FAHLEY NO. 1 WELL COMPLETION REPORT

BY: BEACH PETROLEUM N.L.
DR. A. TABASSI

DECEMBER 1985

TEXT

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FAHLEY-1
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BEACH PETROLEUM N.L.

(Incorporated in South Australia)

BEACH PETROLEUM N.L.

FAHLEY NO. 1- PEP 105

WELL COMPLETION REPORT

BY:

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DECEMBER 1985

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Separate folder PE 902403

APPENDIX 7

SOURCE ROCK STUDIES

FAHLEY NO. 1

K.K. No.	Depth (m)	$\bar{R}_v$max	Range	N	Exinite Fluorescence (Remarks)
					Pember Formation
x3000	1050 Ctgs	0.28	0.21-0.52	29	Sparse liptodetrinite, yellow to orange, rare cutinite, yellow orange, rare ?phytoplankton, yellow. (Sandstone>>
	$\bar{R}_i$	0.79	0.59-0.89	5	siltstone>carbonate. Dom sparse, V>E>I. Vitrinite and exinite sparse, inertinite rare. Rare yellow fluorescing droplets of ?oil. Inorganic mud additive sparse. Iron oxides common. Carbonate rare. Framboidal pyrite abundant.)
x3001	1150 Ctgs	0.29	0.21-0.36	28	Sparse phytoplankton, yellow, sparse liptodetrinite, yellow to orange. (Siltstone>>sandstone. Dom common, V>E>I. Vitrinite common, exinite sparse, inertinite rare. Inorganic mud additive rare. Iron oxides abundant. Carbonate sparse. Pyrite abundant.)
x3002	1250 Ctgs	0.32	0.27-0.41	26	Sparse phytoplankton, bright yellow to yellow, sparse liptodetrinite, yellow to orange, rare sporinite, yellow to orange. (Siltstone>>carbonate>sandstone. Dom common, V>E>I. Vitrinite common, exinite sparse to common, inertinite rare. Rare yellow fluorescing droplets of ?oil. Inorganic mud additive sparse. Iron oxides abundant. Pyrite abundant.)
					Paaratte Formation
x3003	1460 Ctgs	0.35	0.24-0.52	28	Sparse sporinite, yellow to orange, sparse liptodetrinite, bright yellow to orange, rare cutinite, yellow orange, rare phytoplankton, bright yellow to yellow. (Sandstone> siltstone>carbonate>coal. Coal rare, vitrite. Dom common, I>V>E. Inertinite common, vitrinite sparse to common, exinite sparse. Iron oxides common. Inorganic mud additive rare. Pyrite abundant.)
x3004	1690 Ctgs	0.37	0.27-0.50	29	Sparse liptodetrinite, yellow to orange, rare sporinite, yellow, rare phytoplankton, bright yellow to yellow. (Sandstone>siltstone>carbonate>coal. Coal rare, vitrite= inertite. Dom common, I>V>E. Inertinite sparse to common, vitrinite and exinite sparse. Green fluorescing ?oil droplets present especially in the mounting resin. Inorganic mud additive sparse. Iron oxides sparse. Pyrite common.)
x3005	1940 Ctgs	0.40	0.35-0.53	16	Rare liptodetrinite and cutinite, yellow to dull orange, rare resinite, yellow. (Sandstone>siltstone>claystone>
	$\bar{R}_i$	1.12	0.62-1.77	13	carbonate>coal. Coal sparse, V. Vitrite. Dom sparse, I>E>V. Inertinite sparse, exinite and vitrinite rare. Green to yellow fluorescing ?oil droplets present. Inorganic mud additive present. Pyrite abundant.)

FAHLEY NO. 1

K.K. No.	Depth (m)	$\bar{R}_v$max	Range	N	Exinite Fluorescence (Remarks)
x3006	2030 Ctgs	0.37	0.25-0.51	22	Rare phytoplankton, bright yellow to yellow, rare liptodetrinite, yellow to orange. (Sandstone>>siltstone>>carbonate>coal. Coal rare, vitrite, probably cavings. Dom sparse, I>V>E. Inertinite and vitrinite sparse, exinite rare. Iron oxides common. Inorganic mud additive rare. Green fluorescing ?oil droplets rare. Cavings may form a significant part of the vitrinite population. Pyrite common.)
x3007	2310 Ctgs *Presumed cavings	0.58*	0.47-0.76	17	Sparse liptodetrinite, yellow orange, rare phytoplankton, yellow. (Sandstone>siltstone>carbonate>shaly coal. Shaly coal rare, inertite. Dom common, I>V>E. All three maceral groups sparse. Iron oxides common. Inorganic mud additive sparse. Green fluorescing ?oil droplets present, mainly in setting resin. Pyrite common.)
					Belfast Mudstone
x3008	2400 Ctgs	0.60	0.41-0.75	25	Sparse sporinite and liptodetrinite, yellow to orange, sparse phytoplankton, bright yellow to yellow, rare cutinite, yellow to orange, rare resinite, yellow, rare ?fluorinite, green. (Siltstone>sandstone>carbonate>coal. Coal rare, vitrite. Dom abundant, I>E>V. Inertinite and exinite common, vitrinite sparse to common. Diffuse humic matter rare. Iron oxides sparse. Green fluorescing ?oil droplets present. Pyrite abundant.)
x3009	2520 Ctgs	0.58	0.46-0.71	12	Rare sporinite, yellow, rare phytoplankton and liptodetrinite, bright yellow to yellow. (Sandstone>>siltstone>carbonate. Dom common, I>V>or=E. Inertinite common, vitrinite and exinite rare. Inorganic mud additive sparse. Iron oxides common. Pyrite abundant.)
	$\bar{R}_i$	1.00	0.85-1.21	5	
x3010	2620 Ctgs	0.60	0.47-0.76	32	Rare resinite and sporinite, yellow, rare phytoplankton, bright yellow to yellow, rare liptodetrinite, yellow to orange. (Sandstone>>siltstone>>carbonate>coal. Coal rare, pyritized vitrite. Dom common, I>V>E. Inertinite common, vitrinite and exinite sparse. Iron oxides rare. Inorganic mud additive rare. Green fluorescing ?oil droplets present. Diffuse humic matter rare. Pyrite common.)
x3011	2690 Ctgs	0.66	0.48-0.81	29	Sparse phytoplankton, bright yellow to yellow, sparse liptodetrinite, bright yellow to orange, rare resinite, yellow, rare sporinite, yellow to orange, rare cutinite, orange to dull orange. (Sandstone>>siltstone>carbonate>shaly coal. Shaly coal rare, vitrite. Dom common, V>I>or-E. All three maceral groups sparse. Inorganic mud additive rare. Green fluorescing oil droplets present. Moderate green oil cut from cracks in ?carbonate/additive. Pyrite common.)

FAHLEY NO. 1

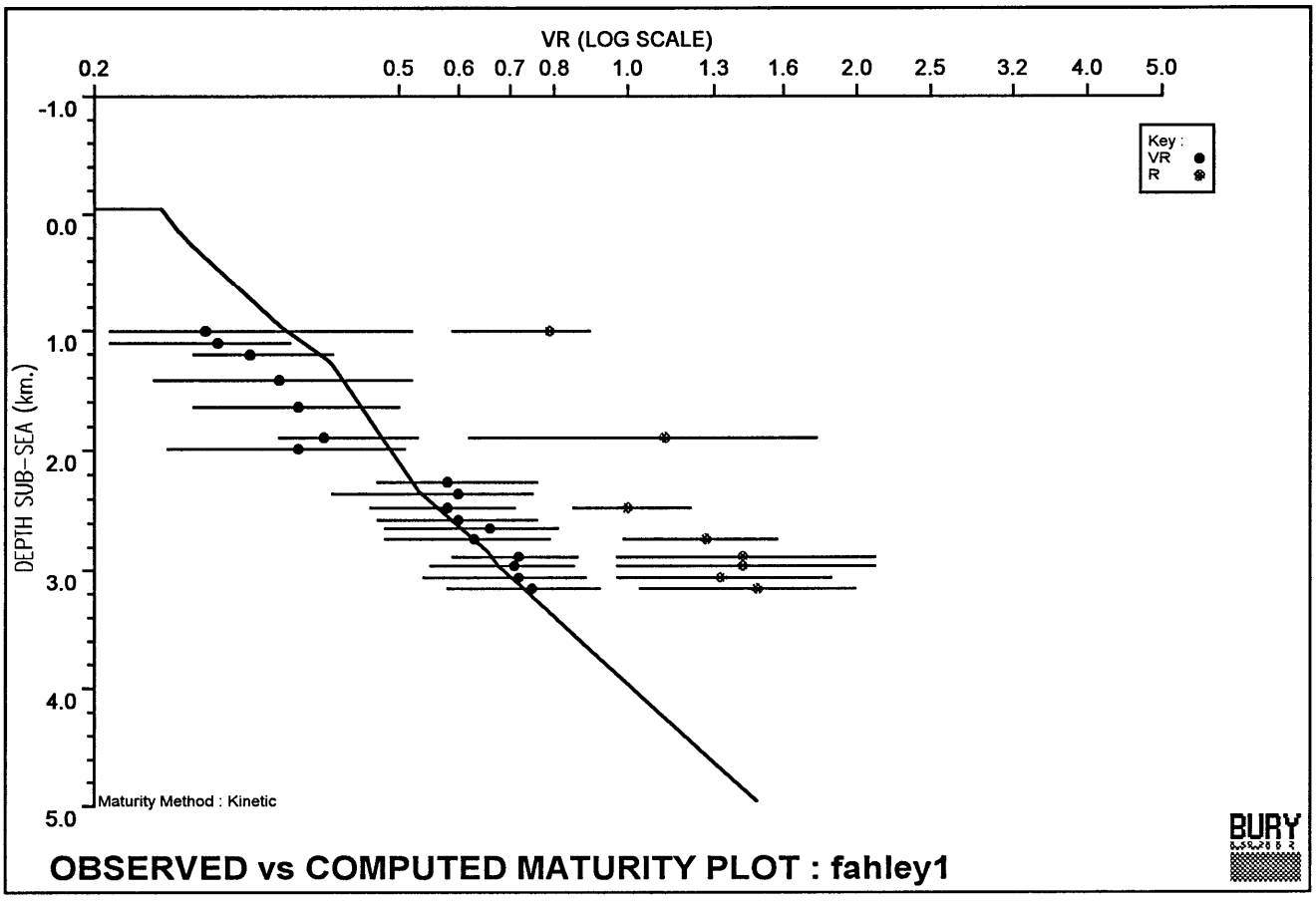
K.K. No.	Depth (m)	$\bar{R}_v$max	Range	N	Exinite Fluorescence (Remarks)
x3012	2780 Ctgs	0.63	0.48-0.79	29	Sparse liptodetrinite and cutinite, yellow orange to dull orange, rare phytoplankton, yellow, rare sporinite, yellow
	$\bar{R}_i$	1.27	0.99-1.57	6	orange, rare resinite, yellow, rare ?bituminite, dull orange to brown. (Sandstone>siltstone>carbonate>claystone> shaly coal. Shaly coal common, inertite. Dom common, I>or=V>E. Inertinite and vitrinite common, exinite sparse. Vitrinite shows weak dull brown fluorescence. Green ?oil in fissures of carbonate. Mud additive present. Pyrite abundant.)
					Waarre Sandstone
x3013	2930 Ctgs	0.72	0.59-0.86	25	Sparse liptodetrinite and sporinite, yellow orange to dull orange, rare cutinite, yellow to dull orange, rare resinite/
	$\bar{R}_i$	1.38	1.11-1.76	6	fluorinite, greenish yellow to yellow, rare phytoplankton, greenish yellow, rare ?bituminite, dull orange to brown. (Sandstone>siltstone>carbonatecarbonaceous siltstone. Dom abundant, in some siltstone grains common overall. I>V>E. Inertinite common, vitrinite sparse, exinite locally abundant but sparse overall. Some vitrinite shows weak dull brown fluorescence. Green oil cut from some siltstone grains. Strong mineral fluorescence. Pyrite abundant.)
x3014	3010 Ctgs	0.71	0.55-0.85	25	Sparse liptodetrinite and sporinite, yellow to dull orange, rare cutinite, yellow to dull orange, rare ?phytoplankton,
	$\bar{R}_i$	1.42	0.97-2.11	5	greenish yellow. (Siltstone>sandstone>carbonate>shaly coal. Shaly coal rare, vitrite. Dom common, I>V>E. Inertinite common, vitrinite and exinite sparse. Most vitrinite shows weak brown fluorescence. Green oil cut from some siltstone grains. ?Oil present in sandstone. Strong mineral fluorescence. Pyrite abundant.)
x3015	3110 Ctgs	0.72	0.54-0.88	31	Sparse liptodetrinite, yellow to dull orange, rare sporinite and cutinite, yellow orange to dull orange, rare resinite,
	$\bar{R}_i$	1.33	0.97-1.85	5	yellow. (Siltstone>sandstone>claystone>carbonate>shaly coal. Shaly coal rare, V>>E>I. Clarite. Dom common, I>V>E. Inertinite common, vitrinite and exinite sparse. Vitrinite shows weak dull brown to brown fluorecence. Rare green oil cut from some siltstone and claystone grains and occasionally from vitrinite. Strong mineral fluorescence. Pyrite abundant.)

FAHLEY NO. 1

K.K. No.	Depth (m)	$\bar{R}_v$max	Range	N	Exinite Fluorescence (Remarks)
x3016	3200 Ctgs	0.75	0.58-0.92	32	Common cutinite and sporinite, yellow orange to dull orange, sparse liptodetrinite, yellow to dull orange, sparse resinite, yellow, rare bituminite, dull orange, rare suberinite, dull yellow to dull orange, rare ?telalginite, yellow, rare fluorinite, greenish yellow. (Siltstone> sandstone>carbonaceous siltstone>carbonate>shaly coal. Shaly coal rare, I>V. Vitrinertite(I)=inertite. Dom abundant, I>V>or=E. Inertinite abundant, vitrinite and exinite common. Vitrinite shows dull orange to brown fluorescence. Weak green oil cut from some vitrinite. Greenish yellow fluorescing oil droplets present. Strong mineral fluorescence. Pyrite abundant.)
		$\bar{R}_I$	1.04-1.99	5	

FAHLEY NO. 1

KK No.	Depth (m)	TOC
x3000	1050	0.47
x3001	1150	1.57
x3002	1250	1.13
x3003	1460	1.46
x3004	1690	1.14
x3005	1940	0.40
x3006	2030	0.44
x3007	2310	1.08
x3008	2400	1.65
x3009	2520	0.73
x3010	2620	1.02
x3011	2690	1.18
x3012	2780	0.71
x3013	2930	0.96
x3014	3010	0.69
x3015	3110	0.86
x3016	3200	1.54


VR (LOG SCALE)
0.2
0.5
0.6
0.7
0.8
1.0
1.3
1.6
2.0
2.5
3.2
4.0
5.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
DEPTH SUB-SEA (km.)
Key :
VR
R
Maturity Method : Kinetic
BURY
OBSERVED vs COMPUTED MATURITY PLOT : fahley1

APPENDIX 9

ROCK-EVAL ANALYSIS

The Australian Mineral Development Laboratories

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P.O. Box 114 Eastwood
SA 5063
In reply quote:

amdel

14 November 1985

F 3794/0
F 6292 - Part 2

Beach Petroleum
PO Box 350
LAMBERMELL VIC 3124

Attention: Mr Tabesh

REPORT F 6292 - Part 2

YOUR REFERENCE: Letter dated 19 August 1985 from Dub. Langton

TITLE: Source rock evaluation, Hanley-1, Otway basin

IDENTIFICATION: 1000-3200 m depth

MATERIAL: 10 washed cuttings

LOCALITY: HANLEY-1

DATE RECEIVED: 21 August 1985

WORK REQUIRED: Total organic carbon and Rock-Eval pyrolysis

Investigation and Report by: Teresa O'Leary

Chief-Petroleum Services Section: Dr Brian G. Steveson

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1. INTRODUCTION

This report formally presents total organic carbon and Rock-Eval pyrolysis data for thirteen cuttings samples from Fahley-1 (Table 1). This report also includes brief descriptions of analytical procedures, graphical representation of data and interpretative comments.

2. ANALYTICAL PROCEDURE

2.1 Sample Preparation

Unwashed cuttings were ground in a Siebtechnik mill for 20-30 secs.

2.2 Total Organic Carbon (TOC)

Total organic carbon was determined by digestion of a known weight (0.2-0.3 g) of powdered rock in 50% HCl to remove carbonates, followed by combustion in oxygen in the induction furnace of a Leco IR-12 Carbon Determinator and measurement of the resultant CO_2 by infra-red detection.

2.3 Rock Eval Analysis

A 100 mg portion of powdered rock was analysed by the Rock-Eval pyrolysis technique carried out on a Rock Eval 2 instrument; operating mode, Cycle 1.

3. RESULTS

TOC and Rock-Eval pyrolysis data for the thirteen cuttings samples are listed in Table 1. Figures 1-4 are crossplots of hydrogen index versus Tmax which demonstrate kerogen type and maturity for the intervals shown in Table 1.

4. INTERPRETATION

4.1 Maturity

Tmax values range between 413-429°C for the section studied (Table 1) these values correspond to maturities of VR = 0.4-0.6% (Figures 1-4). Insofar as their dispersed organic matter comprises mainly woody herbaceous matter (type II-III kerogen) the Tertiary Cretaceous sediments of the Fahley-1 section are immature for the generation of oil.

If contamination due to diesel based drilling mud can be ruled out the high production indices (PI) in the Paaratte and Belfast intervals suggests the presence of migrated hydrocarbons.

4.2 Source Richness

Organic richness is generally poor (TOC <1%) (Table 1), source richness also follows this trend. Potential yields characteristic of fair oil source beds (S_1+S_2 = 2-6 kg hydrocarbons/tonne) are found in the Pember, Pearatt and Belfast intervals. However, these values are high due to the large S_1 values.

4.3 Kerogen Type and Source Quality

The dispersed organic matter in the sediments of the Tahley-1 section has the bulk composition of gas prone type III kerogen (Figs. 3-4). Samples with hydrogen indices in the range HI = 100-200 may have some liquids generating potential, but their organic leanness and immaturity detracts from their ability to expel significant quantities of oil.

TABLE 1

ROCK-EVAL PYROLYSIS 12/11/85

Client BEACH PETROLEUM

Well FAHLEY-1

DEPTH	T MAX	S1	S2	S3	S1+S2	PI	S2/S3	PC	TOC	HI	OI
PEMBER MEMBER											
1050.00	423	0.15	1.08	2.83	1.23	0.12	0.38	0.10	1.17	92	241
1150.00	426	0.16	2.73	10.84	2.89	0.06	0.25	0.24	1.84	148	589
1250.00	426	0.14	1.56	5.00	1.70	0.08	0.31	0.14	1.47	106	340
PAARATTE FORMATION											
2310.00	428	2.11	1.72	1.78	3.83	0.55	0.96	0.31	1.87	92	95
BELFAST MEMBER											
2400.00	432	1.80	1.89	1.96	3.69	0.49	0.96	0.30	2.10	90	93
2520.00	428	1.26	1.22	1.49	2.48	0.51	0.81	0.20	1.21	101	123
2620.00	434	0.86	1.58	1.14	2.44	0.35	1.38	0.20	1.37	115	83
2690.00	434	0.79	1.39	1.26	2.18	0.36	1.10	0.18	1.55	90	81
2780.00	427	0.31	0.66	1.12	0.97	0.32	0.58	0.08	0.70	94	160
WAARRE FORMATION											
2930.00	432	0.32	0.93	0.55	1.25	0.26	1.69	0.10	0.88	106	63
3010.00	438	0.13	0.52	0.60	0.65	0.20	0.86	0.05	0.71	73	84
3110.00	438	0.22	0.85	0.66	1.07	0.21	1.28	0.08	0.89	95	74
3200.00	439	0.23	1.49	0.26	1.72	0.13	5.73	0.14	1.52	98	17

KEY TO ROCK-EVAL PYROLYSIS DATA SHEET

	PARAMETER	SPECIFICITY
T max	position of S_2 peak in temperature program (^{o}C)	Maturity/Kerogen type
S_1	kg hydrocarbons (extractable)/tonne rock	Kerogen type/Maturity/Migrated oil
S_2	kg hydrocarbons (kerogen pyrolysate)/tonne rock	Kerogen type/Maturity
S_3	kg CO_2 (organic)/tonne rock	Kerogen type/Maturity *
$S_1 + S_2$	Potential Yield	Organic richness/Kerogen type
PI	Production Index ($S_1/S_1 + S_2$)	Maturity/Migrated Oil
PC	Pyrolysable Carbon (wt. percent)	Organic richness/Kerogen type/Maturity
TOC	Total Organic Carbon (wt. percent)	Organic richness
HI	Hydrogen Index (mg h'c (S_2)/g TOC)	Kerogen type/Maturity
OI	Oxygen Index (mg CO_2(S_3)/g TOC)	Kerogen type/Maturity *

*Also subject to interference by CO_2 from decomposition of carbonate minerals.

FIGURE 1

Client : BEACH PETROLEUM
Well name : FAHLEY-1
Interval : PEMBER MEMBER

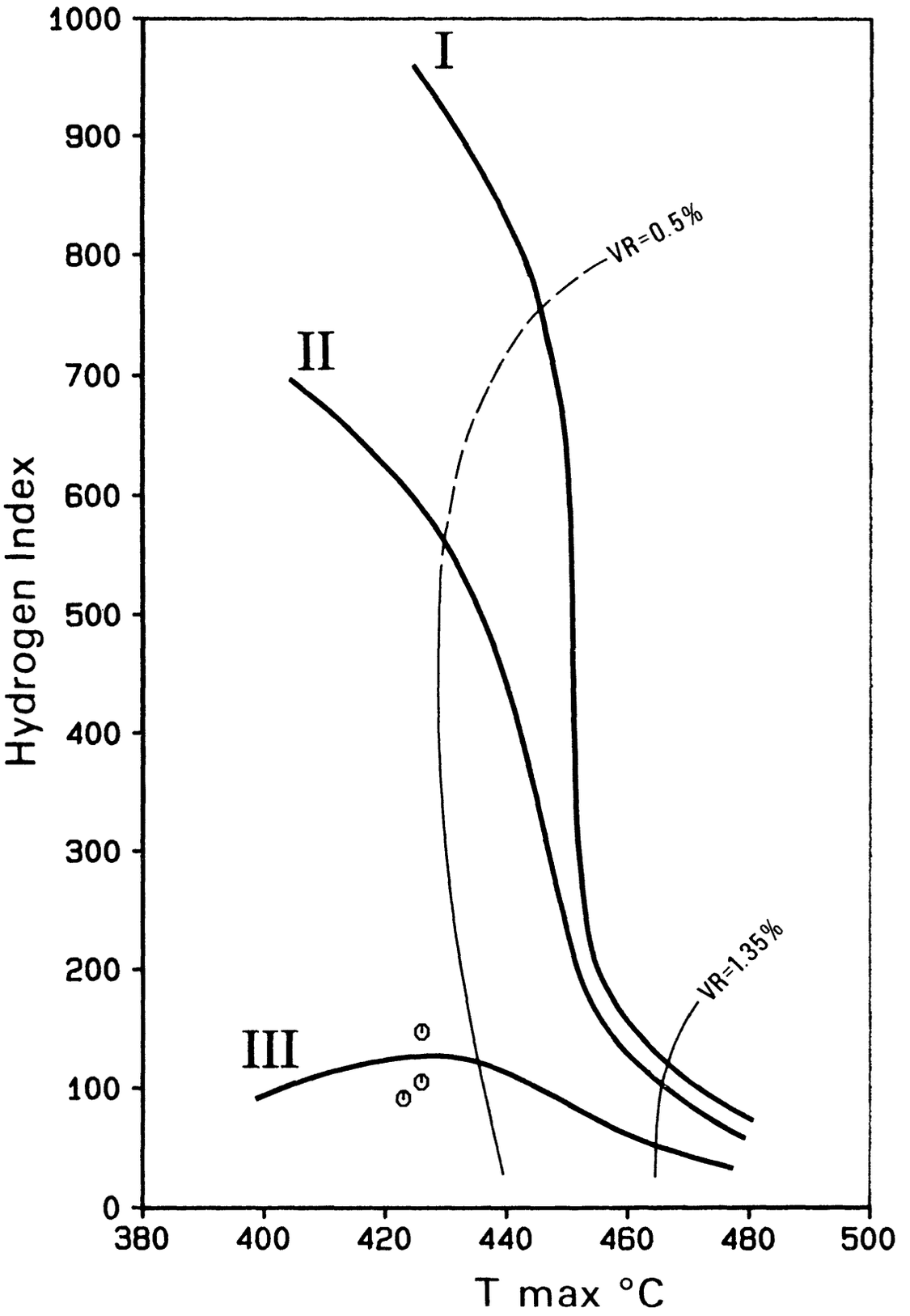
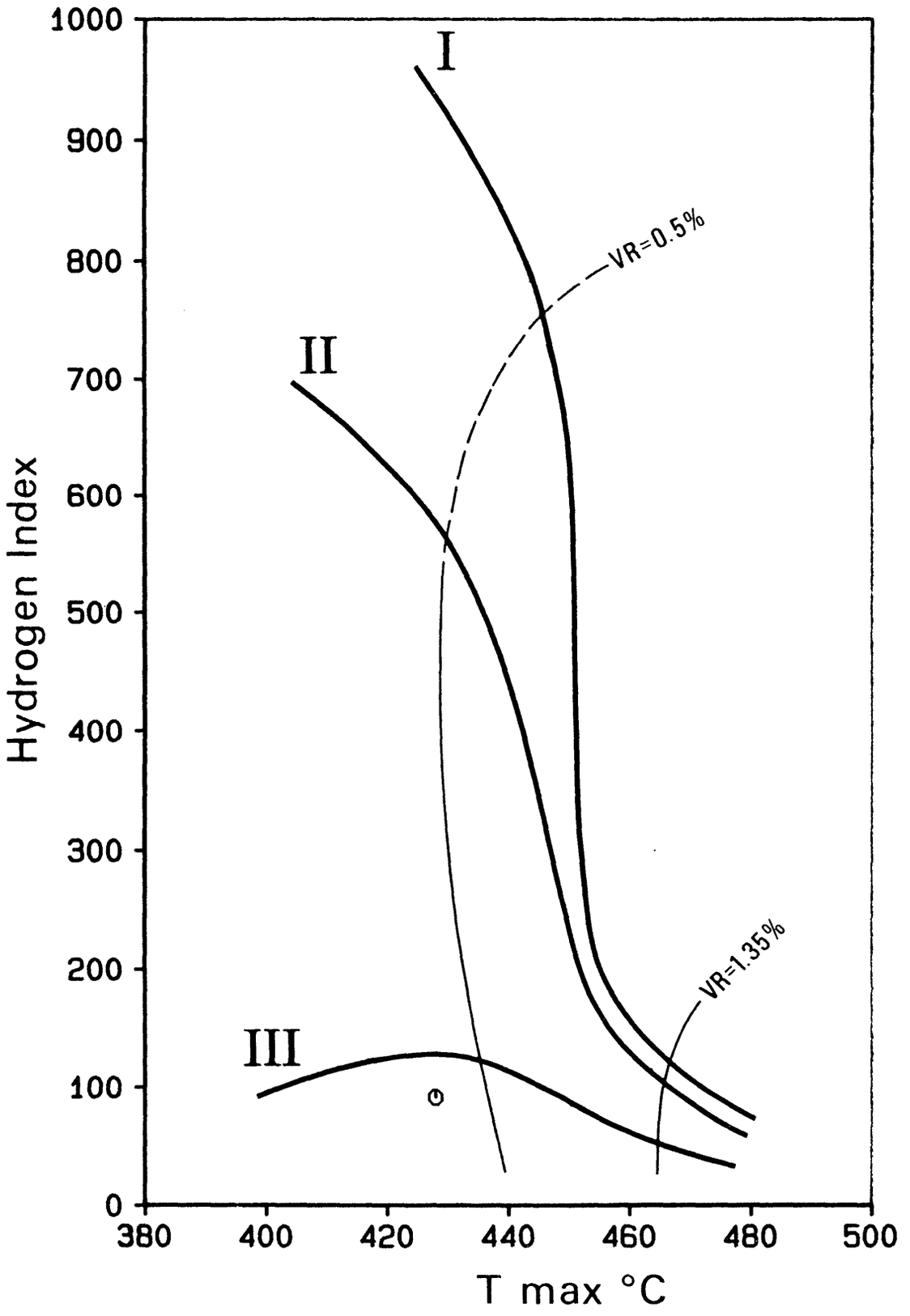
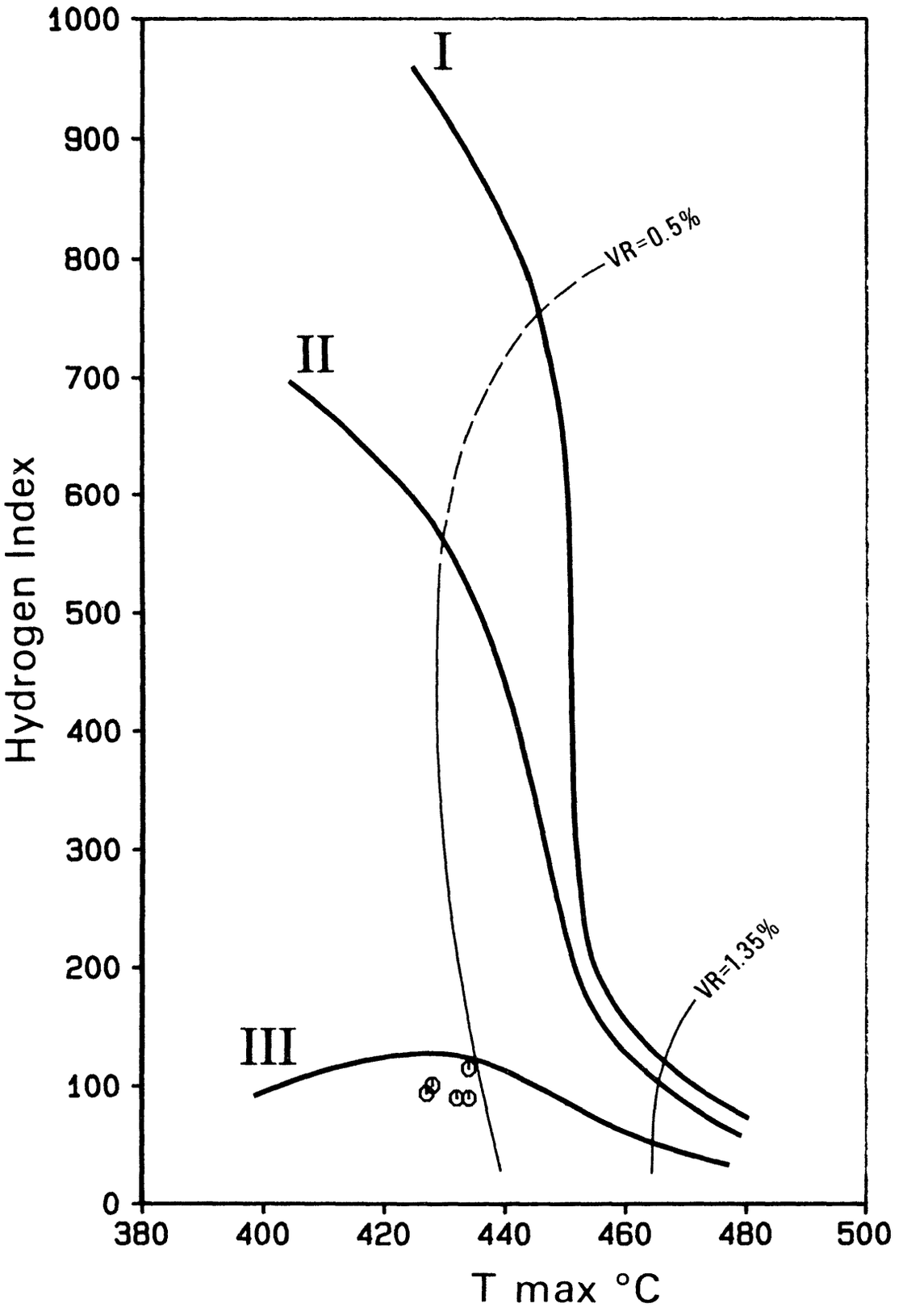


FIGURE 2

Client : BEACH PETROLEUM
Well name : FAHLEY-1
Interval : PAARATTE FORMATION



Client : BEACH PETROLEUM
Well name : FAHLEY-1
Interval : BELFAST MEMBER



Client : BEACH PETROLEUM
Well name : FAHLEY-1
Interval : WAARRE FORMATION