, calc tr Coal : blk		0069-1L 0069-3L 0069-5L 0069-2L 0069-4L
3311.00				0070
	1.14	50 Sh/Clst: brn gy to dsk brn, mic 30 S/Sst : lt gy to lt or gy, f, kln, l 20 Cont : dd, prp tr Sh/Clst: lt brn to m brn, calc tr Coal : blk		0070-1L 0070-3L 0070-5L 0070-2L 0070-4L
3317.00				0071
	1.14	80 Sh/Clst: drk gy to brn gy to dsk brn, mic 20 S/Sst : lt gy to lt or gy, f, kln, l tr Sh/Clst: lt brn to m brn, calc tr Cont : dd, prp		0071-1L 0071-3L 0071-2L 0071-4L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
3323.00				0072
	1.52	45 Sh/Clst: drk gy to brn gy to dsk brn, mic 30 S/Sst : lt gy to lt or gy, f, kln, l 25 Cont : dd, prp tr Sh/Clst: lt brn to m brn, calc		0072-1L 0072-3L 0072-4L 0072-2L
3326.00				0073
	2.31	70 Sh/Clst: drk gy to brn gy to dsk brn, mic 20 S/Sst : w to lt gy, f, kln, l 10 Cont : dd, prp		0073-1L 0073-2L 0073-3L
3335.00				0074
	1.65	40 Cont : dd, prp 30 Sh/Clst: drk gy to brn gy to dsk brn, mic 30 S/Sst : w to lt gy, f, kln, l		0074-3L 0074-1L 0074-2L
3347.00				0076
	1.73	75 Sh/Clst: m gy to drk gy to brn gy to dsk brn, mic, wx 15 Cont : dd, prp 10 S/Sst : w to lt gy, f, kln, l tr Sh/Clst: m brn to pl brn, calc		0076-1L 0076-3L 0076-2L 0076-4L
3356.00				0075
	1.57	100 Sh/Clst: m gy to drk gy to brn gy to dsk brn, mic, wx tr S/Sst : w to lt gy, f, kln, l tr Cont : dd, prp tr Sh/Clst: m brn to pl brn, calc		0075-1L 0075-2L 0075-3L 0075-4L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
3386.00				0077
	2.13	80 Sh/Clst: m gy to drk gy to brn gy, mic, fis		0077-1L
		15 S/Sst : w to lt gy, f, kln, l		0077-2L
		5 Cont : dd, prp		0077-3L
		tr Sh/Clst: m brn to pl brn, calc		0077-4L
3404.00				0078
		100 S/Sst : lt or gy, f, l		0078-1L
		tr Sh/Clst: drk gy		0078-2L
		tr Cont : prp		0078-3L
3413.00				0079
		50 S/Sst : w to lt gy, crs, l		0079-1L
		25 Cont : prp, dd		0079-3L
		15 Sh/Clst: brn gy to drk gy, mic		0079-2L
		10 Ca : or gy to lt or		0079-4L
		tr Kaolin : w		0079-5L
3422.00				0080
		100 S/Sst : w to lt gy, crs, l		0080-1L
		tr Sh/Clst: brn gy to drk gy, mic		0080-2L
		tr Kaolin : w		0080-3L
3431.00				0081
	1.70	50 S/Sst : w to lt gy, crs, l		0081-1L
		50 Sh/Clst: brn gy to drk gy, mic		0081-2L
		tr Coal : blk		0081-3L
		tr Kaolin : w		0081-4L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
3440.00				0082
	1.20	75 Sh/Clst: brn gy to drk gy, mic 25 S/Sst : w to lt gy, crs, l tr Coal : blk tr Kaolin : w		0082-2L 0082-1L 0082-3L 0082-4L
3449.00				0083
	1.47	90 S/Sst : w to lt or gy, crs, l 10 Sh/Clst: brn gy to drk gy, mic tr Kaolin : w		0083-1L 0083-2L 0083-3L
3458.00				0084
		85 S/Sst : w to lt or gy, crs, l 15 Sh/Clst: brn gy to drk gy, mic tr Kaolin : w tr Cont : prp		0084-1L 0084-2L 0084-3L 0084-4L
3467.00				0085
		100 S/Sst : lt or gy, f, l tr Sh/Clst: brn gy to drk gy, mic		0085-1L 0085-2L
3476.00				0086
		75 S/Sst : w to lt gy, crs, f, l 25 Sh/Clst: brn gy to pl brn to drk gy, mic tr Sh/Clst: m brn		0086-1L 0086-2L 0086-3L
3485.00				0087
		100 S/Sst : lt or, f, l tr Sh/Clst: drk gy, mic		0087-1L 0087-2L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
3494.00				0088
	0.87	60 Sh/Clst: drk gy, mic 40 S/Sst : w to lt gy, crs, l tr Cont : prp		0088-2L 0088-1L 0088-3L
3503.00				0089
	0.94	80 Sh/Clst: lt gy to lt ol gy to drk brn, wx 20 S/Sst : w to lt gy, crs, l tr Cont : prp		0089-2L 0089-1L 0089-3L
3512.00				0090
		100 S/Sst : lt or gy, crs, l tr Sh/Clst: m gy to drk gy		0090-1L 0090-2L
3521.00				0091
		100 S/Sst : lt or gy, crs, l tr Sh/Clst: m gy to drk gy		0091-1L 0091-2L
3530.00				0092
	0.88	65 S/Sst : w to lt gy, crs, l 35 Sh/Clst: m gy to lt ol gy to drk brn gy		0092-1L 0092-2L
3539.00				0093
	0.80	40 S/Sst : w to lt gy, crs, l 35 Sh/Clst: lt ol gy to m gy to drk gy 20 Sltst : drk red brn 5 Sh/Clst: m brn to pl brn		0093-1L 0093-2L 0093-3L 0093-4L

Table 1 : Lithology description for well NOCS 34/10-2

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	%		
Lithology description				
3548.00				0094
	0.71	45	Sh/Clst: lt ol gy to m gy to drk gy	0094-2L
		35	S/Sst : w to lt gy, crs, l	0094-1L
		10	Sltst : drk red brn	0094-3L
		10	Sh/Clst: m brn to pl brn	0094-4L
		tr	Coal : blk, wx	0094-5L
		tr	Cont : prp	0094-6L

Table 2 : Rock-Eval table for well NOCS 34/10-2

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
2900.00	cut	Sh/Clst: brn gy to brn blk	0.44	8.09	0.55	14.71	2.76	293	20	8.5	0.05	433	0005-2L
2939.00	cut	Sh/Clst: brn gy to drk brn gy to drk gy	0.51	7.15	0.62	11.53	3.35	213	19	7.7	0.07	432	0010-2L
2948.00	cut	Sh/Clst: brn gy to drk brn gy to drk gy	0.87	5.82	0.79	7.37	4.04	144	20	6.7	0.13	434	0011-1L
2966.00	cut	Sh/Clst: brn gy to drk brn gy to brn blk	0.66	4.43	0.79	5.61	3.48	127	23	5.1	0.13	435	0013-1L
3029.00	cut	Sh/Clst: m gy to lt brn gy to brn gy	0.47	4.85	0.69	7.03	2.30	211	30	5.3	0.09	436	0020-1L
3038.00	cut	Sh/Clst: m gy to brn gy to drk brn gy	0.44	4.03	0.74	5.45	2.35	171	31	4.5	0.10	432	0021-1L
3116.00	cut	Sh/Clst: m gy to drk gy	2.10	6.03	0.64	9.42	2.32	260	28	8.1	0.26	433	0027-1L
3131.00	cut	Sh/Clst: brn gy to m gy to drk gy	0.61	5.46	0.51	10.71	3.46	158	15	6.1	0.10	436	0030-1L
3137.00	cut	Sh/Clst: brn gy to m gy to drk gy	0.31	2.77	0.90	3.08	2.11	131	43	3.1	0.10	435	0032-1L
3146.00	cut	Sh/Clst: brn gy to gy brn to m gy to drk gy	0.38	3.64	0.74	4.92	2.40	152	31	4.0	0.09	433	0035-1L
3152.00	cut	Sh/Clst: brn gy to drk brn gy to brn blk	0.68	9.86	1.00	9.86	4.21	234	24	10.5	0.06	431	0037-1L

Table 2 : Rock-Eval table for well NOCS 34/10-2

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
3161.00	cut	Sh/Clst: m gy to brn gy to drk gy	0.38	4.95	0.76	6.51	2.72	182	28	5.3	0.07	434	0040-1L
3167.00	cut	Sh/Clst: drk gy to drk brn gy to brn blk	0.37	4.97	0.92	5.40	2.64	188	35	5.3	0.07	435	0042-1L
3200.00	cut	Sh/Clst: brn gy to drk brn gy to drk gy	0.39	4.78	0.63	7.59	2.41	198	26	5.2	0.08	435	0048-1L
3203.00	cut	Sh/Clst: brn gy to drk brn gy to drk gy	0.35	3.61	0.50	7.22	2.11	171	24	4.0	0.09	437	0049-1L
3218.00	cut	Sh/Clst: m gy to drk gy to drk brn to gy brn	0.42	4.27	0.87	4.91	2.50	171	35	4.7	0.09	434	0054-1L
3227.00	cut	Sh/Clst: drk gy to brn gy to drk brn gy to drk brn	0.50	4.23	0.82	5.16	2.68	158	31	4.7	0.11	436	0056-1L
3227.00	cut	Sh/Clst: m brn to m y brn	0.25	1.88	0.89	2.11	1.56	121	57	2.1	0.12	436	0056-2L
3257.00	cut	Sh/Clst: drk gy to brn gy to drk brn	0.55	6.08	0.68	8.94	2.94	207	23	6.6	0.08	435	0061-1L
3281.00	cut	Sh/Clst: m gy to drk gy to brn gy to drk brn	0.66	7.59	0.77	9.86	3.15	241	24	8.3	0.08	431	0065-1L
3305.00	cut	Sh/Clst: brn gy to dsk brn	0.24	1.48	1.07	1.38	1.47	101	73	1.7	0.14	438	0069-1L
3326.00	cut	Sh/Clst: drk gy to brn gy to dsk brn	0.40	3.88	0.66	5.88	2.31	168	29	4.3	0.09	437	0073-1L

Table 2 : Rock-Eval table for well NOCS 34/10-2

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
3347.00	cut	Sh/Clst: m gy to drk gy to brn gy to dsk brn	0.45	2.38	0.58	4.10	1.73	138	34	2.8	0.16	436	0076-1L
3386.00	cut	Sh/Clst: m gy to drk gy to brn gy	0.51	3.01	0.75	4.01	2.13	141	35	3.5	0.14	437	0077-1L
3449.00	cut	Sh/Clst: brn gy to drk gy	0.31	1.78	0.56	3.18	1.47	121	38	2.1	0.15	435	0083-2L

Table 3 List of composite samples appearing in well NOCS 34/10-2

Depth unit of measure: m

NOTE: Depths shown in results tables correspond to the composite samples' lower depth.

<u>Upper depth</u>	<u>Lower depth</u>	<u>Typ</u>	<u>Sample</u>	<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Sample</u>
2891.00	2894.00	com	0095-0 is composed of:	2891.00	cut	Sh/Clst: m gy to lt brn gy to brn gy, mic	003-2
				2894.00	cut	Sh/Clst: m gy to drk gy to brn gy, mic	004-2
2891.00	2894.00	com	0096-0 is composed of:	2891.00	cut	Coal : blk	003-3
				2894.00	cut	Coal : blk	004-3
2906.00	2921.00	com	0097-0 is composed of:	2906.00	cut	Sh/Clst: brn gy to brn blk, wx	006-2
				2921.00	cut	Sh/Clst: brn gy to drk brn gy, wx	008-2
2975.00	2993.00	com	0098-0 is composed of:	2975.00	cut	Sh/Clst: brn gy to brn blk, mic, wx	014-2
				2984.00	cut	Sh/Clst: brn gy to drk brn gy to brn blk, mic, wx	015-1
				2993.00	cut	Sh/Clst: brn gy to drk brn gy to brn blk, mic, wx	016-1
3002.00	3011.00	com	0099-0 is composed of:	3002.00	cut	Sh/Clst: brn gy to drk brn gy, mic, wx	017-1
				3011.00	cut	Sh/Clst: brn gy to drk brn gy, mic, wx	018-1
3056.00	3065.00	com	0104-0 is composed of:	3056.00	cut	Sh/Clst: pl y brn	023-3
				3065.00	cut	Sh/Clst: pl y brn	024-3

Table 3 List of composite samples appearing in well NOCS 34/10-2

Depth unit of measure: m

NOTE: Depths shown in results tables correspond to the composite samples' lower depth.

<u>Upper depth</u>	<u>Lower depth</u>	<u>Typ</u>	<u>Sample</u>		<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Sample</u>
3263.00	3275.00	com	0100-0	is composed of:	3263.00	cut	Sh/Clst: lt brn to m brn to m y brn, calc	062-2
					3269.00	cut	Sh/Clst: lt brn to m brn to m y brn, calc	063-2
					3275.00	cut	Sh/Clst: lt brn to m brn to m y brn, calc	064-2
3404.00	3422.00	com	0101-0	is composed of:	3404.00	cut	Sh/Clst: drk gy	078-2
					3413.00	cut	Sh/Clst: brn gy to drk gy, mic	079-2
					3422.00	cut	Sh/Clst: brn gy to drk gy, mic	080-2
3458.00	3485.00	com	0102-0	is composed of:	3458.00	cut	Sh/Clst: brn gy to drk gy, mic	084-2
					3467.00	cut	Sh/Clst: brn gy to drk gy, mic	085-2
					3476.00	cut	Sh/Clst: brn gy to pl brn to drk gy, mic	086-2
					3485.00	cut	Sh/Clst: drk gy, mic	087-2
3512.00	3521.00	com	0103-0	is composed of:	3512.00	cut	Sh/Clst: m gy to drk gy	090-2
					3521.00	cut	Sh/Clst: m gy to drk gy	091-2