



TPR
OR-358A

**Cape Sorell No. 1
Geological Completion Report
Exploration Permit T-12-P
Offshore West Tasmania
Australia**

TPR
OR-358A

GEOLOGICAL COMPLETION REPORT

CAPE SORELL NO. 1 WELL

EXPLORATION PERMIT T-12-P

OFFSHORE WEST TASMANIA

AUSTRALIA

AMOCO AUSTRALIA PETROLEUM COMPANY

HOBART, TASMANIA

OCTOBER, 1982

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1. Composite Well Log	Pocket
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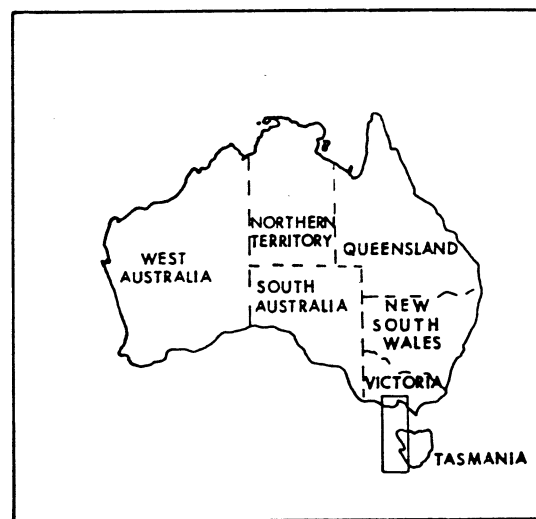
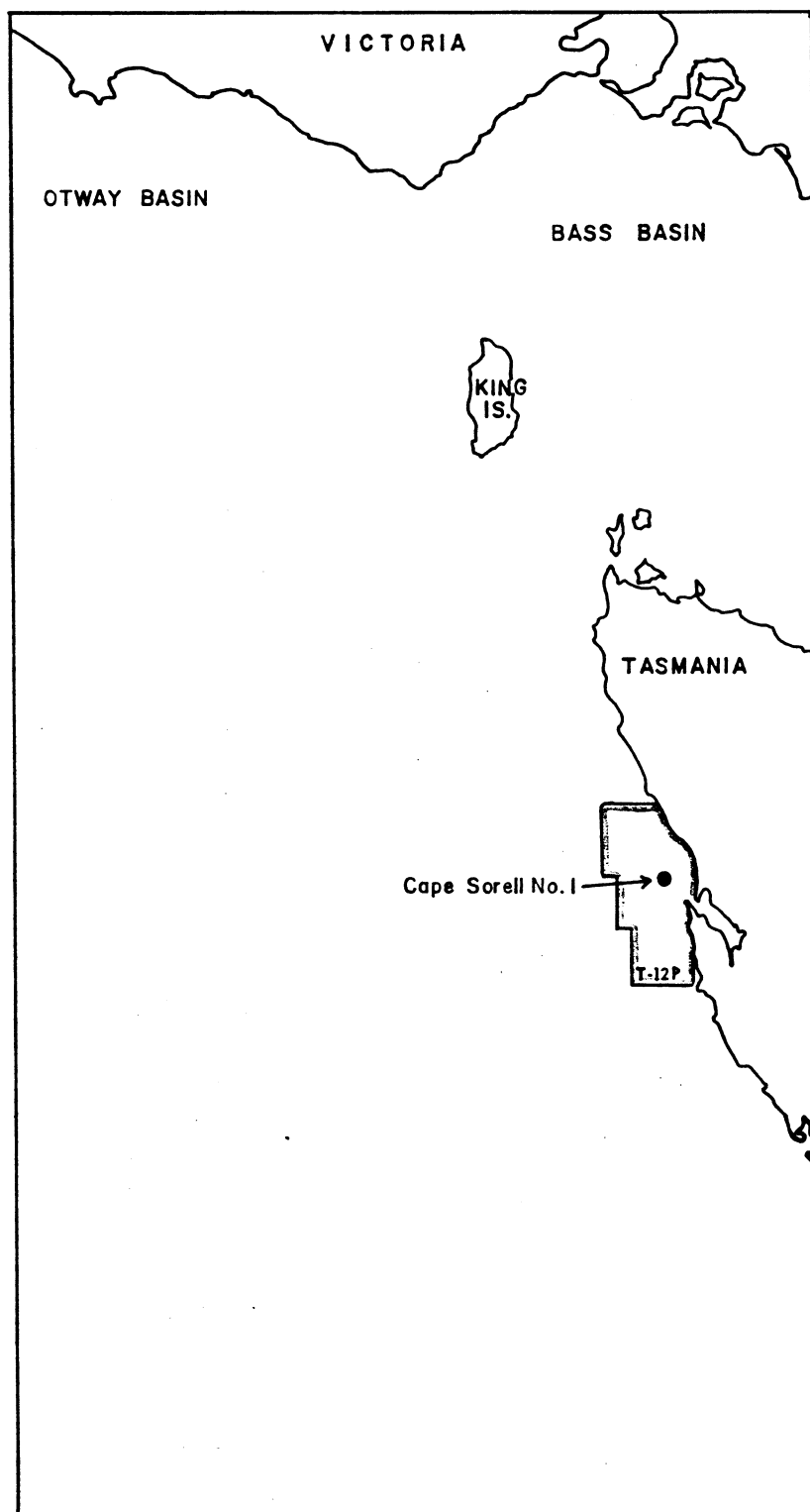
INTRODUCTION

The Cape Sorell No. 1 Well is located in Amoco's T-12-P Permit Area, offshore West Tasmania, Australia. It is 12 miles off Cape Sorell in 309 feet of water on seismic line 81-12, shot point 1080 (see Location Plat, Fig. 1).

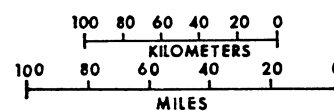
The nearest well control is the Esso/Hematite Clam 1 Well 110 miles to the north. The Cape Sorell Sub-Basin, 30 miles long and 15 miles wide, is on trend with the Otway Basin, approximately 250 miles north, where some 100 wells have been drilled to date.

An initial study of the tectonic history of the area and the application of seismic stratigraphy indicated that the Cape Sorell sub-basin post-Paleozoic stratigraphy was similar to that of the Otway Basin to the north and that the older part of the section might be related to strata found in Antarctica to the south. The principle objective horizons in the prospective structure were interpreted to be the Waare equivalent sandstones in the upper Cretaceous (anticipated 2500' to 4600' depth) and the Pretty Hill sandstones equivalent at the top lower Cretaceous (anticipated 4600' to 6500'). Approximately 19,000 acres of areal closure and from 400 to 800 feet of vertical closure were mapped at the Upper Cretaceous and Top Lower Cretaceous levels, respectively (Figures 2 and 3).

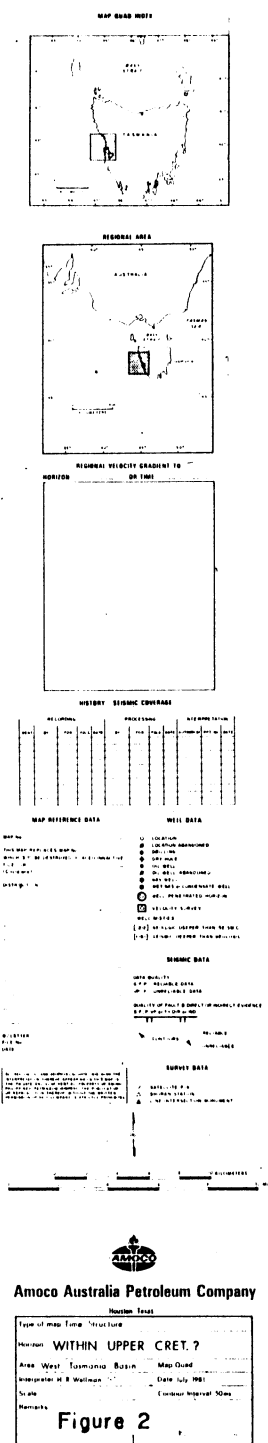
The entire stratigraphic section encountered in Cape Sorell No. 1 (Figure 4) was much younger than anticipated by methods of seismic stratigraphy. Preliminary paleo/palynological results indicate that the



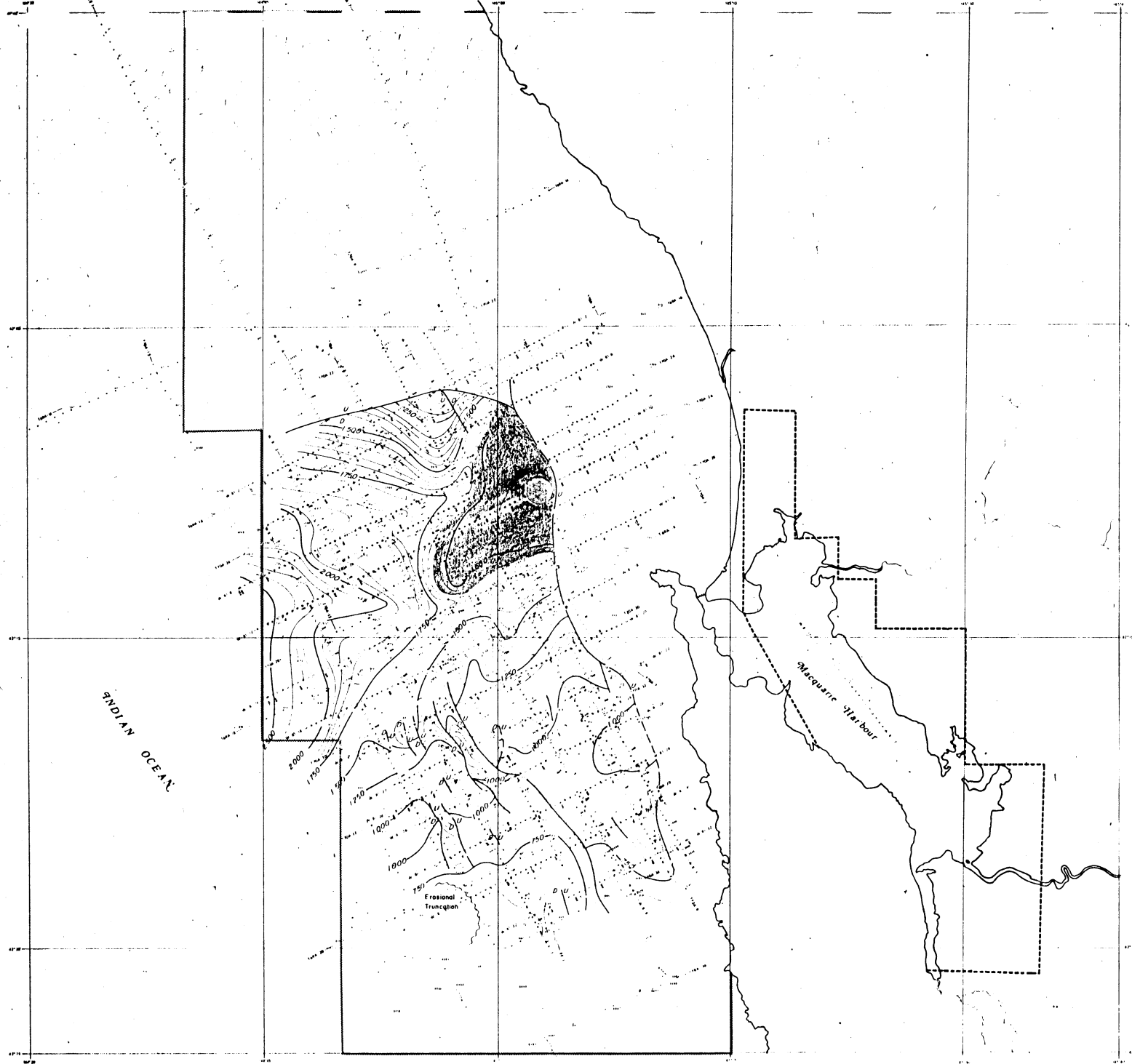
LOCATION MAP



AUSTRALIA	
CAPE SORELL NO.1 LOCALITY MAP	
	Figure 1



4.



MAP GRID INDEX

REGIONAL AREA

REGIONAL VELOCITY GRADIENT TO HORIZON

HISTORY - SEISMIC COVERAGE

MAP REFERENCE DATA

WELL DATA

SEISMIC DATA

SURVEY DATA

Amoco Australia Petroleum Company

Figure 3

oldest rocks encountered were of Early Paleocene/Late Cretaceous age. The anticipated reservoir zone around 3,000' was Early Eocene sandstones with no shows. The objective horizons at 5000' were Middle/Late Paleocene sandstones and shales with no shows. Chloritic calcitic schistose conglomerates, indicative of proximal basement, were encountered towards the bottom of the well. TD was reached at 11,576 ft. (Figure 4).

There were no significant oil shows encountered and no significant zones of interest. Log analyses throughout the interval drilled reveal that several clean reservoir strata are essentially water-saturated and non-productive.

Operation of the semi-submersible Diamond M Epoch was commenced at the wellsite at 0500 hours on July 2, 1982. The well was spudded at 0900 hours on July 5, 1982 and drilling reached a total depth of 11,576 feet sixty days later on September 3, 1982. The well was plugged back to 380 feet and abandoned as a dry hole.

WELL DATA SUMMARY

Well Name:	CAPE SORELL NO. 1
Classification Before Drilling:	Exploratory Wildcat Well
Classification After Drilling:	Abandoned Dry Hole
Location:	Exploration Permit T-12-P, Offshore West Tasmania, Australia
Seismic Line Reference:	Shot Point 1060, Seismic Line 81-12
Geographical Coordinates:	Latitude: 42°08'09.646" S Longitude: 145°01'45.84" E
Water Depth:	309.0 Feet
Elevation RKB:	72.0 Feet
RKB to Sea Floor:	381.0 Feet
Drilling Contractor:	Diamond M Drilling Co.
Rig Name and Type:	Diamond M Epoch Semi-submersible
Chronology of Events:	
Rig Arrival:	July 2, 1982 0500 Hrs.
Spud Date:	July 5, 1982 0900 Hrs.
Date T.D. Reached:	September 3, 1982 1830 Hrs.
Date Well Abandoned:	September 14, 1982 2345 Hrs.
Total Days to Reach T.D.:	60 Days, 9½ Hours
Total Depth Reached:	11,576 Feet Driller's Depth . 11,560 Feet Logger's Depth
Plug Back Depth:	380 Feet
Well Status:	Plugged and Abandoned

*Note: All depths stated in this report are drilled depths measured from the RKB reference point unless noted otherwise.

GEOLOGICAL SUMMARY

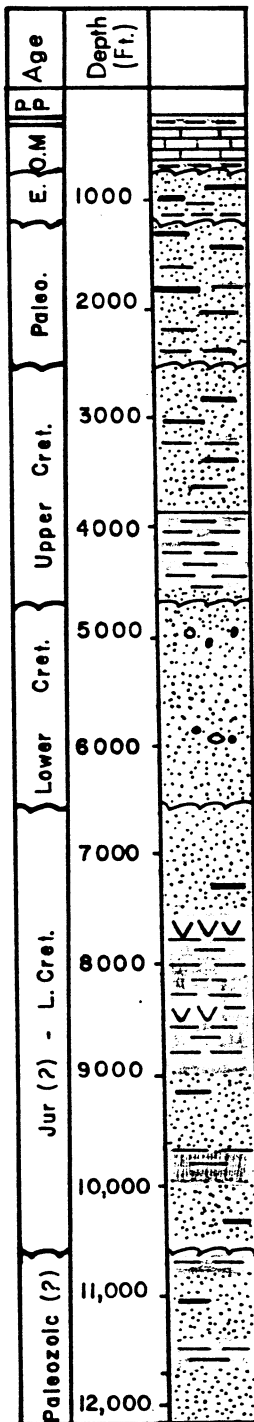
Cape Sorell-1 lithology is summarized in Figure 4; lithologic descriptions are detailed in Appendix A. The well spudded in Miocene/Oligocene reefal, argillaceous limestone containing abundant crinoids and fossil debris. It then penetrated a thick section of Early Eocene middle sublittoral sandstone with interbeds of mudstone and shale. The sandstone is generally fine to medium grained, subangular to subrounded, containing dominantly clear quartz. The section then graded into a thick, monotonous section of Middle to Late Paleocene very shallow marine sandstone with common mudstone interbeds. This Paleocene sandstone is fine to medium-grained, occasionally poorly sorted, angular to subrounded, dominantly quartz with trace lithic fragments. At 9300 feet, the well penetrated Early Paleocene/Late Cretaceous littoral to shallow sublittoral conglomerates and conglomeratic sandstones. These lithologies are fine to very coarse grained, very poorly sorted, with sharp to angular grains and fragments of quartz-mica schist, acid volcanics and quartzites. Approximately 800 feet of interbedded shales, siltstones and sandstones were then encountered and the well reached TD in conglomerate containing quartzite, schist and chalcedony fragments. Due to lack of equivalent rocks exposed on land, no formation names were assigned to the drilled section.

Summary of Oil Shows

Claystone from 10,090 to 11,130 feet contains traces of oil that relinquished a clear crush cut with medium pale yellow transparent fluorescence. A slight trace of free oil with golden yellow fluorescence was present in

CAPE SORELL NO.1

Predicted



Actual Section

Age	Envir.	Depth (Ft.)	Lithology	Shows	Comments
Miocene / Oligocene		1000	Limestone; reefal and argillaceous		30" csg 693'
		2000	Sandstone; f-mg. subang-subrnd. dom clr qtz.		20" csg 1393'
Early Eocene	Middle Sublittoral	3000			
		4000	Mudstone and Shale.		13 3/8" csg 4144'
		5000			
Paleocene Middle / Late Paleocene	Very Shallow Marine	6000			
		7000	Sandstone; f-mg. occ cg. poorly sorted. ang-subrnd. dom qtz. tr. lith frags incl. mafic volcs. tr. kaolinite chlorite, calc.		
		8000			
Middle Paleocene		9000	Conglomerate and Congl Sandstone; f-vcg. v. poorly sorted, sharp-ang. frags of qtz-mica schist, acid volcs and qtzites. var abund Kaolin, chlorite.		9 3/8" csg 9002'
Early Paleocene / Late Cretaceous	Littoral - Shallow Inner Sublittoral	10,000	Interbedded Sandstones and Claystones.	Trace free oil.	
		11,000	Interbedded Shales, Siltstones and Sandstones. Sandstone and Congl Sandstone; sharp frags of qtzite, qtz-chlorite-sericite schist, chalcedony, micropyritic aggregates, occ garnetiferous qtz, gneissic.	Trace to good tr med golden brown, fluorescing free oil. Residual oil count decreasing. Slight tr free dead oil. Good to excel crush cuts in shales	
		TD 11,576			
		12,000			

Figure 4

samples from 10,130 to 10,290 feet. All lithologies from 10,130 to 11,286 feet contain good traces of residual oil with light to medium straw crush cuts and moderate to intense transparent yellow fluorescence. Crush cuts are most intense in argillaceous lithologies. No significant oil shows were recorded.

Summary of Gas Shows

Mud gas shows were encountered in only one zone in the well. From 1035 to 1985 feet, C_1 only was recorded with a peak of 57 units at 1,350 feet. From 10,515 to 11,325 feet the total gas detector recorded no gas; but blender analysis of cuttings gas (using 400 cc cuttings) showed C_1 through C_4 from 10,515 to 10,600 feet and C_1 through C_4 from 10,600 to 11,325 feet. These shows are considered insignificant.

Petroleum Prospects

None.

Bottom Hole Temperature

230°F as recorded by Schlumberger thermometer attached to the downhole HDT tool during Run No. 4 at 11,560 feet with 19 hours since last circulation.

Casing Record

<u>Size</u>	<u>Drillers Depth</u>	<u>Schlumberger Depth</u>
30"	693'	693'
20"	1393'	1393'
13-3/8"	4144'	4140'
9-5/8"	9002'	8998'

Wireline Logging Record

Schlumberger Logging Services

<u>Run No.</u>	<u>Type</u>	<u>Date</u>	<u>Scales</u>		<u>First Reading</u>	<u>Last Reading</u>
			<u>1/500</u>	<u>1/200</u>		
1	DIS-BHC-GR	8 July '82	X✓	✓X	300'	1440'
1	FDC-CNL-GR	8 July, '82	X✓	✓X	693'	1437'
1	HDT	8 July, '82		✓X	693'	1437'
2	DIS-BHC-CAL-GR-SP	22 July '82,	✓X	✓X	1392'	4146'
2	HDT	22 July, '82		X	1392'	4146'
3	DIL-BHC-GR	10 August '82	X✓	✓X	4140'	9025'
3	DLL-MSFL-GR	11 August '82	X✓	✓X	4140'	9010'
3	LDL-CNL-GR	11 August '82	X✓	✓X	4140'	9022'
3	HDT	11 August '82		✓X	4140'	9025'
4	DIL-SLS-GR	3 Sept. '82	X✓	✓X	8998'	11556'
4	LDL-CNL-GR	4 Sept. '82	X✓	✓X	8998'	11558'
4	HDT	4 Sept. '82		✓X	8998	11558'
4	RFT	4 Sept. '82	-	✓-	8898	11556'
4	CST	5 Sept. '82	-	-	Recovered 44 of 51 attempts	

Mud Logging

Geoservices Overseas S.A.

		First	Last
	<u>Scale</u>	<u>Reading</u>	<u>Reading</u>
Continuous Mud Logging:	1/500	Spud	11576
<u>and Pressure Engineering</u>			

PALEONTOLOGY AND PALYNOLOGY

Selected ditch cutting samples were subjected to quick-look biostratigraphic analyses by Robertson Research; these results are summarized in Table 1 and as part of the Composite Log (Enclosure 1 in pocket).

Samples generally suffer from poor in situ preservation and frequently sparse faunas. Consequently, age-dating and inferred environments are quite general.

TABLE NO. 1
PALEO/PALYNOLOGY SUMMARY - CAPE SORELL NO. 1 WELL

Depth	Formation	Age	Environment	Fauna & Flora
4050-4158'		Early Eocene		Pollen: <u>Malvacipollis subtilis</u> <u>Malvacipollis diversus</u> <u>Periporopollenites demarcatus</u> <u>Protaceidites leightoni</u> <u>Protaceidites tenuis</u> <u>Protaceidites asperopolus</u> <u>Protaceidites spp.</u> <u>Nothofagus flemingii</u> <u>Nothofagus emarcidus type</u> <u>Myrtaceidites sp.</u> <u>Triorites spp.</u> <u>Retitricolporites spp.</u> <u>Retitricolpites sp.</u> Numerous dinoflagellate cysts
4050-4158'			Middle sublittoral	Rare non-age diagnostic calcareous benthonic foraminifera
4080', 4110', 4140', 4158'				Nannofossils: <u>Zygrhablithus bijugatus</u> <u>Zygrhablithus dubius</u> <u>Discoaster kuepperi</u> <u>Discolithina panarium</u> <u>Discolithina exilis</u> <u>Neococcolithus dubius</u>
5990-6110'				Barren of calcareous nannofossils No age-diagnostic foraminifera; common arenaceous and rare, fragmented calcareous benthonics

Depth	Formation	Age	Environment	Fauna & Flora
6010', 6110'		Late-Middle Paleocene	Very shallow marine & Sp	Palynomorphs: <u>Metaceidites sp.</u> <u>Phyllocladidites reticulosaccatus</u> <u>Proteacidites cf. annularis</u> <u>Triorites sp.</u> <u>Nothofagidites sp.</u> <u>Proteacidites spp.</u>
7530-7610'				Barren of Foraminifera
7510', 7610'				Poor Palynomorph assemblage: <u>Proteacidites spp.</u> <u>Phyllocladidites sp.</u> <u>Triporopollenites sp.</u> Various trilete spores
7490', 7530', 7570', 7610'		Paleocene	Very shallow marine	Poor calcareous nannofossil assemblage: <u>Crucioplacolithus tenuis</u> <u>Chiasmolithus danicus</u>
8950'-9030'				barren of foraminifera Barren of calcareous nannofossils
8930', 9030'				Palynomorphs: <u>Proteacidites spp.</u> <u>Nothofagidites spp.</u> "fusca" group
		Not older than than Middle Paleocene		<u>Triporopollenites sp.</u> <u>Locopodium sporites spp.</u> <u>Undifferentiated trilete spores.</u>
9050'-9330'				No foraminifera.
9350'				Rare trochoid arenaceous foraminifera
9350'				Barren of palynomorphs

Depth	Formation	Age	Environment	Fauna & Flora
9250'		Cretaceous or older (reworked?)		Very poorly preserved spore-dominated palynomorph assemblage. Single specimen of <u>Vitreisporites pallidus</u>
10,196'		Paleocene- Senonian		Barren of Foraminifera Poor palynomorph assemblage; includes <u>Gambierina rudata</u>
10190-10610', 10770-10850'				Rare arenaceous foraminifera, including: <u>Haplophragmoides</u> <u>? Trochammina</u> <u>? Ammobacculites</u>
10510', 10610', 10750', 10,850'		Paleocene- Late Cretaceous	Littoral-shallow inner sublittoral	Poor palynomorph assemblages, including: <u>Proteacidites spp.</u> <u>Nothofagidites spp.</u> <u>Lycopodiumsporites sp.</u> <u>Ricarentes</u> <u>Gambierina edwardsii</u>
10860-11260'				Barren of nannofossils
11190'			Littoral	Poorly preserved non-age diagnostic arenaceous foraminifera, including: <u>? Trochammina sp cf squamata</u> <u>? Spirolacamina sp.</u>
11250'				Rare, poorly preserved indeterminate arenaceous foraminifera
11160', 11260'		Early Paleocene- Late Cretaceous		Moderately rich palynomorph assemblages, including: <u>Triporopollenites sectilis</u> <u>Gambierina edwardsii</u> <u>cf Tricolpites longis</u> <u>Nothofagidites spp.</u> <u>Proteacidites spp.</u> <u>Various bisaccates</u>

Depth	Formation	Age	Environment	Fauna & Flora
11350-11420'			Early Paleogene- Late Cretaceous	Barren of foraminifera and calcareous nonnofossils Poor to moderately rich palynomorph assemblages
11430', 11510', 11550',				Rare indeterminate arenaceous foraminifera
11480', 11510', 11540', 11576'				Barren of nannofossils

GEOCHEMICAL EVALUATION

Geochemical results, presented in Appendix C, suggest that lithologies in the zone 10,000-11,000 ft have good potential as a source of hydrocarbons (most likely oil/gas), but that the organic matter present is thermally immature to early mature. These rocks would have to be buried to 18,000-20,000 feet to be in the peak oil generation window.

CORE DESCRIPTIONS

I. Sidewall Cores

One (1) CST run was conducted on Cape Sorell No. 1 well. A total of 51 sidewall cores were attempted by Schlumberger on depth interval 9,586'-11,380'. A good percentage of recoveries (86%) was achieved with 44 bullets recovered and 7 lost.

The SWC's were transmitted to Amoco Research Center in Tulsa, Oklahoma for paleo-palynological and geochemical studies. Selected SWC's were sent to Robertson Research for paleo-age dating and geochemical maturation analysis of carbonaceous samples.

The detailed descriptions of all SWC's are presented in Appendix B of this report.

Run:	Attempted:	Recovered:	Lost:	Date
1 :	51 :	44 :	7 :	5 Sept.'82

II. Conventional Core

A seven (7) foot core was cut at depth interval 11,420'-11,427'; 4.9' (70%) was recovered.

Core Summary

CONGLOMERATE (100%): Rounded polygenetic cobbles to pebbles as rubble and as solid conglomerate. Grain sizes vary from 4.25" cobble to granules. Solid conglomerate matrix xenoblastic. General composition is green schists and gray to gray-white quartzites with one angular, holohyaline, black obsidian cobble of 2" diameter found in upper 5" of core. Matrix is schistose and is dominantly chloritic with variably abundant calcite and pyrite. Tan kaolins (?) variably common in matrix with variably abundant black augite (?) and traces of dodecahedral garnet. Calcite also as encrustations. Trace cubic pyrite. Matrix schistosity maximum at base of core. "Milky" quartz veins common in, and restricted to, quartzites. This conglomerate is a rudaceous sediment with a hydrothermally metamorphosed matrix.

Refer to detailed description and summary diagram of the core, Figure 5, and the Composite Log - Enclosure 1 in pocket.

Core No. 1 (11,420' - 11,427')
Cape Sorell No. 1
(Rec'd. 4.9 Ft.)

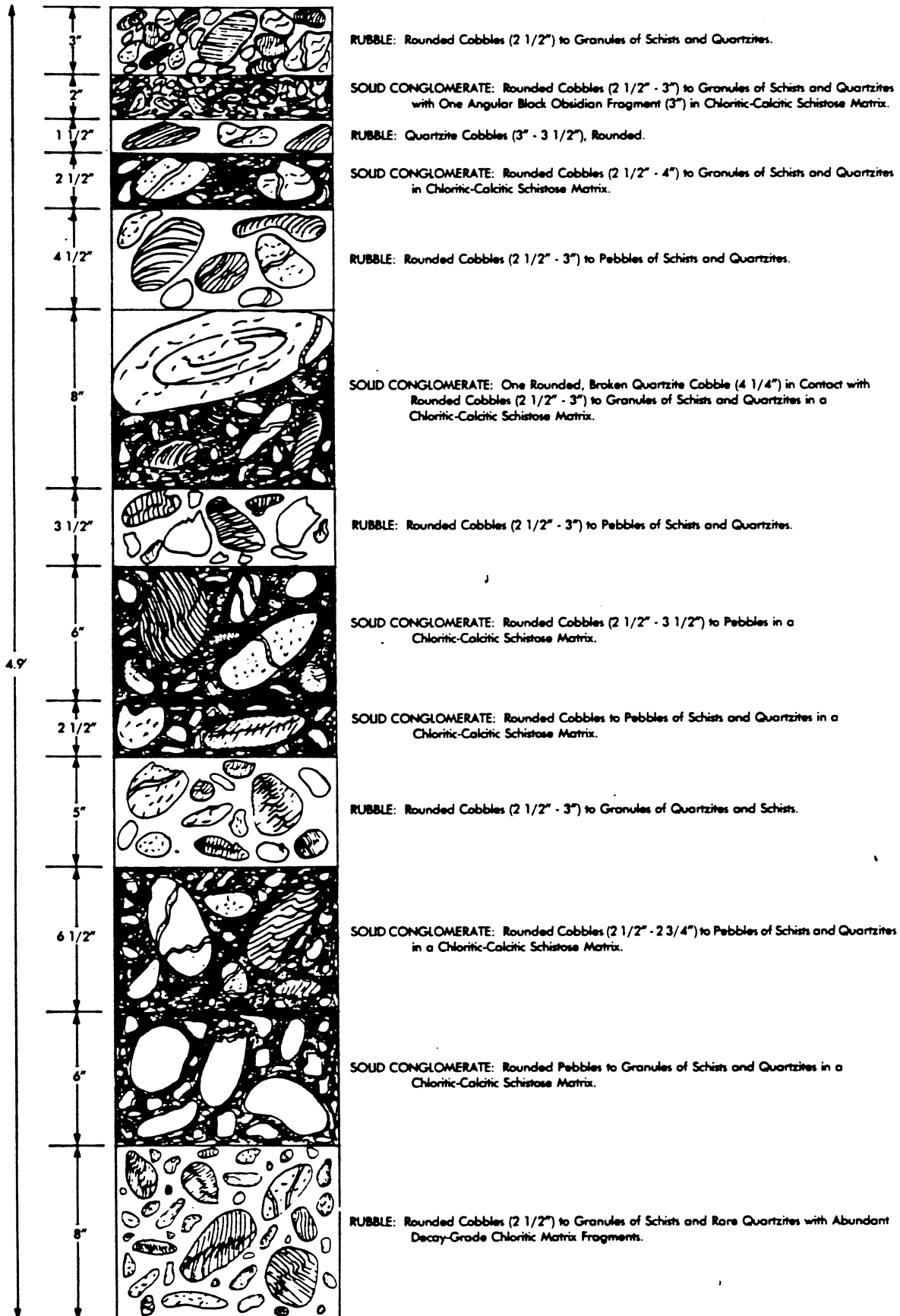


Figure 5

WELL TESTS

Based on log evaluation, wellsite geology and shows, no zones warranted drillstem testing.

A repeat formation tester (RFT) was run in the 8½" hole section over the open hole interval 9002 ft. to 11,576 ft. No formation fluids were recovered. The following is a summary of information obtained:

<u>Depth</u>	<u>Shut in Pressure (PSIG)</u>
10,586	91
10,588	4851
11,240	119
11,242	116
11,320	No Seal
11,321	No Seal
11,322	159
11,336	No Seal
11,338	625
11,352	132

DIPMETER SURVEY

Results of the four RUNS of the four-arm high resolution dipmeter/deviation survey (HDT) run on wireline by Schlumberger over the entire well are summarized on the composite well log, Enclosure I of this report (in pocket).

Dips are generally low angle throughout the well and confirm the structure anticipated (Figure 6 and 7). From surface down to the shoe of the 13-3/8" casing at 4144' the well bore was washed out, often to greater than 20" in diameter; consequently, no reliable data were recovered in this interval.

Dips from the 13-3/8" shoe down to 4900 ft. average 4° to the SW. From 5600 to 5700 ft. dips are 14° to the SW, from 5700 to 7500 ft. 8° to the NW, and from 7500 to 8400 ft. 2° to the north. There are no reliable dips from 8400 to 9600 ft. Dips from 9600 to 9800 ft. are approximately 14° to the NE. No reliable data are available from 9800 to 10,100 ft. 20° dips to the NE are present from 10,100 to 11,300 ft., and no reliable data exist from that depth to TD.

LINE 81-12

Cape Sorell No. 1

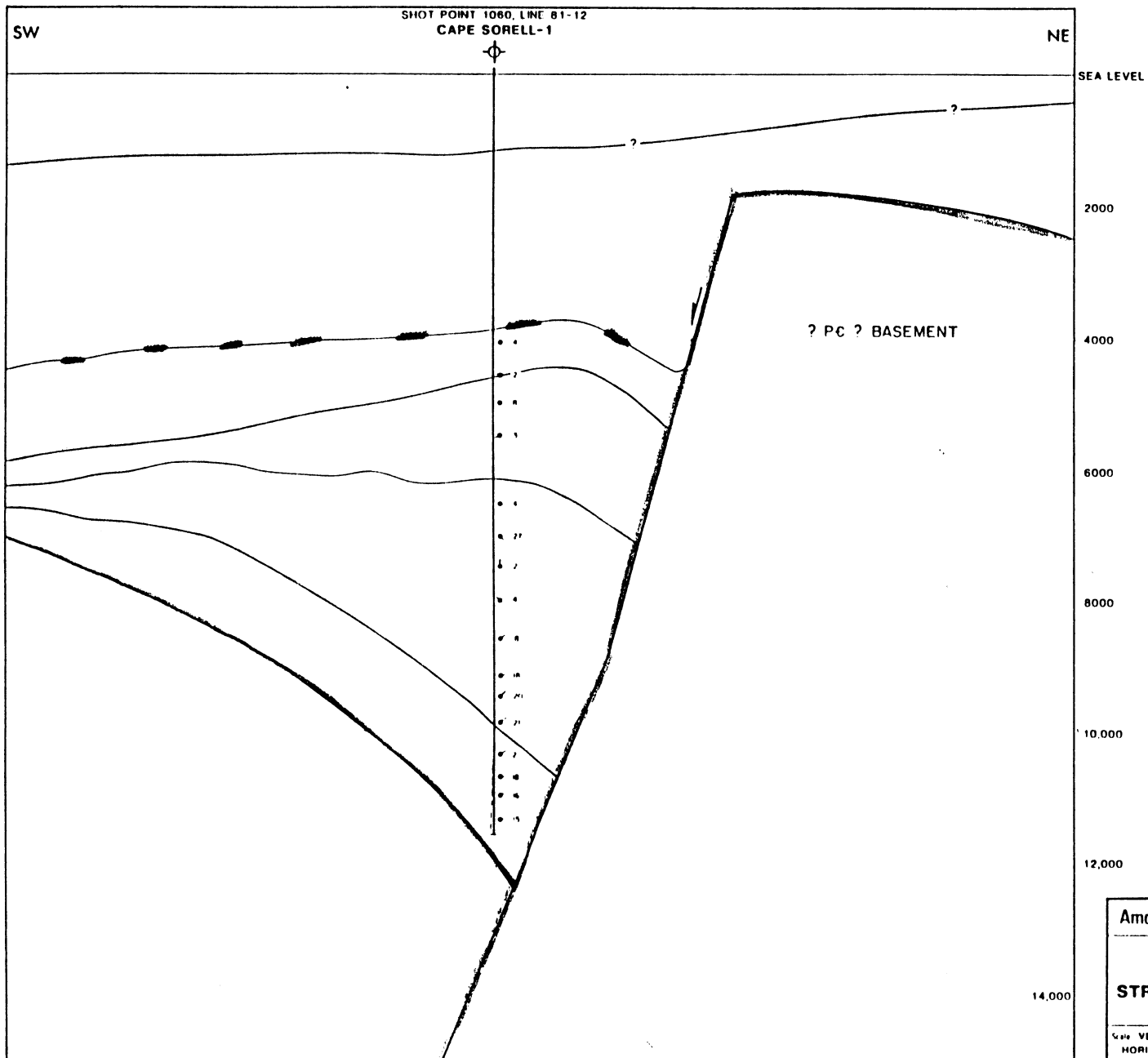
NE

SW



23.

Figure 6



South & Central America & Far East Region
Houston, Texas

Amoco Australia Petroleum Company

CAPE SORELL-1
STRUCTURAL INTERPRETATION

Scale VERTICAL 1:12,000 Author M.J. FOCKLER
HORIZONTAL 1:40,000 Date SEPT., 1982

GEO THERMAL GRADIENT

Maximum bottom hole temperatures were recorded by a thermometer on successive Schlumberger wireline logging runs. These data are tabulated below and were used to construct a present day temperature gradient curve shown in Figure 8.

<u>Log Type</u>	<u>Suite (R₀)</u>		<u>Depth (ft.)</u>	<u>Time Since Last Temperature Circulation</u>	
	<u>No.</u>	<u>Date</u>			<u>°F</u>
DIS-BHC-GR	1	8 July '82	1440	2:30 hrs.	-
FDC-CNL-GR	1	8 July '82	1440	4:30 hrs.	-
HDT	1	8 July '82	1440	7:00 hrs.	-
DIS-BHC-CAL-GR-SP	2	22 July '82	4154	6:15 hrs.	102.0°
HDT	2	22 July '82	4157	10:00 hrs.	103.0°
LDL-CNL-GR	3	11 Aug. '82	9025	21:00 hrs.	171.0°
HDT	3	11 Aug. '82	9025	25:00 hrs.	176.0°
DIL-BHC-GR	3	11 Aug. '82	9025	33:30 hrs.	145.0°
DLL-MSFL-GR	3	11 Aug. '82	9025	38:30 hrs.	162.0°
DIL-SLS-GR	4	4 Sept. '82	11560	08:00 hrs.	186.0°
LDL-CNL-GR	4	4 Sept. '82	11560	13:30 hrs.	226.0°
HDT	4	4 Sept. '82	11560	19:00 hrs.	230.0°
RFT	4	4 Sept. '82	11560	26:00 hrs.	226.0°

CASE SOTEL NO. Geothermal Gradient

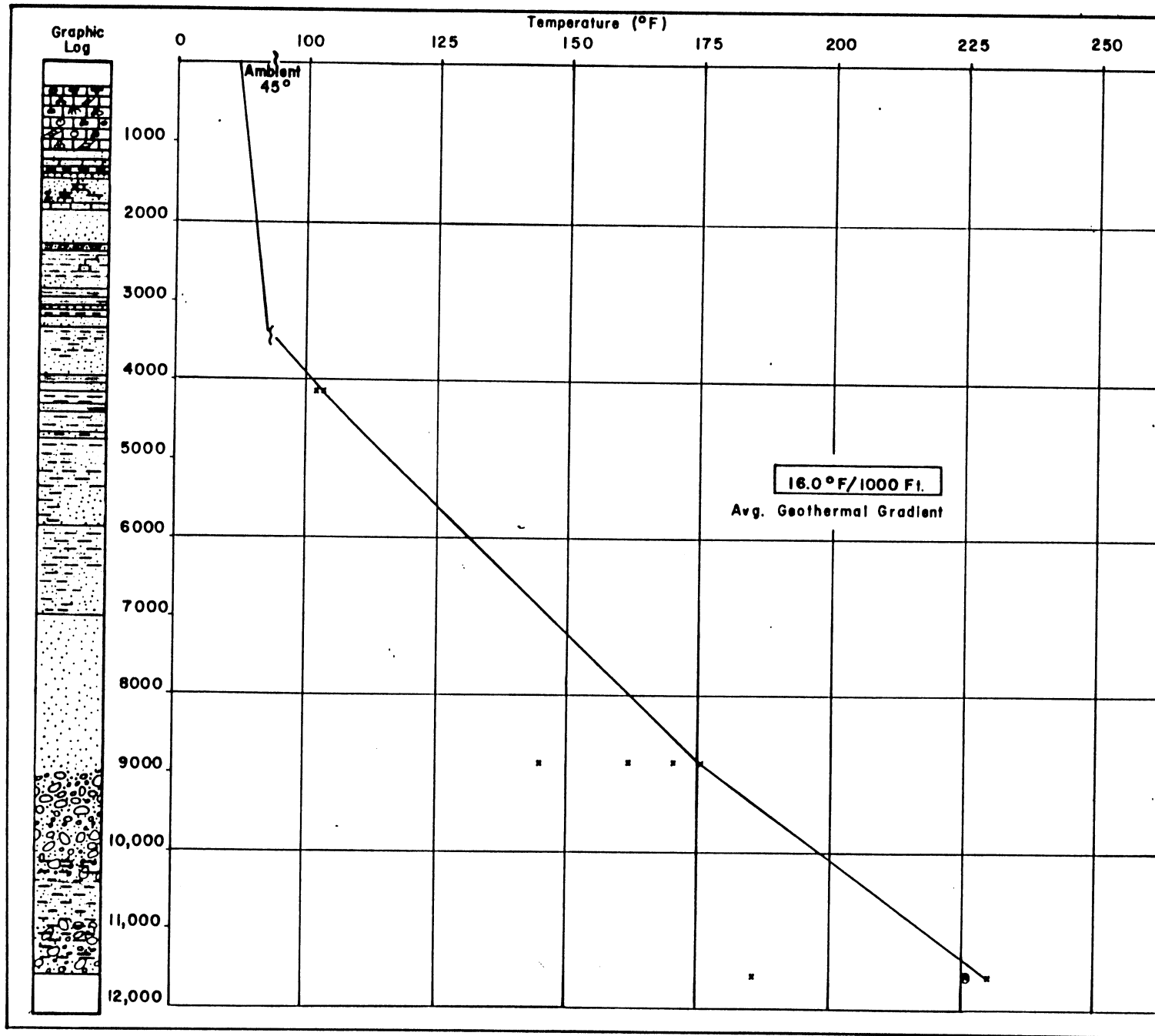


Figure 8

VELOCITY SURVEY

A well velocity survey was conducted by Schlumberger on Cape Sorell No. 1 on September 5, 1982. Twenty four (24) check shot levels were shot at the following depths:

<u>Depth</u>	<u>Travel Time (ms)</u>
4,000.1	527.8
11,499.9	1141.1
11,199.9	1120.7
11,000.1	1107.0
10,500.0	1071.9
10,200.0	1050.0
10,000.0	1036.7
9,500.0	1002.9
9,000.0	763.4
8,500.0	926.8
8,000.0	884.6
7,500.0	847.0
6,999.9	807.8
6,500.0	764.8
6,000.0	720.4
5,499.9	673.9
5,000.0	628.1

Velocity Survey Cont'd.

<u>Depth</u>	<u>Travel Time (ms)</u>
4,500.0	580.1
4,000.2	527.0
3,499.9	471.2
2,999.9	414.6
4,299.9	350.8
1,999.9	285.4
1,500.0	212.9

APPENDIX A

Description of Cutting Samples
Cape Sorell No. 1

by

W. F. Barrett

W. L. Weibel

CAPE SORELL NO. 1 SAMPLE DESCRIPTIONS

(W. F. Barrett)

(W. L. Weibel)

(Note: All samples described when wet)

- 309'-720' Ls (100%)(Sampled from bit and hole opener at the end of two runs between 309'-690' and 690'-720'.)
- Foraminiferal Ls w/ 80% forams and 20% crinoid stems & gd tr to abund coral frags; tr shells, forams (gy-tan) w/crinoids & corals (lt. crm); abund micro-pyrite aggregates w/xls beyond 120x to clearly-defined dodecahedra at 30x; abund pyrite xl impregnation of dom. forams in both xl & disseminated form w/tr fossil replacement; lt to med gry color variations in forams & trace-gd tr red-brn, limonitic(?) ls frags & "floating" formas; drilling residual 90% unconsolidated and 10% ls frags; ls frags mega gry-tan mottled & micro gry-tan mottled w/v/minor med dk brn & dk gry elongate fossils (crinoids?), mod hd, mod brtl, dom micritic w/v/minor micro-xln, tr or-ylw, or, red-or micritic ls frgs, varying to crmy-or to crmy-wht as apparent ocean bottom sed's outcrop; highly calcitic; crush cut clr w/fluor absent.
- 720'-750' Foraminiferal Ls (100%)(Sample dominated by approx. 80% med gry cmt contam.): Crmy-wht to tan w/tr-abund lt-med gry (crinoids), gry-tan, or-tan, or & red-brn shell & coral frags; 100% unconsolidated as drilling residual; forams 80%, crinoids, coral frags & shell frags 20% (crinoids 15%); tr micro-pyrite aggregates; highly calcitic; crush cut clr w/fluor absent.
- 750'-780' Coral Ls (100%)(Cmt. contam. approx. 40%)(V/abund. forams in 230-mesh separation only as apparent slough): Crmy-wht w/v/minor variably lt-med gry coral frags (90%) and abund lioclemid bryozoan frags w/tr crinoid ossicles & slight tr apparent algal pellets; highly calcitic; 100% unconsolidated drilling residual; crush cut clr w/fluor absent.
- 780'-810' Coral Ls (100%): Crmy-wht w/v/abund sparite infilling (clr); dom coral frags w/abund crinoid ossicles and bryozoan frags w/slight tr. forams (slough?-forams); 100% unconsolidated drilling residual; crush cut clr w/fluor absent.
- 810'-840' Coral Ls (100%): Crmy wht coral frags w/tr-abund lt-med gry; try bryozoan frags; 100% unconsolidated drilling residual; crush cut clr w/fluor absent. (Cont'd. forams as apparent slough).
- 840'-870' Coral Ls (100%): Crmy-wht to wht w/v/slight gry-wht highly porous coral frags w/tr-abund lioclemid bryozoan frags; 100% unconsolidated drilling residual; tr algal pellets; crush cut clr w/fluor absent. (Cont'd forams as apparent slough.)

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 870'-900' Bioclastic Skeletal Ls (100%): Wht to minor v/lt grsh-wht; 80% algal pelletoids w/20% coral w/tr bryozoan frags; tr micro-pyrite aggregates; 100% unconsolidated drilling residual; crush cut clr w/fluor absent. (Cont'd. foram slough).
- 900'-930' Bioclastic Skeletal Ls (100%): Wht to minor crmy-wht; 90% wht algal pellets & pellet debris w/10% wht-crmy wht coral frags & abund crinoid spicules; tr lt grn glauc (?); tr micro-pyrite aggregates & highly disseminated pyrite in fossils; v/slight tr apparent shell frags (wht, laminated); 100% unconsolidated drilling residual; crush cut clr w/fluor absent.
- 930'-960' Bioclastic Skeltal Ls (100%): Wht; 90% algal pellets & pellet frags, 10% coral frags; slight tr dk grn glauc (?); tr marly matl. w/grysh stria (slicks?); 100% unconsolidated drilling residual; extremely calcitic; crush cut clr w/fluor absent.
- 960'-990' Bioclastic Skeltal Ls (100%): Wht dom w/minor gry-wht, grnsh-wht & variably med-brn (mottled brn, clr, wht) algal pellets & pellet frags & ls frags, the ls frags exclusively brn mottled; abund coral & crinoid frags; abund variably dk grn, mod pelletoid, occas micro-pyritic glauc (?); brn ls often lithoclastic w/abund shell frags, micritic cmt, mod hd, mod brtl, highly calcitic; 90% unconsolidated drilling residual w/10% ls frags as brns; clr crush cut w/fluor absent; abund forams, algal pellets.
- 990'-1020' Bioclastic Algal-Skeletal Ls (100%): Crmy-wht dom. to brnsh-wht, crmy-brn algal pellets (70%), coral frags (20%) & crinoid stems & forams tr-abund 10% brn mottled lithoclastic ls frags; all highly calcitic; tr lt-med grn glauc(?) pellets; slight tr micro-pyrite aggregates; crush cut clr w/fluor absent.
- 1020'-1050' Bioclastic Algal-Skeletal Ls. (100%): Wht, crmy-wht & gry-wht-mottled algal w/minor coral frags w/tr crinoid stem frags; approx. 20% variably lt-med brn w/mottled gry-wht (shell frags) ls frags as lithoclastic ls; 80% unconsolidated drilling residual as algal, coral & crinoid frags w/tr free sparite; tr-abund lt-dk grn, pelletoid glauc (?); slight tr micro-pyrite aggregates; crush cut clr w/fluor absent.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 1050'-1080' Bioclastic-Lithoclastic Ls. (100%): Wht, crmy-wht, gry-wht & variably v/lt gry; dom bioclastic (80%) w/v/abund to dom coral frags w/sparite as sparse cmt, tr-abund algal pellets & pellet frags, slight tr crinoid stem frags & abund forams, approx. 20% med brn w/tan "mottled" lithoclastic Ls, clasts dom tan coral w/v/minor apparent shell frags, tr med to dk grn pelletoid glauc(?); abund micro-pyrite aggregates in free & bioclastic frags; all highly calcitic; crush cut clr w/fluor absent.
- Mudstn (Tr): Med dk brn; mod soft; abund lt-med tan dom coral frags; tr micro-pyrite & dk grn glauc (?); clay matrix non-calc w/coral frags highly calcitic; crush cut clr w/fluor absent.
- 1080'-1110' Lithoclastic Ls (100%): Wht, crmy-wht, gry-wht, lt med-gry, gry-tan, tan w/occas lt-med grn glauc (?) & med-lt brn w/tan coral frags (in ls frags); admixture of shell, coral, crinoid, algal frags w/prolific forams & tr bryozoan frags; tr micro-pyrite aggregates; tr acicular clr pyroclasts w/both hollow & filled w/substance of metallic luster (>120 x), pyroclasts of silica in single acicular and up to four-pronged acicular; crush cut clr w/fluor absent.
- 1110'-1137' Sd (70%): Clr, sub-ang qtz; fn; minor frsted grains; luster sub-vitreous to v/minor vitreous w/tr clr acicular qtz (silica) pyroclasts, hollow-centered; w/well-sorted; cut clr w/fluor absent.
- Mesocoquina (30%): Fn-med size shell frags, dom brachypods, pelecypods, pectins, turitella w/abund crinoid stems and bryozoa frags w/minor coral frags - all med tan; abund algal pellets & pellet frags as apparent slough, wht, crmy-wht, gry-wht, w/tr med grn pelletoid glauc (?); tr micro-pyrite (slough?); 100% of mesocoquina unconsolidated drilling residual w/matrix material absent, indicating very poor compaction and induration; crush cut clr w/fluor absent.
- 1137'-1170' Sd (100%): Fn; well-sorted w/tr-abund med; fn sub-ang, clr to minor vitreous dom qtz; med sub-ang to sub-rnd, clr to frsted dom qtz; cut clr w/fluor absent. (Unconsol. drlg. resid.) Note: Sieve of 230-mesh sampled 90-95% mesocoquina s. debris as apparent slough from action of stabilizers w/10-mesh loaded w/lge brnsh ls, lithoclastic frags.)
- 1170'-1200' Sd (100%): Fn w/minor med; fairly well-sorted; dom clr w/minor vitreous & frsted, dom sub-ang, dom qtz; cut clr w/fluor absent; 100% unconsolidated as drilling residual Note: Marked incr. in med sd in sieve of 230-mesh w/cont'd. high count of ls frags & mesocoquina debris, including micro-pyrite and glauc(?), dk grn.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 1200'-1230' Sd (100%): Fn-med; mod well-sorted; dom clr w/minor vitreous & abund frsted, dom sub-ang w/minor med sub-rnd, dom qtz; 100% unconsolidated as drilling residual; cut clr w/fluor absent. Note: Cont'd med sd grain incr in meshes 230-mesh w/sloughing ls frags & mesocoquinal ls markedly decreasing.
- Dolomite (Tr): Med dk brn; micritic, extremely hd; extremely brtl w/conchoidal frac; rnded edges; detrital.
- 1230'-1260' Sd (100%): Fn-med; mod well-sorted; clr to vitreous w/v/minor frsted, sub-ang to minor sub-rnded dom qtz; extremely "clean" sd grain sample as 100% unconsolidated drilling residual; cut clr w/fluor absent. Note: Sample 100% sd grains in all sieves w/only tr ls slough in 60 & 230-mesh sieves.
- 1260'-1290' Sd (70%): Fn-med; mod well-sorted; clr to vitreous w/v/minor frsted (med, dom), sub-ang to minor sub-rnd dom qtz; tr vitreous, micro-platy veinlet qtz frags (free); tr micro-pyrite aggregates; 100% unconsolidated as drilling residual; clr cut w/fluor absent. Sloughing ls absent in 60-mesh sieve.
- Dolomite (30%): Med dk brn; micro-xln (sucrosic); v/hd; v/brtl w/blocky frac; v/abund, sharp, clr-frsted qtz grain inclusions; tr micro-thin calcite veinlets; crush cut clear w/fluor absent.
- 1290'-1320' Sd (70%): Fn-med; mod well-sorted; clr to minor frsted w/v/abund vitreous, sub-ang to sub-rnd, dom qtz; tr incr med grain count w/tr sub-cse; tr micro-pyrite aggregates; tr clr mica; clr cut w/fluor absent.
- Dolomite (30%): Med dk brn; micro-xln (sucrosic); v/hd; v/brtl w/blocky frac; v/abund, sharp, clr-frsted qtz grain inclusions; tr micro-thin calcite veinlets; crush cut clear w/fluor absent.
- Mudstn (Tr): Red-brn; mod soft, mod calc.
- 1320'-1350' Mudstn (70%): Mega, dk red-brn; micro, med dk red-brn; mod firm as drlg. resid; from drlg fluid color change, apparently extremely soluble in mass; occas varying to minor v/dk red-brn to reddish-blk; non-calc w/tr apparent micro-fossil reactions; v/slight tr "vfn" silty; crush cut clr w/fluor absent ("Ferruginous mudstn")
- Sd (30%): Fn-v/minor med; clr to minor frsted, well-sorted, dom sub-ang, dom qtz; v/abund clr mica; mod abund micro-pyrite aggregates w/tr pyritohedrons; abund micro-thin qtz veinlet frags; 100% unconsolidated drlg resid; cut dk w/fluor absent. (Cont'd. dolo frags Re: 1290'-1320').

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 1350'-1380' Mudstn (60%): Mega, dk red-brn; micro, med to med dk red-brn to med dk brn; mod firm; extremely soluble in mass from drlg fluid coloration; non-calc w/tr apparent micro-fossil reastions; tr "vfn" silty; crush cut clr w/fluor absent.
- Dolomite (10-20%): Micro, med brn; extremely hd; extremely brtl w/sub-conchoidal & tr conchoidal frac; micritic w/mod abund frsted, sharp qtz inclusions; tr dk grn pelletoid glauc (?) inclusions; crush cut clr w/fluor absent.
- Sd (10-30%): Fn; well-sort; dom sub-ang; cut absent.
- 1380'-1410' Sd (100%): Fn-med; mod poorly-sorted; dom sub-ang, clr to vitreous as fn & sub-ang to sub-rnd w/tr rnd, clr to variably frsted as med; 100% unconsolidated as drlg resid; abund clr mica (muscovite); cut absent. Note: Cont'd micro-pyrite, glauc (?), shell frags, forams, ls & dolo frags, mudstn frags as apparent slough no >10% in 60-230-mesh & as dom ls & mesocoquinal ls frags in 10-mesh.
- 1410'-1440' Sd (100%): Fn-med-cse; poorly-sorted; 70% clr & 30% frsted when fn & 50% clr w/50% frsted to wht when med & dom wht w/v/minor frsted when cse; ang to dom sub-ang as fn w/sub-ang to rnd when med & dom rnd as cse; tr micro-pyrite aggregates; tr clr muscovite & red-brn bi; 100% unconsolidated as drlg. resid; cut absent.
- 1440'-1490' Sd(100%): Fn-med; well-sorted; dom. ang-sub-ang; clr to frsted dom qtz; slight tr micro-pyrite aggregates; slight tr muscovite; 100% as unconsolidated drlg resid; cut absent.
- 1470'-1500' Sd(100%): Fn-cse; mod poorly-sorted; ang to sub-ang w/v/minor sub-rnded to rnded clr to frsted w/v/minor feint or; tr dk grn glauc, muscovite & micro-pyrite aggregates; tr to abund dk red-brn mudstn & med grn to dk red-brn ls frags as apparent slough; 100% as unconsolidated drlg resid; but absent.
- 1500'-1530' Sd(80%): Fn-med w/minor cse; mod poorly-sort; clr to frosted w/v/minor or dom qtz; tr vitreous sanidine; tr muscovite & micro-pyrite aggregates; 100% as unconsolidated drlg. resid; but absent.
- Ls(20%): Med brn w/lt brn mottling; vhd; vbrtl; micritic; highly calcitic; tr wht calcitic cly; variable superfine sdy & silty.
- 1530'-1560' Sd(100%): Fn-med; mod well-sorted; dom ang w/minor sharp & v/minor sub-ang; clr w/minor frsted dom qtz; tr med to dk grn gluuc(?); v/slight tr micro-pyrite aggregates; 100% as unconsolidated drlg resid; cut absent.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 1560'-1590' Sd(100%): Fn-cse; fn-med dom sub-ang w/minor ang to v/minor sub-rnd(med); cse sub-rnd to rnd; clr to frosted dom qtz; abund micro-pyrite aggregates; 100% as unconsolidated drlg resid; cut absent.
- Ls(Tr-abund): Med to dk brn mottled; vhd & brtl; micritic to micro-xln; vfn to superfine sdy; highly calcitic; out absent; possible slough.
- 1590'-1620' Sd(100%): Fn-med w/v/minor cse; fn-med dom ang w/subordinate sub-ang, dom clr w/minor frsted qtz; cse rnd w/abund broken grains, dom frsted; 100% as unconsolidated drlg. resid; cut absent; tr micro-pyrite aggregates.
- 1620'-1650' Sd(100%): Fn w/subordinate med & tr cse; well-sorted; dom. ang to sharp as fn w/med dom sub-ang & cse rnded; dom clr w/minor frsted qtz; tr gry & or qtz grains; tr micro-pyrite aggregates; tr lt to med grn glauc(?); 100% unconsolidated as drlg. resid; cut absent.
- 1650'-1680' Sd(100%,w/10% micro-pyrite aggregates): Fn-med; ang-sub-ang w/tr-abund cse & rnded; dom clr w/minor frsted qtz; micro-pyrite (10%) vfn sdy-dom cubic w/minor octahedra; abund dk grn glauc(?), variably w/micro-dissem pyrite.
- 1680'-1710' Sd(100%) w/vfn sdy micro-pyrite aggregates to 30%: Fn to v/cse, as a micro-conglomeratic sd; fn-med, ang to sub-ang, cse-v/cse dom rnded; clr to frsted w/v/minor wht & slight tr v/pale grnsh qtz; v/slight tr med to dk gry, rnd qtz grains, all cse; micro-pyrite aggregates (30%) v/sdy, cubic to octahedral w/bulk specular & beyond 120X; 100% as unconsol. drlg. resid; cut absent.
- Mudstn(Abund): Dk red-brn; soft; variably superfine to vfn sdy & silty; non-calc w/slight tr apparent micro-fossil reactions; cut absent.
- Ls(Tr): Med brn; vhd & brtl; micro-xln; var. sdy; cut absent. (Shell frags, corals, crinoids cont'd as apparent micro-fossil slough.)
- 1710'-1740' Sd(100%): Fn-med w/minor cse; ang to sub-ang as fn-med & sub-rnd to rnd as cse; clr to frsted as fn-med & frsted to lt-med gry as cse; tr micro-pyrite aggregates; tr or grains, dom sharp qtz; 100% as unconsol. drlg resid; cut absent.
- 1740'-1770' Sd(100%): Fn-v/cse; poorly-sorted; clr w/minor vitreous (sharp sanidine & qtz) to frsted w/abund med gry cse; sharp to sub-ang w/minor sub-rnd to rnd (esp. cse); abund micro-pyrite aggregates, occas sdy; (tr med br ls; tr red brn mudstn-slough?); 100% drlg resid; no cut.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 1770'-1800' Ls(30%): Med brn to dk brn to dk red-brn; vhd to mod hd w/incr cly; v brtl; micritic to micro-xln; highly calcitic w/tr dolomite phases; v/sdy w/superfine to vfn, sharp, clr to gry-frsted qtz grains & tr med trn glauc(?) pellets in both ls & dolo. phases; tr micro-pyritic; cut absent.
- Mudstn(20%): Vdk red-brn to brnsh-blk; v/soft & sol; v/sdy; non-calc; mod silty; cut absent.
- Sd(50%): Fn-cse; ang-rnd; clr-frsted w/miner gry (as cse); abund cse gry, rnd qtz grains w/mod. disseminated micro-pyrite; 100% as unconsolidated drlg. resid; cut absent; tr micro-pyrite aggs.
- 1800'-1830' Sd(100%): Med w/minor cse; v/well-sorted; ang to sub-ang, dom clr w/minor frsted (esp. rare cse) qtz w/slight tr vitreous sanidine(?); v/"clean" sd; 100% as unconsol. drlg. resid; cut absent.
- 1830'-1860' Sd(100%): Med w/v/rare cse; extremely well-sorted, "clean" sd; dom sub-ang to sub-rnd clr qtz w/v/minor frsted & v/rare med to dk gry cse grains; 100% as unconsolidated drlg resid; cut absent.
- 1960'-1890' Sd(100%): Med; extremely well-sorted; dom clr. ang to sub-ang w/minor frosted qtz; v/"clean" sd; 100% as unconsol. drlg. resid; cut absent.
- 1890'-1920' Sd(100%): Fn-med; mod well-sorted, v/"clean" sd; ang to sub-rnd w/v/rare rnd cse grains; clr to frosted w/v/minor vitreous qtz & sanidine; 100% as unconsol drlg resid; cut absent.
- 1920'-1950' Sd(100%): Fn-cse, dom med; mod poorly-sorted, v/"clean" sd; ang to rnded; vitreous to clear w/subordinate frsted (dom cse) dom qtz; 100% as unconsol drlg resid.
- 1950'-1980' Sd(100%): Fn; extremely well-sorted, v/"clean" sd; sharp, angular to sub-rnd w/minor rnd; vitreous qtz & sanidine(?) w/dom clr w/minor frsted qtz; 100% as unconsol drlg resid; cut absent.
- 1980'-2010' Sd(100%): Fn-med; med well-sorted, v/"clean" sd; ang to sub-rnd w/minor sharp & rnd; clr to frsted qtz w/minor vitreous qtz & sanidine; 100% as unconsol drill resid; cut absent.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 2010'-2040' Sd(100%): Fn-med; med well-sorted, v/"clean" sd; ang to rnd; clr to frsted w/minor vitreous (qtz & sanidine?) qtz; tr gry, rnded qtz grains; tr micro-pyrite aggregates; rare lt "rose"-colored, ang qtz grains; 100% as unconsol drlg resid; cut absent.
- 2040'-2067' Sd(100%): Fn-med; mod well-sorted w/v/minor cse; dom sub-ang w/subordinate ang & abund sub-rnd to rnd; clr to frsted w/minor vitreous (qtz grains; tr micro-pyrite aggregates; 100% as unconsol drlg resid; cut absent.
- 2067'-2100' Sd(100%): Fn-med; dom. ang to sub-ang w/abund sub-rnd to rnd, cse; fn dom clr, med clr-trsted, dom qtz w/tr-abund vitreous sanidine; tr grysh, rnded & or sub-ang qtz grains; tr micro-pyrite aggregates; 100% as unconsol drlg resid; cut absent; tr clr vein qtz.
- 2100'-2130' Sd(100%): Fn-med; med well-sort; dom ang w/minor sub-ang, clr w/minor frosted dom qtz w/tr-abund sharp, vitreous sanidine, tr clr vein qtz; 100% as unconsolidated drlg resid; cut absent.
- 2130'-2160' Sd(100%): Fn; extremely well-sort; ang-sub-ang, clr to frsted, dom qtz; tr-abund sub-rnd to rnd as random fn-med, dom frsted qtz; tr med grn glauc(?); 100% as unconsol. drlg resid; cut absent.
- 2160'-2190' Sd(100%): Fn; extremely well-sort; ang to sub-ang, clr to frsted, dom qtz & tr sub-rnd to rnd, dom frsted qtz; tr med grn glauc; 100% as unconsol drlg resid; cut absent.
- 2190'-2220' Sd(100%): Fn-med; mod well-sort; ang to sub-ang, abund sub-rnd & tr rnd; clr to frsted, dom qtz w/tr-abund sharp, vitreous sanidine; tr micro-pyrite aggregates; 100% as unconsol drlg resid; cut absent.
- 2220'-2250' Sd(100%): Vfn-med, poorly-sort; ang to rnd, dom sub-ang, clr w/minor frsted qtz & tr-abund, ang to sharp apparent sanidine; tr-abund micro-pyrite aggregates; tr med, dull grn, micro-pyritized glauc(?) pellets; 100% as unconsol drlg resid; tr brnsh-blk shaley siltstn & red-tan, micritic ls frags; cut absent.
- 2250'-2280' Sd(100%): Fn-cse; poorly sorted; ang to sub-ang as fn-med & sub-ang to sub-rnd as med w/cse dom rnd; clr to frsted w/tr-abund variably gry w/tr pink to or, rnd (as gry) to ang & sub-ang as pink & or; abund vitreous, dom sharp sanidine; tr clr qtz vein frags; 100% as unconsol drlg resid; cut absent; tr micro-fossils, siltstn & ls as apparent slough.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

2280'-2310' Micro Cgl(30%): Fn-cse; extrem poor sorting; cse, sub-ang to rnd w/v/abund ang & brkn w/sharp frags; clr to frsted qtz; fr-cse micro-pyrite aggregates, variably vfn to fn, sharp sdy; tr med-cse, grysh, rnded, micro-pyritic qtz; random frags of tan-or ls, red-brn ls, wht, mottled ls, dk red-brn ls; red-brn mudstn frags, micro-fossils & shell frags as apparent slough w/well cmt contam; 100% as unconsol drlg resid; cut absent.

Sd(70%): Fn; v/well-sort; ang-sub-ang; clr-frsted dom qtz w/vitreous vein qtz & sanidine, dom sharp; tr micro-pyritic aggregates; 100% as unconsol drlg resid; cut absent. (Abund cmt contam.)

2310'-2340' Microconglomeratic Sd(100%): Vfn-cse; extreme poor sorting, cse, sub-ang to rnd w/v/abund ang & broken w/sharp frags; clr to frsted qtz; fn-cse micro-pyrite aggregates; variably vfn to fn, sharp sdy; highly similar to micro cgl at 2280' to 2310; but w/incr count in sd phase to approx. 60%, w/cgl phase of approx. 40%; 100% as unconsolidated drlg. resid; cut absent.

2340'-2370' Sd(100%): Vfn - v/cse, microconglomeratic, sharp to rnd; clr to frsted dom qtz w/abund vitreous sanidine; 100% as unconsol drlg. resid; cut absent.

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~~2470'~~^{2470'}-2400' Mudstn(30%): Dk brn to brnsh-blk; v/soft; v/sol; tr sub-fissile; variably silty & v/fn sdy; highly hydratable; non-calc; abund micro-pyritized.

Ls(20%): Med dk brn to mottled med & dk brns w/tans & lt brns; mod hd & brtl; micritic; v/silty & vfn sdy; v/clyey; abund w/disseminated micro-pyrite; non-calc. (Abund fossils free in general sample.)

Sd(50%): Fn-med w/v/abund cse; mod poor sort; ang to rnd; clr to frsted w/abund grys & tr or; gry, cse rnd grains variably micro-pyritized; abund micro-pyrite aggregates; 100% as unconsol drlg resid; cut absent.

2400'-2430' Sd(70%): Fn-cse; mod poor sort; ang to rnd; clr to frsted dom qtz w/abund vitreous sanidine; abund micro-pyrite aggregates; abund micro-fossils; 100% as unconsol drlg resid; cut absent.

Mudstn(30%)" Vdk brn to brnsh-blk; mod soft & sol; variably silty & vfn sdy; non-calc. (cont'd cmt slough.)

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 2430'-2460' Mudstn(40%): Vdk brn to brnsh-blk; v/soft & sol; variably silty w/minor vfn sdy; non-calc.
- Sd(60%): Fn-cse; poorly-sort; ang to sub-ang as fn, sub-ang to sub-rnd as med & sub-rnd to rnd as cse; clr to frsted fn-med & clr to frsted to variable gry as cse; tr orangish grains; 100% as unconsolidated drlg resid.
- 2460'-2490' Mudstn(80%): Vdk brn to brnsh-blk; v/soft & sol; variably silty & vfn sdy; v/abund free micro-fossil frags, often totally micro-pyritized; non-calc.
- Sd(20%): Fn-cse; mod poor sort; ang to rnd w/minor sharp grains; clr to frsted (fn-med) w/v/abund frsted & grysh grains (med-cse); slight tr ang, or grains; tr-abund micro-pyrite aggregates; 100% as unconsol drlg resid; cut absent; tr vein qtz.
- 2490'-2520' Mudstn(90%): Vdk drn to brnsh-blk; v/soft & sol; variably silty & sdy (vfn); tr micro-fossil frags; non-calc.
- Sd(10%): Fn-med, dom fn; mod well-sort; sub-ang to sub-rnd; clr to frsted qtz w/v/slight tr vitreous sanidine; tr micro-pyrite aggregates; cut absent; 100% as unconsol drlg resid.
- 2520'-2550' Mudstn(80%): Vdk brn to brnsh-blk; v/soft sol; abund silty & vfn sdy; non-calc.
- Sd(20%): Fn; extremely well-sort; ang to sug-ang; clr to frsted; tr micro-pyrite aggregate; 100% as unconsol drlg resid; cut absent.
- Ls(Tr-abund): Med lt brn, mottled; mod soft to mod hd; basically mod brtl when hd; micritic; no cut.
- 2550'-2580' Mudstn(40%): Vdk brn; v/soft & sol; variably silty & sdy; non-calc; abund micro-fossil frags.
- Sd(60%): Fn-cse; ang to rnd; clr to frsted dom qtz w/minor vitreous sanidine & tr clr to vitreous vein qtz; tr-abund micro-pyrite aggregates; 100% as unconsol drlg resid; cut absent.
- 2580'-2610' Mudstn(80%): Vdk brn to brnsh-blk; v/soft & sol; variably silty & clyey; abund forams & general micro-fossil assemblages (shell frags, brachiopods, cerals, pelecypods, pectens, gastropods, turritella, crinoid stems); non-calc.
- Sd(20%): Fn-cse; mod poor sort; ang to rnd; clr to frsted w/abund vitreous sanidine & slight tr clr to vitreous vein qtz; 100% as unconsol drlg resid; cut absent. (Slough?)

(Cape Sporell No. 1 Sample Descriptions Cont'd)

- 2610'-2640' Mudstn(100%): Vdk brn to brnsh-blk; v/soft & sol; variably silty & vfn sdy; abund micro-fossils, minor micro-pyritized (esp. crinoid stems); non-calc.
Sd(Tr-abund): Fn-cse; ang-rnd; clr-frsted; as apparent slough.
- 2640'-2695' Mudstn(70-100%): Vdk brn; v/soft & sol; variably sdy & silty; abund brnsh-blk & blk w/micro-pyrite lineations; tr included biotite; tr-abund micro-fossil frags; non-calc.
Sd(Tr-30%): Fn w/v/minor med; ang-sub-ang; clr to frsted dom qtz w/minor vitreous sanidine; (well-sorted); tr micro-pyrite aggregates; 100% as drlg. resid; cut absent.
- 2695'-2700' Sd(100%): Med; extremely well-sorted & "clean: ang to sub-ang; clr-frsted dom qtz w/tr-abund vitreous sanidine; tr pale grn glauc(?); tr wht kaol(?); (occas rnded, clr-frsted grains as rare); 100% as drlg resid; cut absent.
- 2700'-2830' Sd(100%): Fn-med; mod well-sorted; ang to sub-ang w/minor sub-rnd & abund rnded dom qtz; tr to v/abund vitreous sanidine; tr micro-pyritized forams; tr-abund micro-pyrite aggregates; 100% as unconsol drlg resid.
- 2730'-2760' Sd(100%): Fn-med; mod well-sorted; ang to sub-ang w/minor sub-rnd & abund rnded dom qtz w/tr-abund vitreous sanidine; tr pale grn glauc(?); tr wht kaol(?) rare rnd, frsted qtz; 100% as unconsol drlg resid; cut absent.
- 2760'-2790' Sd(100%): Clr, fn-med, mod well srted, subang to subrnd, dom qtz, tr k-feldspar and glauc(?), occ shell fragments, 100% as drlg residual.
- 2790'-2820' Sd.(100%): Clr, fn-med, mod well srted, subanglr to rdd, dom qtz, tr microfossils, sl pyritic, occ SS frags, 100% as drlg residual.
- 2820'-2850' Sd.(60-70%): Fn-med, clr-wht, mod well srted, dom qtz, tr-abund pyritic grns, occ shell frags, 100% as drlg residual.
Mudstn(30-40%): V. dk gry, v. soft, variably silty and sandy, soluble, micro-pyritic, micaceous.
- 2850'-2880' Sd.(70-80%): Fn, v well srted, clr, subanglr to subrdd, dom qtz, tr-abund microfossils, occ shell frags, rare salmon-red granitic frags, micaceous, 100% as drlg residual.
Mudstn(20-30%): V. dk gry, v soft, variably sandy and silty, soluble, non-calc, micropyritic.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 2880'-2940' Sd(80-90%): Clr, fn-med, mod well srted, subangular to subrdd, dom qtz, abund mica, occ shell frags, rare biotite with sd grains adhering via hematite, 100% as drlg resdl.
Mudstn(10-20%): V. dk brn - v. dk gry, v. soft, soluble, variable silt and vfn sd content, micropyrritic, rare pyritized worm tubules.
- 2940'-2970' Sd.(100%): Fn-med, clr, mod well sorted, anglr to subrdd, tr k-feldspar, micaceous, 100% as drlg resdl.
- 2970'-3000' Sd.(70-80%): Clr, fr-crse, mod srted, anglr to subrdd, tr magnetite, pyrite, occ shell frags, occ rudaceous mafic volcanic frags, 100% as drlg resdl.
Siltstn(20-30%): Med-dk brn, mod well srted, dom qtz, mod soft, non-calc, sl clayey to clayey, non-calc, sltstn frags range fro 0.25mm to 1mm in size.
- 3000'-3030' Sd.(80%): Clr, fn-med, mod srted, anglr to subrdd, tr k-feldspar, micro-pyritized forams, mic, occ shell frags, 100% as drlg resdl.
Siltstn(20%): Dk brn-dk gry, poorly sorted, clayey, mod. soft, non-calc, sltstn frags range in size from 0.25mm to 1mm.
- 3030'-3060' Sd.(100%): Clr/wht, anglr to subrdd, fn-med, mod well srted, dom qtz, tr to common biotite (leached to a translucent brown), tr granitic frags, tr to common forams (not pyritized), micaceous, 100% as drlg resdl.
- 3060'-3090' Sd.(100%): Clr, fn-med, mod well srted, subanglr to subrdd, tr SS frags, tr to common micro-pyritized forams, occ Fe-oxide stain surrounding biotite flakes on sd grns as local cementing agent, 100% as drlg resdl.
- 3090'-3120' Sltstn(60-70%): Med dk to vkd brwn, clayey to v clayey, sdy, poorly srted, cale, sltstn. frags range in size from 0.75 to 1.5mm.
Sd.(30-40%): Vfn-crse, poorly srted, clr, anglr to subrdd, tr SS frags, occ shell frags, rare micro-pyritized forams, occ Fe-oxide stain surrounding biotite flakes on Sd. grms as local cementing agent, 100% as drlg resdl.
- 3120'-3150' Mudstn(100%): V dk brn, mod soft & soluble, variably sandy and silty, tr-common included mica, tr micro-pyritized forams, non-calcareous; up to 30% sd. slough in sample as indicated by corrected drilling exponent of 1.12 to 1.46.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 3150'-3180' Mudstn(90-100%): V dk gry to v dk brn, v soft to extremely soft, variably sandy and silty, tr-common included mica.
Sd.(Tr-10%): Clr, fn-crse, mod poor srtd, subang to rdd, 100% as drlg resdl.
- 3180'-3210' Sd(100%): Clr-wht, vfn-vcrse, v poorly std, occ v. subangular-rdd, tr-common micro-pyritized fossil frags (0.5-1mm size), tr glauc(?), micaceous, 100% as drlg residual; 20-40%. Mudstn slough in sample, dk grysh brn, variably sdy and silty, v soft to mod soft.
- 3210'-3240' Sd(100%): Clr-wht w/tr med brn and wht, also med reddish brn and clr, med-crse, mod well srtd, subanglr-subrdd, tr k-feldspar, tr micro-pyritized fossil frags of 0.5-1mm size, 100% as drlg resdl.
- 3240'-3270' Sd(100%): Clr, occ lt. yellow, lt. reddish brn, med-crse, mod well srtd-well srtd, subanglr-rdd, occ shell frags, 100% as drlg resdl.
- 3170'-3300' Sd(100%): Clr, occ yllsh-brn, med dk brn, clr and reddish brn; fn-med w/tr crse, mod srtd-mod well srtd, subanglr-subrdd, occ shell frags, 100% as drlg resd'l.
- 3300'-3330' Sd.(100%): Clr, fn-med w/tr crse, mod well srtd, subanglr-subrdd, 100% as drlg resd'l.
- 3330'-3360' Mudstn (90-100%): V dk gry-dk brn, v. soft, soluble, silty, sl. sdy; up to 70% sd. in sample although corrected drilling exponent of 1.1-1.3 indicates that the drilled interval is not sand, but that the sand is slough.
Sd. (Tr-10%): clr, fn-med, mod well srtd, anglr-subrdd, tr glauc(?), 100% as drlg residual
- 3360'-3390' Sd. (80-90%): Fn-crse, poorly-mod srtd, anglr-subrdd, clr-wht, tr-common glauc(?), occ pyrite grains, 100% as drlg resdl.
Mudstn (10-20%): V dk gry, v soft, soluble, variably silty and sandy, up to 90% sd. slough in sample.
Anthracite coal (Tr-10%): Micro-pyritic coating on surface, vitreous & conchoidal surface upon breakage, mod. hard, brittle, poss. from 3374' (Dxc).
- 3390'-3420' Sd. (90-100%): Clr-wht, fn-med, mod srtd, subanglr to subrdd, tr glauc(?), occ shell frags, 100% as drlg resdl.
Mudstn (Tr-10%): V dk gry, v soft, v silty. soluble, sl sdy.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 3420'-3450' Sd. (100%): Clr, fn-med, mod srted, subanglr/subrdd, pyritic, 100% as drlg resdl.
- 3450'-3480' Sd. (100%): Clr, fn-crse, poorly-mod srted, subanglr-rdd, tr garnet (v dk brn, translucent, v. hd, conchoidal frac, non-mgntc), common pyrite grns, occ med gry, well rdd, crse-grnd ftz, 100% as drlg resdl.
- 3480'-3510' Sd. (100%): Fn-med, mod srted, clr-wht, subanglr-rdd, common micropyritized fossil frags, occ shell frags, 100% as drlg resdl.
- Mudstn (Tr): Vdk gry, silty, v sft, soluble, sndy.
- 3510'-3540' Sd. (90-100%): Med-crse, mod srted, clr-wht, subanglr-subrdd, common pyritized fossil frags incldg worm tubules and sand-sized grains, 100% as drlg. resdl.
- Mudstn (Tr-10%): V dk gry, v. soft, soluble, var silty & sdy.
- 3540'-3570' Sd. (100%): Fn-crse, poorly srted, clr/wht, anglr-rdd, occ v. well rdd; rare canary yellow, subspherical, extremely well rdd qtz grns; 100% as drlg resdl.
- 3570'-3600' Sd. (100%): Clr-wht, fn-med, mod srted, subanglr-well rdd, occ v well rdd, qtzse; v well rdd qtz is ubiquitously crse-grnd; 100% as drlg resdl.
- 3600'-3630' Sd. (70-90%): Clr-wht, fn-med, mod srted, subanglr to subrdd, dom qtz, occ biotite flakes, 100% as drlg resdl.
- Mudstn (10-30%): Dk gry, mod soft, mod frm, semi-soluble, not nearly as silty or sandy as shallower samples, but some pieces are still silty and sandy.
- 3630'-3660' Sd. (100%): Clr-wht, fn-crse, mod srted, subanglr-rdd, occ v well rdd, crse grnd, clr qtz, 100% as drlg resdl.
- 3660'-3690' Sd. (100%): Fn-crse, poorly sorted, clr, subanglr-well rdd, 100% as drlg resdl.
- 3690'-3720' Sd. (100%): Fn-crse, poorly sorted, clr, subanglr- well rdd, 100% as drlg resld.
- 3720'-3750' Sd. (100%): Fn-med, mod srted, subanglr-rdd, tr glauc(?), 100% as drlg resld.
- 3750'-3780' Sd. (100%): Fn-med, mod srted, subanglr-rdd, clr, 100% as drlg residual.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 3780'-3810' Ds. (100%): Fn-med, mod srted, subanglr-rdd, clr, 100% as drlg resdl.
- 3810'-3840' Sd. (100%): Fn-med, mod srted, subanglr-rdd, clr, 100% as drlg resdl.
- 3870'-3900' Sd. (100%): Fn-med, occ crse, mod srted, clr, subanglr-rdd, 100% as drlg resdl.
- 3900'-3930' Sd. (100%): Fn-med mod srted, clr, subanglr-rdd, occ shell frags, 100% as drlg resdl.
- 3930'-3960' Sd. (80-100%) Fn-med clr, mod srted, subangular-rdd, tr biotite, 100% as drlg resdl.
Mudstn (Tr-20%): vdk gry, mod soft, semi-soluble, silty.
- 3960--3990' Mudstn (40-80%): V dk gry, mod sft, semi-soluble, occ. silty.
Sd. (20-60%): Fn-med clr-wht, mod srted, sub anglr to subrdd, 100% as drlg resdl.
- 3990'-4020' Sd. (30-70%): V fn-med, poorly srted, clr-wht, subanglr-subrdd, tr canary yellow qtz grns, tr glauc (?), 100% as drly resdl.
- 4020'-4050' Sd. (100%): V fn-crse, clr-wht, poorly srted, subanglr-subrdd, 100% as drlg residual.
- 4050'-4080' Sd. (100%): V fn-crse, clr-wht, poorly srted, subanglr-subrdd, occ fossil frags, 100% as drlg resid.
- 4080'-4112' Sd. (100%): Fn-med, clr-wht, mod srted, subanglr-subrdd, 100% as drlg resdl.
- 4112'-4161' Shale (100%): V dk gry, hd-V. hd, subfissile-fissile occ curvilinear, insoluble.
- 4161'-4170' Shale (100%): V dk gry, mod hd, subfiss-fiss, non-calc, insoluble, 95% cement contaminant.
Sd (Tr): Brnsh yell, crse-vcse, 100% as drly gesdl.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

4170'-4200' Mudstn (60%): Med dk brn-vdk gry, mod sft-sl hd, insoluble, variably sdy and slty, non-calc.

Shale (40%): Vdk gry, mod hd, fis-v fiss, non-calc, insoluble, sl pyritic.

Sd (Tr): Fn, slr, mod well-srtd, subanglr, 100% as drlg resdl.

4200'-4230' Mudstn (50-70%): Med dk brn-med dk brn, mod sft, sl soluble, variably sdy & slty, non-calc.

Slstn (20-40%): Med dk brn-med dk gry, calc-v calc, sl sdy, mod well srtd, sl argil, mod hd-v hd, insoluble.

Shale (Tr-10%): Vdk gry, sl hd-mod hd, insoluble, subfiss-fiss, non-calc, sl pyritic.

Sd (Tr-10%); Vfn and rarely crse, clr, mod srtd, subanglr-subrdd, 100% as drlg resdl.

4230'-4260' Mudstn (70-80%): Med dk brn-med dk gry, mod. sft. sl soluble, var sdy & slty, calc, tr non-calc, occ. subfiss.

Slstn (10-20%): Med dk grn-med dk gry, calc-u calc, sl sdy, poorly srtd-mod well srtd, argil, mod hd-vhd, insoluble.

Sd (Tr): Vfn-vcse, clr, poorly-mod srtd, anglr-subrdd, 100% as drlg resdl.

4260'-4290' Sd (30-50%): Fn-v crse, clr-wht, mod sortd to poorly srtd, comm-abund glauc, anglr-subangl, occ shell frags, tr-comm. pyrite frags ranging from 0.5 to 1.75mm in size, 100% as drlg resdl.

SS (20-40%): Clr-wht, fn-med, od srtd, angular-subrdd, comm glauc, dom qtz, cemented tightly w/calcite, cut absent.

Shale (10-30%): Vdk gry, slilty, v firm-mod firm, insoluble, subfiss-fiss, non-calc.

Slstn (Tr-10%): Vdk grh, slty, v firm-mod firm, insoluble, subfiss-fiss, non-calc.

Slstn (Tr-10%) Med brn-med dk brn, v sdy, argil, calc, comm glauc, v hd, cut absent.

(Cape Spretell No. 1 Sample Descriptions Cont'd)

- 4290'-4320' Sd (60-80%): Fn-vcse, clr-wht, poorly-mod srted, anglr-subrdd, tr-comm pyrite frags encapsulating med-fn qtz sd grns, comm-abund glauc, 100% as drlg resdl.
- SS (10-20%): Clr-wht, fn-crse, mod srted, anglr-subrdd, comm glauc, dom qtz, cemented tightly w/calcite, cut absent.
- Shale/mudstn (Tr-10%): Med dk gry-med dk brn, frm-mod hd, v calc, slty splntry, non-fiss to fiss, sl pyritic and micaceous.
- Sltstn (Tr) Med lt brn-med dk brn, v sdy, argl, comm glauc, v hd, calc, cut absent.
- 4320'-4350' Sd (60-80%): Fn-vcse, clr-wht, poorly srted, anglr. subanglr-comm glauc; comm-abund pyrite frags encapsulating clr ds grns, pyrite occ tinged w/multi colored hus (calcopyrite?). tr-comm is frags, rate shell frags, 100% as drlg resdl.
- SS 10-20%): Clr-wht, fn-crse, mod srted, anglr-subrdd, tr glauc, cemented tightly w/calcite, dom qtz, cut absent.
- Mudstn/Shale (Tr-10%): Med dk gry, frm, subfiss to non-fiss, slty, blocky, sl pyr, mica.
- Coal (Tr): Mod hd, bituminous(?), conch, frac. upon breakage.
- 4350'-4380' Sd (60-80): Fn-v crse, clr-wht and occ lt bnsh yell, subanglr-subrdd, poorly sortd, tr-comm glauc, comm pyrite frags, occ chalcopryite(?), tr ls frags, 100% as drlg resdl.
- SS (10-20%): Clr-wht, Fn-crse, mod srted, fubanglr-subrdd tr glauc, cemented tightly w/calcite, dom qtz, cut absent.
- Mudstn/shale (10-20%): Med dk gry, frm, non-fiss-fiss, slty, splntry, occ blk, sl pyr and mica.
- 4380'-4410' Sd (20-50%): Fn-crse, clr-wht and occ lt brnsh yell, subanglr-subrdd, mod srted-prly srted, tr-comm pyrite frags, tr glauc, 100% as drlg resdl.
- Shale/mudstn (20-40%): Med dk gry, frm-mod rd, subfiss-nonfiss, blk, sl pyritic.
- SS (10-30%): Clr-wht and lt brnsh yell, fn-med, subang-subrdd, mod srted, tr tlauc, rare pyrite-cemented SS frags w/in SS framework, as a lithic frag, tightly cemented w/calcite, no cut.

(Cape Sorell No. 1 Sample Description Cont'd)

4410'-4440' Sd (30-40%): Slr-wht, occ lt yell brn, fn-crse, poorly-mod srted, subanglr-subrdd, tr glauc, com pyrite frags, 100% as drlg resdl.

Mudstn (20-40%): Med gry-med dk gry, calc, frm-sl hd, sl pyritic, var sdy & slty, occ subfiss.

SS (20-30%): Clr-wht and lt yell brn, fn-crse, prly-mod srted, subanglr-subrdd argill, calcite-cemented, cut absent.

4440'-4470' Sd (40-50%): Clr-wht vfn-vcrse, poorly srted, subanglr-subrdd, comm occ is frags, pyrite frags, 100% as drlg resdl.

Shale (30-40%) Med gry-med dk gry, mod sft-mod frm, occ non-fiss, al pyritic, slty.

Slstn (10%): Med gry-lt dk gry, sl sdy, v hd-mod frm, v calc.

4470'-4500' Sd (50-60%): Clr-wht, vfn-vcrse, v poorly srted, subanglr-subrdd, comm pyrite frags, tr ls frags, tr glauc, 100% as drlg resdl.

Mudstn/Shale (20-30%): Med dk gry, mod sft-mod frm, occ subfiss, sl pyritic, slty, non-calc.

Slstn (10-30%): Med lt gry-lt dk gry, sdy, arg, v poorly srted, sl calc, mod hd-mod frm.

4500'-4530' Sd (40-50%): Clr-wht, vfn-vcrse, v poorly srted, subanglr-subrdd, abund pyrite frags, 100% as drlg resdl.

Shale/mudstn (40-50%): Med brnsh gry-med dk gry, mod frm-mod sft, subfiss to non-fiss, occ slty, non-calc.

Slstn (10-20%): Lt dk gry-med lt gry, sdy, argil, v prly srted, calc, mod frm-mod hd.

4530'-4560' Shale/mudstn (50-60%): Med dk gry, mod frm-mod hd, occ nonfiss, sl. calc-sl pyritic.

Sd (40-50%): Clr-wht, vfn-vcrse, v poorly srted, subanglr-subrdd, comm-abund pyrite frags, 100% as drlg resdl.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 4560'-4590' Shale/mudstn (40-60%): Med dk gry-vdk gry, slty, mod rd, blk, occ non-fiss, non-calc.
- Sd (20-40%): Clr-wht, vfn-crse, poorly srted, subanglr-subrdd, comm pyrite frags, 100% as drlg resdl.
- SS (20-40%): Med lt brn-med dk gry, vfn-crse, arg, slty, angular-subrdd, v v poorly srted, calcite-cemented.
- 4590'-4620' Mudstn (60-70%): Med dk gry, variably sdy slty, v frm- v hd, v calc.
- Sd (10-30%): Clr-wht, vfm-crse, anglr-subrdd comm pyrite frags (also chalcopryrite detected), 100% as drlg resdl.
- SS (10-20%): Med lt gry-med dk gry, vfn-crse, v poorly srted angular-subrdd, arg, slty, calcite-cemented.
- 4620'-4650' Mudstn (60-70%): Med dk gry, var slty and sdy, v frm- v hd, v calc-ccalc.
- Sd (10-30%): Clr-wht, vfm-vcrse, anglr-subrdd, comm pyrite frags, occ ls frags, 100% as drlg resdl.
- SS (10-20%): Med lt gry, vfn-vcrse, v poorly srted, arg, slty, calc cmted.
- 4650'-4680' Mudstn (50-60%): Med dk gry, var slty and sdy, v frm-mod hd, calc.
- Sd (20-40%): Clr-wht, vfn-vcrse, anglr-subrdd, com pyrite frags, occ ls frags, 100% as drlg resdl.
- SS (10-30%): Lt-med gry, vfn-vcrse, prly srted, arg, slty, calcite-cmted.
- 4680'-4710' Mudstn (40-60%): Med dk gry, var slty and sdy, vfrm-mod hd, calc.
- Sd (20%-30%): Clr-wht, vfn-vcrse, prly srted, subang. to subrdd, tr-comm pyrite frags, 100% as drlg resl.
- SS (10-30%): Lt med gry-med dk brnsh gry, fm-crse, poorly srted, arg, slty, occ micro-pyritic calcite-cmted.
- 4710'-4770' Sd (40-60%): Clr-wht, fn-vcrse, poorly srted, subanglr-subrdd, tr pyrite, frags, 100% as drlg resdl.
- Mudstn (40-60%): Dk med gry, var slty and sdy, v frm-mod hd, calc.
- SS (Tr-10%): Lt med gry, fn-crse, prly srted, subang-subrdd calcite-cmted.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 4770'-4800' Sd (50-70%): Clr-wht, fn-crse, prly srted, subanglr-subrdd, tr pyrite frags, 100% as drly resdl.
SS (20-30%): Med lt. gry, fn-crse, prly srted, subang to subrdd, occ argil, calcite-cemented.
- 4800'-4830' Sd (80%): Clr-wht, fn-vcrse, prly srted, subanglr-subrdd, tr-comm pyrite frags, 100% as drlg resdl.
SS (10-20%): Fn-crse, clr-med gry, sl argil, prly srted, subanglr-subrdd, tr glauc, calcite-cemented.
Mudstn (Tr-10%): Med dk gry, var sdy and slty, mod frm, calc, occ pyritic.
- 4830'-4860' Sd (50%): Clr-wht, fn-vcrse, poorly srted, subanglr-subrdd, tr-comm pyrite frags, occ whole forams, 100% as drlg resdl.
Mudstn (30%): Med dk grysh brn, v sdy, mod frm, occ subfiss, occ slty, non-calc.
SS (10-20%): Wht-med gry, fn-med, mod well srted-prly srted, white variety is glauconitic, subanglr-subrdd, non-slty, non-arg, calcite-cmted, med gry variety is arg, slty, also calcite-cmted.
- 4860'-4890' Sd (50%): Fn-vcrse, wht-clr, prly srted, anglr-rdd, comm pyrite, 100% as drlg resdl.
Shale/mudstn (30%): Dk-med grsh brown, v frm, fiss and occ non-fissile/sdy, sl calc.
SS (10-20%): Fn-med, clr-wht, occ glauc, subanglr-subrdd, mod srted; slao tr med gry, arg, slty, vfn-med, prly srted; both types calcite.
LS (Tr-10%): Wht-vlt gry, v sdy (vfn), slty, microxln, no visual porosity.
- 4890'-4920' SS (50-60%): Med dk gry-lt med gry, slty, fn-med, arg, prly, mod srted, anglr-subrdd, calcite-cmted.
Mudstn (20-30%): Med grysh brn, mod frm, sdy, sl to non-calc.
Sd (10-20%): Fn-crse, clr-wht, anglr-subrdd, comm-abund pyrite.
LS (Tr): a/a

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 4920'-4950' Sd (30-40%): Clr-wht, fn-vcrse, poorly srted, subanglr-subrdd, tr glauc, common pyrite frags, occ shell frags, 100% as drly resdl.
SS (30-40%): Med lt gry- med grysh brn, fn-med, occ crse, mod-prly srted, anglr-subrdd, calcite-cmted.
Siltstn (20%): Med dk gry, micropyrilic, arg, calcite-cmted (v hd).
LS (Tr): a/a (poss slough).
- 4980'-5005' Sd (60-70%): Clr-wht, fn-crse, occ v crse, prly srted, anglr-rdd, common pyrite frags, 100% as drlg redl.
SS (20%): Vfn-med, med gry, mod srted, occ well srted, subanglr-subrdd, calcite-cmted,
Siltstn (20%): Med dk gry, arg, calcite-cmted.
- 4980'-5005' Sd (60-70%): Clr-wht, fn-crse, occ v crse, prly srted, anglr-rdd, comm pyrite frags, 100% as drlg.
SS (20%): Vfn-med, med gry, mod srted, occ well srted, subanglr-subrdd, calcite-cmted
Siltstn: Med grysh brn-med dk gry, arg, mod-vhd, calcite-cmted.
- 5005'-5040' Sd (90%): Clr, occ wht, fn-vcrse, poorly srted subanglr-rdd, tr pyrite frags, 100% as drlg resdl.
Mudstn (10%): Dk grysh brn, mod frm, slty, non-calc.
SS (Tr): Clr, med, well srted, subanglr, glauc, calc.
- 5040'-⁵~~4070~~' Sd (70%): Clr, occ wht, fn-vcrse, prly srted, subanglr-rdd, tr-comm pyrite frags, tr lithic frags, tr chlorite, 100% as drlg resdl.
SS (10-20): Med gry-med grysh brn, vfn-crse, prly srted, com slty, arg, anglr-subrdd, calcite cemented; occ reddish-brn matrix + chlorite.
Mudstn: Dk grysh brn, v sft, smooth, non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 5070'-5100' Sd (50-60%): Fn-crse, occ vcrse, clr-wht, prly srted, subanglr-rdd, tr-comm pyrite frags, tr lithic frags (v well rdd), 100% as drlg resdl.
Sltstn (20%): Med grysh brn, v sdy, anglr, mod hd, arg, calc.
Mudstn (20%): Med grysh brn, mod sft-mod firm var sdy and slty sl soluble, occ subfiss, non calc.
- 5100'-5130' Sd (70%): Clr-wht, fn-crse, occ v crse, subanglr-well rdd, tr pyrite, tr chlorite, tr lithic frags, 100% as drlg resdl.
SS (20%): Lt frags med grysh brn, vfn-crse, prly srted, anglr-subrdd, slty, arg, calc.
Sltstn (10%): Med grysh brn, mod sft-mod hd, ang, sdy-vsdy, calc.
- 5130'-5160' Sd (60-70%): Clr-wht, fn-crse, occ vcrse, subanglr-rdd, tr pyrite, tr lithic frags, 100% as drlg resdl.
SS (20-30%): Med grysh brn, anglr-subrdd, drlg resdl, vfn-crse, slty, arg, vprly srted; occ the framework grns consist of mod well-srted fn-med qtz sd; calc.
Sltstn (10%): Med grysh brn, arg, v sdy, mod hdy calc.
- 5160'-5190' Sd (70%): Clr-wht, fn-v crse, subanglr-subrdd, rare quartzite frag, rare volcanic frag mineralized w/pyrite & some bornite(?), 100% as drlg resl.
SS (20%): Med grysh brn, arg, vfn-crse v prly srted, angular-subrdd, silty, calc.
Siltstn (10%): Med grysh brn ang, v sdy, mod hdy calc.
- 5190'-5220' Sd (50-60%): Clr-wht, fn-vcrse, v prly srted, subang to subrdd, 100% as drly resdl.
SS (30-40%): Med brnsh gry, vfn-crse, ang, v prly-prly srted, silty, angular-subrdd, calc.
Sltstn (10-20%): Med brush gray, ang, v sdy, mod hd, calc.
- 5220'-5250' Sd (50-60%): Clr-wht, fn-vcrse, vprly srted, subang-subrdd, 100% drlg reg.
SS (30-40%): Med grysh brn, vfn-crse, ang, tr glauc/chlor, slty, v prly srted; occ well-sorted, med grn, calc, 5-10% vis. Ø.
Sltstn (10-20%): Med brnsh gry, org, v sdy, mod-hd, calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 5250'-5280' Sd (40-50%): Clr-wht, fn-vcrse, prly srted, subang-subrdd, tr volc frags, 100% as drlg resdl.
- Sltstn (20-30%): Med gry, arg, v sdy-sdy, mod hd, calc.
- Mudstn (20%): Med grysh brn-med brn, slty, v sdy, mod-sl hd, calc.
- SS (10%): Med grysh brn, v fn-crse anglr-subrdd, arg, slty, calc.
- 5280'-5310' Sltstn (50%): Med gry brn, arg, occ sdy, mod sft-mod hd, sl calc-calc, occ mica.
- Mudstn (30-40%): Med gry brn, slty- v slty mod sft - mod hd, sl sdy, pyritic.
- Sd (10-20%): Clr wht, fn-vcrse, subanglr-subrd, prly srted, 100% as drlg resdl.
- 5310'-5330' Mudstn (60%): Med gry grn, slty, mod soft, non-calc, pyritic.
- Sltstn (30%): Med gry brn, arg, occ sl sdy, non-calc.
- Sd (10%): clr-wht, fn-crse, v prly srted, subang-subrd 100% as drlg resdl.
- 5330'-5350' Mudstn/Clay (70-80%): Med brnsh gry-med dk gry, sl slty, sticky, mod sft, smooth, sl soluble.
- SD (10-20%): Clr, med lt gry, and med dk gry, occ brnsh yell, vfn-vcrse, poorly srted, angular-rdd, tr pyrite frags (occ massive, cubic xln, med sd size), occ lithic frags, 100% as drlg resdl.
- SS (Tr-10%): Med brnsh gry, fn-med, mod srted, subanglr-subrdd argil, calcite-cmtd, tr mafics(?), cut absent.
- 5350'-5370' Mudstn (40-60%): Med to lt dk gry, sl slty, mod sft, soluble, not abundant in sample, calc.
- SS (30-50%): Lt brnsh gry - med dk gry, fn-med, v ang-subanglr, argil sl-v calc, dom qtz, occ lithic frags, poorly mod srted, cut absent.
- Sd (10%): Vfn-vcrse, v poorly srted, clr-wht, occ med gry, subanglr-subrdd tr pyr frags, poss slough, 100% as drlg resdl.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 5370'-5390' SS (90%): Vlt med gry - med lt grysh brn, vfn-med, mod srt'd, sl arg. cemented tightly w/calcite, rare glauc, anglr-subrdd, = 10% dk-colored gns.
Mudstn (10%) Lt dk gry, mod sft, soluble, slty, calc.
- 5390'-5410' SS (40-50%): Lt med brn, fn-med, slty, sl arg, calc, prly-mod srt'd, subanglr-subrdd.
Sd (40%): Lt med brn-med gry, fn-med, slty-sl org, calc, prly-mod siltd, subanglr-subrdd.
Sd (30%): Clr-vlt brn, fn-med, occ crse, mod-prly srt'd, subang-subrd, 100% as drly resdl.
Mudstn (10-20%): Med brn, slty, ady, modified calc.
- 5430'-5450' SS (40%): Lt med brn-med gry, fn-med, mod-prly srt'd, subang-subrdd slty, calc.
Mudstn (30-40%): Med brn, slty, mod slty calc.
Sd (20-30%): clr-vlt brn, fn med, occ crse, mod-prly srt'd, subanglr-subrdd, 100% as drlg resdl com pyr frags.
- 5450'-5470' Mudstn (60%): Dk med gry, sl sticky, mod sft-mod frm,
SS (30-40%): Vfn-med, med gry, prly-mod srt'd calc, subang-subrdd, occ micropyrritic, slty, arg.
Sd (Tr-19%): Vfn-med, occ crse, clr-v lt brn, tr-comm pyrite frags, prly-mod srt'd, subang-subrd.
- 5470'-5490' Mudstn (60%): Dk med gry, mod sft, calc, sl stky, occ mod frm.
SS (30-40%): Vfn-med med gry, prly-mod srt'd, subang-subrdd, occ microptr, slty, ang, calc.
Sd (Tr-10%): Vfn-med, occ crse, clr-v lt brn, tr-comm pyrite frags, prly-mod srt'd, subang-subrdd.
- 5490'-5490' SS (40-50%): Vfn-med, med gry, prly-mod srt'd, subang-subrdd, occ micropyritic, glauc(?), calc.
Sd (30-40%): Fn-crse, clr-v lt brn, tr-comm pyrite frags, prly-rwd srt'd, subang-subrdd.
Mudstn (20%): Dk med grysh brn, mod sft, soluble, calc, (and washing out, not represented well in sample).

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 5510'-5530' Sd (50%): Fn-vcrse, clr-wht, subang-subrdd, prly srted, calc, tr pyrite frags.
SS (40%): Vfn-med, med lt gry, prly-mod srted, subanglr-subrdd calc, sl ang.
Mudstn (10%): Med grysh brn, mod sft, sub, calc.
- 5530'-5550' SS (70-80%): Fn-med, occ crse, med lt gry, prly-mod srted, subanglr-subrdd sl arg-arg, calc.
Sd (10-20%): Fn-vcrse, v prly srted, clr-wht, subanglr-subrdd, dome qtz, tr pyrite frags,
Mudstn (10%): Med grysh brn, bpd sft. sol, calc.
- 5550'-5570' SS (70%): Fn-med, dk med gry, arg-vang, slty, v prly srted, subanglr-subrdd, calc, micropyrritic.
SD (10-20%): Fn - v crse v prly srted clr-wht, subanglr-subrdd, dom qtz, tr-comm pyr frags, 100% as drlg resdl.
Mudstn (10-20%): Med gry, sdy, slty, mod sft, calc.
- 5570'-5590' SS (50-60%): Lt med gry, fn-med, occ crse, prly srted, sl ang, suganglr-subrdd, tr pyrite frags, calc.
Sd (20-30%): Vfn-vcrse, v prly srted, clr-wht, subanglr-subrdd dom qtz, tr pyrite frags, 100% as drlg resdl.
Mudstn (10-20⁹%): Med brush gry, sdy, slty, mod slt, drlg resdl.
- 5590'-5630' SS (40-50%): Med med gry, vfn-med, arg, shy, prly srted, subang-subrdd calc.
Mudstn (30-40%): Med grysh brn, var sdy & slty, sl sol, mod sft, sl calc.
Sd (10-20%): Fn-crse, occ vcrse, clr-vlt brn, ptly sortd, subang-subrdd, tr pyrite frags, 100% as drlg reslts.
- 5630'-5650' Mudstn (50-60%): Med gry, mod sft, sdy, shly.
Sd (20-30%): Fn-crse, occ v crse, clr-sht, prly srted, tr pyr frags.
SS (10-20%): Fn-crse, occ vcrse, med med gry, prly srted, subang-subrdd calc, arg. sl slty.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 5650'-5670' SS (40-50%): Fn-med, med med gry, slty, avg, calc, subanglr-subrdd, v prly srted.
- SD (40-50%): Fn-crse, clr-wht, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
- Mudstn (10-20%): Med dk gry, mod sft, slty, sl calc.
- 5670'-5690' SS (40%): Med med gry, fn-med, slty, sl avg, calc, subang-subrdd, v prly srted.
- Sd (40%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, 100% as drly gesdl.
- Mudstn (20%): Med dk gry, mod sft, slty, sl calc.
- 5690'-5710' Sd (60%): Cl-wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, mica 100% as drlg resdl.
- SS (40%): Med lt gry, fn-med, mod-prly srted, subang-subrdd, sl ang. calc.
- 5710'-5730' Sd (40-50%): Clr-wht, fn-crse, prly srted, subang-subrdd tr pyrite frags, mica, 100% as drly ges.
- SS (30-40%): Med med gry fn-med, avg, prly srted, slty, subang-subrdd, calc.
- 5730'-5750' Sd (40%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, mica, 100% as drlg resdl.
- Mudstn (30-40%): Med brnsh gry, mod sft slty, non-calc.
- SS (20-30%): Med grysh brn avg, slty, fn-med occ crse, tr pyrite frags, calcite-cmted.
- 5750'-5770' Sd (40%): Clr-wht, fn-crse, prly srted, subanglr-subrdd, tr-comm pyrite frags, mica, 100% as drlg resdl.
- Mudstn (20-30%): Med brnsh gry, mod sft, slt, non-calc.
- SS (30-40%): Med gry brn, arg, slty, fn-med, tr pyrite frags, calc.
- 5770'-5790' SS (50%): Med gry brn, arg, slty, fn-med, occ crse, tr pyrite frags, calcite-cmted, prly srted, subang-subrdd.
- Sd (30-40%): Clr-wht, fn-crse prly srted, subanglr-subrdd tr-com pyrite frags, mica, 100% as drlg res.
- Mudstn (10-20%): Med gry brn, mod sft-mod frm, slty, non calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 5790'-5810' SS (70%): Med gry brn, fn-med, occ crse, prly srted, tr pyrite frags, subang-subrdd calcite cntd.
Sd (20%): Clr-wht, fn-crse, prly srted, subanglr-subrdd, tr-comm pyrite frags, mica, 100% as drlg res.
Mudstn (10%): Med gry brn, slty, mod sft mod frm, non-calc.
- 5810'-5830' SS (50-60%): Med gry brn, arg, slty, fn-med, occ crse, prly srted, subang-subrdd, tr pyrite frags, calcite-cmt.
Sd (20-30%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr-comm pyrite frags, 100% as drlg resdl.
Mudstn (10%): Med gry brn, slty, mod sft-mod frm calc.
Dol Ls (Tr-10%): V lt brn, microcrystalline, sdy, glauc.
- 5830'-5850' SS (70-80%): Med gry brn arg, slty, fn-med, prly srted, tr pyrite frags, subang-subrdd calcite cmted.
Sd (10-20%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr-pyrite frags, 100% as drlg resdl.
Mudstn (Tr-10%): Med gry brn, mod stf-mod frm, alty, calc.
- 5850'-5870' SS (70-80%): Med gry brn, slty, arg, fn-med, prly srted, tr pyrite frags, subang-subrdd, calcite - cmted.
Sd (10-20%): Clr, occ wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
Mudstn (Tr-10%): Med gry brn, slty mod sft, sl calc-noncalc.
- 5870'-5890' SS (70-80%): Lt med gry brn, sl. arg, slty, fn-med, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg res.
Sd (20-30%): Clr-wht fn-crse, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
- 5890'-5910' SS (80%): Lt med gry brn, slty, sl. avg, fn-med, prly srted, busang-subrdd, tr pyrite frags, calc-cmted.
Sd (20%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
- 5910'-5930' SS (80%): Lt med gry, sl slty, sl avg, fn-med, occ crse, prly srted, subang-subrdd, calcite cmet.
Sd (20%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 5930'-5950' SS (79%): Med lt gry, vfn-med, occ crse, slty, prly srted, tr pyrite frags, tr glauc, subang-subrdd, calcite cmt.
Sd (20%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, mica, 100% as drlg resdl.
- 5950'-5970' SS (70%): Med lt gry, vfn-med, occ crse, prly srted, subang-subrdd, silty-v silty, avg, calcite cmted.
Sd (10-20%): Clr wht, fn-crse, prly srted, subanglr-subrdd, tr pyrite frags, 100% as drlg resdl.
Mudstn (10-20%): Med brn, slty, occ v sdy, mod frm, sticky, non-calc.
- 5970'-5990' SS (80-90%): Lt med gry, vfn-med, slty, sl avg-avg v prly srted, subang-subrdd, tr pyrite frags, calc cmted.
Sd (10-20%): Clr-wht, fn-med, occ crse and v crse comm pyrite frags, poorly srted, subang, 100% as drlg resdl.
Mudstn (Tr): Med gry brn, mod sft-mod frm, sticky, non-calc.
- 5990'-6010' SS (80%): Lt-med med gry brn, fn-med, occ crse, prly srted, avg-v arg, subanglr-subrdd, tr pyrite frags, calcite-cmted, slty-sl slty.
Sd (10-20%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
Mudstn (Tr-10%): Med gry brn, sl-mod from sticky, non-calc.
- 6010'-6030' SS (70-80%): Lt-med med gry brn, fn-med, occ crse, prly srted, avg-v avg, slty, subang-subrdd, to pyrite frags, calcite-cmted.
Sd (10-20%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
Mudstn (Tr-10%): Med gry brn, mod sft-sl frm, sticky, non-calc.
- 6030'-6050' SS (70%): Med gry brn, avg, fn-med occ crse, prly srted, slty, subanglr-subrdd, tr pyrite frags, calcite cmted.
Sd (20%): Clr-wht, fn-crse, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
Mudstn (10%): Med gry brn, mod sft-sl frm, sticky, non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 6050-6070' SS (60%): Fn-med, occ crse, med gry, avg, slty prly srted, subang-subrdd, tr pyrite frags, calcite cmted.
- Sd (30%): Fn-crse clr-wht, prly sorted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
- Mudstn (10%): Med gry brn, mod frm, sticks, non-calc.
- 6070'-6090' SS (60-70%): Fn-med, med gry brn, avg, slty, subang-subrdd, prly srted tr pyrite frags, calcite-cmted.
- Sd (20-40%): Fn-crse clr-wht, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
- Mudstn (Tr-10%): Med gry brn, mod frm, sticky, non-calc.
- 6090'-6110' SS (70%): Med gry, avg-v avg, slty, vfn-med, prly srted, subang-subrdd v calc.
- Sd (10-20%): Clr-wht, fn-crse, v prly srted, subang-subrdd tr pyrite frags, 100% as drlg resdl.
- Mudstn (10-20%): Med gry brn, silty, mud soft-mud frm, non-calc.
- 6110'-6130' SS (70%): Med gry, avg - v avg, slty, vfn-med, prtly srted, subanglr-subrdd, v calc.
- Mudstn (10-10%): Dk med gry brn, slty, mod sft-mod frm, sl calc.
- Sd (10-20%): Clr-wht, fn-med, prly srted, subang-subrdd, tr pyrite frags, 100% as drlg resdl.
- 6130'-6150' SS (40%): Lt-med gry, avg, slty, vfn-med prly srted, subanglr-subrdd, v calc.
- Sd (20-30%): Clr-v lt brn, fn-med, occ crse, prly srted subang-subrdd 100% as drlg resdl.
- Mudstn (30-40%): Med dk gry-dk grysh brn, v sft-mod sft slty, non calc.
- 6150'-6170' Mudstn (40-50%): Dk med gry, v sft, v slty, sdy-v sdy, non-calc.
- SS (30-40%): Lt grysh brn, vfn-med, prly srted, subang-subrdd avg, slty, v calc.
- Sltstn (10-20%): Med dk grysh bn, avg, ady (vfn-fn) mod sft-mod hd, calc,

(Cape Sorell No. 1 Sample Descriptins Cont'd)

6170'-6190' Mudstn (50%): Lt brn gry, mod sft, v sdy, v slty, non-calc.

SS (30-40%): Lt grysh brn, vfn-med pxy srted, arg. slty- v slty, v calc.

Sltstn (10-20%): Dk grysh brn, mod sft-mod hd, calc, org, sdy (vfn-fn), micaceous.

6190'-6210' Sltstn (40-50%): Med dk grysh brn, avg, sdy, mod sft-mod frm calc, mica.

SS (20-30%): Lt med gry-dk med gry, avg, slty, vfn-med prly srted, subang-subrdd, calcite-cmted.

Mudstn (20-39%): Med grysh brn, slty, sl sdy, mod sft, sl calc-calc.

6210'-6230' Sltstn (60-70%): Med dk grysh brn, arg, sdy, mod sft-mod frm, calc, micra.

Mudstn (20-30%): Med grysh brn, slty, sl sdy, mod sft, sl calc-calc.

SS (10%): Lt med gry, sl arg, slty, vfn-med prly srted, subang-subrdd calc-v calc.

6230'-6250' Sltstn (60-70%): Med dk grysh brn, arg sl sdy, mod sft-mod frm, calc, micaceous.

Mudstn (20-30%): Med grysh brn, slty, sl sdy, mod sft, calc-sl calc.

SS (10%): Lt med gry, slty, vfn-med, prly srted, subanglr-subrdd, calc-v calc.

6250'-6270' Sltstn (70%): Med dk gry, arg-v arg, sl sdy, mod sft-mod frm, mica, non-calc.

Mudstn (20-30%): Dk med gry, slty, sl sdy, mod sft, non calc.

SS (Tr-10%): Lt-med grysh brn, vfn-med, prly srted, slty, subang-subrdd calc.

6270'-6290' Sltstn (70-80%): Med dk gry, arg, sl sdy-sdy, mod sft-mod frm, mica, sl calc.

SS (20-30%): Fn-med, anglr-subrdd, clr-lt gry, mod srted, calcite-cmted, no visual porosity.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 6290'-6310' Siltstn (80-90%): Med dk gry brn, arg, ady, mod sft-mod frm, mica, calc.
- SS (10-20%): Clr/v lt med gry, slty, occ ang, vfn-med, prly-mod srted, tr coal frags, calcite cmt (1-2 mm & loose).
- 6310'-6330' Sltstn (80%): Med dk gry, mod sft-mod frm, arg, ady (vfn-fn), calc, mica.
- SS (20%): Vfn-med, occ crse, med lt grysh brn-med dk grysh brn, v prly-prly srted, subanglr, calc cmt, arg, slty.
- 6330'-6350' Sltstn (60%): Dk med grysh brn, avg, sdy, mod sft-mod frm, calc, sl mica.
- SS (40%): Fn-med, lt med gry, sl arg, mod srted, subanglr, tr lithic frags incldg fn grnd SS, ls(?), sandy mudstn(?), calcite-cmted.
- 6359'-6370' Sd/SS (80-90%): Vfn-crse, clr/white and translucent, prly-mod srted, anglr-subrdd, occ grns have reddish pink to med lt gry, Fe-oxide stain, calcite-cmted; tr pyrite frags, tr v dk gry lithic frags (sl pyritic) that could be either v hd mudstn or mafic volc frags.
- Sltstn (10-20%): A/a, probably as slough as deduced from corrected drilling exponents of 1.01-1.22
- 6370'-6390' Sd/SS (80-90%): Med lt gry/Clr/white, vfn-med, mod srted-mod well rtd, subanglr-subrdd, tr lithic frags, tr pyrite frags, calcite-cmted.
- 6390'-6410' Sd/SS (80%): Clr/med lt gry, occ wht, mod srted, vfn-med, occ crse, subanglr-subrdd, tr lithic frags incl pyrite, calc.
- Sltstn (10-20%): Dk med gry, arg, sdy, mod sft-mod frm, calc.
- 6410'-6430' SS (90-100%): Med lt gry, fn-med, occ crse, prly srted, subanglr-subrdd, calcite cmted.
- Sltstn (Tr-10%): Med gry brn, mod frm, sdy, arg, calc.
- 6430'-6450' SS (90%): Med lt gry, f-med, occ crse, prly srted, subanglr-subrdd, tr lithic frags, calcite cmt.
- 6450'-6470' SS (90-100%): Med lt gry, f-med, occ crse, prly srted, subanglr-subrdd, tr lithic frags, calcite cmt.
- Sltstn (Tr-10%): Dk med grysh brn, sdy, arg, mod frm, calc, mic.

(Cape Sorell No. 1 Sample Descriptins Cont'd)

- 6470'-6490' SS (90%): Med lt gry, f-med, occ crse, prly srted, subanglr-subrdd, calcite cmt, tr lithic.
Sltstn (10%): Dk med gry, mod frm, sdy, calc, mic, arg.
- 6590'-6510' SS (80%): Med lt gry, fn-med, occ crse, prly srted, sl arg, sl slty, tr lithic frags, calcite cmt.
Sltstn (20%): Dk to med gry-brn, ady, arg, mod frm, calc.
- 6510'-6530' SS (80-90%): Med lt gry, fn-med, occ crse, prly srted, sl arg, sl slty, tr lithic frags, calcite cmt.
Sltstn (10-20%): Dk med gry brn, sdy, arg, mod frm calc.
- 6530'-6550' SS (80-90%): Med lt gry, fn-med, occ crse, prly srted, sl arg, sl slty, tr lithic frags, calcite-cmt.
Sltstn (10-20%): Dk med gry bn, sdy, org, mod form, calc.
- 6550'-6570' SS (80%): Med lt gry, fn-med, occ crse, prly sctd, subang-subrdd, sl slty, sl ang, tr lithic frags, calcite cmt.
Sltstn (20%): Dk med brown, sdy, ang mod fm, calc.
- 6570'-6590' SS (90%): Med lt gry, fn-med, occ crse, prly srted, surang-subrdd, sl arg, tr lithic frags, calcite cmt.
Sltstn (20%): Dk med brn, arg, sdy, mod frm, calc.
- 6590-6610' SS (90%): Med lt gry, fn-med, tr crse, prly srted, subanglr-subrdd, tr lithic frags, calcite cmt.
Sltstn (10%): Dk med brn arg sdy, mod frm, sl calc-calc.
- 6610'-6630' SS (90-100%): Med lt gry, fn-med, tr crse, prly srted, subanglur-subrdd, tr lithic frags, calcite cmt.
Sltstn (Tr-10%): Dk med brn, arg, mod srm, sl calc-calc.
- 6630'-6650' SS (90-100%): Med lt gry, prly srted, fn-med, tr cse subang-subrdd, tr lithic frags, calcite cmt.
Sltstn (Tr010%): Dk md brn arg mod frm w/sdy, calc.
- 6650'-6670' SS (90-100%): Lt med gry, fn-med, tr crse, prly srted, subang-subrdd, tr lithic frags, tr kaolinite, calc.
Sltstn (Tr-10%): Dk med brn, arg, mod frm, calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 6670'-6690' SS (90-100%): Lt med gry-lt med grnsh gry, fn-med, tr crse, prly srted, subang-subrdd, tr lithic frags, calc, tr kool.
Sltstn (Tr-10%): Dk med brn, arg, mod frm, sl sdy, calc.
(Cape Sorell No. 1 Sample Descriptions Cont'd)
- 6690'-6710' SS (90-100%): Lt med grnsh gry-lt med gry, fn-med, tr crse, prly srted, tr koolin, chlorite(?)-green clay, sl calc.
Sltstn (Tr-10%): Med med brn, mod frm, arg, sl calc, sl calc.
- 6710'-6730' SS (100%): Med lt grnsh gry, fr-med, tr case, prly srted, subang-subrdd, tr lithic frags, tr koolinite, chlorite(?).
- 6730'-6750' SS (90%): Fn-med, tr crse, med lt grnsh gry, prly srted, subang-subrdd, tr lithic frags, tr koolin, chlorite(?).
Sltstn (10%): Med brn, mod frm, arg, sl sdy, sl calc.
- 6750'-6770' SS (100%): Fn-crse; tr v crse, granules; med lt grnsh gry-med lt grysh grn, prly srted, subanglr-subrdd, tr lithic frags, tr kaolin, tr chlorite(?).
- 6770'-6790' SS (90%): Fn-crse, tr v crse/granules, med lt grnsh gry, prly srted, subanglr-subrdd tr lithic frags, tr kaolin, tr cheorite(?).
Sltstn (10%): Med brn, ang, mod frm sl calc, sl sdy.
- 6790'-6810' SS (90-100%): Med lt grnsh-gry, fn-crse, tr v crse/gran, prly srted, subanglr-subrdd tr lithic frags, tr kaolin, tr chlorite(?).
Sltstn (Tr-10%): Med med brn-med lt grnsh brn, mod frm, tr kaolin, sl calc-calc.
- 6810'-6830' SS (90-100%): Med lt grnsh gry, fn-crse, tr crse/gran, subang-rdd, granules occ rdd, white qtz 3mm in diameter and broken, v prly srted, tr kaolin chlor(?).
Sltstn (Tr-10%): Dk med brn, sl sdy, mod frm, arg calc.
- 6830'-6850' SS (100%): Clr med lt grnsh gry, fn-crse, tr v crse, tr-comm kaolin, tr chlorite(?), tr lithic frags, v prly srted.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

6850'-6870' SS (90%): Med lt gry, vfn-crse, tr v crse/gran/peb, v prly rtd, subanglr-subrdd, to lithic frags includ. Sialic volc frags up to 5x9mm in size (pebble), prob. Cambrian volcanics (exposed in W. Tasmania). tr-comm kaolin, tr chlor(?).

Sltstn (10%): Med lt grnsh gry-med med brn, mod sft-mod frm, sdy, v. arg, calc.

NOTE: Suspected that green aphanitic lithic frags are frags of Jurassic dolerite-type rock exposed in Tasmania and same rock may provide bulk of chlorite(?).

6870'-6890' SS (100%): Fn-med, tr crse/v crse (poss slough), comm kaolin, sl calc, med lt gry-med lt grnsh gry, tr chlor(?), subanglr-subrdd tr lithic frags incl dk gry shale.

6890'-6910' SS (90-100%): Fn-med, tr crse/v crse, tr-comm kaolin, med lt gry-med lt grnsh gry; tr lithic frags including green aphanitic frags (volc/plnt?) having a sucrosic texture under high magnification; also persistently since about 6400' RKB red/pink/orange quartzite (PE?); tr kaolin, tr chlor(?), sl calc.

Sltstn (Tr-10%): Dk med brn, v sdy, mod frm, mica, arg, calc.

6910'-6930' SS (100%): Med lt gry, med lt grnsh gry, fn-med, tr crse/v crse, v prly srted, tr lithic frags, tr-comm kaolin, sl calc, tr chlor(?).

6930'-6950' SS (80-90%): Lt med gry-med lt grnsh gry, vfn-med, tr crse/v crse, v prly srted, tr lithic frags, subanglr-subrdd, tr-common kaolin, sl calc, tr chlorite (?).

Sltstn (10-20%): Dk med gry brown, arg, mod frm, calc, sdy.

6950'-6970' SS (60-70%): Lt med gry-med lt grnsh gry, vfn-med, tr crse/v crse, tr lithic frags, anglr-subrdd, tr kaolin, tr chlorite(?).

Sltstn (30-40%): Med dk grysh brn, arg, sdy, mod frm, calc, mica.

6970'-6990' SS (70-80%): Lt lt gry-med lt grnsh gry. fn-crse, prly srted, anglr-subrdd, tr lithic frags, sl slty, tr kaolin, tr chlorite(?).

Sltstn (20-30%): Med dk gry-brn, mod frm, sdy, mica, calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 6990'-7010' SS (90-100%): Lt med gry-med lt grnsh gry, fn-crse, prly srted, anglr-subrdd, tr lithic frags including increasing reddish-pink quartzite and mafic volcanics (v dk gry/vdk dk gry), tr kaolin, tr chlor(?).
Sltstn (Tr-10%): Dk med grnsh gry, ady, arg, mod frm calc., calc.
- 7010'-7030' SS (80-90%): Fn-crse, lt med gry-lt med grnsh gry, prly srted, anglr-subrdd, tr lithic frags, tr kaolin tr chlor(?), calc.
Sltstn (10-20%): Dk med brn, sdy, arg, mod frm, mica, calc.
- 7030'-7050' SS (80%): Lt med gry-lt med grnsh gry, fn-crse, prly srted, anglr-subrdd, tr lithic frags, tr kaolin, chlor(?), calc.
Sltstn (20%): Dk med brn, sdy, arg, mod frm, calc, mica.
- 7050'-7070' SS (90%): Lt med gry-lt med grnsh gry, fn-crse, occ v crse, v prly srted, anglr-subrdd, tr lithic frags, tr kaolin, tr chlor(?) calc.
Sltstn (10%): Dk med brn, sdy, arg, mod frm, calc, mica.
- 7070'-7090' SS (90%): Lt med gry-lt med grnsh gry, fn-crse, occ v crse, v prly srted, anglr-subrdd, tr lithic frags, tr kaolin, tr chlor(?), calc.
Sltstn (10%): Dk med brn, sdy, org, mod frm, calc, mica.
- 7090'-7110' SS (90-100): Lt med gry-med lt grnsh gry, fn-crse, v prly srted, occ v crse, anglr-subrdd, tr lithic frags, tr kaolin, chlor(?), calc.
Sltstn (Tr-10%): Dk med brn, sdy, arg, mod frm, calc, mica.
- 7110'-7130' SS (100%): Fn-crse, med lt gry-med lt grnsh gry, occ crse, tr lithic frags, v prly srted, tr kaolin, chlor(?), calc.
- 7130'-7150' SS (100%): Lt med gry - lt med grnsh gry, fn-crse, occ verse, v prly srted, tr lithic frags, tr kaolin, chlor(?), calc.

NOTE: All of the sandstones below, unless otherwise noted, have between 5% and 15% lithic fragments as framework grains. These lithic fragments are confined to reddish-pink quartzite, v dk gry mafic volcanics, pyrite encasing, Sd grains and occ mod hd, v dk gry shale.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 7150'-7210' SS (90-100%): Lt med gry-lt med grnsh gry, fn-crse, occ v crse, v prly srted, surbnglr-subrdd, tr kaolin, chlor(?), calc.
Sltstn (Tr-10%): Dk med brn, sdy, arg, mod frm, calc, mica.
- 7210'-7230' SS (80%): Lt med grnsh gry-gry, vfn-crse, tr v crse, v prly srted, anglr-subrdd, tr kaolin chlor(?), calc.
Sltstn (20%): Dk med brn, mod frm, sl sdy, arg, mica, sl calc-calc.
- 7230'-7270' SS (70-80%): Lt med grnsh gry, gry, fn-crse, tr v crse, v prly srted, anglr-subrdd, tr kaolin, chlorite(?), calc.
Sltstn (20-30%): Dk med brn, mod frm, s/sdy, arg, calc.
- 7270'-7310' SS (90%): Lt med grnsh gry-gry, fn-crse, tr v crse, v prly srted, anglr-subrdd, tr kaolin, chlorite(?), calc.
Sltstn (10%): Dk med brn, arg, sdy, mod frm, calc.
- 7310'-7450' SS (90-100%): Lt med gry-grnsh gry, fn-crse, tr v crse, v prly srted, anglr-subrdd fr kolin, chlorite(?), calc.
Sltstn (Tr-10%): Dk med brn, mod frm, sdy, arg, mica.
- 7450'-7990' SS (90-100%): Lt med grnsh gry, fr-crse, tr v crse, b prly srted, ang-subrdd, tr kaolin, chlorite(?), calc.
Sltstn (Tr-10%): Dk med brn, sdy, arg, mica, mod frm, calc.
NOTE: Sandstones are remarkably similar.
- 7990'-8290' SS (90-100%): Lt med grnsh gry-gry-gry, fn-crse, tr v crse, anglr-subrdd, tr kaolin, tr chlorite, calc.
- 8290'-8750' SS (90-100%): Med lt grnsh gry-gry, fn-crse, tr v crse, v poorly srted, anglr-subrdd, tr kaolin, tr chlor(?), calc.
Sltstn (Tr-10%): Dk med brn, mod frm, arg, sdy, mica, calc.
- 8750'-8790' SS (70-80%): Lt med gry-grnsh-gry, fn-crse, tr v crse anglr-subrdd, sl arg, tr kaolin, tr chlorite(?), calc.
Sltstn (20-30%): Dk med brn, sdy, org, mod frm, mic, calc.
- 8790'-8870' SS (80-90%): Lt med gry-grnsh gry, fm-crse, tr v crse, anglr-subrdd, sl ang, tr kaolin, chlor(?), calc.
Sltstn (10-20%): Dk med brn, mod frm, sdy, org, mica, calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 8870'-8930' SS (90-100%): Lt med gry-grnsh gry, fn-crse, tr v crse, v prly srted, anglr-subrdd, tr kaolin, chlor(?), calc.
- Sltstn (Tr010%): Dk med gry, mod frm, sdy, arg, mic, calc.
- 8930'-8970' SS (80-90%): Lt med grnsh-gry-gry, fn-crse, tr v crse, anglr-subrdd, v prly srted, tr kaolin, chlor(?), calc.
- 8970'-8990' SS (60-70%): Lt med gry, to grnsh-gry, vfn-crse, fr v crse, tr yellow, wht, med gry qtz, anglr-subrdd, v prly srted, tr-common kaolin, tr chlor(?), calc, sl slty.
- Sltstn (30-40%): Dk med grysh brn, arg-v arg, sl sdy, mod frm calc.
- 8990'-9032' SS (80-80%): Lt med grnsh gry-gry, vfn-crse, tr v crse, v prly srted, sl arg, sl slty, tr kaolin, tr chlor, anglr-subrdd, tr yellow, wht qtz, calc.
- Sltstn (10-20%): Dk med brn, mod frm, sdy, arg, mica, calc.

9032'-9370'

- 9032'-9070' Sd (100%): Fn-v/cse, dom med to cae; dom ang w/v/abund sharp and gd tr sub-rnd to rnd; mega, "salt and pepper" med gry w/red-brn frags abund (wet); micro, multi-colored w/dom (55%) frsted to wht w/minor clr to vitreous qtz and feldsp
- 9050'-5070' subordinated by lt-med grn chloritic frags; dk grn to
- 9070'-9090' grysh-blk and micro-pyritized glauc(?) frags; variably
- 9110'-9130' grysh-silver to silver-grn to silver sericite schist frags;
- 9130'-9150' tr dk grn serpentine (?) frags; qtz of gry, grnsh, purplish,
- 9150'-9170' orange, reddish, reddish-brn, olive-grns (edidote?) ylws, dk
- 9170'-9190' rd (sharp, conchoidal chalcedony); tr v/dk red jasper; tr
- 9190'-9210' ylw-grn olive; v/abund blk mafic frags as apparent basalt;
- 9210'-9230' red-brn basalt frags, varying to dk grnsh-red; lt red,
- 9230'-9250' aphanitic, rnded rlt grains (aplite?); tr blk augite;
- 9250'-9270' feldspars varying from clr, vitreous sanidine to frsted,
- 9270'-9290' whts, grys, orange (as approx 25% of sample); tr purple
- 9290'-9310' clystn as a volcanics(?); tr brnsh-tan, mod hydrated, mod
- 9310'-9330' firm; non-calc clystn as apparent nodules;
- 9330'-9350' Colloquially: Arkosic Sandsonte) 100% as unconsolidated
- 9350'-9370' drlg residual).
- Note: Interval conglomeratic w/v/abund frags of qtz-mica schist, chlorite-sericite schist, acid volcanics and quartzites; free mica as v/slight tr (mus, bi).

(Cape Sorrell No. 1 Sample Descriptions Cont'd)

9370'-9390' Conglomerate, Conglomeratic Sandstones and Sandstone (100%):
 9390'-9410' Sandstone fn-cse, dom med-cae; dom ang w/minor sub-ang abund
 9410'-9430' sharp tr sub-rnd; multi-colored w/dom clr to frated qtz
 9430'-9450' feldsp and minor variably lt to dk grn, chloritic grains, dk
 9450'-9490' gry, lt-dk gry-grn, chloritic grains
 9490'-9510' dk gry, lt-dk grn, silver, reddish-blk,
 9410'-9530' blk, brnsh-blk, lt-med dk brn, lt tan, reddish-purple, olive
 9430'-9550' grn; grains rk frags dom v/fresh; tr vitreous sanidine; tr
 9550'-9570' micro-pyrite aggregates; v/hd; highly fri; variable tr calc;
 9570'-9590' abund wht and gry-wht kaolin; general sorting v/poor w/finer
 9590'-9610' grades mod well-sorted to mod poor sorting; 80% as unconsol
 9610'-9630' drlg. resid. Conglomerate
 9630'-9650' and Conglomeratic Sandstone fn-v/cse to broken pebbly (and
 9650'-9670' suspected larger); very poorly sorted; sharp to angular
 9670'-9590' w/minor sub-ang to sub-rnd mineral and frags of rks;
 9690'-9710' variably abund sharp to splintery wht, milky, fistd and
 9710'-9730' variably translucent to clr vein-type qtz frags; tr rnd dom
 9730'-9750' chalcedony as broken, cse grains; v/fresh, multi-colored
 9750'-9770' mineral and rlt frags of qtz-chlorite-mica (sericite)
 9770'-9790' schists, acid volcanics, abund quartzites and occas breccia
 9790'-9810' frags; variable tr micro-pyritized clastic (?) vitrain-type
 9810'-9830' coal frags; tr dk aphanitic frags; variably abund wht and
 9830'-9850' gry-wht (slicked) kaolin; variably abund wht and gry-wht
 9850'-9870' (slicked) kaolin; tr micro-pyrite aggregrs, occas w/rnd, clr
 9870'-9890' to gry-frosted qtz; abund grns, gry, whts, brns, reds,
 9890'-9910' purples, ylws, or, olive-grns, brnsh-blks, blks and
 9910'-9930' vitreous, clr, fistd grains and frags; occas tr lt-med tan,
 9930'-9950' sucrosic to micritic dolo ls and calcitic dolo frags; tr
 9950'-9970' lt-med brnsh-tan, mod hd, non-calc clystn frags; abund
 9970'-9990' fn-med, wht to variably transparent qtizitic ss frags, occas
 9990'-10010' w/grnsh chlorite from 9887' to 19,055'; tr-abund dk brn,
 10010'-10030' v/clyey; mod hd; mod fis, non-calc shly claystn from 10,090'
 10030'-10050' to 10,130'.
 10070'-10090'
 10090'-10110'
 10110'-10130'

10130'-10150' Claystn (T-10%): Med brn to med dk brn; v/soft; highly sol;
 10150'-10170' occas mod firm, poorly sol and shaley; non-calc; variably
 blk carbonaceous w/occas abund v/hd, v/btrl, brilliantly
 glossy, homogeneous

Coal w/conchoidal frac & sharp shaley clystn-boundaries - a
 vitrain - type coal in tr amts; abund med gry, sdy clystn.

Ss (50-100%): V/fn-v/cse; poorly sorted when cser and mod
 well sorted when vfn-fn; med hd; highly indurated w/silica
 cmt; highly Kaolinitic; dom ang qtz and foldsp w/abund
 variable grn chlorite(?); dom wht, varying from gry-wht to
 grnsh-wht; non-calc; 90% as unconsolidated drlg resid.

Cgl. (Tr-50%): Suspected as slough, but w/incr qtzite
 count.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10170'-10190' Conglomerate and Conglomeratic Sandstn (80-100%):
10190'-10210' Vfine-v/cse; multi-coloration characterized by dom milky-wht
10210'-10230' splintery qtz and variably grn, gry-grn and brnsh grn, w/med
to dk grn dom as chloritic schist frags; abund dk grn and
grysh-blk basalt frags and abund gry to gry-brn qtzite frags
w/gd tr tan to gry, ashy tuff frags; tr free splintery pink
qtz frags; abund wht and gry-wht free kaolin; tr-abund
micro-pyrite aggregates.

Clystn (Tr-10%): Probable slough of med dk brn to dk brn to
brnsh-blk; mod soft to mod hd; occas varying to sub-fis
shaley; v/cley; non-calc; variably blk carbonaceous.

Coal (Tr): Blk vitrian as apparent slough.

Sd & Sandstn (10-20%): Vfn-med, mod well sort as vfn-fn and
poorly sort as cser; v/hd; highly friable (as ss); tr calc
(as ss) w/abund kaolin to non-calc and "welded" siliceous,
colors gry-wht to gry-grn and clr, frsted and wht,
respectively, 80% as unconsolidated drlg resid.

10230'-10250' Claystn (20-40%): Dk brn w/minor med dk brn and tr med lt
10250'-10270' brn w/dker brn varves; mod soft to minor mod hd, sub-fis
shaley; non-calc; abund frags w/blk carbonaceous beds, dom
planar w/v/minor scattered crenulated.

Conglomeratic Sandstn and Sandstn (60-80%): Cont'd micro and
vfn macro frags of qtz-chlorite-mica schists, acid
volcanics, qtzites and splintery vein-type qtz: ss
vfn-v/cse; poor sort; vhd; highly fri; gry-grn to gry-wht;
tr calc; ang to sub-ang dom qtz and feldsp.

10280' Spot Sand (100%): Fn-med; com sharp to ang grains w/approx. 5%
sharp ss frags; com frsted w/monor frsted wht and wht
w/abund clr; dom qtz w/subordinate feldsp of albite-twinned
microcline in abundance; occas tr cse, sub-rnd, frsted qtz
grains; tr lt-med grn chloritic grains and qtz grain
coloration; gd tr wht & gry-wht (slicks) kaolin; tr qtz
veinlet frags; sorting mod poor; ss frags v/hd. and highly
fri; 95% as unconsolidated drlg. resid; tr micro-pyrite
aggregates.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10285' Spot SS (60-70%): Fn-cse; poorly-sorted w/surviving frags dom fn-grained; gry-wht "salt and pepper" ss frags w/v/abund sharp frags of "milky" qtz; micro-conglomeratic w/abund lt-med grn chloritic frags and grains, med gry, disseminated micro-pyritic chalcedony frags of conchoidal frac, abund mafic frags and grains (hb?), abund micro-pyrite dissemination in qtz grains and frags w/micro-pyrite "painting" on veinlet-type qtz; abund aggregates of micro-pyrite; abund qtzite frags, vitrain of high gloss.

Clystn (30-40%): Med dk to dk brn; mod soft, sol; blk carbonaceous; shaley; non-calc.

10285'-10290' Sd (80%): Fn-med w/abund cse; dom ang w/minor sub-rnd qtz and feldsp (orthoclase and microcline); mod poor sorting; abund chloritic grains and frags; tr micro-pyrite aggregates; grains frsted, frsted-wht to wht; tr clr vein qtz; abund wht and gry-wht, slickensided kaolin; tr mafics and micro-pyritized qtzite frags; 80% as unconsolidated drlg resid w/ss frags gry-wht; dom fn-grained; v/hd to mod hd; highly friable; non-calc.

Sh (20%): Med dk brn; mod soft; mod fis; v/clyey; blk carbonaceous; non-calc; tr varying to "shaley" mudstn equiv.

10290'-10320' Ss (80%): Gry-wht to grnsh-gry; vfn-med w/tr cse, sharp, milky-wht vein qtz; mod hd; highly fri; non-calc; dom silica w/kaolin "dust"; v/abund free wht and gry-wht kaolin; abund micro-cgl frags of qtz schists and qtzites; ss frags abund "welded" qtzitic; abund micro-pyrite in qtz grains.

Sh (Tr-10%): Med brn to brnsh-blk; mod soft; poorly fis; variably clyey and silty; blk carbonaceous; non-calc; varying to shaley slitstn equiv.

Tuff (TR): Med gry; extremely hd and "welded", non-calc; minor med dk gry, mod soft; ashy and montmorillonitic w/mod hydration swelling; non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10310'-10330' Ss (40-60%): Vfn-med w/minor cse grains and sharp, milky qtz veinlet frags; mod poor sorting; dom ang w/v/minor sub-ang; qtz dom w/minor feldsp (dom microcline?); abund interstitial kaolin w/abund free wht and gry-wht" lickened" kaolin; v/abund micro-cgl frgs of highly dk grn chloritic qtz schist and variably gry qtzite frags; tr clr vein qtz/ abund micro-pyrite as dissem. and aggr: 50% as unconsolidated drlg resid.

Shale (20-40%): Med brn to med dk brn w/minor dk brnsh-blk; variably blk carbonaceous; mod soft; mod fis to minor highly fis w/tr curvilinear partings; non-calc; v/clayey to w/minor silty.

Siltstn (20%): Med gry-brn to med brn; med soft; occas sub-fis; v/clayey; non-calc.

10330'-10350' Sd (60%): Vfn-cse; poorly sorted; sharp to ang; abund qtz, feldsp (esp microcline), chlorite-qtz schist frags, qtzite frags; abund variably clr, frsted and milky wht qtz veinlet frags; abund free kaol (wht); tr free forams; tr micro-pyrite.

Sh (30%): Med brn to dk brn; v/clayey w/minor silty; mod to poorly fis dom w/tr highly fis; variably blk carbonaceous to abund highly bitumenous; non-calc.

Coal (Approx 5%): Brnsh-blk to blk, dull to semigloss fibrous bitumen w/minor v/glossy, v/hd; highly homogeneous, conchoidal frac coal as "vitrain".

Siltstn (Approx 40%): Med brn; v/soft; v/clayey; non-calc.

10350'-10360' Sd (80%): Vfn-med; ang w/minor sub-ang dom qtz w/minor feldsp grains; mod poor sort; highly micro-conglomeratic w/frags of qtz veinlets, qtz schists, chlorite schists, qtzites and rnded frags of dk grn volcanics (dom divine basalt).

Sh (20%): Med dk brn; mod hd; mod fis, abund silty; non-calc; blk carbonaceous w/vitrain, free as slough?

10360'-10367' Ss (50%): Vfn-fn w/minor med; grns-gry to grnsh gry-wht;
10367'-10370' and mod firm to firm; non-calc; cmt silica w/kaolin "dust"; abund grn, chloritic and dker mafic grains; sd equiv 50%; tr pyrite.

Claystn (50%): Dk brn; v/soft; highly sol; variably silty; non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 10370'-10380' Sh (60%): Dk brn; mod hd; mod fis; v/cltyey, varying to med dk gry-brn silty sh; all non-calc; dk brn sh variably blk carbonaceous, occas w/1-2 mm "vitrain" seams; tr micro-prytic when high in coal ("vitrain"); crush cut (as w/all argillaceous seds since 10090') med straw w/v/brt and intense, mod translucent fluor. (Tr free forams.)
- Ss (40%): Gry wht to grnsh-wht; fn-med; v/hd; highly fri; highly calcareous w/kaolin-impregnated sparry calcite cmt; sharp, dk gry qtz (chalcedony); clr, frsted and frsted-wht qtz and feldspars; abund rnded apparent mafic grains w/tr med grn chloritic grains; occas (tr to abund) micro-wht w/clr qtz and feldsp-grained ss frags having secondary silica outgrowths, giving a welded appearance; tr "welded" ss frags in grnsh-wht varieties; mod abund micro-dissem pyrite in qtz grains; drlg resid. of 40% unconsol.
- 10380'-10390' Ss (80%): Gry, grnsh-gry and grnsh gry-brn; vfn-fn; mod sorted; aub-ang to rnded grains of qtz, feldsp w/minor mafic frags and abund disseminated micro-pyrite; abund lt-med grnsh, chloritic grains and frags; 70% as unconsol. drlg. resid w/ang, occas sharp clr to frsted qtz and feldsp and micro-pyrite aggregates; ss frag "matrix" siliceous w/abund kaol and secondary qtz. Sh (20%): Dk brn; mod bh; mod fis; v/cltyey; non-calc; variably blk carbonaceous; tr silty.
- Coal (Abund.): Blk, brilliant luster, vhd w/conchoidal frac; highly homogenous; tr micro-pyritic; "clean" contact boundaries.
- 10415'- Spot Ss (50%): Vfn-med; gry-wht to grnsh-gry w/abund grnsh-brn; mod soft; highly fri; mod well-sorted within limited grain sizes; silica and Kaolin "matrix"; non-calc; 70% as unconsolidated drlg resid w/sharp to sub-ang qtz and feldsp grains, abund free wht and gry "slicked" Kaolin and micro-pyritic aggregates.
- Sh (30-40%): Med dk brn to dk brn; mod hd to mod soft; mod fis; non-calc; blk carbonaceous.
- Siltstn (19-20%): Lt brn to med brn; v/soft and sol; v/cltyey to mod superfine sdy; non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10400'-10410' Coal (10-30%): Blk; v/hd and brittle w/very well developed conchoidal frags; brilliant gloss; highly homogeneous vitrain. Sh (20-40%): Dk brn to minor brnsh-blk; mod l fis; mod hd to mod soft; v/clayey to v/minor silty; non-calc; variably blk carbonaceous.

Siltstn (10-20%): Med gry-brn to med brnsh-gry; v/soft; v/sol; v/clayey w/abund superfine sdy; non-calc. Ss (30-40%): Vfn-fn; gry-wht to grnsh-wht; mod hd; mod fri; non-calc w/v/abund kaol; tr mafics; 80% as unconsol drlg resid w/ang to sub-ang grains of qtz and feldsp, dom frsted w/minor clr and tr grnsh; tr free micro-pyrite aggregates.

10410'-10420' Coal (10-30%): Blk, v/hd; v/brtl w/conchoid frac; brilliant gloss; a homogeneous vitrain; abund well-stratified bituminous variety w/dull and brt luster bands, rectangular jointing, brittle, blk "color", homogeneous and devoid of megascopic structures.

Shale (10-40%): Dk brn; mod soft; mod fis; v/clayey; non-calc; variably silty; variably blk carbonaceous. Ss (30-50%): Vfn-med; gry-wht; kaolinitic; non-calc; mod hd; highly fri; dom ang to sub-ang grains; tr mafics.

10390'-10400' Coal (20-40%): Blk; v/hd and brittle w/conchoid frac; brilliant gloss; homogeneous; tr micro-pyrite layers; vitrain variety of coal. Sh (20-80%): Dk brn to v/dk brn; mod hd to mod soft; mod to poorly fis; v/clayey w/v/minor silty; non-calc; variably blk carbonaceous. Ss (10-60%): Vfn-med; gry-wht to grnsh gry sht; mod soft; highly fri; kaolinitic; non-calc; grains dom ang; tr clr to wht veinlet qtz; tr micro-pyrite aggregates.

10410'-10420' Ss (70%): Vfn-med; gry wht and gry brn; mod firm; highly fri; ang to sub-rnd; frsted, clr, gry, grysh-wht, grnsh grains in wht to lt tan matrix; tr dolomitic in matrix proximus to qtz and feldsp grains; abund included micro-pyrite grains; tr metallic gry inclusions (magnetite ?); abund wht (milky) vein qtz frags; tr reddish ferric coloration; variable "welding" in frags from qtz outgrowths; 60% as unconsol. drlg resid; tr tridymite (?) in grnsh silica.

Sh (20%): Med dk brn; mod firm; v/clayey; mod to poorly fis; non-calc.

Clystn (10%): Med brn; v/soft and sol; tr silty; rarely sub-fis when silt absent; non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10420'-10430' Ss (90%): Fn-med; mod. poor sorting; gry to brnsh-wht mosaic; v/hd; highly fri; tr calc in dom dolo-form; dom ang w/slight tr sub-rnd grains; dom frsted qtz and feldsp w/abund clr qtz and microcline (?) and tr vitreous sanidine; abund blk (mafic), gry-grn, tan, gry, brn grains and micro-cgl frags w/abund dissem. and aggregate micro-pyrite; 40% as unconsolidated drlg. resid.

Sh (10%)(Slough?): Dk brn; mod soft; mod to poor fis; variably silty w/v/clayey dom; non-calc.

Sltstn (Abund): Gry-brn; v/clayey; v/soft and sol; tr superfine sdy; non-calc.

Coal (Abund): Apparent vitrain slough.

10430'-10440' Ss (90%): Vfn-med; mod poor sorting when fn-med, mod well sorted when vfn; variable mosaics of whts, brns, reddish-brns w/dom frsted, frsted-wht to wht qtz and feldsp w/abund vitreous (sandidine?) grains and clr qtz and feldsp grains; abund micro-pyrite disseminations; tr-abund disseminated garnet; siliceous cmt w/abund kaolin "dust"; non-calc; abund cse, sharp milky and frsted vein qtz frags; 40% as unconsolidated drlg. resid; abund chalcedony, gry.

Shale (10%): Med dk brn; mod soft and fis; non-calc; tr pyritic; variably blk carb; variably gry-brn, silty.

10440'-10450' Ls (Tr): Med brn and tan mottled; vhd; v/brtl; micritic; also tr as frac fillings in bituminous coal (dom lt tan sparritic ls).

Ss (80%): Vfn-med; gry-wht, grnsh-wht, gry-brn and lt-med brn; med hd; highly fri; tr to mod calc; med kaolinitic; grains dom ang to sub-ang qtz and feldsp w/abund chloritic grains and mafic rk frags, med gry, variable brn w/tr to abund garnet and micro-pyrite; abund clr, frsted, milky wht and orange dom vein qtz; abund microp-pyrite aggregates; v/abund frags of qtz achist (chloritic) and qtzite; 50% as unconsolidated drlg resid.

Sh (Tr-20%): Dk brn to minor med dk brn; mod soft; mod fis; v/clayey; variably blk carbonaceous w/tr-abund blk bitumen inclusions; non-calc; tr micro-pyritic.

Sltstn (Tr-10%): Gry-brn to med brn; v/soft and sol; v/clayey; non-calc.

Tuff (Tr): Variably tan; vhd and brtl; v/vfn to superfine sdy; ashy; non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10450'-10460' Ss (60%): Vfn-fn w/abund med; gry-brn w/clr frsted, grnsh, brnsh, tan (kaol ?), ylw-brn sub-ang to sub-rnd qtz and feldsp dom w/variably abund mafics; tr calc; "matrix" mod kaolinitic; 70% as unconsolidated drlg resid; cont'd. frags of schist and qtzite.

Sh (20-4-%): Med brn, med dk brn to brnsh-blk, dk to med gry-brn; mod hd; dom mod. fis; dom v/clyey w/minor silty; variably superfine sdy; brns variably blk carbonaceous; non-calc.

Siltstn (Tr-10%): Variable gry to gry-brn; mod hd to v/salt; v/clyey; variably sol; variably superfine sdy; non-calc.

Ls (TR): Lt tan; mod to vhd, brtl; micritic.

10460'-10470' Ss (80-90%): Vfn-cse; poorly-sorted to mod well sorted in vfn-fn size range; gry-wht, gry brn, grnsh gry-wht, grnsh gry, grnsh w/abund reddish garnetiferous (qtz) grains and abund grnsh chlorite schist frags and vari-colored (tans, wht, clr, frsted, grnsh) qtzite frags; tr calc; tr matrices; 70% as unconsol drlg resid.

LS (Tr): Lt to med tan to v/lt brn sucrosic mixture of clastic calcitic, mod impure, ls frags that include sd grains, mafic grains and chloritic grains.

Sh (10-20%): Med to dk brn; mod hd and fis; clyey; non-calc.

Tuff (Tr): Variably gry; vhd; ashy; non-calc.

10470'-10480' Ss (100%): Vfn-v/cse, micro-conglomeratic in part; v/hd; highly friable w/extremely abund (20%) of sharp dom wht
10480-10490' w/minor gry-wht, frsted, clr and ylw to pink qtz of v/cse size as apparent vein qtz; frags of qtzite, tuff, chlorite schist, chalcadony; v/abund lt-med tan, sucrosic to micritic ls frags w/abund vfn-fn ss w/tan sparry calcite cmt; tr ls w/variably abund sharp sd grains; abund micro-pyrite aggregates; 60% as unconsolidated drlg resid; vfn-med ss tr calc; tr dk ("steel") gry, ang to sharp sh frags in cse ss.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10490'-10500' Ss (40-50%): Vfn-med w/abund cse; gry-wht and gry-brn; v/hd;
10500'-10510' highly fri; tr calc; kaolinitic; sharp to ang w/minor
10510'-10520' sub-rnd dom qtz w/minor feldsp grains; cont's abund sharp
vein qtz frags and micro-cglatic frags of qtzites and
schists; 70% as unconsolidated drlg resid.

Sh (30-60%): Dk brn to brnsh-blk w/minor med brn and med dk
brn; mod hd; mod fis; v/cliey; variably abund blk
carbonaceous w/tr sh frags w/vitrain inclusions; non-calc.

Coal (Tr-30%): Blk; brilliant glossy; highly homogeneous;
v/hd and brtl w/conchoidal frac; a vitrain-quality coal.

10520'-10530' Sh (30-50%): Dk brn and med dk brn w/minor brnsh blk; mod
10530'-10540' hd; poorly fis as dk brn to mod fis as med dk brn, dk brns
occas blocky; v/cliey; variably blk carbonaceous, varying to
minor "cannel" in type; non-calc.

Coal (Tr-abund): Vitrain as apparent slough.

Ss (50-70%): Vfn-v/cse, variably conglomeratic: sharp to
sub-rnd grains w/v/abund sharp and splintery wht, clr, gry
veinlet qtz; v/hd; highly fri; gry-wht, gry-brn to
brnsh-wht; tr calc; mod abund kaolin in "matrix"; abund
chloritic frags and qtzite frags; tr-abund micro-pyrite
aggregates; 70% as unconsolidated drlg resid; tr tan and
gry-tan tuff frags.

Siltstn (Tr-10%): Med gry-brn and med brn; v/cliey and tr
superfine sdy; non-calc.

10540'-10550' Sh (90%): Dk brn w/minor med dk brn; mod hd; mod fis
w/minor blocky, v/cliey w/v/minor silty to superfine sdy;
variably blk carbonaceous w/abund grading to a "cannel"-type
of coal having a pitch-like texture and close-grained,
compact and homogeneous, giving a sub-conchoidal to
conchoidal frac.

Coal (10%): Blk vitrain w/"cannel"-type.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10550'-10560' Ss (80-90%): Vfn-cse, dom fn-med w/abund 10560-10570'
10560'-10570' micro-conglomeratic; dom wht to lt gry-wht w/minor variably
gry, brn and grnsh; v/hd; highly fri; abund sharp, splintery
wht to frsted vein qtz; abund bound kaolin of wht to lt
tan-wht color; abund frags translucent w/secondary silica
"welded" appearance; tr calc; frag grains dom shap and
angular; 80% as unconsolidated drlg. resid w/ang to sub-ang
and minor sharp to sub-rnd dom qtz w/minor feldsp and abund
micro-pyrite aggregates, tr med grn chloritic "grains".
slough from reworked appearance and high 8-mesh count.

Sh (10-20%): Dk brn to med dk brn w/abund coal as apparent
slough from reworked appearance and high 8-mesh count.

10570'-10580' Ss (90%): Vfn-v/cse, variably micro-conglomeratic;
splintery, wht vein qtz; sharp, wht, frsted, clr and tr pink
qtz; abund gry, frsted, grnsh qtzite; tr-abund med to dk grn
schist (chloritic) frags; all cse to v/cse micro-cgl frags;
ss dom fn-med; wht, clr, frsted, grnsh-wht, grnsh-gry,
brnsh-wht w/variably abund blk mafics (?) and dk grn
chlorite grains, v/hd; highly fri, often w/difficulty;
tr-mod calc; abund kaolin; variable pyrite from all
fractions, including pyrite on vein qtz, in ss and as
micro-pyrite aggregates; 60% as unconsol drlg resid.

Shale (10%): Dk brn; mod firm; mod fis; v/clyey, minor
varying to shaley clystn; non-calc; variably blk
carbonaceous; suspected as slough.

10580'-10590' Sh (30%): Dk brn; mod firm; mod fis, v/minor varying to
sub-fis (shaley) clystn; non-calc; v/clyey; variable blk
carbonaceous content, giving v/dk brn to brnsh-blk
coloration; tr silty.

Clystn (10%): Med lt brn to med brn w/minor med dk brn;
v/soft and extremely sol to mod firm; tr silty rare;
non-calc; blk carbonaceous v/rare.

Siltstn (20%): Med gry-brn; mod soft to mod hd and shaley;
v/clyey to rare superfine sdy; non-calc.

Sandstn (40%): Vfn-v/cse, dom fn-med; sorting poor to
extremely poor, micro-conglomeratic; med gry-wht, lt-med gry
and grnsh-gry w/abund grn (med and dk) schist (chlorite)
frags; abund wht, gry-wht and "rose-pink" vein qtz frags;
abund gry, tan-gry and gry-wht qtzite frags; variably abund
wht to tanish-wht "matrix" kaol; tr calc when lter and
non-calc when dker; micro-pyrite aggregates variably abund
w/abund micro-pyrite disseminated in chlorite schist frags
and ss dom of chlorite schist detritus; 60% as unconsol.
drlg. resid; finer ss grains ang-rare rnd; cser grains ang.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10590'-10600' Ss (70%): Vfn-med; mod well sort; v/hd; highly fri w/variable difficulty; non-calc; variably kaolinitic; abund brnsh-grn, micro-pyritic ss frags w/ang to sub-ang grains and v/poor sorting; ang-sub-ang w/minor sub-rnd and rare rnd grains of qtz and feldsp w/abund variable grn chlorite and tr mafics; tr to abund aggregates of micro-pyrite, tr w/included slr, sharp qts grains; 60% as unconsol. drlg resid, vein qtz.

Sh(30%): Dk brn, med dk brn, med brn and gry-brn; mod hd to v/soft; v/clayey; blk carbonaceous; non-calc.

10600'-10610' Ss (70%): Wht to v/lt gry-wht; v/hd to mod hd; highly fri; (10606 Spot) vfn-fn; mod well-sort; dom clr to frsted w/minor frsted gry qtz and feldsp w/abund grnsh chloritic and blk mafic (?) grains; abund secondary silica w/abund kaolin "matrix dust"; slight tr calc; tr included, ang micro-pyritic aggregates' 80% as unconsol. drlg. resid.; chlorite schist, vein frags qtz.

Sh (30%): Dk brn, med dk brn and med brn; mod hd to mod soft; v/clayey; non-calc; blk carbonaceous.

Coal (Tr-abund): Blk vitrain as apparent slough.

10610--10620' Sh (80%): Med dk brn, dk brn and brnsh-blk; mod hd; mod (10611' spot) fis; v/clayey, varying to dk gry-brn silty; non-calc; variably blk carbonaceous; slight tr extremely hd, med brn, tr blk carbonaceous, blocky frac, siliceous sh or mudstn.

Coal (Tr-10%): Brnsh-blk to blk; brnsh-blk dom well-stratified, poorly to mod glossy; frac poor to gd w/variable brtl tendencies; carbonization variable; blk is vitrain-type coal w/brilliant gloss, v/hd; v/brtl w/well developed conchoidal frac; homogeneous.

Ss (Tr-20%): VFfn-fn; gry-wht, tan-wht, lt grnsh-wht; mod hd to mod soft; highly fri w/ease; variably kaolinitic; slight tr calc; 90% as unconsolidated drlg resid w/

Sltstn (Tr-10%): Med gry to med gry-brn; v/soft; mod sol; v/clayey to superfine sdy; non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10620'-10630' Sh (70%): Dk brn, med brn and dk brnsh gry; mod hd to med
10630'-10640' soft; dom v/silty; non-calc; mod fis to variably poorly fis
when v/silty; dk and med brns w/tr-abund blk carbonaceous;
brnsh-grys non-carbonaceous; tr lt-brn, shaley clystn equiv.

Siltstn (30%): Med gry and med gry -brn w/v/minor med brn;
med soft w/abund mod hd, shaley; v/clyey to mod superfine
sdy; non-calc.

Claystn (Abund): Dk tan to lt brn w/minor med dk brn;
extremely soft and sol (suspect high loss into mud system).

10640'-10650' Sh (50%): Med brn and gry-brn w/minor dk brn; v/soft;
10650'-10660' poorly fis w/v/minor mod fis, v/clyey; variably silty,
w/grys v/silty and most poorly fis; non-calc; rare blk
carbonaceous.

Siltstn (20%): Med gry-brn and med gry w/rare dker brns;
variably clyey and superfine sdy; non-calc.

Clystn (10%): Med lt brn to med brn w/rare dker brn;
variably slty; highly sol; extremely soft; non-calc; v/rare
blk carbonaceous.

Ss (20%): Vfn-cse, dom fn-med; gen poor sort; grysh-wht,
grysh-brn and grysh, grnsh-brn; mod hd to v/hd; highly fri;
kaolinitic; tr calc; ang to sub-rnd dom qtz and feldsp w/abund
grnsh chloritic and blk to brnsh-blk mafic grains; 80% as
unconsol drlg resid.

Tuff (Tr): Lt tan to grnsh-tan; extremely hd, brtl
w/sub-conchoidal frac as highly siliceous; abund
micro-pyrite disseminations; abund brnsh-blk banding; ashy.

LS (Tr): Med tan; v/hd and brtl; micritic; vfn sdy.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10660'-10670' Sh (40-60%): Med brn, med gry-brn and med dk brn; mod soft;
10570'-10680' variably clayey to sdy and silty, w/silt dom arenaceous
10680'-10690' phase; non calc; poorly to v/minor mod fis and tr highly
10690'-10700' fis.

Siltstn (20-30%): Med gry-brn; variably clayey w/minor
superfine sdy; non-calc.

Clystr (tr-10%): Med lt brn; extremely soft; highly sol
w/approx 90% estimated lost into mud (drlg fluid); non-calc.

Ss (10-40%): Vfn-med hd; highly fri; wht, gry-wht and
grnsh-wht; sub-ang to sub-rnd, frsted w/minor clr and
transparent w/variable gry qtz and feldsp grains; tr-abund
chloritic, mafic and sh micro-frags; tr v/lt pink qtz (?) a
sharp blk carbonaceous (?) frags; tr micro-pyrite
disseminations and aggregates; highly wht kaolinitic
"matrix"; tr calc; 80% as unconsol drlg resid.

10700'-10710' Ss (30-50%): Vfn-fn; mod well sort; brnsh and grysh-wht;
10710'-10720' mod soft; extremely fri; abund med-grain grains of qtz and
10720'-10730' frags of chlorites, mafics and shales; mod to highly
kaolinitic w/abund free wht and gry-wht, "slicked" kaolin;
non-calc; tr micro-pyrite dissemination and aggregates,
rarely superfine sdy and silty; 80% as unconsolidated drlg.
resid.

Sh (30-40%): Med dk brn, med brn and minor brnsh-blk; mod
hd and fis to mod soft and poorly fis; v/clayey as brns to
mod silty as rare gry-brns; non-calc; variable blk
carbonaceous w/abund vitrain-type coal.

Clystn (Tr-10%): Lter brns; v/soft and sol; tr blk carb.

Siltstn (10-20%): Med gry-brn to brns; v/soft; v/clayey.

10730'-10740' Coal (20%): Blk; v/hd; v/btrl; homogeneous; brilliant
luster; conchoidal frac; a vitrain-type coal; abund
lower-grade mod lustreous bitumen.

Sh (60%): Med dk brn and dk brn w/minor gry-brn; mod hd and
fis as med dk brn to brnsh-blk and dk brn and poorly fis and
mod soft as gry-brn; v/clayey and blk carbonaceous w/abund
included vitrain-type and bituminous coal in dk brn to
brnsh-blk sh; gry-brn sh w/silty w/rare superfine sdy; all
non-calc; shales occas varying to lter brn shaley slystn.

Siltstn (10%): Med gry-brn; v/clayey to minor superfine sdy;
tr shaley, non-calc.

Ss (10%): Vfn-fn; gry-wht; ang to sub-ang; mod well sort;
mod hd to v/soft; highly fri; highly kaolinitic; non-calc;
90% as unconsol drlg resid.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10740'-10750' Ss (30-40%): Vfn-v/cse; mod well sort as vfn-fn, more
10750'-10760' poorly-sort as fn-med, poorly sort as med-v/cse; v/abund
micro-conglomeratic frags of qtz (incl wht vein qtz), qtzite
and chlorite schist; tr ss frags w/brn-stained qtz, vfn-fn,
grains; kaolinitic; non-calc; mod abund wht vein-type qtz;
abund free, wht to gry-wht kaolin; 90% as unconsol drlg
resid.

Shale (60-70%): Med brn, med dk brn, rare brnsh-blk and med
to dk gry-brn; mod firm, mod fis, v/clyey, variably blk
carbonaceous as med to dk brn; mod soft, poorly fis,
v/silty; vsoft and sol to tr as med to dk gry-brn; all
non-calc.

Siltstn (Tr-10%): Med gry-brn; v/soft; v/clyey; non-calc;
slight tr superfine sdy.

10760'-10770' Ls (10-39): Lt to med brn and tan mottled; v/hd; v/brtl;
10770'-10780' micritic; varying to vfn-fn variably sdy and minor med cse
sd; sd grains ang to sub-ang w/rare shrp, frsted, grsh-clr
qtz and feldsp w/abund med gry and med grn frags and mod
sbund micro-pyrite aggregates; mod calcitic; possibly
detrital.

Ss (70-80%): Lt to med brn and tan-wht; vfn-cse w/minor
v/cse; v/hd; highly fri, dom w/difficulty; dom lt to med tan
ls "matrix" w/abund sparry calcite cmt; sharp to sub-rnd,
v/poorly sorted grains of clr, frsted, wht, grnsh, lt-dk gry
qtz w/minor feldsp; variably abund micro-pyrite aggregates;
abund wht and gry-wht free kaolin; abund free, wht, sharp
vein-type qtz; 605 as unconsol drlg resid.

Sh (Tr-30%): Med brn to med dk brn; mod soft; poorly fis
and minor varying to sub-fis clystn; v/clyey to variably
silty; non-calc; tr blk micro-carbonaceous.

10780'-10790' Ss (70%): Vfn-med; mod poor sort; mod soft to mod hd;
highly fri; tr calc; variably kaolinitic; grains ang to
sub-ang, minor feldsp; abund grains of chloritic and mafics;
fair tr micro-pyrite aggregates; colors rang from
gry-wht, gry-brn to brnsh-wht; 80% as unconsol drlg resid.

Sh (20-30%): Med dk brn to dk brn; mod soft; dom poor fis
variably clyey and silty, non-calc; variable traces blk
carbonaceous.

Siltstn (Tr-10%): Med gry; v/soft; v/clyey; rare super-fn
sd, non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 10790'-10800' Sh (40-80%): Med brn to med gry-brn; mod soft to minor mod
10800'-10810' hd; poorly to mod fri; variably clayey and silty; non-calc;
10810'-10820' brns w/variable blk carbonaceous.
10820'-10830'
10830'-10840' Siltstn (10-20%): Med gry-brn; mod soft; v/clayey; v/minor
10840'-10850' superfine sdy; non-calc.
10850'-10860'
10860'-10870' Ss (20-60%): Vfn-v/cse; vfn-fn dom gry-wht to gry-brn to
brnsh-wht; fn-med lt to med brn mottled; med to v/cse grnsh,
brnsh wht w/abund micro-cgl frags of qtzite, chlorite-qtz
schist and abund wht, gry-wht and pink vein-type qtz; ss
grains ang to sub-ang w/tr rnd and tr sharp; 80% as unconsol
drlg resid w/clr to gry, dom ang qtz and feldsp; abund free
wht and gry-wht kaol; abund disseminated and aggregate
micro-pyrite; incr qtzite frags 10,850'-10,870'; ss tr calc.

Claystn (Tr-10%): Lt to med brn; v/soft and sol; minor
silty; tr blk carbonaceous; non-calc.

10870'-10880' Ss (50-60%): Vfn-v/cse mod well sort and fn-v/cse v/poorly
10880'-10890' sorted, micro-conglomeratic; v/hd; highly fri; tr calc;
gry-wht, wht, gry-brn, grnsh gry-wht to grnsh gry-brn;
vfn-fn ss w/ang to sub-ang qtz and feldsp and abund mafics
and chlorite, tr micro-pyrite in tr calc kaolinitic matrix;
med-v/cse ss w/micro-frags qtzite, gry and brnsh tuff,
chlorite-qtz schist to tr tan buff, including abund free
wht, grnsh-wht vein-type qtz; abund disseminated and
aggregate micro-pyrite; 70% as unconsol drlg resid.

Sh (30-40%): Med brn; mod soft; poorly fis; v/clayey w/tr
gry-brn silty; non-calc; tr blk carbonaceous.

Siltstn (10-20%): Med gry and med gry-brn; v/clayey;
non-calc.

10890'-10900' Ss (70%): Vfn-v/cse; vfn-med mod poor sort; med-v/cse
v/poorly sorted, micro-conglomeratic w/minor vfn-fn well
sort; vfn-fn gry-wht to gry-brn, ang-sub-rnd dom clr w/minor
frsted and tr gry qtz and feldsp w/abund brn, grn and blk
grains; vfn-fn ss highly kaolinitic, tr calc, v/soft and
highly fri; vf-med ss dom gry brn, kaolinitic, mod hd;
highly fri, clr, frsted, gry qtz and feldsp-bearing w/sharp
to ang frags sh (silicified), qtzites, schist frags, tr
calc; med to v/cse, conglomeratic (micro) ss extremely
poorly sort w/frags qtzite, tan and gry tuffs, acid
volcanics, chlorite-qtz schists, vein qtz, kaolin,
micro-pyrite in multi-coloration of wht, clr, frsted, gry,
gry-grn, brns, tans, or blk and pink, occas tuffaceous ss.

Sh (30%): Med brn, med gry-brn w/minor v/dk brn; mod firm
and fis as brns; v/soft and poorly fis as med gry-brn; brns
v/clayey; med gry-brns variably silty; all non-calc; variably
blk micro-carbonaceous as brns.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

10900'-10910' Ls (10-20%): Lt tan to dk brn mottled; micritic to
10910'-10920' micro-sucrosic and v/fn sucrosic; varies from clastic ls
dolo ls and calcitic dolo frags as sucrosic to variably
superfine to v/fn sdy w/clr, frsted, wht and gry qtz and
feldsp (?), also w/tr grnsh chloritic (frags ?) grains and
slight tr mafics; tr micro-pyrite; ls variably calcitic and
dolomitic, occas varying to calcitic dolo; all of these
carbonates apparently clastic as micro-conglomerate phase.

Microconglomeratic Ss (70-80%): Dom sharp and splintery
qtz, qtzite chalcedony frags w/v/abund frags of qtz-chlorite
schists, chlorite-sericite schists, tuffs, acid volcanics
w/v/abund micro-pyrite aggregates and tr free rose vein qtz,
abund grnsh qtz (100% micro-cgl ss.)

Sh (Tr): Med dk brn as apparent slough.

10920'-10930' Sh (30%): Dk brn to med dk brn; modsoft to v/soft w/abund
mod hd; dom poorly fis, varying to "shaley" clystn w/abund
mod fis; non-calc; abund blk carbonaceous.

Siltstn (10%): Med gry-brn; v/soft; v/clyey; non-calc.

Sandstn (60%): Fn to v/cse, micro-conglomeratic
w/qtz-chlorite schist, qtzite, abund lt tan to dk brn
micritic dolo ls and calcitic dolo; wht to grn to pink,
splinter vein-type qtz; tr micro-pyrite aggregates; slight
tr rnded, dk gry chalcedony; abund free kaolin; fn-med ss
dom gry-brn, mod well sort, ang to sub-ang w/tr sub-rnd, clr
to frsted qtz and feldsp w/slight tr grns, chloritic grains
blk to brnsh-blk mafic (?) grains; 70% as unconsol drlg
resid.

10930'-10940' Microconglomerate (70%): Multi-colored frags of qtz,
10940'-10950' qtzite, acid volcancis, schists, chalcedony, tuffs and ls
incuding tan, wht, gry-wht, grn, gry, pink, brn, blk, clr.

Ss (30%): Vfn-cse, dom fn-med; poorly to mod well sort;
ang to sub-ang qtz and feldsp w/abund grns and dk mafics(?);
tr calc; abund kaol; tr micro-pyrite: 80% as unconsol drlg
resid.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 10950'-10960' Sh (70%): Med brn to dk brn; v/soft; poorly fis; v/clayey, varying to shaley Claystn; variably silty; non-calc; "claystn" phase highly sol.
- Siltstn (10-20%): Med gry-brn; v/soft; highly sol; v/clayey; non-calc.
- Ss (10-10%): Vfn-med, fn-cse and med-v/cse, micro-conglomeratic; vfn-med mod poor sort; fn-cse and med-v/cse, micro-cgltc; extremely poor sort; finer grains ang-sub-ang qtz and feldsp w/dom clr to frsted and minor wht, gry-wht, grns, gry-grns, brns; cser and micro-cgltc as dom free wht vein-type gqz, tr pink qtz (vein-type), qtzite, schist, acid volcanics and tuffs; 90% as unconsol drlg resid; brns, grys, whts dom.
- 10960'-10970' Microconglomerate (60-80%: Dom frags of qtz-chlorite
10970'-10980' schist, chlorite-sericite schist, qtzites, vein qtz, abund
10980'-10990' ls and tr tuffs w/respective colors of wht to clr to pink
10990'-11000' (qtz), lt-dk grn, med "silvery" grn, tans to grys to whts to grnsh (qtzites), wht to pink and splintery (vein qtz), lt tans to dk brns (ls) gry to gry-grns (tuffs); frags dom sharp to rnd and frac; abund free micro-pyrite aggregates; abund free wht and gry-wht (slickensided) kaolin.
- Ss (20-40%): Vfn-cse; poorly sort as cser and mod well sort as vf-fn and fn-med; gry-wht, gry-grn and gry-brn; mod to v/hd; highly fri; vfn, v/calc and cser, tr calc; 80% unconsol drlg resid.
- Sh & Claystn (Tr-abund) and Coal (Tr): Apparent slough.
- 11000-11010' Sh (40%): Dk brn to med dk brn; mod hd and fis to mod soft and poorly fis; v/clayey to minor silty; non-calc; tr to abund blk carbonaceous.
- Ss (60%): Vfn-fn, fn-med, med-cse and micro-cgltc; finer ss gry-wht, gry-grn and gry-brn, mod soft to mod hd, highly fri; tr calc, kaolinitic, ang to sub-ang qtz and feldsp w/abund grn (chloritic) and blk (mafic) grains, tr micro-pyritic; med-cse and micro-cgltc ss v/poorly sort w/frags of acid volcanics, qtzite, qtz-mica schists, chlorite schists, abund tan to med dk brn and micritic ls and tr gry to grnsh-gry tuffs, including abund free wht, grnsh-wht and pink vein-type qtz and aggregates of micro-pyrite.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

11010'-11020' Sh (10-30%): Dk brn to med dk brn and v/minor brnsh-blk;
11020'-11030' med hd and fis to mod soft and poorly fis; v/clayey w/minor
variably silty; non-calc; variably blk carbonaceous.

Ss (20-40%): Vfn-fn, gry-wht, gry-grn & brn, mod soft and
fri, ang to sub rnd qtz and feldsp, variably kaol, to to mod
calc, 90% as unconsol drlg resid; fn-cse, gry-grn to gry-brn
to lt brn, poor sort, mod hd, highly fri, tr calc, variably
kaolinitic, clr, frsted, gry, grn, brn ang to sub-rnd grains
(dom slr, frsted, gry qtz w/minor feldsp); v/cse,
conglomeratic (micro) composed of qtzites, schists, acid
volcanics, ls, tr sh (silic) and abund wht to pink vein-type
qtz, abund wht to gry-wht kaol and abund micro-pyrite
disseminations and aggregates.

11030'-11040' Sh (50%): Med dk brn, med brn, dk gry-brn; v/soft; poorly
fis; dk brns v/clayey, med brns abund silty and gry-brns
v/silty; dom mod sol; non-calc; dker brns variably
micro-carbonaceous.

Siltstn (20%): Med to dk gry-brn w/minor med gry-brns;
v/clayey; gry-brns variably super fn sdy; dker brns sub-fis;
non-calc.

Clystn (10%): Lt to med brn w/minor gry-brn; extremely soft
and sol; non-calc.

Ss (20%): Vfn-fn; gry-brn, gry-brn and gry-wht; mod well
sort; v/hd; highly fri w/ease; highly kaolinitic; slight tr
calc, dom ang to sub-ang qtz w/minor feldsp and tr-abund grn
chlorite (?) and blk (mafic) grains; variable tr
micro-pyrite aggregates.

Slough (Abund): General assemblage of micro-cgl frags,
including splinter qtz, schist frags, ls frags; acid
volcanic frags, qtzites and tuff frags w/associated grn and
wht-dominated multicoloration.

11040'-11050' Ss (30%): Vfn-fn; med well-sort; ang to sub-rnd w/rare rnd
grains of dom clr, frsted and lt gry qtz w/minor feldsp;
abund mafics and chloritic (?) grains in approx 30% of
frags; tr calc in few frags w/abund kaol; mod abund
micro-pyrite aggregates; 90% as unconsolidated drlg resid.

Cgl (50%): Cont'd multicolored, sharp to rare rnd frags of
schists, volcanics, qtzites and splinter qtz.

Sh (20%): Cont'd dk brn to minor gry-brn; non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

11050'-11060' Sd (20-40%): Vfn-fn; ang, sub-ang w/minor sub-rnd and rare
11060'-11070' rnd grains of qtz and feldsp, dom clr to frsted w/minor
11070'-11080' gry-frsted; abund variably grn chloritic (?) and tr blk
11080'-11090' mafic grains; tr micro-pyrite; abund kaolin; 95% as unconsol
11090'-11100' drlg resid.

Ss (10%): Vfn-cse; gry-grn, gry-wht to gry-brn; mod soft;
highly fri; slight tr calc; highly kaolinitic; tr
micro-pyrite; ang to rnd grains, giving v/poor sort; clr to
frsted w/minor gry qtz and minor feldsp; tr-abund chloritic
(grn) and mafic (grains); tr to abund micro-frags of
schists, tuffs, qtzites and acid volcanics; 20% as unconsol
drlg resid.

Cg (30-40%): Cont'd sharp frags of schists, acid volcanics,
qtzites, tuffs and splintery qtz w/grns dom in
multicoloration. (Frag of vitrain, rnded sh and variable
amts of cgl. are apparent slough.)

Sh (10-30%): Cont'd dk brn to med brn; non-calc.

11100'-11110' Sh (30-49%): Dk brn to med dk brn w/minor dk gry-brn; mod
11110'-11120' firm and fis to mod soft and poorly fis, occas varying to
sub-fis to mod soft and poorly fis, occas varying to sub-fis
clystn equiv; variably silty as med gry brns; non-calc; dker
brns variably micro-carbonaceous.

Ss (50-60%): Vfn-fn w/minor fn-med; gry-brn to bry-grn;
vfn-fn, well sort and fn-med, poorly-sort; ang to minor rnd,
clr to frsted qtz and feldsp, abund gry-w/grns and blks in
cser.

Siltstn (10-20%): Gry-brn to med brn; v/soft; v/clyey;
abund superfine sdy as med brn; non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

11120'-11130' Ss (60-70%): Vfn-fn and v/fn-v/cse micro-conglomeratic;
11130'-11140' vfn;fn gry-sht, brnsh-wht & gry-brn, ang to sub-rnd w/rare
d Qtz and foldsp & v/minor chloritic & mafic grains and
micro- frags; v/soft; highly fri; variably kaolinitic; tr
calc; slight tr micro-pyrite, 80% as unconsol drlg resid;
v/fn-v/cse, gry-grn to gry-brn, rare shap to dom ang to
sub-ang w/rare rnd clr, frsted, gry & grnsh Qtz w/minor clr
and frsted (w/gry?) feldsp, mod to highly kaolinitic, tr
calc, tr disseminated and aggregate micro-pyrite, cgltc phase
of Qtzite, schist and splinter Qtz w/abund micro-pyrite
aggregates; cser drlg resid, 90% unconsol.

Sh (20-30%): Dk brn & med brn w/abund brnsh-blk; mod hd and
fis to mod soft, poorly fis and varying to lter clystn
equiv; non-calc; blk carbonaceous abund.

Siltstn (Tr-10%): Med gry to med gry-brn; v/soft; variably
sol; v/clyey to superfine sdy; tr sub-fis; non-calc.

Coal (Tr.): Blk vitrain as apparent slough.

11140'-11150' Ss (40-50%): Vfn-fn and vfn-v/cse, micro-conglomeratic
w/marked incr Qtzite and splintery Qtz in micro-cgl phase;
vfn-fn, gry-grn, gry-wht and gry-brn, well sort clr, frsted,
bry Qtz and feldsp w/minor chloritic and mafic grains;
highly kaol; tr calc; 90% as unconsol drlg resid; vfn-v/cse
w/abund micro-pyrite

Cgl (10-20%): Cont'd schists, volcanics w/marked v/cse to
pbly-size vein-type Qtz & Qtzite frags w/abund apparent
clastic lt tan to dk brn ls frags; abund wht & gry-wht kaol;
tr micro-pyrite aggregates; slight tr pink and ylw-grn Qtz.

Sh (30-50%): Dk brn to med brn w/tr dk gry-brn; mod firm
and fis to mod soft and poorly fis w/dk gry-brn varying to
sub-fis siltstn phase as rare; non-calc; variably clyey and
silty w/dk gry-brn mod fis; dk brn and med brn variably
micro-carbonaceous.

11150'-11160' Cgl (100%): Sharp frags of splinter vein-type Qtz, Qtzite,
chlorite schists, tuffs, ls, possible med to dk grn, v/hd
ss; frags totally sharp without exceptions; multi-colors
include, whites (milky), frsted-gry, gry, grns, tans, brns,
dk gry, grnsh-silver, pink (rose Qtz), ylws, or
pyrite-metallic; abund free wht and gry-wht (slicked)
kaolin; sd vfn-fn to minor med, clr, frsted, rare gry Qtz
and feldsp as 100% unconsol drlg resid. (Tr sh slough.)

(Cape Sorell No. 1 Sample Descriptions Cont'd)

11160'-11170' Cgl (30-40%): Cont'd sharp frags of splintery qtz, qtzites,
11170'-11180' volcanics and chlorite schists w/grn-dominated
multi-coloration.

Ss (10-20%): Vfn-fn; gry-grn, gry-brn and minor gry-wht;
mod well sort; tr calc; highly kaolinitic; v/soft; highly
fri; 90% as unconsol drlg. resid.

Sh (40-60%): Dk brn dom w/abund micro-carb; mod hd; mod
fis; non-calc; abund free vitrain coal (slough ?)

11180'-11190' Ss (40-50%): Vfn-fn; med gry to med gry-brn; mod soft to
mod firm; highly fri; mod calc as med gry & tr calc as med
gry-brn; ang to sub-rnd w/rare rnd, clr to frsted and minor
gry dom qtz w/minor feldsp; mod to highly kaolinitic; 60% as
unconsol drlg resid w/sharp to sub-anb clr and frsted qtz
dom.

Sh (30-40%): Dk brn, med brn w/minor brnsh-blk; mod soft
and v/clayey; poorly fis; variably silty as minor; variably
micro-carbonaceous; non-calc.

Cgl (Tr-10%): Apparent slough from lat 200'.

Slitstn (10-30%): Med gry w/minor gry-brn; v/soft; v/clayey
to superfine sdy; non-calc.

11190'-11200' Cgl (100%): Sharp frags of: Wht, gry-wht, grnsh-wht, gry
11200'-11210' and brnsh-wht qtzites of homogeneous qtzose character w/dom
11210'-11220' mutually interferent qtz pellicles; qtz-chlorite-sericite
11220'-11230' schists w/lt grnsh-silver (sericite) and dker grn (chlorite)
11230'-11240' coloration; v/dk grn frgs w/abund grnsh-blk and blk augite
11240'-11250' and tan clys in pseudo-mica form (a decay schist w/remnant
11250'-11260' sericite ?); sharp to rnded, gry, brn and gry-blk chalcedony
11260'-11270' frags; splintery vein-type qtz w/wht, milky wht, red pink,
11270'-11280' slw, brn transluc, gry-wht, frsted, purple colors; clys of
11190'-11280' brn, blue-grn purple, gry, grn, tan, red colors: ash tuff
frags of dk gry, dk brn, med lt gry, tan colors; ls frags of
mottled lt tan to v/dk brn (sucrosic to micritic); kaolin
frags of wht and slickensided gry-wht and gry-brn colors;
aggregates of micro-pyrite; the general mosaic of colors is
dominated by the grns and whts; tr garnetiferous qtz.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 11280'-11290' Clystn (30%): Dk brn, dk reddish-brn, med brn; extremely soft and sol; highly calc w/residue from HCL digestion of claystn dom colloidal cly w/abund sharp, clr qtz(?) and clr mica (sericite ?) of silt to superfine grade; ferric oxides of hematite to limonite inferred from red-brn and brn variegation; mod hydration swelling; tr grn, chloritic(?) or ferrous(?) clystn.
- Cgl (60%): Multi-colored admixture of : Sharp frags of dom qtzites of grys, whts, gry-brns w/minimal detrital grain and matrix differentiation, the appearance being homogeneous w/maximum mutual qtz pellicle interference, w/traces of occas finely disseminated iron oxide(?); sharp frags of dom chlorite-sericite schists of pale grn w/minor med grn color; v/abund free wht to frsted-wht to frsted and tr pink w/slight tr gry, splintery vein-type qtz; all phases contain variable amts of disseminated micro-pyrite; v/slight tr dk gry-blk, magnetite pellets, free.
- Ss (10%): Superfine to vfn; med gry; sub-ang to ang apparent qtz and feldsp; v/soft; highly fri; tr calc; abund matrix kaolin; 95% as unconsd drlg resid.
- 11290'-11297'
11297'-11300' Cgl (100%): Sharp frags of qtzite (60%) and qtz-chlorite-sericite schists (40%); qtzites dom wht, gry-wht and frsted w/abund grnsh-wht and tr grn, tans, oranges, yellows, abund disseminated micro-pyrite, homogeneity variable from mozaics of granular appearance w/qtz grains set in clr siliceous cmt to qtzose frags of mutually interferent qtz pellicles; qtz-chlorite-sericite schist frags in sharp form, gry-grn to lt grn and silvery-grn w/v/minor dker grn colors, often (approx. 30% of frags) w/lt tan cly from apparent sericite decomposition; gd tr free wht kaolin; slight tr rnd, red qtz grns (vfn); slight tr ylwsh-tan ash tuff frags; a qtzite-rich cgl.
- 11300'-11310' Sh (10%): Dk brn to minor med dk brn; mod hd and fis as dk brn w/minor mod soft, poorly fis and varying to sub-fis clystn; non-calc; variably blk carbonaceous; tr silty.
- Cgl (90%): Sharp, fresh frags of variable grn qtz-chlorite schists, chlorite sericite schists (tr), qtzites (40%), pseudo-qtzites as "welded" ss and v/abund splintery wht vein-type qtz; apparent matrix chloritic-qtzitic-calcitic w/v/abund free calcite; micro-pyrite variably abund as disseminations and coatings w/tr free cubic and as micro-aggregates, occas w/rnd, dk gry to clr qta(?) grains; tr free kaolin; v/slight tr v/soft, tr calc ss (slough?).

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 11300'-11305' Sh (10%): Dk brn; mod firm and fis w/v/minor mod soft and poorly fis; non-calc; variably minor blk carbonaceous.
- Cgl (90%): Cont'd schists and qtzites in chlorite-qtz-calcite "matrix" w/v/abund splintery vein qtz.
- Sh (30%): Dk brn w/v/minor med dk brn; mod hd and fis as dk brn and mod soft, poorly, fis as med dk brn; non-calc; variably blk carbonaceous.
- Cgl (70%): Cont'd schists and qtzites in qtz-chlorite-calcite "matrix" w/v/abund vein qtz; rnded grains and frags absent all sizes; crystals not detected.
- 11310'-11315' Sh (40%): Dk brn to med brn; mod hd to mod soft; dom mod fis, varying to v/clyey and soft, poorly fis as med brn; non-calc; dker brns variably blk carbonaceous.
- Cgl (60%): Incr grnsh coloration w/incr schists and chlorite-qtz-calcite "matrix" and qtzites, including wht, sdy tuff-quartzite; vein qtz cont'd.
- 11315'-11320' Sh (20%): Cont'd dk brn to med brn
- Cgl (80%): Cont'd schists and qtzites w/approx 60% of sample as qtzites.
- 11320'-11325' Cgl (100%): Qtzites and schist frags cont'd w/tr variably gry chalcedonic qtz; tr red, sucrosic qtzite.
- Sh (Abund): Dk brns cont'd apparent slough
- 11325'-11330' Cgl (100%): Qtzites (60%) and schists (40%) in sharp frags w/extremely abund splintery vein qtz and tr red, sucrosic qtzite; notable absence of crystals and mica (free); cont'd qtz-chlorite-calcite "matrix" w/abund free calcite as apparent cobble to granule coatings; rnding absent.
- 11330'-11335' Cgl (100%): Grn coloration dom as schists and "matrix" proportion increase to approx 60% of sample; appear purple (dk), sucrosic qtzite astr; abund rose-colored (pink) vein-type, splintery qtz; wht vein qtz and clr to dom wht calcite cont'd; tr augite(?) from chlorite and calcite; tr "chocolate" brn mudstns.
- 11335'-11340' Cgl (100%): Grns 70% as schists and chloritic "matrix" incr; appear ylw qtz w/pink qtz; appear pink cly, mod indurated and w/tr disseminated "splintery" rutile(?); tr "chocolate" brn clystn, non-calc.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

- 11340'-11345' Cgl (100%): Cont'd dom grnsh coloration from variable
11345'-11350' schists and qtz-chlorite-calcite "matrix" w/minor qtzite (40%); free wht, pink, purple and yellow vein-type splinter qtz w/abund grnsh sharp qtz and tr reddish, garnetiteous(?) (no x/s qtz; cont'd free wht calcite; appear ferric-oxide clys w/"chocolate" brn clys.
- 11350'-11355' Cgl (100%): Cont'd schists and qtzites in "matrix" of
11355'-11360' qtz-chlorite-calcite; appear dk gry, sucrosic qtzite w/calcite vein fillings; cont'd tr-abund garnetiferous qtz; cont'd pyrite; abund wht and gry-wht kaol; tr purple, sucrosic qtzite; cont'd reddish and chocolate w/tr purple clys (non-calc).
- 11360'-11365' Cgl (100%): Cont'd as 11350'-11360' w/appear v/abund purple
to purple-wht qtz; incr dker grn chloritic frags and "matrix" material.
- 11365'-11370' Cgl (100%): Cont'd as 11,360'-11,365' w/v/abund purple to
purple-wht qtz; tr purple, sucrosic, garnetiferous qtzite; tr reddis-brn and reddish w/slight tr "chocolate" brn clys, non-calc as ferric oxides incr; tr "varved" grnsh, highly micro-pyritic qtzite; qtzites vary from sucrosic to highly "fused".
- 1370'-11375' Cgl (100%): Cont'd w/grns dom and incr dker grns; marked
incr multi-coloration w/accessory reds, pinks, purples, brns, tans, yellows, olive-grns, y/w-grns, y/w-brns; cont'd wht, pink and purple vein qtz; cont'd wht and gry-wht (slicked) kaolin; cont'd disseminated and aggregate w/tr cubic micro-pyrite; cont'd high calcite content; tr incr apparent augite.
- 11375'-11380' Cgl (100%): Cont'd as 11370'-11275' w/incr kaolin (wht,
crm).
- 11380'-11385' Cgl (100%): Cont'd sharp frags of qtzites (30%) and schists
11385'-11390' (70%)(%="of sample") w/cont'd multi-coloration beginning @ 11370'; incr v/dk grn w/appear grnsh-blk chlorite and abund augite(?) from chlorite and calcite.
- 11390'-11395' Cgl (100%): Cont'd multi-coloration beginning @ 11370'
11395'-11400' w/inner in y/w, sharp qtz, purple and sucrosic qtzite;
11400'-11405' reappear ferric oxides w/reddish-brn clys (non-calc); abund
11405'-11410' dk gry (carbonaceous?) clystn, non-calc; slight tr rnded,
11410'-11415' broken chalcedonic qtzite frags; xls absent; abund apparent augite in approx 10% of chloritic frags; tr incr garnetiferous qtz; abund qtzite w/lt red-brn, highly disseminated cly and wht kaolinitic feldspars(?) in translucent qtz "matrix", tr tan-brn tuff, highly silica indurated to pseudo-qtzite; tr v/dk grn, vfn chloritic frags.

(Cape Sorell No. 1 Sample Descriptions Cont'd)

11415'-11420' Cgl (100%): Cont'd multi-coloration w/marked dker grn
11420'-11423' chloritic count w/abund "ultra-fresh" lt to med grn
11423'-11424' chlorite schist frags w/tr sericite schist; abund (less than
11424'-11425' 10%) variable med-dk "chocolate" brn, med brn and purple-brn
clystn w/tr variable med gry and olive-grn clystn, all
non-calc, tr to non-silty; tr incr micro-pyrite
disseminations and aggregates.

11425'-11430' Cgl (90%): Cont'd sharp frags and multi-coloration w/incr
dominance of med to dk grn schistic chlorite.

Clystn (10%): Dom dk brn to med "chocolate"brn; tr to mod
silty; non-calc; zero to tr blk carbonaceous.

11430'-11435' Cgl (100%): Cont'd chloritic grn dominance w/subordinate
11435'-11440' variably wht to multi-colored qtzites, vein-qtz as schists
11440'-11445' and qtzites vary only slightly in percentages; general
11445'-11450' multi-coloration cont'd abund micro-pyrite disseminations
11450'-11455' and aggregates w/slight tr free cubic; variable garnet (tr
11455'-11460' dodecahedral) and rutile ("splinters"); alteration clys dom
11460'-11465' kaolins(?) variably highly disseminated in
11465'-11470' qtz-chlorite-calcite "matrix" free calcite dom v/abund;
11470'-11475' free wht vein qtz variably highly abund; all frags extremely
11475'-11480' fresh and sharp; clys variably reddish, reddish-brn,
11480'-11485' "chocolate" brn, med-dk gry and rare purples; cont'd
11485'-11490' tr-abund purple, sucrosic qtzites.
11490'-11495'
11495'-11500'
11500'-11505'
11505'-11510'

11510'-11515' Cgl (100%): Cont'd as 11430'-11515' w/marked incr in lter
11515'-11520' colored qtzites and wht vein qtz; continue dom of grn
11520'-11525' chloritic colorations w/whites from calcite and vein qtz
11525'-11530' subordinate except from 11570' to 11576, where "whites" incr
11530'-11535' to approx 60% of sample w/marked qtzites; frags fresh and
11535'-11540' sharp w/x/s not observed; chlorite schists and qtzites
11540'-11545' represent 99% of drill returns w/only rare broken rnded
11545'-11550' granules to pbs occurred; cgl matrix is dom mod hd, but
11550'-11555' scratches w/little force and is dom chloritic w/abund
11555'-11560' calcite & is highly variable in micro-pyrite content, w/dom
11560'-11565' v/abund pyrite; dodecahedral garnet and cubic pyrite only
11565'-11570' observed x/s; grnsh-blk to blk mineral apparently augite
11570'-11576' after chlorite and calcite.

END DRILL RETURNS SAMPLE DESCRIPTIONS

WB/dw
299/A

CORE NO. 1 DESCRIPTION:

Core No.1 (11420'-11427') Cut 7', recovered 4.9' of 100% conglomerate. Conglomerate characterized by cobbles to approx 6" dia. varying to granules w/minor pebble sizes. General composition is green schists and minor gry to gry-wht qtzites w/complete rounding dominant. Matrix is dom. chloritic w/variably abund calcite and variably abund micro-pyrite disseminations. Milky qtz veins common in qtzites. Abund "matrix" is unstable, esp at base of core.

From Top to Bottom of Core No. 1 (4.9'):

(Top) 3.0" - Rubble of cobbles to pebbles
2.0" - Solid cgl of dom granules to pbs.
1.5" - Quartzite cobble
2.5" - Solid cgl. of cobbles to pbs.
4.5" - Rubble of cobbles (1"-3" dia.)
8.0" - Solid cgl w/one 4.25" quartzite
Cobble and 3.75" of granules to pebbles.
3.5" - Rubble of qtzite and schist, dom cobbles
6.0" - Solid cg. of cobbles to pebbles
2.5" - Solid cgl of cobbles to pebbles
5.0" - Rubble of cobbles to granules (qtzites & schists)
6.5" - Solid cgl of cobbles to pebbles
6.0" - Solid cgl of dom granules to pebbles
8.0" - Rubble composed of small cobbles (2.5") to granules
w/v/abund "decay"-grade chloritic matrix. (Variable rounding
alternation noted at base-of-core cobbles from bit action.) (Core
confirmed samples caught during coring circulation.)

NOTE: Metamorphism of conglomerate cobbles, granules and pebbles absent, with the metamorphism being confined to the matrix. Cobbles, granules and pebbles totally lacked both optical continuity with the matrix and exhibited zero encroachment metamorphic alteration. Thus the conglomerate of Core No. 1, as a unit, is a rudaceous sediment with metamorphosed matrix. (Conclusion made without thin section study.)

WB/dw
299/A

APPENDIX B

Sidewall Core Descriptions

Cape Sorell No. 1

Run 1

Attempted 51, Recovered 44



AMOCO SIDEWALL CORE DESCRIPTION REPORT

Well: CAPE SORELL NO. 1

Date: SEPTEMBER 5, 1982

RUN NO 1

Page 1 of 7

Field: OFFSHORE W. TASMANIA

Geologist(s): WESLEY F. BARRETT

Elev. (K.B.): 72 (ft) MSL

Company: AMOCO AUSTRALIA PETROLEUM CO.

Service Co. SCHLUMBERGER

Recovered 44 of 51 Attempts

NO.	ACC.	ACT.	SWC DEPTH (ft.)	RECOV. Inches	CONDITION	LITHOLOGY	COLOR	GRAIN SIZE	Consol- idation	Pore- sity	SECONDARY MTL.			SHOWS				REMARKS Shipped to: (Tulsa-Amoco Research Center)
											Arg.	Silty	Calc.	Odor	Stain	Fluoresc.	Cut Fluoresc.	
1			11,380	3/4	1 piece	Cgl: Grn, schistose w/one frag Qtzitic dk grn sh	Grn							0	0	0	0	Tulsa
2			11,345	3/4	1 piece cracked	Cgl: Grn, dk grn, blk-chlorite augite schist (& matrix)	Grn							0	0	0	0	Tulsa
3			11,338	Lost	Empty	-	-			-	-	-	-	-	-	-	-	Empty
4			11,327	3/4	1 piece	Cgl: Qtz-chlorite schist w/matrix	Grn			?				0	0	0	0	Tulsa
5			11,322	1	1 piece	Cgl: Qtz-chlorite-pyrite schist "matrix"	Grn			?				0	0	0	0	Tulsa
6			11,317	1/2	Totally Fragmented	Cgl: Qtz-chlorite "matrix"	Grn			?				0	0	0	0	Tulsa
7			11,315	1	1 piece	Cgl: H-med, chloritic matrix w/blk, grn-veined, sucrosic, rounded granules	Grn			?				0	0	0	0	Tulsa
8			11,300	1-1/8	1 piece	Clystn: Dk brn, v/soft, micro-mica, non-calc, feldsp(?)	DkBrn			Cly	X			0	0	0	0	Tulsa
9			11,300	3/4	1 piece	Clystn/Clyey Ss: Dk brn, extremely sdy/clyey, non-calc, highly blk carbonaceous	DrBrn w/wht			Tr?				0	0	0	0	slr w/mod brt, mod int transp ylw
10			11,251	3/4	1 piece	Cgl: Grnsh-wht, dom calcite w/minor chlorite, matrix.	Grnsh wht			Tr?				0	0	0	0	Tulsa
11			11,242	5/8	1 piece	Clystn: (Micro) Med brn, mod no, sub-fis, non-calc, calcite veinlets, micro-carb, vitrain	Med brn			Cly	X			0	0	0	0	Geochem Tulsa
12			11,237	1	1 piece	Cgl: Grnsh-wht, chlorite-Qtz-calcite-augite schist, feldsp(?)	Grnsh wht			?				0	0	0	0	Tulsa
13			11,222	Lost	Empty	-	-			-	-	-	-	-	-	-	-	-
14			11,212	Lost	Empty	-	-			-	-	-	-	-	-	-	-	-

Recovery
LB = lost bullet
MF = misfired
DB = broken bullet
EB = empty bullet

Condition
I = intact
B = broken
S = shattered

Lithology
Ss. = Sandstone
Slat. = Siltstone
Clyst. = Claystone
Sh. = Shale
Ls. = Limestone
Dol. = Dolomite
Cgl. = Conglomerate

Color
G = gold
gy = gray
brn = brown
grn = green
y. = yellow

Grain Size
v.fn. = very fine
fn. = fine
m. = medium
cse = coarse
Cgl. = Conglomerate

Consolidation
U = unconsol, loose
P = poor
H = hard
M = moderate
L = loose

Porosity
P = poor
F = fair
G = good

Secondary Material
sl. = slightly
m. = moderately
v. = very
) argillac.
) silty
) calcar.

Odor
Fl = faint
F. = fair
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AMOCO SIDEWALL CORE DESCRIPTION REPORT

Well: CAPE SORELL NO. 1

Field: OFFSHORE W. TASMANIA

Date: SEPTEMBER 5, 1982

RUN NO 1

Page 2 of 7

Elev. (K.B.): 72 (ft) MSL

Geologist(s): WESLEY F. BARRETT

Company: AMOCO AUSTRALIA PETROLEUM CO.

Service Co. SCHLUMBERGER

Recovered 44 of 51 Attempts

NO.	ACC.	ACT.	SWC DEPTH (ft.)	RECOV. Inches	CONDITION	LITHOLOGY	COLOR	GRAIN SIZE	Consolidation	Porosity	SECONDARY MTL.			SHOWS				REMARKS
											Arg.	Silty	Calc.	Odor	Stain	Fluoresc.	Cut Fluoresc.	
15			11,198	1/4	1 piece broken, w/ drilg mud	Cgl Matrix: Grnsh-wht,qtz-chlorite-calcite schistose	Grnsh wht							0	0	0	clr w/mod pale ylw fluor	Tulsa
16			11,186	5/8	1 piece	Cgl Matrix: v/lt grnsh-wht extremely calcitic w/v/mino-chlorite, qtz, kaolin, pyrite, aug(?)	very light grn-wht							0	0	0	Clr w/v/pale ylw fluor	Tulsa
17			11,173	1/2	1 piece broken	Cgl Matrix: Schistose, qtz-chlorite-calcite-augite(?) rutile, kaolinitic	Med grnsh wht							0	0	0	Clr w/extremely pale ylw fluor	Tulsa
18			11,173	1/2	1 lrg frag w/broken pieces	Clystn: Med gry-brn,mod hd siliceous,v/abund blk dissen carb, abund mica tr garnet(?) non-calc	Med Gry-brn							0	0	0	Clr w/med brt, mod int transp ylw fluor	Paleo/Palynd Robtsn Res
19			11,169	1/2	broken	Cgl Matrix: Med lt gry-wht qtz-calcite-kaolin-chlorite-augite-garnet-schistose	Med lt gry-wht							0	0	0	Clr w/extr pale ylw	Tulsa
20			11,169	3/4	broken	Detrital Cgl Matrix: Dk grn schistose sub-matrix w/ detrital qtz, chlorite, feldsp(?)chalced,vitrain,garnet-calcite	dk grn							0	0	0	Clr w/extr pale ylw	Tulsa
21			11,136	3/4	1 piece, broken	Cgl: Med dk grn w/mottled wht, w/dk gry brn, dk gry grn,micro-pyritic (cubes) clystn frags,v/calcitic	Grn-wht & med gry mot							0	0	0	Clr w/extr pale ylw	Tulsa
22			11,034	1/2	broken	Cgl Matrix: Dk gry-grn w/ detrital qtz, dk gry qtzite	Grn-wht & med							0	0	0	Clr w/extr pale ylw	Tulsa

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											Arg.	Silty	Calc.	Odor	Stain	Fluoresc.	Cut Fluoresc.	
23			10,974	3/4	1 piece	Clystn: Dk gry-brn; mod soft sub-fis, non-calc, blk carb, micro-mica, siliceous, tr chlorite	DkGrn brn							0	0	0	Extr lt straw ylw w/extr brt w int poorly transp golden-ylw fluor	Geochem Robtsn Res
24			10,974	3/4	1 piece broken	Clystn: wht kaolin, tr chloritic w/v abund silt-grade qtz, feldsp(?), non-calc	wht-to pale grn-wht							0	0	0	Clr w/mod pale ylw	Paleo/Paly Robtsn Res
25			10,914	3/4	broken	Clystn: Med dk brn, mod hd, mod sub-fis, non-calc, var silty, abund blk carb(qtz, feldsp, aug?)	med-dk brn							0	0	0	Clr w/mod brt & int transp w/ylw fluor	Geochem Robtsn Res
26			10,914	Lost	broken bullet	-	-	-	-	-	-	-	-	-	-	-	-	-
27			10,892	1	broken	Clystn: Med gry-grn v/soft, dom kaol, variably highly chloritic, blk carbonaceous	Med gry-grn							0	0	0	tr calcite pale ylw fluor	Paleo/Palynol Robtsn Res
28			10,771	7/8	1 piece	Clystn: Med dk "choc" brn, mod hd, sub-fis, micro-mica, non-calc, tr ferric-oxide stain, rutile(?) dessem and veinlets	med dk choc brn							0	0	0	Clr w/v brt & int, transp lt ylw	Geochem Robtsn Res
29			10,771	5/8	broken	Clystn: Med dk "choc" brn, mod hd, sub-fis, non-calc highly homogeneous cly	MedDk Choc Brn									0	Clr w/v brt & int, transp lt ylw	Paleo/Paly no1 Robtsn Res

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Geologists: WESLEY F. BARRETT

Company: AMOCO AUSTRALIA PETROLEUM CO.

Service Co. SCHLUMBERGER

Recovered 44 of 51 Attempts

NO.	A.C.C.	ACT.	SWC DEPTH (ft.)	RECOV. Inches	CONDITION	LITHOLOGY	COLOR	GRAIN SIZE	Consol- idation	Poros- ity	SECONDARY MTL.			SHOWS				REMARKS
											Arg.	Silty	Calc.	Odor	Stain	Fluoresc.	Cut Fluoresc.	
30			10,608	3/4	1 piece, broken	Clystn: Dk gry-brn, mod hd, sub-fis, non-calc, abund rutile(dissem & veins)blk carb, pyrite	Dk gry- brn							0	0	0	Clr w/v brt & int, transp lt ylw	Paleo/Palynol Robtsn Res
31			10,608	1	1 piece, cracked	Clystn: Dk gry-brn brn-blk, mod hd, sub-fis, variable, extremely blk gibsonitic, non-calc	DkGry- Brn to Brn- Blk							0	0	0	lt straw w/ extr int & brt translu golden ylw fluor	Geochem Robtsn Res
32			10,589	1/2	broken	Ss: Dk gry-wht, v/soft, highly fri, non-calc w/wht kaol matrix dom frsted qtz & feldsp, dom sub ang, tr "matrix"								0	0	0	Clr w/extrem pale ylw fluor	Tulsa
33			10,588	lost	empty	-	-	-	-	-	-	-	-	-	-	-	-	-
34			10,503	1	1 piece	Clystn: Dk "choc" brn, mod hd, sub-fis, non-calc micro- mica	Dk choc brn							0	0	0	Clr cut w/ med brt & int transp ylw fluor	Paleo/Palynol Tulsa
35			10,503	3/4	1 piece	Clystn: Dk "choc" brn, mod hd, sub-fis, tr calc, abund wht silt beds (w/tr kaol)	Dk choc brn							0	0	0	Clr cut w/ med brt ylw fluor	Geochem Tulsa

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Sh. = Shale
Ls. = Limestone
Dol. = Dolomite
Cgl. = Conglomerate

Color
G = gold
gy = gray
brn = brown
grn = green
y. = yellow

Grain Size
v.fn. = very fine
fn. = fine
m. = medium
cse = coarse
Cgl. = Conglomerate

Consolidation
U = unconsol, loose
P = poor
H = hard
M = moderate
L = loose

Porosity
P = poor
F = fair
G = good

Secondary Material
sl. = slightly
m. = moderately
v. = very
) argillac.
) silty
) calcar.

Odor
Ft = faint
F. = fair
G = good



AMOCO SIDEWALL CORE DESCRIPTION REPORT

Well: CAPE SORELL NO. 1

Date: SEPTEMBER 5, 1982

RUN NO 1

Page 5 of 7

Field: OFFSHORE W. TASMANIA

Geologist(s): WESLEY F. BARRETT

Elev. (K.B.): 72 (ft) MSL

Company: AMOCO AUSTRALIA PETROLEUM CO.

Service Co. SCHLUMBERGER

Recovered 44 of 51 Attempts

NO.	ACC.	ACT.	SWC DEPTH (ft.)	RECOV. Inches	CONDITION	LITHOLOGY	COLOR	GRAIN SIZE	Consol- idation	Poros- ity	SECONDARY MTL.			SHOWS				REMARKS
											Arg.	Silty	Calc.	Odor	Stain	Fluoresc.	Cut Fluoresc.	
36			10,437	3/4	1 piece	Clystn: Dk brn & dk gry brn, mod hd, sub-fis, non-calc, mod hydra, v/silty, tr blk carb bentonitic	DkBrn							0	0	0	Clr cut int med brt, int transp ylw fluor	Paleo/Palynol Robtson Res
37			10,437	7/8	1 piece	Clystn: Dk gry-brn, v soft, v/silty, highly hydratable blk carb, non-calc bentonitic	dk gry-brn							0	0	0	Clr cut w/ v/pale ylw fluor	Geochem Robtson Res
38			10,313	7/8	1 piece	Clystn: Dk "choc" brn, mod soft, sub-fis, non-calc, blk carb, variably silty, rutile(?)	dk "choc" brn							0	0	0	Lt str w/v/ brt, v/int, mod transp ylw	Paleo/Polynol Robtson Res
39			10,313	lost	broken bullet	-	-	-	-	-	-	-	-	-	-	-	-	-
40			10,268	5/8	1 piece	Ss: Gry-wht ("salt & paper") v/soft, highly fri, wht kaol matrix, v/slight tr calc, ang-sub-ang qtz, feldsp, tr dk grn, chloritic	gry-wht							0	0	0	Absent	Tulsa
41			10,267	1/2	broken	Ss: Gry-wht ("salt & paper") v/soft, highly fri, non-calc, extremely kaolinitic, dom ang qtz & feldsp (frst d w/ minor clr) tr mafics	gry-wht							0	0	0	Absent	Tulsa
42			10,180	5/8	broken	Clystn: Med dk "choc" brn, mod soft, sub-fis, non-calc, w/ silt, tr blk carb	medDk "choc" brn							0	0	0	Clr w/v/pale ylw fluor	Paleo/Palynol Robtson Res

Recovery
LB = lost bullet
MF = misfired
DB = broken bullet
EB = empty bullet

Condition
I = intact
B = broken
S = shattered

Lithology
Ss. = Sandstone
Siltst. = Siltstone
Clyst. = Claystone
Sh. = Shale
Ls. = Limestone
Dol. = Dolomite
Cgl. = Conglomerate

Color
G = gold
gy = gray
brn = brown
grn = green
y. = yellow

Grain Size
v.fn. = very fine
fn. = fine
m. = medium
cse = coarse
Cgl. = Conglomerate

Consolidation
U = unconsol, loose
P = poor
H = hard
M = moderate
L = loose

Porosity
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AMOCO SIDEWALL CORE DESCRIPTION REPORT

Well: CAPE SORELL NO. 1

Date: SEPTEMBER 5, 1982

RUN NO 1

Page 6 of 7

Field: OFFSHORE W, TASMANIA

Geologist(s): WESLEY F. BARRETT

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Recovered 44 of 51 Attempts

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											Arg.	Silty	Calc.	Odor	Stain	Fluoresc.	Cut Fluoresc.	
43			10,180	3/4	1 piece	Clystn: Dk gry-brn, mod soft, sub-fis, non-calc, highly kaol, v/silty variable, blk carb	DkGry brn							0	0	0	Clr w/v/ pale ylw fluor	Paleo/Palynol Robtsn Res
44			9,946	lost	empty	-	-	-	-	-	-	-	-	-	-	-	-	-
45			9,946	1/2	broken	Ss: Gry-wht('salt & pepper') vfn v/soft, extr fri, rare mod hd, non-calc, hi kaol, qtz feldsp (frsted), mafics, abund grn grains (chloritic?) dom ang to sub-ang	gry-wht							0	0	0	Clr w/extr pale ylw fluor	Tulsa
46			9,808	1	broken	Ss: Gry-wht('salt & pepper') vfn, v/soft, extr fri, non-calc, hi kaol, abund rutile, abund chlor grain, sub-ang qtz/feldsp, frst	gry-wht							0	0	0	Absent	Tulsa
47			9,808	1	broken	Ss: Gry-wht('salt & pepper') v/soft, extr fri, non-calc, hi kaol ang-subang, frst qtz/feldspr chlor, mafics	gry-wht							0	0	0	Absent	Tulsa
48			9,622	1-1/4	1 piece	Ss: Med gry (salt & pepper) v/soft, vfn, highly fri tr calc, highly kaol, abund rutile(?), chloritic grains, mafics, mica, sub-ang to sub-rnd, frst qtz & felspr	Med gry							0	0	0	Absent	Tulsa

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AMOCO SIDEWALL CORE DESCRIPTION REPORT

Well: CAPE SORELL NO. 1

Page 7 of 7

Field: OFFSHORE W. TASMANIA

Date: SEPTEMBER 5, 1982

RUN NO 1

Elev. (K.B.): 72 (ft) MSL

Company: AMOCO AUSTRALIA PETROLEUM CO.

Geologist(s): WESLEY F. BARRETT

Service Co. SCHLUMBERGER

Recovered 44 of 51 Attempts

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											Arg.	Silty	Calc.	Odor	Stain	Fluoresc.	Cut Fluoresc.	
49			9,622	1/16	v broken, small amt	Ss: Med gry (salt & pepper)	MedGry							0	0	0	Insufficient amt to cut	Tulsa
						v/soft, extr fri, non-calc, v/kaol, vfn rutile, chlor												
						frst, ang, qtz/feldspr												
50			9,586	5/8	broken	Ss: Dk gry("salt & papper") v/soft, extr fri, tr calc.	DkGry							0	0	0	Absent	Tulsa
						highly kaol, vfn, dom ang, qtz/feldsp, chlor, mafics, rutile(?)												
51			9,586	3/4	broken	Ss: vfn, dk gry (salt & pepper), v soft, extr fri, calc, highly kaol, tr blk carb, ang, frst qtz/feldsp;	dk gry							0	0	0	Absent	Tulsa
						grns, reds, blks (chlor, rutile, mafics)												

Recovery
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APPENDIX C

Geochemical Analyses

Cape Sorell No. 1

DATA FROM ROBERTSON RESEARCH SINGAPORE (RRI),
WITH ADDITIONAL ANALYSES OF THEIR DATA

Depth	Wt. o/o TOC	Source Analysis	TMAX	Generation Zone Analysis	(mg/gTOC)		Source Analysis	(mg/gTOC)		S2/S3	Petroleum Analysis	Prod. Index	Prod. Analysis	Yield
					HI	S ₂ =(HI)(TOC)		OI	S ₃ =(OI)(TOC)					
10180	1.07	Good	436	Low oil	61	6.53	Poor	37	3.96	1.65	Dry Gas	0.18		0.79
10303	3.97	Very Good	421	Immature	325	129.03	Very good	20	7.94	16.25	Oil	0.13		14.82
10437	0.96	Fair to good	440	Oil	65	6.24	Poor	69	6.62	0.94	Dry gas	0.26		0.84
SWC No. 30														
10608	3.83	Very good	420	Immature	318	121.79	Very good	27	10.34	11.78	Oil	0.13		17.00
10608	18.60	Very good	422	Immature	349	649.14	Very good	24	44.64	14.54	Oil	0.09		17.00
10771	4.46	Very good	428	Immature	345	153.87	Very good	19	8.47	18.17	Oil	0.10		6.16
SWC No. 24														
10771	1.99	Very good	432	Immature	274	54.53	Very good	18	3.58	15.23	Oil	0.12		1.54
10892	1.34	Good	435	Low oil	79	11.06	Poor	31	4.15	2.67	Wet gas	0.31		1.60
10914	1.14	Good	438	Oil	112	12.77	Fair	34	3.88	3.29	Wet gas	0.20		1.12
10974	0.80	Fair	436	Low oil	106	8.48	Poor	16	1.28	6.63	Oil	0.24		
RRI	RRI		RRI		RRI			RRI				RRI		RRI

Indigenous Hydrocarbons (not migrated)

With only two exceptions the samples analysed are organically rich with "average" to "above average" TOC contents. Pyrolysis analyses indicate that with few exceptions the kerogens are relatively hydrogen rich with moderately high hydrogen indices typical of a mixed gas/oil-prone kerogens. TMAX suggest that the organic matter present should be thermally immature to early mature. Major part of the samples analysed show high potential yield values suggesting that these lithologies have "good" potential as a source of hydrocarbons (likely oil/gas) at the optimum level of thermal maturity. Production indices indicate that a large proportion of hydrocarbon potential is already available as free hydrocarbons.

RH/slc

202/TT(2)

ROBERTSON RESEARCH (U.S.) INC.

REPORT NO. 823/110

GEOCHEMICAL ANALYSIS OF
TWO SIDEWALL CORES FROM
CAPE SORELL - 1 WELL
TASMANIA

by

Wallace G. Dcw

Project No. RRUS/823/T/110/2

Prepared by:

Robertson Research (U.S.) Inc.
16730 Hedgcroft, Suite 306
Houston, Texas 77060

Prepared for:

Amoco Production Co.
P. O. Box 4381
Houston, Texas 77210

October 8, 1982

ROBERTSON
RESEARCH (U.S.) INC.

APPENDIX I

TOTAL ORGANIC CARBON DATA

Total organic carbon is determined by pulverizing the sample, treating a carefully weighed portion with warm hydrochloric acid to remove carbonate minerals, and analysing the residue for carbon content with a Leco carbon analyser. It is generally accepted that samples with less than about 0.5 percent TOC cannot yield sufficient petroleum to form commercial deposits and are therefore considered nonsources; samples with between 0.5 and 1.0 TOC are rated as marginal in source quality; and samples with more than 1.0 TOC are considered to be good in source quality.

ROCK-EVAL PYROLYSIS DATA

Rock-Eval data are expressed as mg/g of rock and include four basic parameters: 1) S_1 represents the quantity of free hydrocarbons present in the rock and is roughly analogous to the solvent extractable portion of the organic matter; 2) S_2 represents the quantity of hydrocarbons released by the kerogen in the sample during pyrolysis; 3) S_3 is related to the amount of oxygen present in the kerogen; and 4) T_{max} , in °C, is the temperature at which the maximum rate of generation (of the S_2 peak) occurs and can be used as an estimate of thermal maturity.

In addition, the ratio S_2/S_3 provides a general indication of kerogen quality (type) and reveals whether oil or gas are likely to be generated. The ratio $S_1/(S_1+S_2)$, or the productivity index, is an indication of the relative amount of free hydrocarbons (in place or migrated) present in the sample. Hydrogen index values are in mg of hydrocarbons (S_2 peak) per gram of organic carbon and oxygen index values are in mg of CO_2 (S_3 peak) per gram of organic carbon. When plotted against each other on a van Krevelen-type diagram, information on kerogen type and maturity can be obtained.

Data are interpreted in the following manner:

Source Potential - values of S_2 <2.5 : poor
 2.5-5.0 : marginal
 5.0 > : good

Petroleum Type - values of S_2/S_3 <2.5 : dry gas
 2.5-5.0 : wet gas
 5.0 > : oil

Generation Zones - values of T_{max} <435 : immature
 435-470 : oil
 450 + : gas

Productivity Index - high values of $S_1/(S_1+S_2)$ indicate migrated hydrocarbon.

ROBERTSON
RESEARCH (U.S.) INC.

TOTAL ORGANIC CARBON DATA

CAPE SORELL #1

DEPTH (Feet)	TOC (%)	DEPTH (Feet)	TOC (%)
10503	1.89	11242	1.36

ROCK-EVAL PYROLYSIS RAW DATA

CAPE SORELL #1

DEPTH (FEET)	S1	S2	S3	S2/S3	S1/(S1+S2)	T-MAX
10503	0.650	3.767	0.163	23.082	0.147	421
11242	0.166	1.402	0.159	8.801	0.106	437

HYDROGEN AND OXYGEN INDICES FROM ROCK-EVAL PYROLYSIS DATA, WITH TOC DATA

CAPE SORELL #1

DEPTH (FEET)	HYDROGEN INDEX (mg HC/g TOC)	OXYGEN INDEX (mg CO2/g TOC)	TOC (%)
10503	199	9	1.89
11242	103	12	1.36

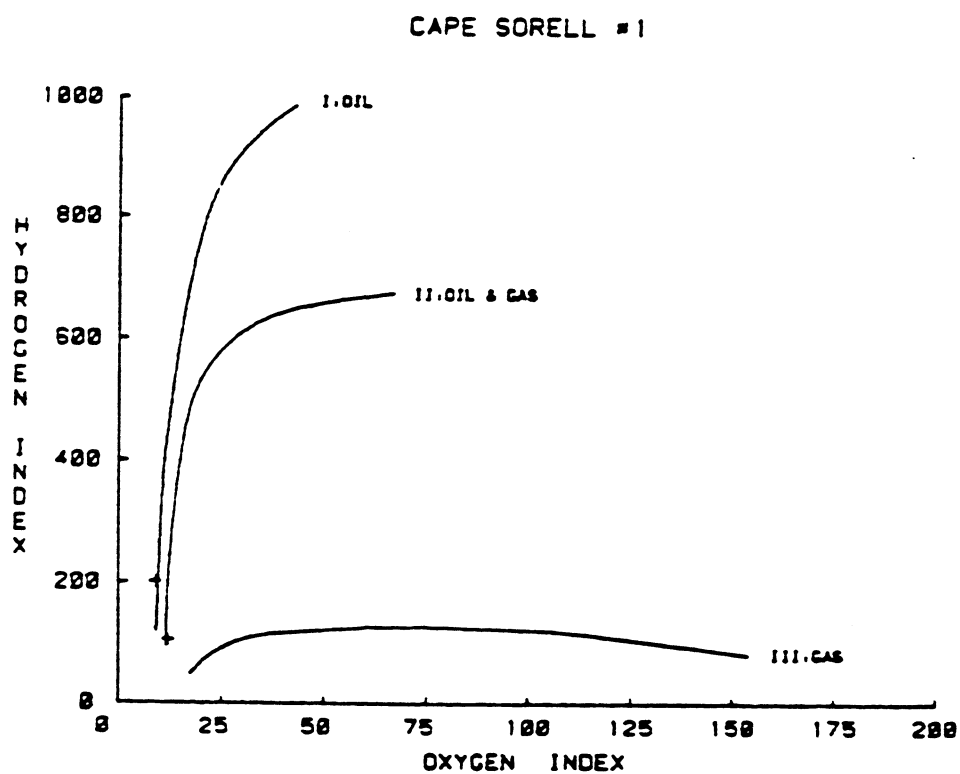


FIGURE : KEROGEN TYPE DETERMINATION FROM ROCK-EVAL
PYROLYSIS DATA

APPENDIX II

REFLECTED LIGHT MICROSCOPY DATA

A sample of ground rock is treated successively with hydrochloric and hydrofluoric acids to concentrate the kerogen, freeze-dried, mounted in an epoxy plug, and polished. Kerogen type is identified with the aid of blue light fluorescence.

The visual kerogen analysis data table contains visual percentage estimates of each principle kerogen type and kerogen background fluorescence data. This data is also displayed on the histograms with relative amounts of solid bitumen and coked material.

The histograms show measured reflectance values of all vitrinite present and on all material with the visual appearance of vitrinite. Shaded values (marked with *) are those used to calculate the interpreted vitrinite reflectance maturities. Unshaded values are interpreted to be oxidized vitrinite, recycled vitrinite, or possibly misidentified material such as solid bitumen, pseudo-vitrinite, or semifusinite. When samples analysed contain no vitrinite, nonindigenous vitrinite or have an insufficient number of readings to allow a reliable maturity determination to be made, then the mean value for that sample is shown as N. D. (Not Determined). Alternate maturity calculations are possible on a few samples. The histograms are identified by a Robertson Research sequence number (RRUS No.) and depth or other notation.

ABBREVIATIONS USED IN VISUAL KEROGEN ANALYSIS DATA SHEET AND HISTOGRAMS

Am	:	Amorphous Kerogen
Ex	:	Exinite
Vit	:	Vitrinite
Inert	:	Inertinite
R _o	:	Vitrinite Reflectance Mean in Immersion Oil
Bkg Fl	:	Background Fluorescence

INTRODUCTION

Two sidewall cores from the Cape Sorell - 1 well, Tasmania were submitted for organic carbon and Rock-Eval pyrolysis analysis. The data was reported and the samples resubmitted for vitrinite reflectance and organic extract analysis. This report covers all the analyses performed on the samples.

DISCUSSION

Both samples are quite high in total organic carbon and are rated as good in source quality. Pyrolysis S_2/S_3 ratios and hydrogen/oxygen indices both suggest the presence of oil-generating organic matter. Fairly low pyrolysis S_2 values, however, indicate only poor to marginal source potential. Visual kerogen analysis, reveals a predominance of gas-generating terrestrial kerogen with an unusually large amounts of inertinite, and moderate to large quantities of solid bitumen. This solid bitumen is probably responsible for the apparent oil-generating capability defined by pyrolysis. Consequently, we do not believe the samples represent oil source beds and should yield only gas.

Pyrolysis T-max indicate fairly low maturities in both samples but this is probably due to the solid bitumen present. Solid bitumen effects are especially severe in the sample from 10,503 feet. Vitrinite reflectance values reveal both samples are in the late stages of oil generation and in the early stages of gas generation. This is supported by high kerogen fluorescence which is greatest in the oil-generation zone. Although one sample contains some oxidized and rough vitrinite, causing a scatter in the data, we believe the reflectance values calculated probably represent the true maturity.

Relatively high pyrolysis S_1 values and productivity indices (S_1/S_1+S_2), especially in the shallow sample, suggest the presence of free hydrocarbons. Very low quantities of organic extract, however, indicate that oil or oil-like material is not present. Saturate fraction gas chromatograms do not resemble crude oil but appear to indicate the presence of trace amounts of diesel oil, probably from the drilling fluid. The oil shows reported in the cuttings from this interval are not present in the two sidewall cores.

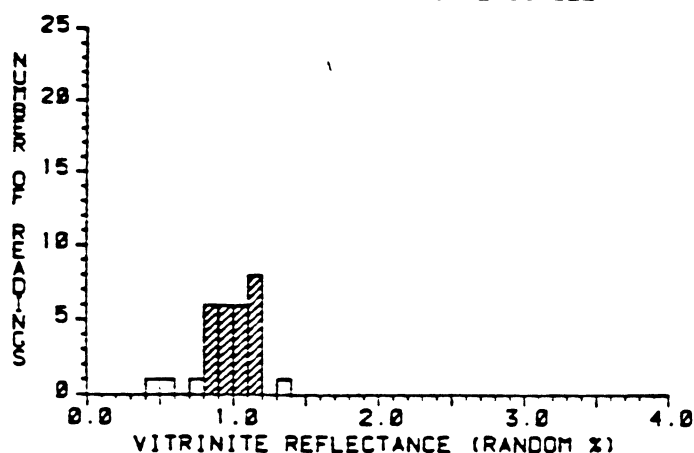
VISUAL KEROGEN ANALYSIS - REFLECTED LIGHT

CAPE SORELL #1

Project No. : RRUS/823/T/129/02

SAMPLE IDENTIFICATION		REFLECT.	KEROGEN CHARACTERISTICS						TOC
RRUS	DEPTH (Feet)	Ro %	Am%	Ex%	Vit%	Inert%	Fluor		%
1	10503	0.90	20	5	50	25	V Hi		1.89
2	11242	1.00	20	10	40	30	V Hi		1.36

CAPE SORELL #1



RRUS No. : 2

DEPTH : 11242.8 Ft
: 3426.6 M

* = Ro MATURITY

VALUES : 26

MEAN : 1.00
STD DEV : 0.11
MEDIAN : 1.01
MODE : 1.15

HISTOGRAM:
Range: 0- 4%
Increment: 0.10%

ORDERED REFLECTANCE VALUES:

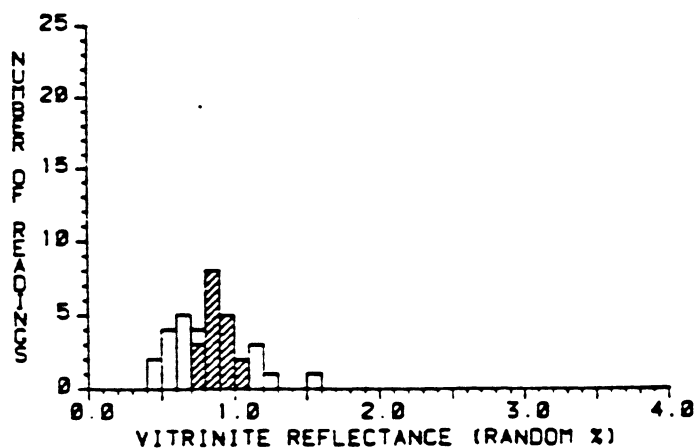
0.48	*0.93	*1.06
0.53	*0.95	*1.11
0.70	*0.96	*1.12
*0.81	*0.97	*1.12
*0.82	*0.97	*1.14
*0.85	*1.00	*1.15
*0.86	*1.01	*1.15
*0.89	*1.01	*1.17
*0.89	*1.01	*1.18
*0.91	*1.03	1.30

KEROGEN DESCRIPTION

Amorphous : 28 %
Exinite : 10 %
Vitrinite : 42 %
Inertinite : 30 %

Back Fluor : V High
Bitumen : High
Coke : 1r

CAPE SORELL #1



RRUS No. : 1

DEPTH : 10503.0 Ft
: 3201.3 M

* = Ro MATURITY

VALUES : 18

MEAN : 0.90
STD DEV : 0.08
MEDIAN : 0.88
MODE : 0.85

HISTOGRAM:
Range: 0- 4%
Increment: 0.10%

ORDERED REFLECTANCE VALUES:

0.42	0.67	*0.88	1.10
0.46	0.70	*0.88	1.11
0.51	*0.77	*0.89	1.16
0.51	*0.79	*0.90	1.24
0.56	*0.79	*0.93	1.51
0.56	*0.84	*0.96	
0.60	*0.85	*0.99	
0.62	*0.86	*0.99	
0.65	*0.87	*1.02	
0.66	*0.87	*1.03	

KEROGEN DESCRIPTION

Amorphous : 20 %
Exinite : 5 %
Vitrinite : 50 %
Inertinite : 25 %

Back Fluor : V High
Bitumen : Med
Coke : None

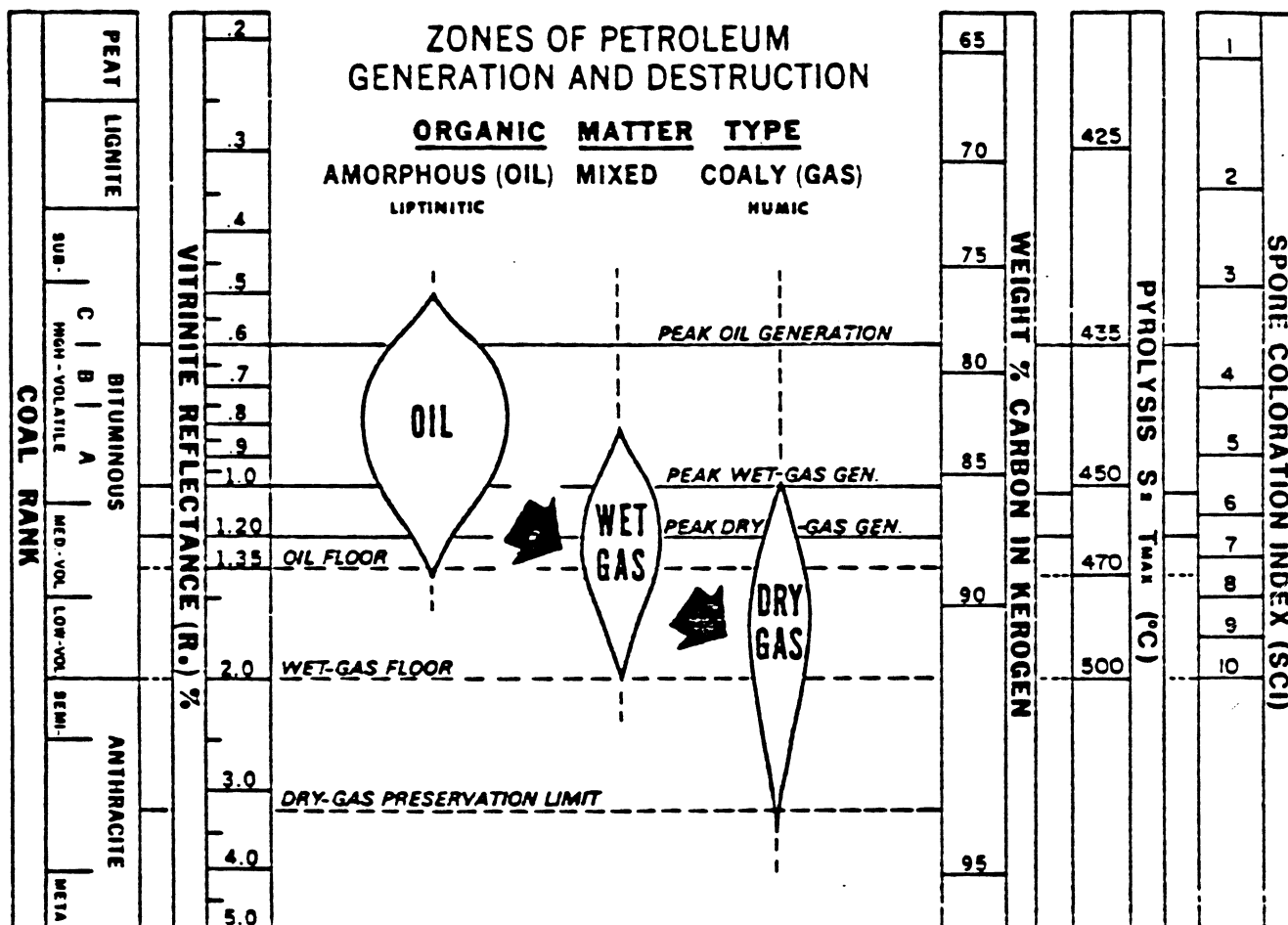


FIGURE : CORRELATION OF VARIOUS MATURATION INDICES AND ZONES OF PETROLEUM GENERATION AND DESTRUCTION.

APPENDIX III

ORGANIC EXTRACT DATA

Fifty grams of each sample is pulverized and soxhlet extracted for 18 hours with dichloromethane to obtain the total amount of extractable material. The extract is first deasphalted by precipitation with hexane. The soluble fraction is then separated into saturates, aromatics, and NSO compounds on a silica-alumina chromatographic column by successive elutions with hexane, benzene, and benzene-methanol solvents respectively. The total extract is expressed in parts per million of total sample extracted and the functional groups are expressed as weight percent of total extract.

Gas chromatograms of the C₁₅+ saturate fraction were produced with a Perkin-Elmer, Sigma 3 gas chromatograph fitted with a 12 foot, NaNO₃/LiNO₃/KNO₃ eutectic column. The chromatograph was programmed from 40°C to 360°C at 12°C/min. using helium carrier gas at the rate of 25 ml/min.

Straight chain paraffins (n-alkanes) are normalized between C₁₅ and C₄₀ to a sum of 100% and the percent of individual components plotted on bargraphs. Several ratios involving pristane (Pr) and phytane (Ph) are also calculated and plotted. Carbon preference index (CPI) values are calculated with the original Bray and Evans formula.

HEAVY HYDROCARBONS NORMALIZED TO 100%

CAPE SORELL #1

ID	C-10	C-11	C-12	C-13	C-14	C-15	C-16	C-17	C-18	C-19	C-20
10503	0.00	0.00	0.00	0.00	0.00	13.15	13.76	16.41	15.39	11.82	8.97
11242	0.00	0.00	0.00	0.00	0.00	13.40	11.06	20.64	19.47	15.21	10.11

ID	C-21	C-22	C-23	C-24	C-25	C-26	C-27	C-28	C-29	C-30
10503	7.54	5.91	3.36	1.43	1.22	0.00	1.02	0.00	0.00	0.00
11242	6.06	2.98	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ID	C-31	C-32	C-33	C-34	C-35	C-36	C-37	C-38	C-39	C-40
10503	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11242	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ID	PR/T X100	PH/T X100	PR/17	PH/18	PR/PH	CPI	C-MAX
10503	71.56	16.11	4.36	1.05	4.44	-	C-17
11242	48.40	12.77	2.35	0.66	3.79	-	C-17

COMPOSITION OF SOURCE ROCK EXTRACT

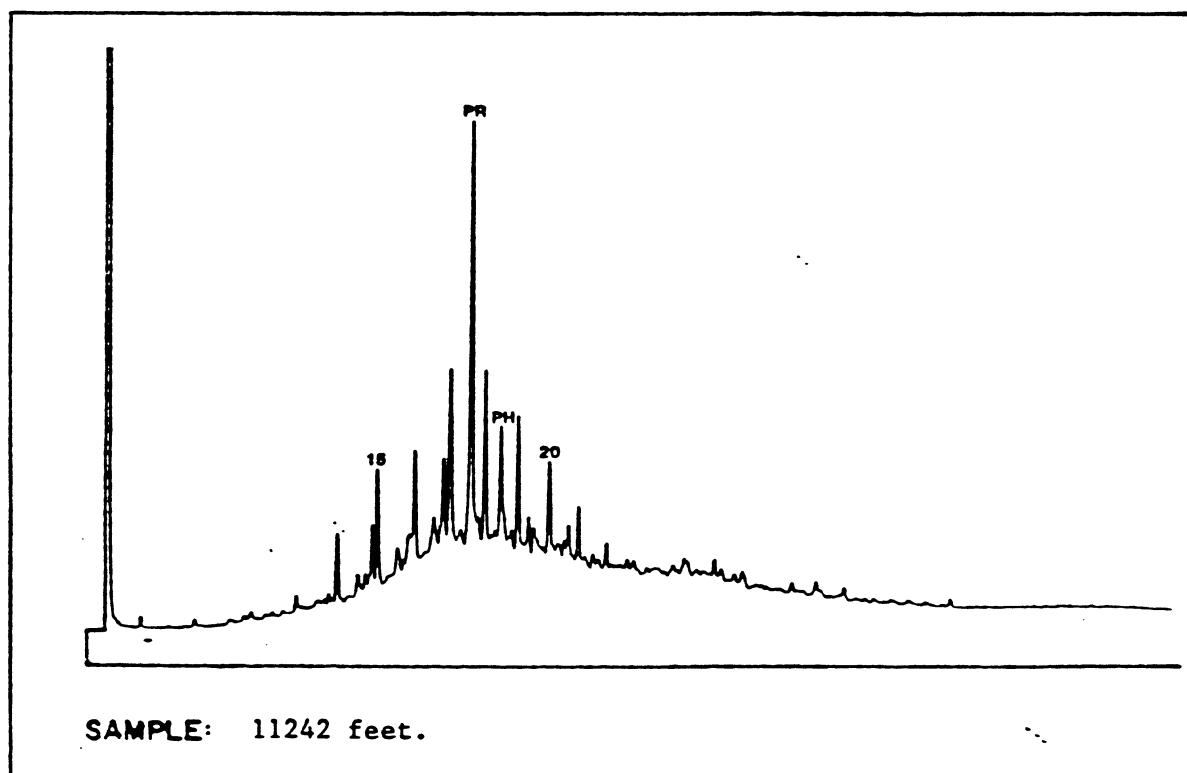
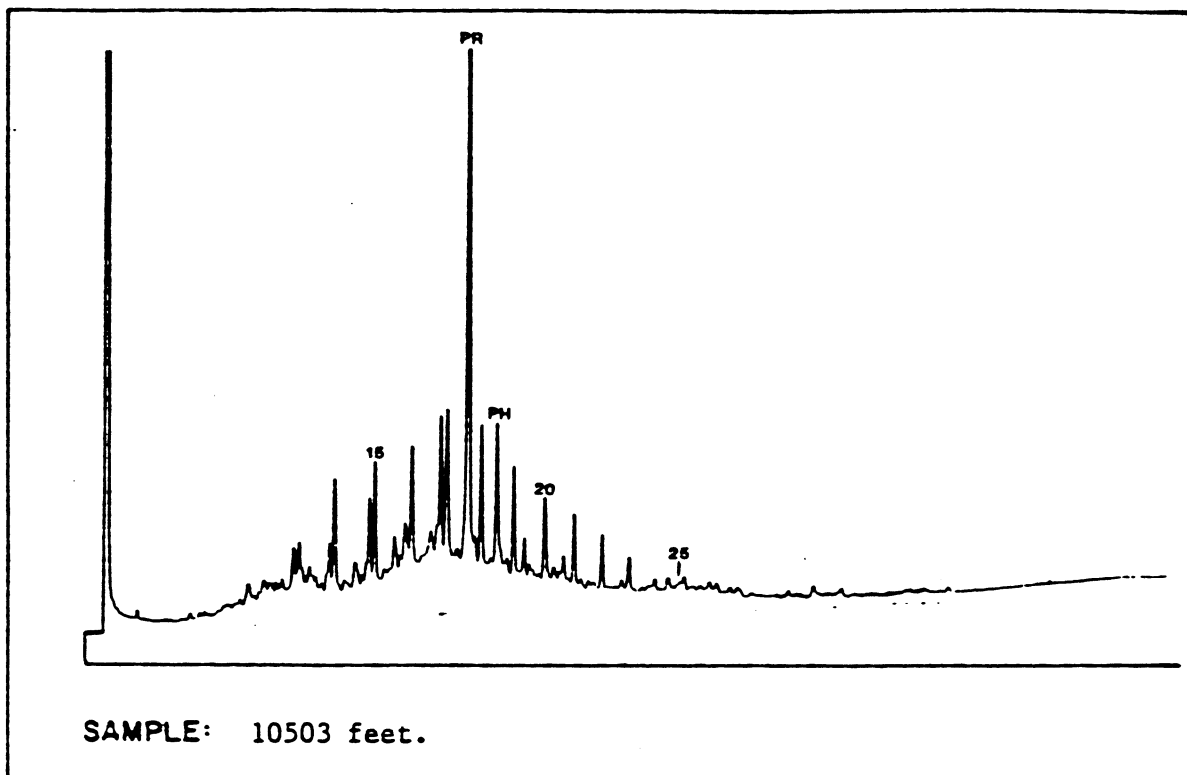
CAPE SORELL #1

DEPTH(FEET)	EXTRACT PPM	% SAT	% AROM	% NSO	% ASPH
10503	123	16.60	26.50	36.40	20.50
11242	35	24.10	29.60	20.40	25.90

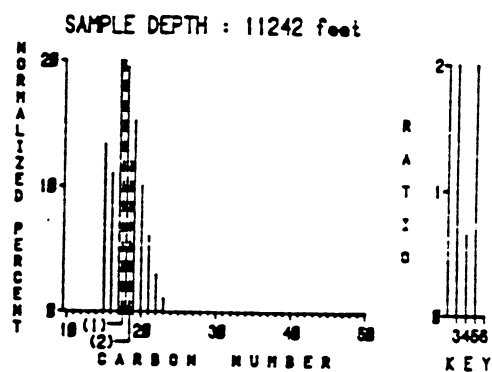
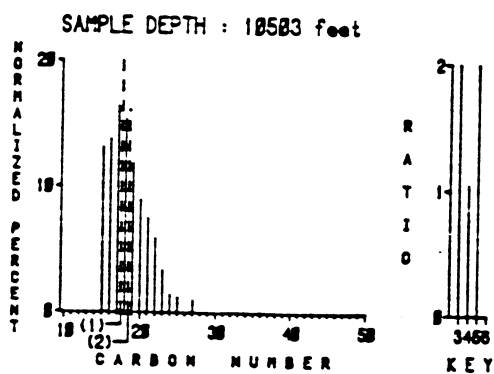
SUMMARY TABLE SHOWING GROUP COMPOSITION AND SELECTED PARAMETERS OF ROCK EXTRACT

CAPE SORELL #1

NOTATION	EXT/TOC	RELATIVE COMPOSITION			PR/PH	CPI
DEPTH(FEET)		%SAT	%ARO	%NSO+ ASPH		
10503	0.006	16.6	26.5	56.9	4.44	-
11242	0.003	24.1	29.6	46.3	3.79	-



GAS CHROMATOGRAMS OF C15+ SATURATE HYDROCARBONS



CAPE SORELL #1

1=100xPristane/Total 3=Pristane/n-C-17 5=Pristane/Phytane
 2=100xPhytane/Total 4=Phytane/n-C-18 6=Carbon Pref.Index

NORMALIZED DISTRIBUTION OF n-ALKANES

Geoservices overseas S.A.

AMOCO AUSTRALIA PETROLEUM CO.

CAPE SORELL 1

Final Well Report

Section 1

82/1056

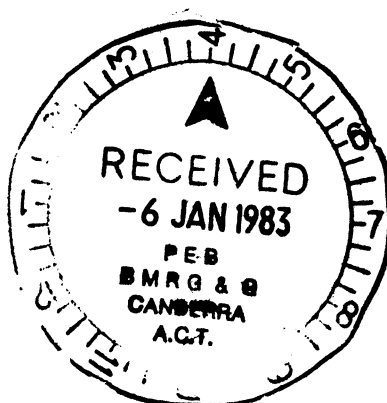
82/1056.

Amoco Australia Petroleum Company.

Cape Sorell 1

General Well Data.

Country	Australia
Area	Offshore West Tasmania
Location (proposed)	Lat: 42° 8' 9.54" S Long: 145° 1' 47.06" E
Drilling Contractor	Diamond M Drilling Co.
Rig	Diamond M Epoch (Semi Sub)
Elevation K.B. A.S.L.	72 ft 22.00
Seawater Depth	309 ft 94.00
Total depth	11576 ft 3525.36
Spudded	5.7.82
Reached T.D.	2.9.82
Drilled by	



SECTION 1

Contents

GENERAL

Well Summary
Days versus depth plot
Final Well Geometry plot
Bit record
Mud record

RIG ACTIVITY

Phase Summaries
Daily Well Diary

OVERPRESSURE

Overpressure Summary
D Exponent Plot 1/15000
D Exponent Plot 1/2000
Temperature Plot

DEVIATION

Deviation Plots
Deviation Data

GEOLOGY

Geology Summary
1/5000 Lithology plot

Contents

SECTION 2

Real Time Depth Plot

Bit Cost Plots

Bit Performance Plots

Drilling Data Reprint

D Exponent Print Out

SECTION 3

Real Time Print Out

Including Bit Data and Hydraulics Reports

GENERAL

Well Summary

Days versus depth plot

Final Well Geometry plot

Bit record

Mud record

WELL SUMMARY CAPE SORELL # 1

The main objective of the Cape Sorell # 1 well was to evaluate the hydrocarbon potential of structurally and stratigraphically confined Lower Cretaceous Pretty Hill sandstones and Upper Cretaceous Waaire sandstones.

The drilling site was located in the off-shore Cape Sorell Basin, approximately 7 1/2 miles west of Strahan in Tasmania. The water depth at the location was 308ft. below MSL. The proposed co-ordinates of the well were:

Latitude: 42 3 9.54

Longitude: 145 1 47.06

A satellite fix however showed the rig to be 20.32ft. (6.19m) off the proposed location.

The well was drilled using the semi-submersible "Diamond 1 Spoon" drilling unit. The well was spudded at 09.15hrs. Monday 5th. July 1982.

A 36" hole was drilled to 720ft. in 20 hours with a 26" Reed bit and a 36" hole opener. 30" casing was then run and the shoe set at 693ft.

A 12 1/4" hole was drilled to 1440ft. and then under-reamed to a diameter of 26". After conditioning the hole, the 20" casing was run and the shoe set at 1393ft. This operation took four days to complete.

Before drilling ahead the BOP was tested and a leak off was performed successfully on the formation below the casing.

A 12 1/4" hole was drilled to a depth of 4153ft. and subsequently under-reamed to a diameter of 17 1/2". Following hole conditioning and the completion of a full Schlumberger logging suite the 13 3/8" casing was run in and the shoe set at 4144ft.

The BOP stack was again successfully tested, however a leak off test at 4165ft. proved unsuccessful. After squeezing the cement a leak off test was successfully conducted at 4403ft.

A 12 1/2" hole was drilled to 9032ft. After conditioning and logging the hole, a 5/8" casing was run in and the shoe was set at 9002ft.

An 8 1/2" hole was drilled to TD. Oil and gas shows were recorded below 10110ft. to 11340ft. when a conglomerate bed was encountered. The BOP slowed dramatically within the conglomerate and it was decided to TD at 11576ft. at 18.00hrs. Thursday 2nd September.

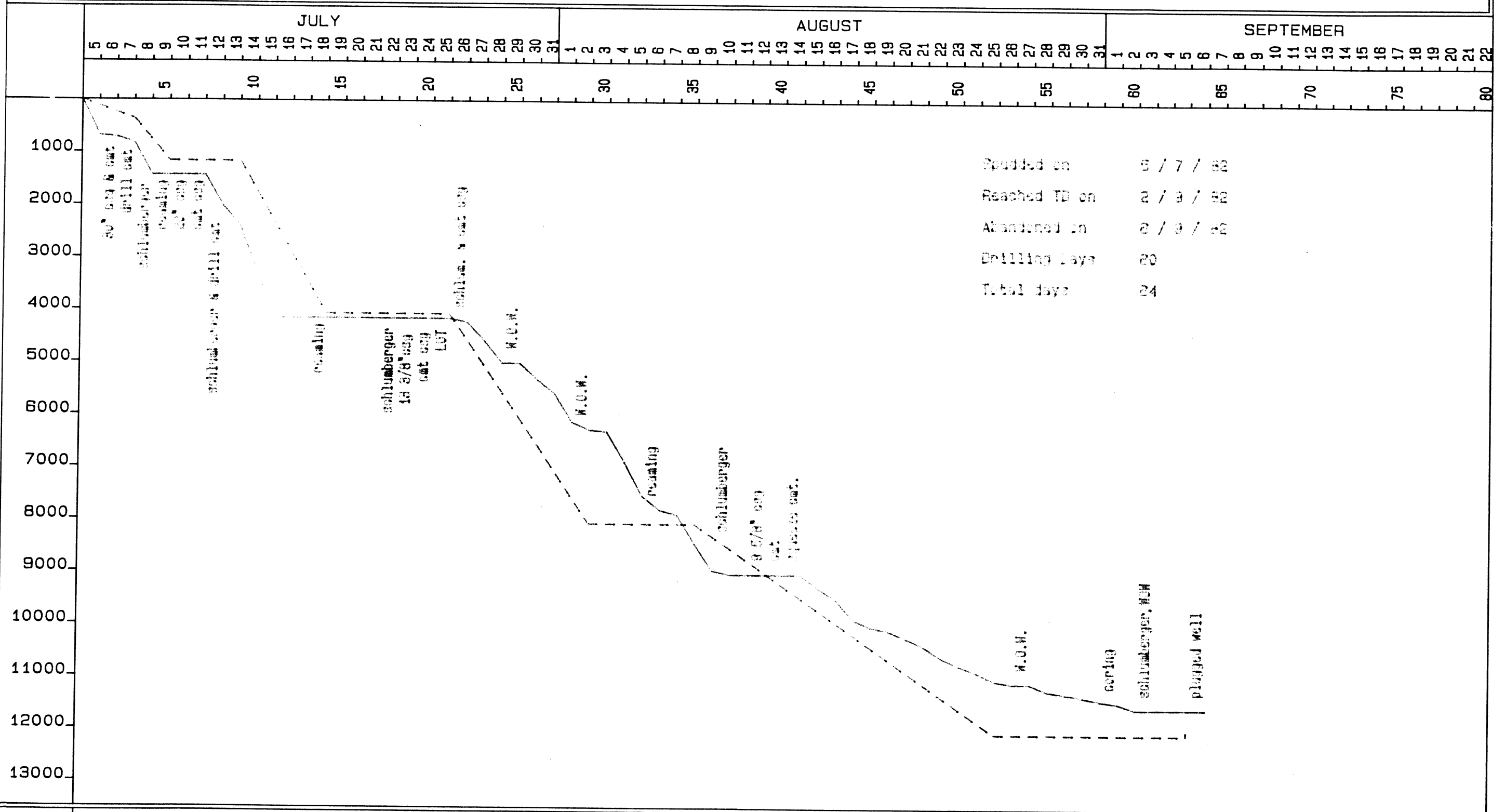
After running a final suite of Schlumberger logs the well was plugged and abandoned.

A.M.O.C.O

CAPE SORELL #1

Drilled Curve

Expected Curve



Daily footage

Geoservices : off line

Elevation KB 72.0 ft above MSL
Sea bed at 308.0 ft below MSL

Hole 36"
at 720.0 ft

Hole 26"
at 1420.0 ft

36" casing shoe at 896.0 ft

26" casing shoe at 1826.0 ft

Hole 17"1/2
at 4162.0 ft

17"1/2 casing shoe at 4144.0 ft

Hole 12"1/4
at 9030.0 ft

12"1/4 casing shoe at 9002.0 ft

Hole 8"1/2
at 11576.0 ft

AMOCO Aust. Pet. Ltd

CAPE MORELL 1

BIT RECORD

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*****
*NUMBER*  TYPE  *SIZE *DEPTH* RUN *FLOW* PP *  IN *BOTTOM*ROTARY* JETS/TPA * NO3 *RPM*  NEAR * ROP *  HYD POWER  * BIT * COST *
*      *      *      * IN  *Ft. *GPM *psi *      *HOURE *HOURE *1 *2 *3 *4 * lbs *      *T*3* G  *Ft/hr *TTL *BIT */sqi*EFF'Y* S/Ft *
*****
*      1*      DEED*25.00* 331* 309* 544* 350* 3.5* 11.50*  3.60*24*24*24* 0* 7000* 47*5*4*0.00* 35.83* 270* 42*0.06*15.53* 215*
*      2* SMITH DSJ*25.00* 690* 30*1033* 225* 3.5* 6.00*  3.50*24*24*24* 0*13000* 35*2*2*0.00*  8.57* 497* 237*0.12*57.69* 1532*
* 3rr2* SMITH DSJ*25.00* 672* 43*1033* 925* 3.5* 6.50*  3.50*22*22*22* 0*17000* 50*3*3*0.00* 13.71* 557* 405*0.50*72.38* 722*
*      4* SMITH F2*12.25* 720* 720* 516*1955* 3.5* 7.60*  4.95*13*13*13* 0*13000* 57*1*2*0.00*145.16* 539* 415*2.77*70.53*  65*
*      5* SMITH DSJ*25.00* 720*1420* 357*1313* 3.5* 17.60* 11.35*22*22*22* 0*13000* 57*2*4*0.00*125.11* 657* 229*0.34*34.93*  65*
*      6* SMITH SDCH*12.25* 1440* 627* 512*2112* 3.3* 13.30*  4.00*12*12*13* 0* 3000* 30*4*2*0.00*156.75* 631* 511*3.41*30.09* 105*
*      7* SMITH SDCH*12.25* 2067* 40* 497* 643* 3.6*  5.00*  2.90*20*20*20* 0*17000* 35*4*2*0.00* 13.79* 133*  66*0.44*35.20*  933*
*      8* SMITH F3J*12.25* 2107*2051* 472*1633* 3.6* 59.00* 29.50*13*13*13* 0*14000* 91*7*4*0.13*  50.53* 463* 313*2.12*62.34* 113*
*      9* SMITH DSJ*14.75* 1253* 792* 750*1500* 3.3*  6.50*  3.47*13*13*19* 0* 5000* 70*2*4*0.50*229.97* 709* 343*1.58*41.02*  51*
* 10rr10* SMITH DSJ*14.75* 2055* 617* 332*2000* 3.3* 15.00*  3.51*13*13*19* 0* 7000* 75*2*4*0.50*113.63* 971* 450*2.07*46.33*  70*
*      11* SMITH DSJ*14.75* 3033*  94* 305*2200* 3.9* 11.40*  5.95*13*13*19* 0*10000* 39*4*4*0.00*167.95*1033* 412*1.39*39.33*  62*
* 12rr11* SMITH DSJ*14.75* 4027*  34* 770*2000* 3.0*  5.00*  3.00*13*13*19* 0*10000* 75*4*4*0.00* 44.67* 393* 351*1.66*40.13* 272*
*      13* SMITH DSJ*12.25* 4064* 102* 554*2450* 9.0*  7.50*  1.70*12*12*12* 0*13000* 33*6*4*0.00* 60.00* 705* 741*4.94*93.22* 464*
*      14* SMITH SDCH*12.25* 4165* 421* 523*2419* 3.0* 20.30*  3.00*12*12*12* 0*24000* 32*7*4*0.00* 52.63* 745* 541*4.27*86.07* 225*
*      15* SMITH SDCH*12.25* 4597* 426* 533*2075* 0.3* 19.60* 10.90*14*14*14* 0*34000*113*7*4*0.50* 39.08* 551* 373*2.52*55.11* 216*
*      16* SMITH SDCH*12.25* 5013* 317* 530*2300* 9.2* 12.45*  9.30*16*15*16* 0*25000*199*7*4*0.25* 34.09* 711* 210*1.40*20.50* 209*
*      17* SMITH SDCH*12.25* 5330* 253* 586*1725* 9.2* 11.50*  9.70*16*15*15* 0*33000*115*5*4*0.00* 27.11* 590* 234*1.39*43.07* 233*
*      18* SMITH F2*12.25* 5593* 333* 532*1705* 9.1* 35.20* 23.00*16*15*15* 0*34000* 73*4*2*0.13* 23.72* 570* 275*1.33*47.47* 236*
*      19* SMITH F2*12.25* 5232*1436* 557*1727* 9.1* 60.50* 51.50*16*15*15* 0*22000* 93*5*4*0.33* 23.35* 571* 254*1.59*41.43* 191*
*      20* SMITH F2*12.25* 7302*  91* 541*1743* 9.1* 20.90*  2.25*16*15*15* 0*27000* 33*4*4*0.25* 40.44* 550* 221*1.47*40.12* 1172*
*      21* SMITH F2*12.25* 7393* 542* 532*1910* 9.1* 23.30* 13.90*16*15*15* 0*33000* 37*2*4*0.25* 33.99* 593* 210*1.40*35.40* 213*
*      22* SMITH F3*12.25* 3435* 597* 520*1927* 9.1* 25.30* 15.10*16*15*15* 0*33000* 33*2*3*0.13* 39.54* 535* 196*1.31*33.53* 205*
* 23rr13* SMITH SDCH* 8.50* 9932*  7* 349*1435* 9.1* 22.00*  9.90*13*13*13* 0*22000* 54*1*1*0.00*  7.73* 292* 136*1.38*46.50* 14324*
*      24* SMITH F3* 3.50* 9040* 460  223*1205* 9.2* 27.50* 15.70*13*13*13* 0*30000* 75*3*4*0.13* 29.43* 227* 109*1.51*47.09* 274*
*      25* SMITH F2* 3.50* 9409* 387  325*1345* 9.2* 33.50* 15.10*14*14*  0* 0*29000* 72*7*3*0.50* 24.04* 255* 136*2.57*72.81* 431*
*      26* SMITH F3* 3.50* 9387* 163* 323*1767* 9.3* 25.30* 12.50*14*14*  0* 0*29000* 59*5*4*0.38* 13.44* 338* 193*2.67*57.07* 760*
*      27* SMITH F4* 3.50*10056* 140* 327*1314* 9.5* 20.30* 12.30*14*14*  0* 0*40000* 53*4*3*0.25* 11.33* 346* 195*2.70*55.44* 732*
*      28* SMITH F2* 3.50*10196* 171* 307*1724* 9.5* 15.25* 12.30*14*14*  0* 0*37000* 66*4*3*0.25* 13.36* 309* 152*2.24*52.34* 543*
*      29* SMITH F3* 3.50*10367* 244* 330*2251* 9.6* 24.50* 22.20*13*13*  0* 0*35000* 63*3*4*0.00* 10.99* 433* 273*3.73*52.75* 504*
*      30* SMITH F3* 3.50*10511* 244* 332*2407* 9.6* 22.50* 21.10*13*13*  0* 0*35000* 65*3*3*0.13* 11.56* 466* 273*3.35*50.50* 474*
*      31* SMITH F3* 3.50*10855* 195* 329*2442* 9.5* 25.00* 22.00*13*13*  0* 0*34000* 62*5*3*0.25*  3.35* 459* 253*3.70*57.03*  640*
*      32* SMITH F3* 3.50*11050* 245* 334*2133* 9.5* 43.40* 30.70*13*13*  0* 0*30000* 59*5*5*0.25*  3.01* 417* 233*3.92*57.00*  795*
*      33* SMITH F7* 3.50*11296* 125* 324*1790* 9.6* 30.50* 21.00*12*12*12* 0*33000* 50*2*2*0.05*  5.95* 321* 153*2.19*49.19* 1137*
*      34* CORP* 3.50*11420*  3* 245* 796* 9.6*  6.50*  4.10* FPA:0.45 *22000* 50*0*0*0.00*  1.95* 114*  33*0.45*23.43* 3377*
*      35* SMITH F57* 3.50*11423* 149* 330*1705* 9.5* 26.10* 22.30*12*12*12* 0*39000* 50*4*3*0.05*  6.63* 346* 155*2.20*47.00* 358*
*****

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REMARKS

#1-3+35"H/O.#9-12+17.5"JR.
#9-12, jets 3x16+ball1+3x12.
#13,23 Drilled CWT,C3G shoe.
OH for C3G

GEOSSERVICES T.O.C.

CAPE SORELL

MUD RECAP FOR 17 1/2in. PHASE WATER BASE

```

*****
*DEPTH*TEMP* 1.W *VIS*PV*YP* GELS *FILTRATE* FILT.*FILTRATE ANALYSIS*SAND*REPORT ANALYSIS* * * *
*FEET *degF* poq *sec*co* *10 10 * API * *Ca ppm Cl ppm * % * OIL WATER SOLS* pH * pF* Mf*MBT*
* * * * *sec mn * cc * CAKE * * * % % % * * * *
*****
* 2022* 65* 3.50* 54* 4*44* 10* 13* 12.0 * 0/32* 120 * 4000 * Trc* 0 * 97 * 3 * 9.5*0.0*0.0* 0*
* 2400* 65* 3.50* 53*15*23* 9* 13* 12.0 * 0/32* 100 * 5000 * Trc* 0 * 97 * 3 * 9.5*0.0*0.0* 0*
* 3547* 65* 3.30* 42* 3*12* 12* 22* 12.0 * 0/32* 120 * 4000 * Trc* 0 * 97 * 3 * 9.5*0.0*0.0* 0*
* 4158* 64* 3.70* 23* 3* 1* 12* 52* 13.0 * 0/32* 100 * 4000 * Trc* 0 * 97 * 3 * 9.0*0.0*0.0* 0*
* 4162* 66* 3.00* 33*20*35* 23* 32* 9.0 * 2/32* 30 * 4500 *0.25* 0 * 97 * 3 * 10.0*0.0*0.0* 0*

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GEOSSERVICES T.O.C.

CAPE SORELL

MUD RECAP FOR 12 1/4in. PHASE WATER BASE

```

*****
*DEPTH*TEMP* 1.W *VIS*PV*YP* GELS *FILTRATE* FILT.*FILTRATE ANALYSIS*SAND*REPORT ANALYSIS* * * *
*FEET *degF* poq *sec*co* *10 10 * API * *Ca ppm Cl ppm * % * OIL WATER SOLS* pH * pF* Mf*MBT*
* * * * *sec mn * cc * CAKE * * * % % % * * * *
*****
* 4168* 37* 9.00* 53*17*12* 6* 15* 11.4 * 2/32* 160 * 5000 *0.40* 0 * 95 * 4 * 12.0*0.3*0.9* 15*
* 4131* 87* 9.00* 41*11* 5* 3* 12* 14.4 * 2/32* 140 * 7000 * Trc* 0 * 95 * 4 * 12.0*0.9*1.6* 15*
* 4535* 39* 9.00* 43*15*10* 3* 17* 3.3 * 0/32* 140 * 6000 * Trc* 0 * 95 * 5 * 11.5*0.4*0.6* 15*
* 5013* 37* 9.20* 49*14*12* 4* 13* 3.2 * 2/32* 160 * 5500 *0.20* 0 * 94 * 6 * 10.0*0.2*0.4* 13*
* 5095* 82* 9.20* 50*15*10* 5* 21* 9.3 * 1/32* 220 * 6500 * Trc* 0 * 94 * 5 * 9.5*0.1*0.2* 13*
* 5327* 34* 9.10* 43*11* 9* 4* 15* 9.9 * 1/32* 150 * 5500 * Trc* 0 * 94 * 6 * 10.0*0.2*0.3* 15*
* 5450* 34* 9.20* 40*13*13* 3* 15* 8.9 * 1/32* 120 * 6000 * Trc* 0 * 94 * 6 * 10.0*0.2*0.3* 15*
* 5594* 81* 9.20* 43*12* 9* 4* 15* 9.6 * 1/32* 100 * 5500 * Trc* 0 * 95 * 5 * 10.5*0.2*0.3* 16*
* 6132* 80* 9.10* 44*11*10* 2* 14* 9.2 * 1/32* 100 * 6000 * Trc* 0 * 95 * 5 * 9.0*0.2*0.4* 15*
* 6260* 90* 9.10* 45*11*11* 3* 15* 8.0 * 2/32* 110 * 5000 * Trc* 0 * 95 * 5 * 9.5*0.3*0.5* 14*
* 6310* 37* 9.10* 43*13*11* 4* 14* 7.0 * 2/32* 120 * 6000 * Trc* 0 * 95 * 5 * 9.5*0.2*0.4* 14*
* 6700* 95* 9.10* 49*13*14* 5* 25* 7.0 * 1/32* 150 * 6000 * Trc* 0 * 95 * 4 * 10.0*0.2*0.3* 12*
* 7180* 94* 9.10* 47*11*12* 4* 13* 7.0 * 1/32* 150 * 6000 * Trc* 0 * 95 * 4 * 9.5*0.3*0.4* 12*
* 7773* 90* 9.10* 43*13*15* 4* 25* 7.2 * 1/32* 100 * 5500 * Trc* 0 * 95 * 4 * 9.5*0.5*0.3* 12*
* 7302* 103* 9.10* 43*13*15* 4* 23* 6.0 * 1/32* 120 * 6000 * Trc* 0 * 95 * 4 * 9.0*0.5*0.3* 12*
* 7350* 107* 9.20* 50*13*17* 5* 30* 7.0 * 1/32* 120 * 6000 * Trc* 0 * 95 * 4 * 10.0*0.4*0.5* 12*
* 8150* 109* 9.10* 55*17*20* 6* 32* 7.0 * 1/32* 100 * 4500 * Trc* 0 * 95 * 4 * 10.0*0.5*0.7* 12*
* 8435* 101* 9.10* 47*15*10* 4* 24* 6.5 * 1/32* 30 * 5000 * Trc* 0 * 95 * 4 * 9.5*0.3*0.5* 12*
* 8500* 93* 9.10* 45*14*12* 4* 25* 7.5 * 1/32* 30 * 4000 * Trc* 0 * 95 * 4 * 9.5*0.3*0.5* 14*
* 8844* 105* 9.10* 43*13*15* 4* 25* 7.5 * 1/32* 30 * 4000 * Trc* 0 * 95 * 4 * 9.5*0.3*0.5* 15*
* 9330* 105* 9.10* 43*13*15* 4* 27* 7.0 * 1/32* 30 * 5000 * Trc* 0 * 95 * 4 * 9.5*0.3*0.5* 15*

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OBSERVINGS T.O.C.

CAPE SORELL

UD RECAP FOR 3 1/2in. PHASE WAPD BASE

```
*****
*DEPTH*TEMP*U.I*VIS*PV*YP* TELS *FILTDATE* FIGN.*FILTDATE ANALYSIS*BAWD*REPORT ANALYSIS*
*REF* *Leg* *Sec* *Sec* *All * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*****
* 9301* 103* 9.20* 43*15*13* 3* 30* 3.4 * 2/32* 80 * 4000 * Pre* 0 * 94 * 6 * 10.5*0.5*0.7* 13*
* 9501* 104* 9.30* 42*12* 9* 5* 14* 3.2 * 1/32* 60 * 3000 * Pre* 0 * 94 * 6 * 11.0*0.5*0.3* 14*
* 9800* 103* 9.20* 45*13* 9* 5* 15* 3.1 * 1/32* 50 * 3000 * Pre* 0 * 94 * 6 * 10.3*0.3*0.6* 13*
* 9843* 100* 9.20* 45*13* 9* 4* 14* 7.6 * 1/32* 30 * 3000 * Pre* 0 * 93 * 7 * 9.5*0.2*0.3* 13*
*10031* 102* 9.30* 55*17*11* 4* 17* 6.0 * 1/32* 120 * 3000 * Pre* 0 * 93 * 7 * 9.5*0.2*0.4* 13*
*10090* 102* 9.50* 51*16*10* 3* 13* 6.0 * 1/32* 100 * 3000 * Pre* 0 * 92 * 3 * 9.0*0.2*0.3* 13*
*10235* 94* 9.50* 50*10*10* 3* 15* 6.0 * 1/32* 120 * 2500 * Pre* 0 * 93 * 7 * 9.0*0.2*0.3* 13*
*10302* 101* 9.50* 50*17*12* 3* 17* 6.0 * 1/32* 150 * 2500 * Pre* 0 * 93 * 7 * 9.0*0.2*0.3* 13*
*10537* 105* 9.50* 43*17*10* 3* 18* 6.6 * 1/32* 160 * 2200 * Pre* 0 * 93 * 7 * 9.0*0.2*0.4* 13*
*10611* 99* 9.50* 53*13*14* 3* 20* 6.6 * 1/32* 200 * 2200 * Pre* 0 * 92 * 3 * 9.0*0.2*0.4* 13*
*10673* 103* 9.50* 49*17*11* 3* 16* 6.9 * 1/32* 160 * 2300 * Pre* 0 * 93 * 7 * 9.0*0.2*0.4* 13*
*10855* 102* 9.50* 43*15*11* 3* 15* 6.0 * 0/32* 160 * 2500 * Pre* 0 * 93 * 7 * 9.0*0.2*0.4* 11*
*10890* 97* 9.50* 45*15*10* 2* 15* 6.7 * 0/32* 130 * 2200 * Pre* 0 * 93 * 7 * 9.0*0.1*0.3* 10*
*11000* 107* 9.50* 43*16*11* 3* 17* 6.2 * 1/32* 130 * 2300 * Pre* 0 * 93 * 7 * 9.0*0.2*0.4* 10*
*11051* 95* 9.50* 52*17*13* 3* 20* 6.1 * 1/32* 130 * 2500 * Pre* 0 * 92 * 3 * 9.0*0.1*0.3* 10*
*11082* 102* 9.50* 51*17*14* 4* 17* 6.4 * 1/32* 200 * 2500 * Pre* 0 * 93 * 7 * 9.0*0.2*0.4* 13*
*11103* 70* 9.50* 51*17*14* 4* 17* 6.4 * 1/32* 200 * 2600 * Pre* 0 * 93 * 7 * 9.0*0.2*0.4* 13*
*11241* 104* 9.50* 51*14*11* 3* 15* 7.5 * 0/32* 160 * 2200 * Pre* 0 * 93 * 7 * 3.5*0.1*0.4* 10*
*11295* 106* 9.50* 49*15*11* 3* 16* 6.9 * 1/32* 130 * 2200 * Pre* 0 * 93 * 7 * 3.5*0.1*0.3* 10*
*11300* 92* 9.50* 43*14* 7* 2* 14* 6.5 * 1/32* 130 * 3000 * Pre* 0 * 93 * 7 * 3.5*0.1*0.1* 12*
*11350* 104* 9.50* 49*14* 8* 2* 15* 6.7 * 1/32* 130 * 3000 * Pre* 0 * 93 * 7 * 9.5*0.1*0.1* 12*
*11420* 105* 9.50* 43*13*10* 2* 15* 9.5 * 1/32* 130 * 3000 * Pre* 0 * 93 * 7 * 9.5*0.1*0.1* 15*
*11427* 90* 9.50* 43*13*11* 2* 16* 6.2 * 1/32* 130 * 3000 * Pre* 0 * 93 * 7 * 9.5*0.2*0.2* 15*
*11455* 91* 9.50* 46*11* 3* 2* 13* 6.0 * 1/32* 120 * 3000 * Pre* 0 * 93 * 7 * 9.5*0.2*0.2* 15*
*11572* 104* 9.50* 49*16*12* 4* 13* 6.0 * 1/32* 160 * 3000 * Pre* 0 * 93 * 7 * 10.0*0.3*0.5* 15*
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RIG ACTIVITY

Phase Summaries

Daily Well Diary

PHASE SUMMARIES

36" HOLE AND 30" STRUCTURAL CASING PHASE

The well Cape Sorell # 1 was souled at 09.15 hours on the 5th July 1961.

BIT # 1 REED 26" with 36" HTC H/O 2*(3*20):

A 36" hole was drilled from 381 ft (E.L.). In the initial stages of drilling, a WOB of 5 klbs and RPM of 60 was used; this increased to WOB, 20 klbs, RPM, 100. The P.O.P slowed down significantly at 650 ft, from 50 ft/hr to 10 ft/hr. At 690 ft, after 12 1/4 hours on bottom, the bit was pulled out, the hole opener badly worn although bit wear was slight.

BIT # 2 SMITH DESJ 26" with 36" HTC H/O (3*22)(3*24)

The 36" hole was drilled down to 720 ft with no problems, running WOB, 20 klbs, RPM 90. The bit was pulled out after 2 1/2 hours on bottom.

After circulating, 30" casing was run, and the casing shoe set at 693 ft.

BIT # RR2

Drilled out shoe and cement with WOB, 10-12 klbs, RPM, 70.

26" HOLE AND 20" STRUCTURAL CASING PHASE

BIT # 4 SMITH F2 12 1/4" (3*13)

A 12 1/4" hole was drilled with no problems from 720 ft to 1440 ft. An initial WOB of 10 klbs was increased to 20 klbs at 850 ft and finally 25 klbs at 1050 ft, with a constant rotation of 65 RPM throughout the run.

High ROP values, ave. 125 ft/hr from 800-950 ft dropped to 40-50 ft/hr but increased dramatically to 200+ ft/hr from 1130 to 1440 ft.

The bit was pulled out at 1440 ft in good condition.

BIT # 5 SMITH DGJ 26" (3*22)

After logging the hole was opened to 26". Again no problems were encountered and a WOB, 15 klbs, RPM, 60 were run on the bit. The bit was pulled out in good condition.

After circulating, the 20" casing was run and the shoe set at 1303 ft.

17 1/2" HOLE AND 13 3/8" STRUCTURAL CASING PHASE

BIT # 6 SMITH SDS 12 1/4" (2*12,1*13)

The cement was tagged at 1325 ft, and the cement and casing shoe drilled out. At 1450 ft a L.O.T. was performed. During the drill run of 627 ft, high ROP values exceeding 200 ft/hr were noted, a WOB, 25 klbs RPM, 100, kept steady.

At 2017 ft, high torque values and some overpull (135 klbs) were encountered. The bit was pulled out at 2057 ft.

BIT # 7 SMITH SDGH 12 1/4" (3*20)

After reaming down from 2013 ft, the drilling rate was very slow, high torque values and over-pull was again observed. The bit was pulled out at 2107 ft.

BIT # 3 SMITH F3J 12 1/4" (3*13)

During the bit run, WOB, 25-35 klbs, RPM, 100. The ROP varied greatly. In the initial phases of the run, drilling rates averaged 125 ft/hr to a depth of 2240 ft, slowing down appreciably to an ave. 35 ft/hr between 2240-2400 ft. From 2400 to 2670 ft, ROP values averaged 15 ft/hr, occasional dropping as low as 5 ft/hr. This trend continued throughout the run with sections often exceeding 200 ft/hr and dropping back to 35-50 ft/hr. at other points. An average ROP over the entire run was 70 ft/hr.

BIT # 9 SMITH DSJ 14 3/4" (2*16) + UR 17 1/2" (3*12)

Run in to 1320 ft and reamed down to 2056 ft; WOB, 5 klbs, RPM, 60. Reaming slows at 2052 ft and the bit is pulled out at 2055 ft.

BIT # RR0 (2*26) + UR 17 1/2" (3*13)

Run in with new under-reamer. Very slow ROP and high torque values for first 20 ft. ROP increases during run. WOB, 5-10 klbs and RPM, 70-80. Pulled out bit at 3033 ft due to high torque values. One cone lost off the under-reamer.

BIT # 11 SMITH DSJ 14 3/4" (2*16) + UP 17 1/2" (3*13)

After reaming down ,the bit was run from 3033ft.-4027ft. During the run WOB 10klbs, RPM 30, the ROP was variable. The bit was pulled out and the under reamer arms changed.

BIT # RR11 (2*16) + UP 17 1/2" (3*13)

The bit was re-run and reamed to 4162ft. with high torque values recorded at 4072ft. WOB 10 klbs, RPM 75.

After logging the 13 3/8" casing was run in and the casing shoe set at 4144ft.

12 1/4" HOLE AND 9 5/8" STRUCTURAL CASING PHASE

BIT # 13 SMITH DSJ 12 1/4" (3*12)

The cement was tagged at 4060ft. After drilling out the float collar and shoe, 5ft. of new formation was drilled. A LOT at 4166ft. proved unsuccessful (Leaked off at 9.9 bpg). Open ended drill pipe was run in and the casing re-cemented.

BIT # 14 SMITH SDGH 12 1/4" (3*12)

After waiting on the cement, a new 12 1/4" hole was drilled to 4595ft. During the bit run, WOB 25-35klbs, RPM 90. Torque values were generally constant at 1000 ftlb. occasionally peaking to 1500 ftlb. A LOT at 4493ft. was successful (Leaked off at 11.0 bpg). Drilling rates were initially high 50-150 ft/hr. from 4160ft. to 4395ft. but decreased over the run, 15-50 ft/hr. from 4400ft. to 4570ft. The bit was pulled out at 4595ft.

BIT# 15 SMITH SDGH 12 1/4" (3*14)

Peamed down from 4302ft. and drilled ahead to 5013ft. WOB 35-40 klbs, RPM 120, the torque values were high at 2300 ftlb to 4654ft. but decreased over the later stages of the run. POP was good during the run 40-70 ft/hr. but finally decreased to 20-30 ft/hr. as the bit became worn. The bit was pulled out at 5013ft.

BIT # 16 SMITH SDGH 12 1/4" (3*16)

During the run, WOB 25-30 klbs. RPM 120-130 and the torque was variable with values between 1500 to 2500 ftlb. (occasionally 3000 ftlb) POP also varied between 40-100 ft/hr. and again to 20 ft/hr. at the end of the run. The bit was pulled out at 5330ft.

BIT # 17 SMITH SDGH 12 1/4" (3*16)

During the bit run, WOB 30-35 klbs, RPM 120 and torque averaged 2000 ftlb. but increased at 5485ft. to 3100 ftlb. The ROP was high 50-70 ft/hr. over much of run only slowing down in the later stages due to bit wear. The bit was pulled out at 5593ft.

BIT # 18 SMITH F2 12 1/4" (3*16)

Drilling parameters over the run varied WOB 30-40 klbs, RPM 70-80 and torque 1500-2500 ftlb.

Drilling commenced with a slow ROP, increasing after 5622ft. and varied between 15-50 ft/hr. at 6269ft. the ROP again slowed. Overpull of 70000-80000 klbs. was observed during a wiper trip and 40000 klbs. at 6100ft. and 6000ft. whilst pulling out. The bit was pulled out at 6282ft.

BIT # 19 SMITH F2 12 1/4" (3*16)

After tagging bottom and drilling ahead a wash out at the Kelly caused some delay. Drilling eventually continued with WOB 20-35 klbs increasing to 35-40 klbs, RPM 80-100 and torque varying over the run. Torque values increased from 2500 ftlb. to 3600 ftlb. until 7220ft. it was noticed that at faster drilling rates torque increased, however at slower drilling rates torque was constant. At 7270ft. the torque values decreased to their initial values. Over the entire bit run ROP averaged 30 ft/hr. The bit was pulled out at 7302ft. 3/8" under gauge.

BIT # 20 SMITH F2 12 1/4" (3*16)

Reamed under gauge hole from 6389ft. to 7302ft. On bottom WOB 25-30 klbs, RPM 80-90 and torque 2200-3100 ftlb. Due to reaming the under gauge hole the bit was pulled out after drilling 91ft. of new hole, at 7393ft.

BIT # 21 SMITH F2 12 1/4" (3*16)

During the bit run WOB 35-40 klbs (7301ft.-3142ft.) decreasing to 30-35 klbs. (3142ft.- 3435ft.) RPM 30-30, POP varied between 15-50 ft/hr. At 7393ft. traces of gas were observed. No overpull was recorded during a wiper trip at 8293ft. The bit was pulled out prematurely due to a wash out located in the 6 1/2" DC-7 3/4" DC cross-over.

BIT # 22 SMITH F3 12 1/4" (3*16)

The final run of the 12 1/4" / 9 5/8" phase drilled well WOB 30-40 klbs decreasing at 8517ft. to 25-30 klbs, RPM 30-30, POP over the run averaged 40 ft/hr. The bit was finally pulled out at 9032ft.

After a full suite of electric logs, and conditioning the hole 9 5/8" casing was run in and cemented. The casing shoe was set at 9002ft.

3 1/2" OPEN HOLE PHASE

BIT # 23 SMITH SDGH 8 1/2" (3*13)

Tagged cement at 8903ft. drilled ahead through the cement into the formation. The LOT was again unsuccessful and the casing was re-cemented. The bit was pulled out after drilling the cement and 7ft. of new hole.

BIT # 24 SMITH F3 8 1/2" (3*13)

After testing the casing and the formation, drilling of the well continued WOB 30 klbs, RPM 75, POP throughout the run averaged 30 ft/hr. No problems were encountered during the run. The bit was pulled out at 9501ft.

BIT # 25 SMITH F2 8 1/2" (2*14)

The bit was reamed down from 9037ft. once on bottom WOB 25-30 klbs, RPM 75 the torque values increased at 9680ft. to 3400-3500 ftlb. and RPM slowed. During the run torque increased and some overpull was noted. POP over the run averaged 25 ft/hr. The bit was pulled out at 9887ft.

BIT # 26 SMITH F3 8 1/2" (2*14)

Once on bottom high torque values led to slow RPM 40 and low WOB 10-25 klbs. Hole caving started at 9950ft. and at each kelly down a pill was pumped to lubricate the hole and displace theavings. The average POP slows down considerably over this run with POP values dropping below 10 ft/hr. The bit was pulled out at 10055ft.

BIT # 27 SMITH F4 8 1/2" (2*14)

During the bit run WOB 40 klbs, RPM 55, ROP was slow and averaged 11 ft/hr. At 10110ft. Hydrogen appeared as a constant background and C1, C2 and C3 were present in low percentages and iC4, nC4 as traces when the cutting samples were treated in a blender. Some free oil was also identified using a solvent cut and under UV lighting. Oil and gas shows persisted throughout the run. The bit was pulled out at 10195ft.

BIT # 23 SMITH F2 8 1/2" (2*14)

During the bit run WOB 35-40 klbs, RPM 65, ROP progressed slowly and averaged 13.5 ft/hr. Oil and gas shows continued over the run. The bit was pulled out at 10367ft.

BIT # 29 SMITH F3 8 1/2" (2*14)

During the run WOB 30-40 klbs, RPM 70, torque values varied between 1800-2300 ftlb. The ROP slow and averaged 11 ft/hr. Oil and gas was still present in the samples. Eventually drilling progress stopped and the bit was pulled out at 10611ft.

BIT # 30 SMITH F3 8 1/2" (2*13)

Drilling continued slowly. The ROP averaged 11.5 ft/hr, WOB 35 klbs RPM 60. Oil and gas reading were persistent during the run. Occasional thin bodies of poorly cemented sandstone gave rise to slight drilling breaks. The bit was pulled out at 10855ft.

BIT # 31 SMITH F3 8 1/2" (2*13)

During the run WOB 35 klbs, RPM 60-65, torque remained steady at 1800-2000 ftlb throughout the run, peaking to 2300 ftlb prior to pulling out. The slow drilling continued averaging 8 ft/hr, again occasional sandstone beds caused slight drilling breaks of up to 15 ft/hr. The bit was pulled out at 11050ft. 1/4" out of gauge.

BIT # 32 SMITH F3 3 1/2" (2*13)

After reaming the last three stands down, drilled ahead with WOB 30-35 klbs, RPM 60 and torque was constant: 13-2100 ft.lbs. Drilling was slow and averaged 8 ft/hr. Possible basement quartzites were encountered at 11270 ft and the bit was pulled out at 11296 ft, 1/4" out of gauge.

BIT # 33 SMITH F7 8 1/2" (2*12)

Reamed down last four stands and drilled ahead with WOB 35-40 klbs, the RPM began at 45 and increased to 60, torque remaining constant at 20-2100 ft.lbs. ROP was very slow averaging less than 6 ft/hr (during initial stage less than 2 ft/hr). The bit was pulled out at 11420 ft for coring.

BIT # 34 COPE EH STAR 3 1/2" (TFA .45)

Eight feet of formation was cored from 11420 to 11428 ft. WOB started at 12 klbs and was increased up to 20-22 klbs, RPM of 50, torque increased during coring: 2200-2300 ft.lb. ROP was very slow averaging 1.3 ft/hr. Due to increasing pressure and torque the core barrel and bit were pulled out at 11423 ft. 4.5 ft (70% recovery) of the core was recovered.

BIT # 35 SMITH F57 8 1/2" (3*12)

Drilled ahead with WOB 30 klbs, RPM 60, torque constant at 20-2100 ft.lb. ROP was slow averaging 6 ft/hr. The bit was pulled out at 11576 ft and Schlumberger rigged up to perform a full logging program.

DAILY WELL DIARY

Drilling Day # 1 (5.7.82)

Lowered and set guide base template. Spudded well at 07.00 hr.
RIH with Bit # 1, run sequence # 1. Drill with hole opener to 690ft.
POOH and breakdown hole opener and Bit.
Make up new hole opener and Bit assembly and RIH.

Drilling Day # 2 (6.7.82)

Continue RIH with Bit # 2, run sequence # 2.
Drill ahead from 690ft to 720ft.
Totco survey and POOH, hole deviation 1 deg.
Run in 30" casing.

Drilling Day # 3 (7.7.82)

RIH to 650ft with Bit # RD2, run sequence # 3 and wait on cement.
Tag cement at 672ft, drill out shoe at 693ft.
Drill out cement to 720ft then POOH.
Pick up and run riser, hook up flow line.
Make up the BHA with Bit # 2, run sequence # 4
and 12.25" drilling assembly.
Break circulation. Test diverter packer, flush lines.
Drill ahead from 720ft to 832ft.

Drilling Day # 4 (8.7.82)

Drill ahead from 832ft to 1440ft
Flow checks at 1116ft, 1137ft, 1168ft and 1411ft for drilling breaks
no flow.
Circulate to condition hole, drop Totco survey.
POOH, hole deviation 3/4 deg.
Lay down 1,7 3/4" DC and pick up Monel, RIH for wiber trip.
Circulate and condition mud.
Drop Multi-shot survey and spot 50 bbls of mud.
POOH and rig up Schlumberger.
Schlumberger: run # 1 DIS, BAC, GR.
run # 2 TDC, CNL, GR.
run # 3 RDT.

Drilling Day # 5 (9.7.32)

Rig down Slumberger.

Change BHA, RIH to 672ft. with Bit # 4, run sequence # 5.

Open hole from 12 1/4" to 26", from 672ft. to 1420ft.

Drilling Day # 6 (10.7.32)

Sweep hole with 100 bbls of mud and circulate with sea water.

Pull up to casing shoe.

Wash to 1420ft. and pump 100 bbls of gel, circulate.

Pump 600 bbls of gel into the hole.

POOH and rig up to run 20" casing.

Run in 20" casing.

Fill casing with sea water and attempt to break circulation, pressure up to 2000 psi - no success.

Rig up to run riser and stack. Test stack.

Drilling Day # 7 (11.7.82)

Test middle and upper pipe rams, inner and outer kill valves to 5000 psi.

Repair kill line at slip joint, continue test.

POOH tset plug, test shear rams.

Circulate 350 bbls through casing.

RIH with open ended pipe, tag float collar at 1329ft.

Rig up cement lines, test lines to 1000 psi and cement 20" casing.

POOH, lay down BHA and Bit.

Wait on cement.

Drilling Day # 8 (12.7.32)

Lay down drill pipe and make up new BHA.

Test manifold, kelly hose and kelly.

Rig up Slumberger for temperature log.

Run log.

Rig down Slumberger.

RIH with Bit #5, run sequence # 6.

Break circulation and test casing to 500 psi.

Drill out cement and float collar from 1325ft. to 1332ft.

Drill ahead to 1450ft.

Drilling Day # 8 (12.7.32) cont.

Circulate 15 minutes, LOP 9.2 bpg maximum at 50 psi.

Drill from 1450ft. to 2017ft. pumping 25 bbls of high viscous mud every 2 joints.

Circulate and drill from 2017ft. to 2022ft.

Drilling Day # 9 (13.7.32)

Drill ahead from 2022ft. to 2067ft.

Circulate and POOH. Change Bit, new Bit # 6, run sequence # 7.

Work past bridge at 2013ft., wash to 2067ft.

Drill ahead to 2091ft.

Stuck pipe at 2091ft., work free.

Reaming down from 2070ft. to 2091ft. and drill on to 2101ft.

Circulate and POOH.

RIH with Bit # 7, run sequence # 8.

Reaming from 2055ft. to 2103ft. working through bridges at 2065ft. to 2091ft.

Drill ahead from 2103ft. to 2393ft.

Drilling Day # 10 (14.7.32)

Drill from 2393ft. to 2582ft.

Circulate for 10 minutes spot 50 bbls gel mud.

Totco survey at 2582ft. deviation 1 deg.

Drill ahead from 2582ft. to 3185ft. with flow checks at 2700ft., 2855ft, 3004ft, and 3185ft for drilling breaks - no flow.

Drilling Day # 11 (15.7.32)

Drill ahead from 3185ft to 4153ft with flow checks at 3301ft, 3543ft, 3652ft, 3850ft and 4034ft for drilling breaks - no flow.

Drilling Day # 12 (16.7.32)

Circulate, pump 70 bbls of mud, high viscous pill and circulate out.

POOH. Tight hole from 3470ft to 2250ft, 10/20000 lbs overpull.

Pick up monel, RIH with Bit # PP3, run sequence # 9.

Bridge at 2438ft, wash and ream from 2430ft to 2940ft.

Drilling Day # 13 (17.7.82)

RIH from 2940ft to 3032ft, ream from 3032ft to 3091ft.

RIH from 3091ft to 3241ft, ream from 3241ft to 3635ft.

RIH from 3635ft to 3797ft, ream from 3797ft to 4158ft.

Pump 70 bbls of high viscous mud and circulate out, displace hole with high viscous mud.

POOH for Schlumberger, tool stuck at 2365ft.

Rig down Schlumberger and RIH to ream out tight spot.

Drilling Day # 14 (18.7.82)

Ream to bottom.

Circulate to condition and clean the hole.

POOH, rig up Schlumberger, tool hangs up at 2400ft.

Rig down Schlumberger and RIH start reaming at 1320ft.

Drilling Day # 15 (19.7.82)

Opening hole to 17 1/2".

POOH, RIH with Bit # PP9, run sequence # 10.

Slip and cut dead line.

Continue under reaming very slowly.

Drilling Day # 16 (20.7.82)

Continue under reaming.

POOH to change under reamer (high torque values).

RIH with Bit # 10, run sequence # 11.

Ream through tight spots at 1395-1460ft, 1950-2020ft, 2065-2085ft.

RIH to 2356ft, continue reaming down, hole under gauge.

Drilling Day # 17 (21.7.82)

POOH change under reamer arms.

RIH, ream from 3996ft to 4150ft.

Drilling Day # 18 (22.7.82)

Ream to 4162ft, circulate to condition and clean hole.

POOH, rig up Schlumberger.

Run # 1 hangs up at 1440ft.

Run # 2 DIS, MVD, SLT, GP.

Run # 3 hangs up at 1440ft.

Run # 4 WDT.

Drilling Day # 18 (22.7.82)

RIH, wiper trip.

Circulate and condition hole.

POOH.

Drilling Day # 19 (23.7.82)

Rig up and run 13 3/8" casing.

Circulate to clean hole and cement casing.

Test BOP, hydrils not working.

Drilling Day # 20 (24.7.82)

Pull up BOP and riser.

Check hydril and test to 3000 psi.

Run in BOP and riser.

Drilling Day # 21 (25.7.82)

Test BOP stack, successful.

PIH with Bit # 11, run sequence # 13.

Tag cement at 4060ft, float collar at 4064ft, drill to 4120ft.

Circulate for 15 minutes.

Test lower hydril to 2000 psi, holds steady.

Drill ahead to 4166ft.

Run LOT leaks off at 9.9 ppq.

POOH and lay down drill collars and heavy weight, pick up 30 joints of drill pipe.

PIH with open ended drill pipe for squeeze job.

Rig up and run Schlumberger cement log.

Drilling Day # 22 (26.7.82)

PIH to recement casing shoe.

POOH.

RIH with Bit # 12, run sequence # 14.

Wait on cement, then drill on to 4233ft.

Drilling Day # 23 (27.7.82)

Drill ahead to 4493ft with flow checks at 4280ft, 4299ft, 4309ft, and 4338ft for drilling breaks - no flow.

POOH to casing shoe for LOT, 11 ppq.

Drilling Day # 23 (27.7.82) cont.

PIH and drill ahead to 4595ft, circulate and drop Totco survey.

POOH, deviation 3/4 deg.

RIH with Bit # 13, run sequence # 15.

Bridge at 4302ft ream to bottom.

Drilling Day # 24 (28.7.82)

Drill ahead to 5013ft.

Circulate and drop Totco survey.

POOH, deviation 3/4 deg.

RIH with Bit 14, run sequence # 16.

Wait on weather, hang off at casing shoe.

Drilling Day # 25 (29.7.82)

Wait on weather.

Drilling Day # 26 (30.7.82)

Wait on weather.

PIH, drill ahead from 5013ft to 5330ft.

Circulate and drop Totco survey.

POOH, deviation 1 deg.

Drilling Day # 26 (31.7.82)

Make up new BHA, RIH with Bit # 15, run sequence # 17.

Drill ahead from 5330ft to 5593.5ft.

Circulate and drop Totco survey.

POOH, deviation 3/4 deg.

RIH with Bit # 16, run sequence # 18.

Drilling Day # 23 (1.8.82)

Drill ahead from 5593.5ft to 5920ft.

Wiper trip at 5920ft.

Drill ahead to 6132ft.

POOH to casing shoe, wiper trip.

Drilling Day # 20 (2.8.82)

Cut and slip dead line.

Totco survey at 6132ft deviation 1/2 deg.

Drilling Day # 29 (2.3.32) cont.

Drill ahead to 6232ft.

Circulate and POOH.

RTW with Bit # 17, run sequence # 19.

PIW to casing shoe, wait on weather.

Drilling Day # 30 (3.3.32)

Wait on weather.

PIW, drill ahead to 6310ft.

Wash out at kelly thread, POOH to casing shoe, change kelly.

Drilling Day # 31 (4.3.32)

RTW and drill ahead from 6310ft to 6883ft.

Drilling Day # 32 (5.3.32)

Drill ahead from 6883ft to 6944ft.

Wiper trip, 10 stands.

Drill ahead from 6944ft to 7273ft.

Wiper trip, 5 stands.

Drilling Day # 33 (6.3.32)

Drill ahead to 7614ft.

Wiper trip, 15 stands.

Drill ahead to 7802ft.

Circulate and Jron Totco survey.

POOH, deviation 1/2 Deg.

RTW with Bit # 13, run sequence # 20.

Drilling Day # 34 (7.3.32)

Peaming from 68ft to bottom.

Drill ahead to 7893ft.

Circulate and POOH.

RTW with Bit # 19, run sequence # 21.

Drilling Day # 35 (8.3.32)

Drill ahead to 8266ft.

Wiper trip, 22 stands.

Drill ahead to 8298ft.

Drilling Day # 35 (9.3.82)

Washout at x/o, 6 1/2" DC and 7 3/4" DC.

RIP with Bit # 20, run sequence # 22.

Drill ahead to 8956ft.

Drilling Day # 37 (10.3.82)

Drill ahead to 9032ft.

POOH to casing shoe.

RIP, circulate, drop multi-shot and POOH.

Drilling Day # 33 (11.3.82)

Rig up Schlumberger.

Run # 1 DIS, BHC, GF.

Run # 2 DHT, MSLE, GF.

Run # 3 LDL, CNL, CR.

Run # 4 HDT.

RIP circulate and condition hole.

Drilling Day # 39 (12.8.82)

Circulate and POOH.

Run in ~~19~~⁹ 5/8" casing.

Drilling Day # 40 (13.8.82)

Run in 9 5/8" casing.

Circulate, pump and displace cement.

Pressure up to 2000 psi.

RIP with pack off running tool, tighten seal assembly.

and test to 4000 psi.

POOH and lay down running tool.

RIP with test plug, test BOP.

POOH, test plug and set wear bushings.

Test top and bottom kelly valves to 5000 psi.

RIP with Bit # 21, run sequence # 23

Drilling Day # 41 (14.8.82)

RIP and tag cement at 8908ft.

Drill cement, circulate and test casing.

Drill 5ft formation, circulate, LOT formation broke at 10.1 psi.

Drilling Day # 41 (14.3.82) cont.

POOH, run Schlumberger, (Cement Bond Log).

Run down Schlumberger and RIH to 9030ft.

Circulate and squeeze cement.

Drilling Day # 42 (15.3.82)

POOH and RIH with Bit # 22, run sequence # 24.

Circulate, test casing, tag bottom and drill 5ft of formation to 9045ft LOT, formation broke at 10.1 spg.

Drill ahead to 9232ft.

Drilling Day # 43 (16.3.82)

Drill ahead to 9501ft circulate and POOH.

RIH with Bit # 23, run sequence # 25.

Beam down from 9037ft.

Drilling Day # 44 (17.3.82)

Beaming, drill ahead. Block off one jet increasing SPP.

Drill ahead to 9827ft.

Circulate and POOH.

Drilling Day # 45 (18.3.82)

RIH with Bit # 24, run sequence # 26.

Beam down last 5 joints, block off one jet increasing SPP.

Drill ahead.

Pull off bottom to repair kelly bushings.

Drill ahead.

Hole caving in, pump pill to displace cavings.

Drilling Day # 46 (19.3.82)

Drill ahead, pump pill to displace cavings.

Circulate and POOH.

RIH with Bit # 25, run sequence # 27.

Cut and slip dead line.

Beam down from 9940ft, block off one jet.

Drill ahead to 10090ft.

Drilling Day # 47 (20.3.32)

Drill ahead to 10105ft.

Circulate and POOH.

RIH with Bit # 26, run sequence # 23.

Drill ahead to 10233ft, block off one jet.

Drilling Day # 48 (21.3.32)

Drill ahead to 10367ft.

Circulate and POOH.

RIH with Bit # 27, run sequence # 29.

Drill ahead.

Drilling Day # 49 (22.3.32)

Continue drilling ahead, block off one jet.

Drill on to 10611ft.

Circulate and POOH.

RIH with Bit # 28, run sequence # 30.

Drilling Day # 50 (23.3.32)

Continue RIH.

Drill ahead, block off one jet.

Drilling Day # 51 (24.3.32)

Continue drilling to 10855ft.

Circulate and POOH.

RIH with Bit # 29, run sequence # 31.

Drill ahead, block off one jet.

Drilling Day # 52 (25.3.32)

Drill ahead to 11050ft.

Circulate and POOH.

Drilling Day # 53 (26.3.32)

Continue POOH.

RIH with Bit # 30, run sequence # 32.

Cut and slip line.

Drill ahead to 11103ft.

Drilling Day # 53 (26.8.82) cont.

Pull upto casing shoe and wait on weather.

Drilling Day # 54 (27.8.82)

Wait on weather.

Drilling Day # 55 (28.8.82)

Continue waiting on weather.

RIH, on bottom, drilling ahead from 11103ft.

Drilling Day # 56 (29.8.82)

Continue drilling ahead to 11269ft.

Circulate and POOH.

Compensator hoses blow off.

RIH with Bit # 31, run sequence # 33.

Hang off at casing shoe, repair compensator hoses.

Drilling Day # 57 (30.8.82)

Continue work on compensator hoses.

RIH from casing shoe.

Beam down last 4 singles.

On bottom and drill ahead.

Drilling Day # 58 (31.8.82)

Continue drilling ahead to 11420ft.

Circulate, drop multishot survey and POOH.

Retrieve survey.

Lay down Monel and new bit stabilizer.

Pick up core barrel and RIH.

Drilling Day # 59 (1.9.82)

Continue RIH.

Drill 8ft. core (11420-11428ft.)

Circulate and POOH.

Recover core and lay down core barrel.

RIH with Bit # 33, run sequence # 35.

Drill ahead from 11428ft.

(Drilling Day # 60 (2.9.32)
Drill ahead to 11576ft.
Circulate and POOH.

Drilling Day # 61 (3.9.32)
Rig up Schlumberger.
Run: BHC, DIS, GR.
POOH due to weather.
Wait on weather.

Drilling Day # 62 (4.9.32)
Wait on weather.
Rig up Schlumberger.
Run: DIL, SLS, GR.
Run: HDT.
Run: WST (Air gun hung up run abandoned).
Run: PFT.

Drilling Day # 63 (5.9.32)
Run: SWS (51 shots).
Run: WST.
Run: FSV cement retainer at 3900ft.
Rigged down Schlumberger.
RIP open ended.

Drilling Day # 64 (5.9.32)
Set cement plug.

OVERPRESSURE

Overpressure Summary

D Exponent Plot 1/15000

D Exponent Plot 1/2000

Temperature Plot

OVERPRESSURE

OVER PRESSURE SURVEY CAPE SORELL # 1

The D exponent was computed continuously from 300ft. and calculated every foot using the following equation:

$$DCS = (\log(a_p * ROP) / (50 * RPM)) / (\log(12 * WOB) / (10.5 * BS)) * H / ECD$$

Where a = equation of bit wear as a function of the footage drilled and the final tooth wear.

p = P exponent (as a function of the bit type and is related to the IADC code).

a_p = Bit wear correction.

ROP = Rate of Penetration.

RPM = Rotation (Revolutions per minute).

WOB = Weight on Bit.

BS = Bit size.

H = formation normal hydrostatic gradient in equivalent mud weight

ECD = Equivalent circulating density.

The extreme softness of the top formations and high ROP values attained rendered the D exponent practically invalid to 4000ft. A lack of argillaceous sediments resulted in difficulties establishing a compaction trend. The on-line system was set to compute the compaction trend by regression, however an almost total absence of argillaceous sediments throughout the well meant that invalid results were obtained. A manually determined trend using argillaceous beds at 3100ft. and 4100ft was therefore set. A regular drift to the left of this trend

would represent a possible forewarning of an overpressured formation.

During the drilling no overpressuring was recorded. The top hole formations consisted largely of sands and poorly consolidated mudstones. Sharp peaks in the curve to the left of the trend represented porous formations rather than overpressured shales.

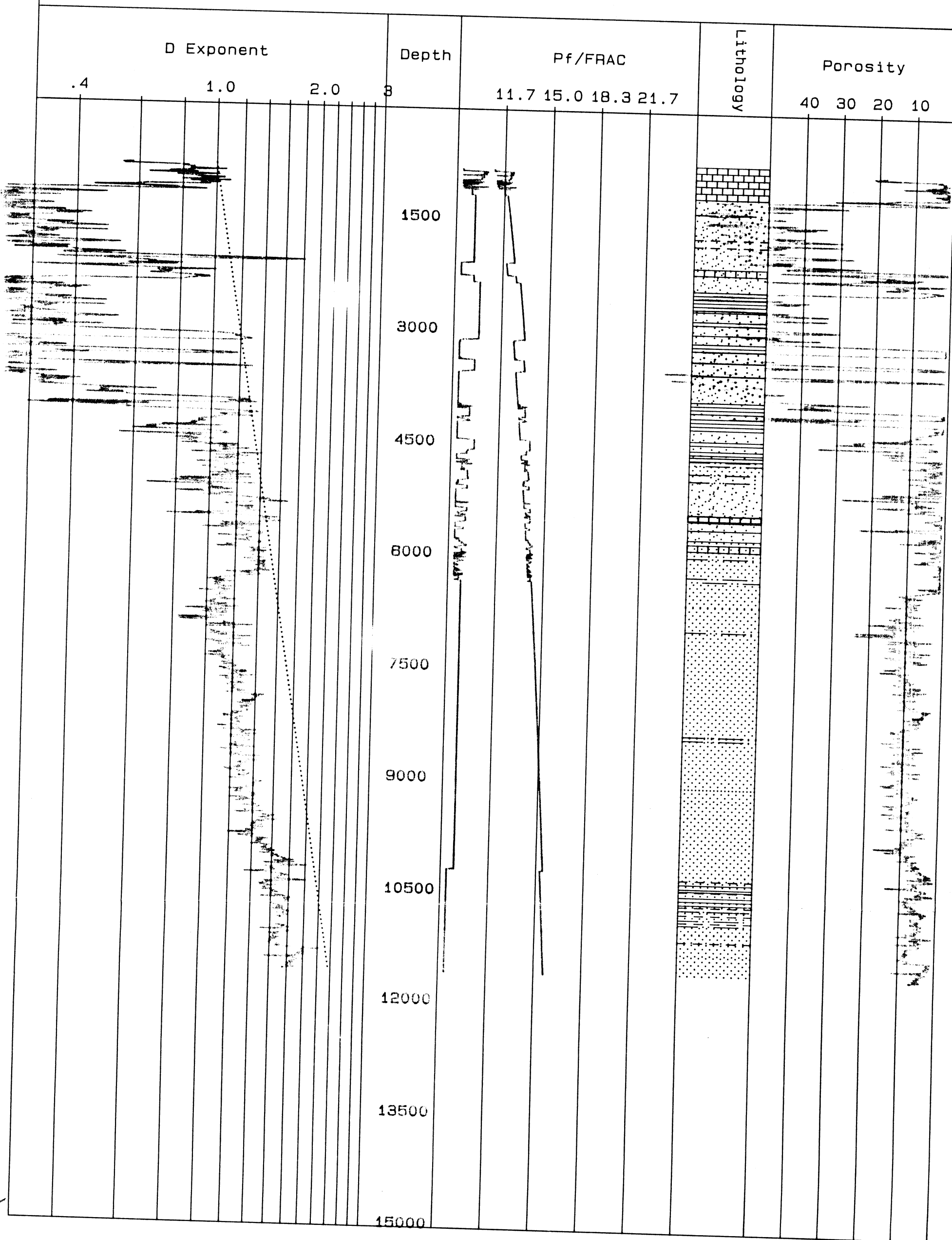
Between 3000ft. and 6500ft. beds of compacted claystones give D exponent values that follow the normal trend.

A sharp leftward movement of the D exponent below 6500ft. represents massive sandstone beds.

TD was reached on 2nd September, 1982 at 11576ft.

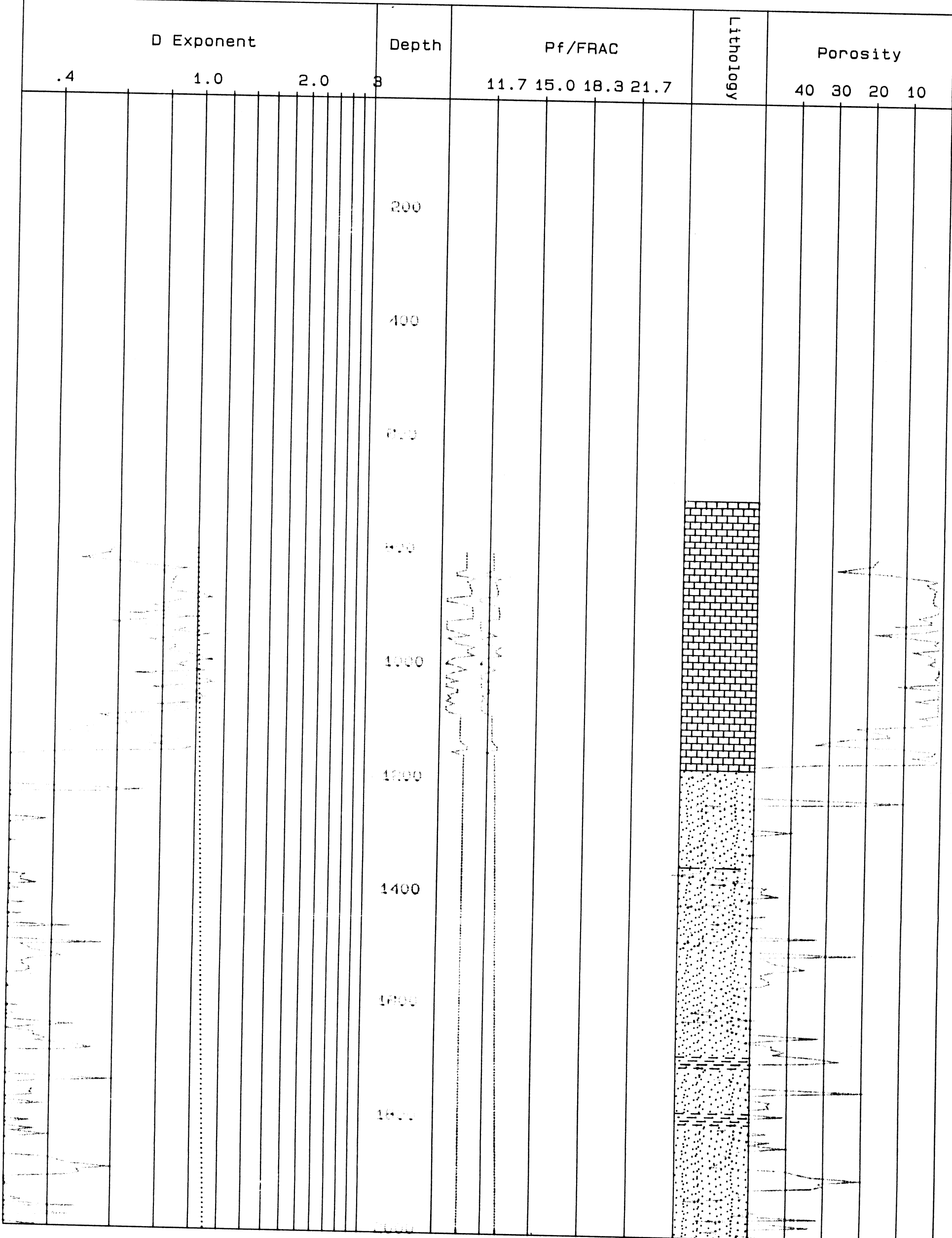
AMOCO CAPE SORELL # 1

Scale 1/ 15000



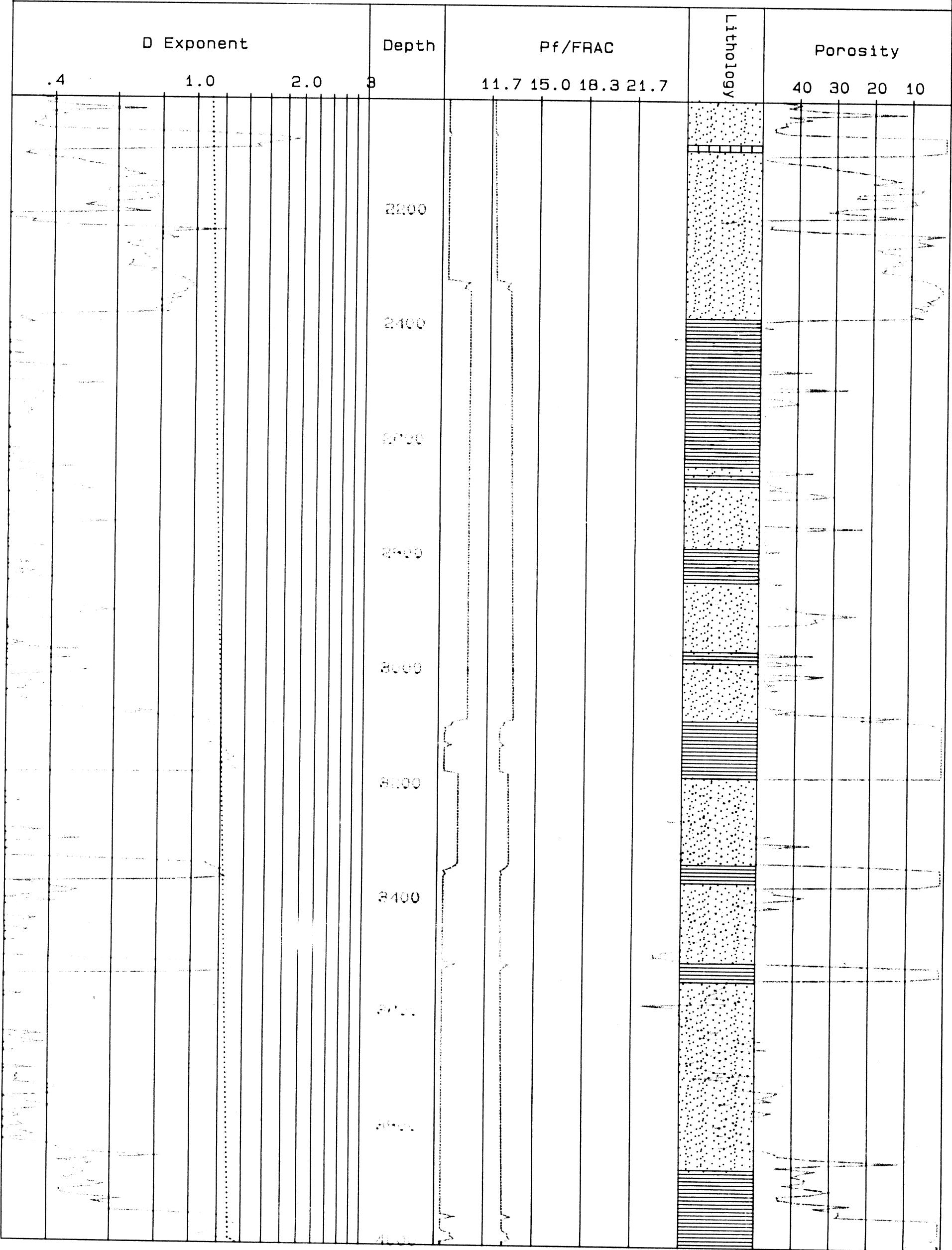
AMOCO CAPE SORELL # 1

Scale 1/ 2000



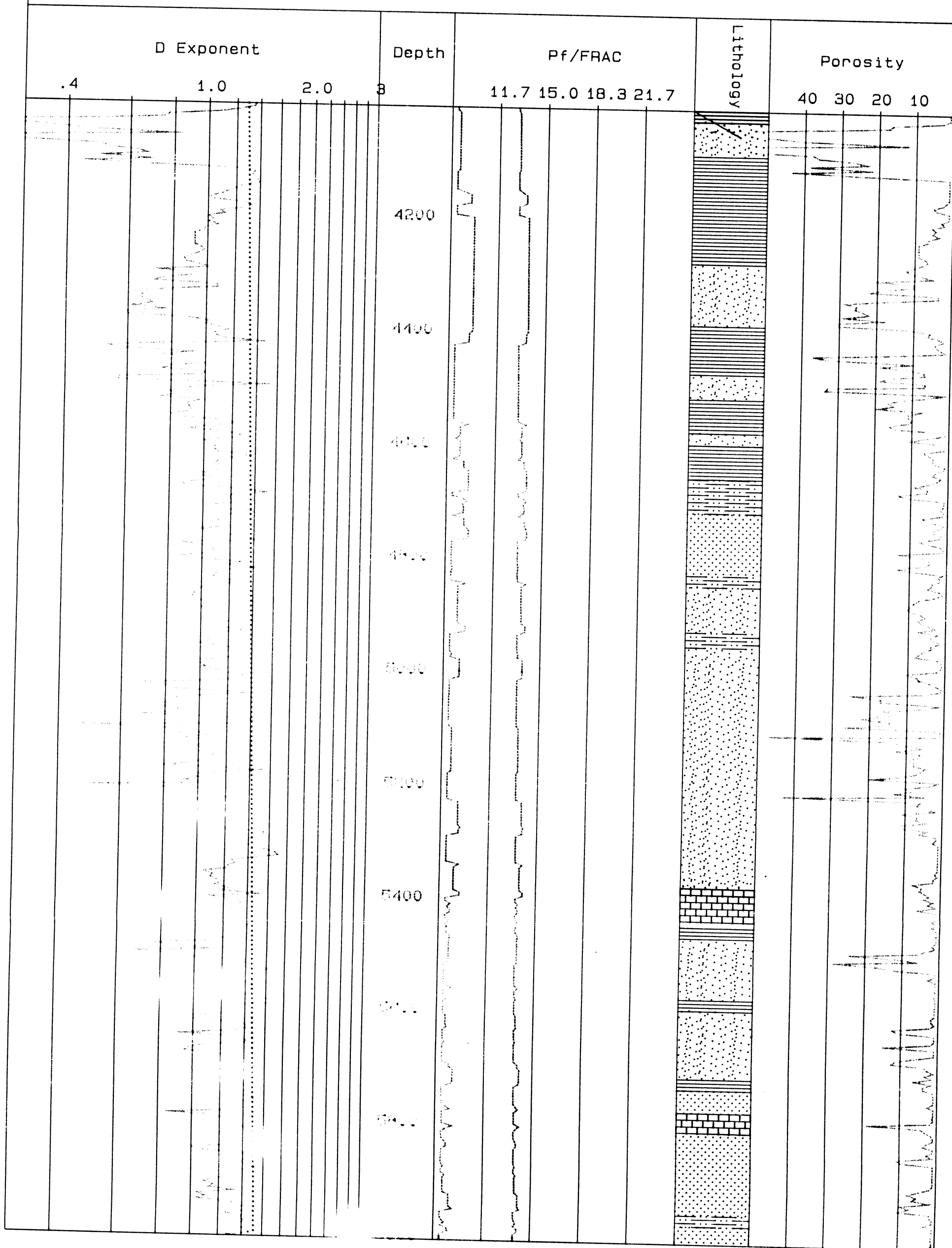
AMOCO CAPE SORELL # 1

Scale 1/ 2000



AMOCO CAPE SORELL # 1

Scale 1/ 2000



CAPE SORELL # 1

80410 1/ 2000

D Exponent						Depth	Pf/Frac				Lithology	Porosity			
.4	1.0	2.0	3				11.7	15.0	18.3	21.7		40	30	20	10
						8200									
						8400									
						8600									
						8800									
						9000									
						9200									
						9400									
						9600									
						9800									
						10000									

AMOCO

CAPE SORELL # 1

30410 1/ 2000

D Exponent								Depth	Pf/Frac				Lithology	Porosity			
.4		1.0		2.0			3		11.7	15.0	18.3	21.7		40	30	20	10
							8200										
							8400										
							8600										
							8800										
							9000										
							9200										
							9400										
							9600										
							9800										
							10000										

AMOCO CAPE SORELL # 1

Scale 1/ 1000

D Exponent										Depth	Pf/Frac				Lithology	Porosity			
.4	1.0	2.0	3								11.7	15.0	18.3	21.7		40	30	20	10
										10200									
										10400									
										10600									
										10800									
										11000									
										11200									
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A.M.O.C.O Cape Sorell #1

TEMPERATURE REPORT

Delta T

Flowline Temperature in °C

Deg. Fahrenheit

Temperature Gradient
(Deg.F / 100 ft)

-20 0 +20

20

40

60

80

100

120

140

160

180

200

220

240

260

0

2

4

6

8

Estimated BHT from E-logs

158 Deg.F at 9032 ft

186 Deg.F at 11576 ft

1400

1600

1800

6200

7000

8400

10000

11200

12400

13000

+

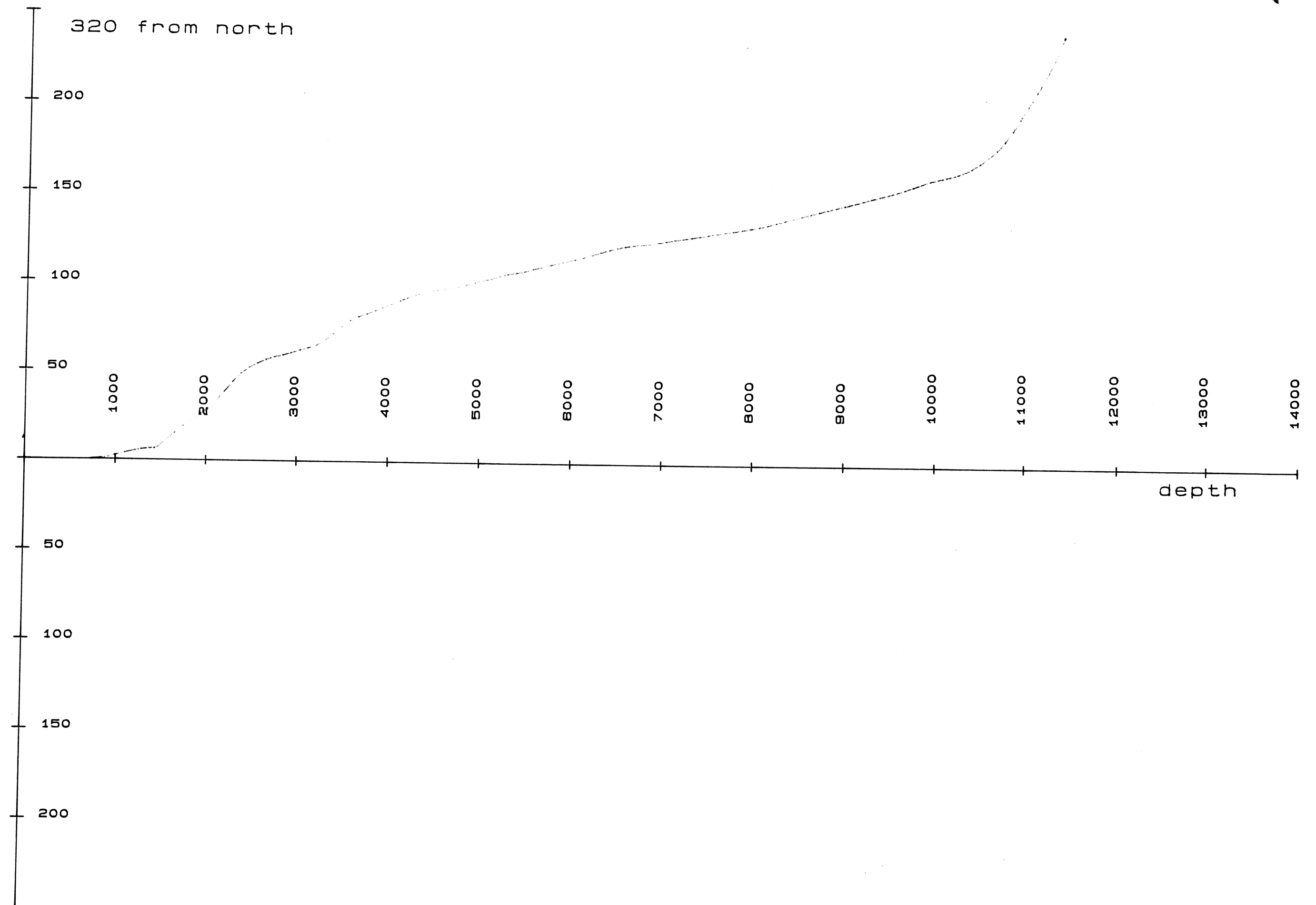
+

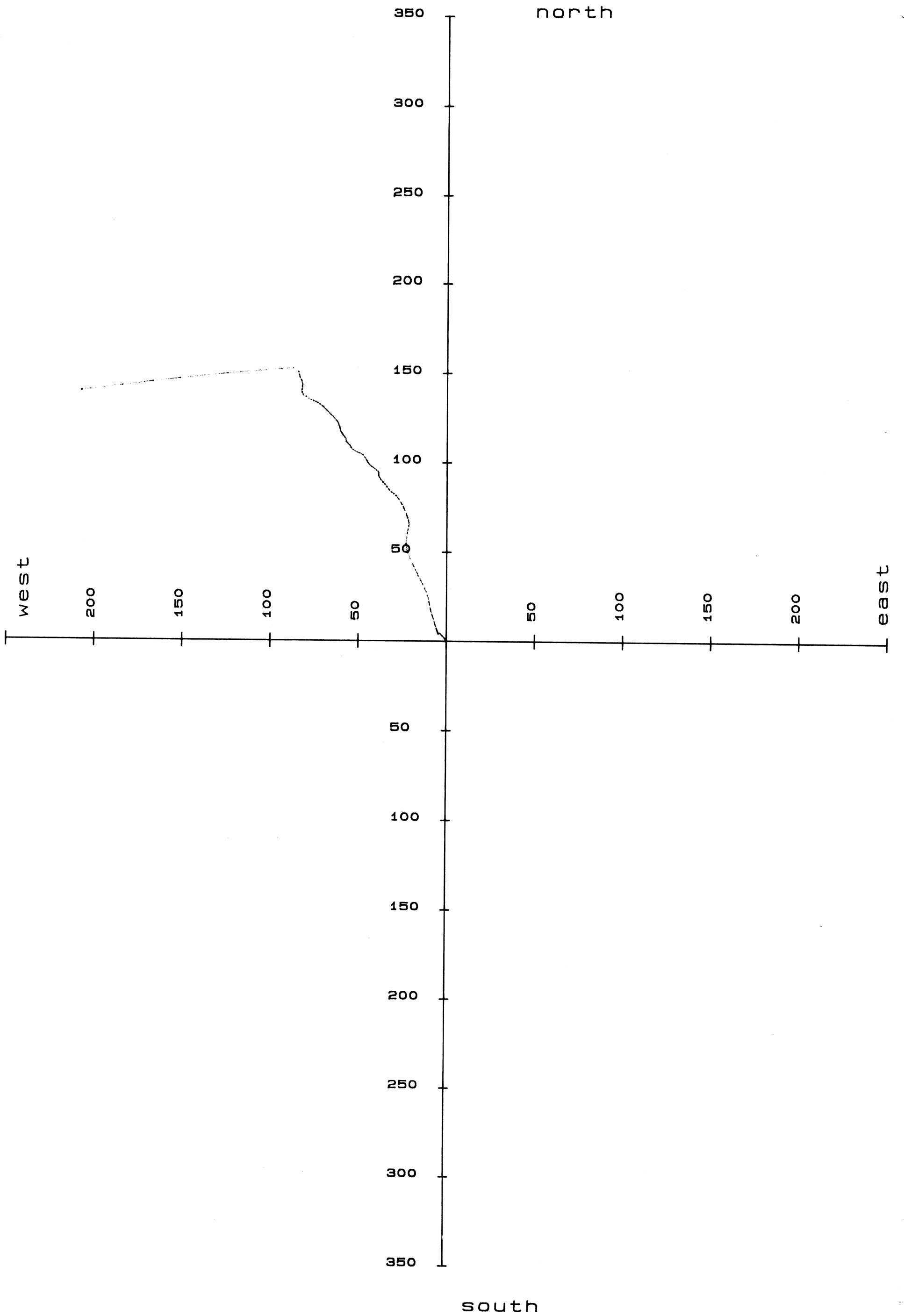
DEVIATION

Deviation Plots

Deviation Data

DEVIATION





MOCO AUSTRALIA LTD

CAPE SORELL 1

* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *
* DEPTH	* DIPT	* BEARING	* Depth	* NO	* SOUTH	* WEST	* EAST	* Dog leg	* File

* 733.1*	0.00*	0.0*	733.10*	0.00*	*	0.00*	*	0.00*	2*
* 916.1*	0.75*	303.0*	916.10*	1.05*	*	0.57*	*	0.41*	3*
* 1099.1*	0.80*	331.0*	1099.03*	2.85*	*	2.25*	*	0.21*	4*
* 1282.1*	0.50*	301.0*	1282.07*	4.35*	*	3.73*	*	0.24*	5*
* 1373.6*	0.40*	237.0*	1373.55*	4.34*	*	4.42*	*	0.53*	6*
* 1422.5*	0.25*	193.0*	1422.45*	4.12*	*	4.50*	*	0.53*	7*
* 1450.0*	2.50*	333.0*	1459.95*	4.83*	*	4.03*	*	7.45*	8*
* 1552.0*	2.70*	344.0*	1551.85*	3.85*	*	6.32*	*	0.32*	9*
* 1643.0*	2.60*	342.0*	1642.76*	12.38*	*	7.55*	*	0.15*	10*
* 1735.0*	2.60*	345.0*	1734.65*	16.83*	*	8.73*	*	0.15*	11*
* 1826.0*	2.20*	343.0*	1825.58*	20.59*	*	9.52*	*	0.45*	12*
* 1913.0*	2.30*	349.0*	1917.51*	24.13*	*	10.34*	*	0.12*	13*
* 199.0*	2.40*	337.0*	2003.43*	27.59*	*	11.43*	*	0.55*	14*
* 2101.0*	3.10*	332.0*	2100.33*	31.58*	*	13.33*	*	0.30*	15*
* 2192.0*	4.00*	331.0*	2191.15*	36.63*	*	15.02*	*	0.90*	16*
* 2234.0*	3.00*	335.0*	2232.93*	41.63*	*	13.57*	*	1.12*	17*
* 2375.0*	2.80*	335.0*	2373.37*	45.81*	*	20.52*	*	0.22*	18*
* 2457.0*	1.80*	341.0*	2455.79*	49.23*	*	21.90*	*	1.12*	19*
* 2553.0*	1.50*	345.0*	2555.75*	51.74*	*	22.55*	*	0.37*	20*
* 2650.0*	1.60*	355.0*	2643.72*	54.20*	*	23.55*	*	0.29*	21*
* 2741.0*	1.00*	6.0*	2730.70*	56.25*	*	23.84*	*	0.71*	22*
* 2833.0*	1.00*	13.0*	2831.63*	57.85*	*	22.77*	*	0.13*	23*
* 2924.0*	1.60*	7.0*	2922.66*	59.88*	*	22.41*	*	0.68*	24*
* 3015.0*	1.40*	14.0*	3014.63*	62.25*	*	21.93*	*	0.29*	25*
* 3107.0*	1.10*	10.0*	3105.61*	64.19*	*	21.55*	*	0.34*	26*
* 3199.0*	1.60*	352.0*	3197.53*	66.35*	*	21.53*	*	0.71*	27*
* 3290.0*	2.20*	338.0*	3233.53*	69.27*	*	22.31*	*	0.33*	28*
* 3382.0*	2.50*	339.0*	3330.45*	72.85*	*	23.72*	*	0.44*	29*
* 3473.0*	2.50*	329.0*	3471.35*	76.49*	*	25.49*	*	0.50*	30*
* 3555.0*	1.75*	327.0*	3553.30*	70.39*	*	27.03*	*	0.32*	31*
* 3655.0*	1.20*	315.0*	3654.27*	81.21*	*	23.73*	*	0.69*	32*
* 3745.0*	0.90*	305.0*	3745.25*	82.29*	*	30.07*	*	0.38*	33*
* 3830.0*	1.25*	307.0*	3837.23*	83.29*	*	31.45*	*	0.39*	34*
* 3913.0*	1.40*	319.0*	3911.21*	84.45*	*	32.70*	*	0.43*	35*
* 4022.0*	1.00*	324.0*	4020.19*	86.25*	*	34.12*	*	0.38*	36*
* 4114.0*	1.25*	320.0*	4112.17*	87.67*	*	35.13*	*	0.23*	37*
* 4143.0*	1.40*	322.0*	4141.17*	88.10*	*	35.05*	*	0.54*	38*
* 4192.0*	1.00*	313.0*	4190.15*	89.95*	*	36.25*	*	0.90*	39*
* 4234.0*	1.00*	317.0*	4232.14*	90.03*	*	37.48*	*	0.08*	40*
* 4375.0*	0.90*	333.0*	4373.13*	91.32*	*	38.35*	*	0.31*	41*
* 4457.0*	0.75*	349.0*	4455.12*	92.57*	*	38.73*	*	0.30*	42*
* 4553.0*	0.50*	3.0*	4555.11*	93.55*	*	38.01*	*	0.35*	43*
* 4650.0*	0.75*	359.0*	4648.51*	94.17*	*	38.27*	*	0.39*	44*
* 4741.5*	0.80*	317.0*	4738.51*	94.83*	*	38.27*	*	0.51*	45*
* 4833.0*	0.80*	307.0*	4831.10*	95.71*	*	40.03*	*	0.15*	46*
* 4924.0*	0.80*	303.0*	4922.09*	96.53*	*	41.15*	*	0.11*	47*

CAPE SORELL 1

Vertical			BOTTOM HOLE COORDINATES				*Dog leg*		
* DEPTH *	*DRIFT*	*BEARING*	*Depth *	* NORTH *	* SOUTH *	* WEST *	* EAST *	*o/100ft*	*File*

* 5016.0*	0.60*	306.0*	5014.03*	97.26*		* 42.12*		* 0.33*	43*
* 5107.5*	0.30*	305.0*	5105.57*	97.90*		* 43.73*		* 0.22*	49*
* 5199.0*	0.80*	317.0*	5197.07*	93.74*		* 44.00*		* 0.13*	50*
* 5290.5*	0.90*	323.0*	5288.56*	99.82*		* 44.83*		* 0.21*	51*
* 5382.0*	0.10*	329.0*	5380.05*	100.50*		* 45.24*		* 0.87*	52*
* 5473.5*	0.90*	330.0*	5471.55*	101.19*		* 45.55*		* 0.37*	53*
* 5565.0*	0.80*	323.0*	5563.04*	102.35*		* 46.35*		* 0.11*	54*
* 5748.0*	0.75*	314.0*	5746.02*	104.23*		* 47.90*		* 0.11*	55*
* 5839.5*	0.60*	297.0*	5837.52*	104.90*		* 48.70*		* 0.27*	56*
* 5931.0*	0.75*	233.0*	5929.01*	105.31*		* 49.78*		* 0.20*	57*
* 6022.5*	0.80*	301.0*	6020.50*	105.83*		* 50.90*		* 0.20*	58*
* 6114.0*	0.90*	291.0*	6111.99*	105.42*		* 52.12*		* 0.20*	59*
* 6205.5*	1.00*	309.0*	6203.43*	107.13*		* 53.44*		* 0.34*	60*
* 6307.0*	0.90*	323.0*	6204.97*	108.32*		* 54.44*		* 0.36*	61*
* 6398.5*	0.70*	326.0*	6396.46*	109.39*		* 55.14*		* 0.22*	62*
* 6480.0*	0.70*	315.0*	6477.95*	110.25*		* 55.85*		* 0.15*	63*
* 6571.5*	0.50*	308.0*	6569.44*	110.89*		* 56.57*		* 0.23*	64*
* 6663.0*	0.40*	315.0*	6660.94*	111.36*		* 57.11*		* 0.12*	65*
* 6754.5*	0.25*	359.0*	6752.44*	111.84*		* 57.55*		* 0.11*	66*
* 6837.5*	0.50*	337.0*	6835.44*	113.01*		* 57.55*		* 0.16*	67*
* 7029.0*	0.60*	340.0*	7026.93*	113.33*		* 57.83*		* 0.11*	68*
* 7120.5*	0.50*	303.0*	7118.43*	114.54*		* 58.40*		* 0.35*	69*
* 7212.0*	0.40*	321.0*	7209.93*	115.04*		* 58.81*		* 0.16*	70*
* 7303.5*	0.40*	330.0*	7301.42*	115.57*		* 59.27*		* 0.07*	71*
* 7395.0*	0.50*	324.0*	7392.92*	116.17*		* 59.66*		* 0.12*	72*
* 7486.5*	0.50*	327.0*	7484.42*	116.83*		* 60.11*		* 0.03*	73*
* 7578.0*	0.50*	326.0*	7575.91*	117.50*		* 60.55*		* 0.01*	74*
* 7672.0*	0.50*	354.0*	7669.91*	118.27*		* 60.84*		* 0.26*	75*
* 7765.5*	0.50*	356.0*	7763.41*	119.03*		* 60.91*		* 0.02*	76*
* 7859.3*	0.50*	333.0*	7857.20*	119.96*		* 61.11*		* 0.21*	77*
* 7953.0*	0.50*	335.0*	7950.90*	120.73*		* 61.47*		* 0.11*	78*
* 8046.3*	0.60*	339.0*	8044.69*	121.61*		* 61.82*		* 0.11*	79*
* 8140.5*	0.75*	323.0*	8138.39*	122.60*		* 62.31*		* 0.21*	80*
* 8234.3*	0.80*	314.0*	8232.18*	123.53*		* 63.11*		* 0.21*	81*
* 8328.0*	0.80*	311.0*	8325.37*	124.47*		* 64.07*		* 0.04*	82*
* 8421.3*	0.80*	321.0*	8419.56*	125.41*		* 64.83*		* 0.15*	83*
* 8515.5*	0.80*	313.0*	8513.35*	126.37*		* 65.83*		* 0.12*	84*
* 8609.8*	0.75*	315.0*	8607.64*	127.25*		* 66.79*		* 0.06*	85*
* 8706.0*	0.75*	321.0*	8703.83*	128.10*		* 67.64*		* 0.03*	86*
* 8796.3*	0.75*	307.0*	8794.63*	129.01*		* 68.49*		* 0.20*	87*
* 8890.3*	0.75*	314.0*	8888.12*	129.81*		* 69.42*		* 0.10*	88*
* 8984.0*	0.75*	313.0*	8981.31*	130.69*		* 70.27*		* 0.06*	89*
* 9016.0*	0.75*	321.0*	9013.31*	131.01*		* 70.55*		* 0.12*	90*
* 9091.5*	0.75*	294.0*	9082.30*	131.61*		* 71.33*		* 0.46*	91*
* 9183.8*	0.90*	314.0*	9180.79*	132.35*		* 72.42*		* 0.35*	92*
* 9274.5*	0.80*	299.0*	9272.28*	133.15*		* 73.61*		* 0.27*	93*

CAPE SORELL 1

Vertical				BOTTOM HOLE COORDINATES				*Dog leg*	
* DEPTH	*DRIFT*	*BEARING*	*Depth	* NORTH	* SOUTH	* WEST	* EAST	*o/100ft*	*File*

* 9366.0*	0.80*	299.0*	9363.77*	133.73*		* 74.63*		* 0.00*	94*
* 9457.5*	0.90*	230.0*	9455.26*	134.33*		* 75.37*		* 0.20*	95*
* 9549.0*	1.00*	291.0*	9546.75*	134.85*		* 77.30*		* 0.12*	96*
* 9640.5*	1.00*	306.0*	9633.24*	135.61*		* 73.70*		* 0.29*	97*
* 9732.0*	1.20*	303.0*	9729.72*	136.60*		* 80.15*		* 0.23*	98*
* 9823.5*	1.00*	293.0*	9821.20*	137.43*		* 81.70*		* 0.30*	99*
* 9915.0*	1.20*	0.0*	9912.69*	138.89*		* 82.67*		* 1.34*	100*
* 10006.5*	0.90*	7.0*	10004.17*	140.57*		* 82.57*		* 0.36*	101*
* 10093.0*	1.00*	10.0*	10095.66*	142.07*		* 82.34*		* 0.12*	102*
* 10189.5*	1.10*	4.0*	10187.14*	143.73*		* 82.14*		* 0.16*	103*
* 10281.0*	1.10*	318.0*	10278.63*	145.39*		* 82.71*		* 0.94*	104*
* 10372.5*	1.60*	342.0*	10370.10*	147.26*		* 83.73*		* 0.31*	105*
* 10464.0*	2.60*	355.0*	10461.54*	150.54*		* 84.45*		* 1.20*	106*
* 10555.5*	3.60*	269.0*	10552.94*	152.56*		* 87.51*		* 4.63*	107*
* 10647.0*	4.80*	265.0*	10644.20*	152.21*		* 94.20*		* 1.35*	108*
* 10733.5*	6.10*	264.0*	10735.23*	151.33*		* 102.85*		* 1.42*	109*
* 10830.0*	6.90*	266.0*	10826.20*	150.43*		* 113.17*		* 0.91*	110*
* 10921.5*	7.75*	264.0*	10916.95*	149.46*		* 124.72*		* 0.97*	111*
* 11013.0*	8.40*	264.0*	11007.54*	148.12*		* 137.50*		* 0.71*	112*
* 11104.5*	9.25*	264.0*	11097.96*	146.65*		* 151.54*		* 0.93*	113*
* 11196.0*	10.40*	263.0*	11188.12*	144.83*		* 167.05*		* 1.27*	114*
* 11287.5*	11.40*	262.0*	11277.97*	142.62*		* 184.20*		* 1.11*	115*
* 11379.0*	11.75*	264.0*	11367.61*	140.39*		* 202.43*		* 0.53*	116*
* 11404.0*	12.00*	263.0*	11392.07*	139.80*		* 207.54*		* 1.30*	117*

GEOLOGY

Geology Summary

1/5000 Lithology plot

GEOLOGY

GEOLOGICAL SUMMARY

SECTION # 1 (720ft-1230ft.)

A predominantly calcareous lithology, differentiated into an upper coral, reef Limestone, white to creamy, hard and calcitic. Containing abundant fossil debris, including coral stems, foraminifera and various shell fragments. The middle and lower beds are typified by a DOLOMITIC Limestone, grey to creamy, hard and silty with an angular break. Lower in the section the DOLOMITE becomes more containing and dirty.

SECTION # 2 (1230ft-6000ft.)

An interbedded sequence of SAND and CLAYSTONE. Throughout the section the sand grains are clear, fine to medium, well sorted and sub-angular. The CLAYSTONE however grades from a light grey moderately hard litho-type with occasional glauconite and pyrite to a brown, very pyritic, moderately fissile variety.

At 4300ft. SANDSTONE and SILTSTONE beds appear. The SILTSTONE light brown to brown, argillaceous, soft and occasionally elastic is possible grading from the CLAYSTONE beds above.

SECTION # 3 (6000ft-10200ft.)

A light grey to white SANDSTONE with fine to medium, poorly sorted grains, grading lower in the section to a moderately sorted, well cemented SANDSTONE. Occasional interbedded SILTSTONES, dark brown, soft slightly fissile and sandy are seen throughout the upper section.

Some traces of KAOLINITE appear at 6500ft. and again at 8000ft.

At 9500ft. the SANDSTONE becomes green, attributed to a noticeable chlorite content, this lithology continued to 9700ft. marking the top of a 100ft. thick CONGLOMERATE bed, and again below to 10200ft.

SECTION # 4 (10200ft-11200ft.)

Free oil and gas shows were obtained in the interbedded CLAYSTONES, SILTSTONES and SANDSTONES typifying this section.

The CLAYSTONES, grey, dark grey or brown, blocky and sub-fissile to fissile seem to grade into SILTSTONE, both giving direct straw cuts.

Two SANDSTONES are identifiable in the section, one light grey to green, medium grained, well sorted and poorly cemented. The other cream to light grey, very coarse and well cemented. Both SANDSTONES had a good orange direct cut and a yellow cut under UV light.

At 11000 ft. a COAL seam also gave a good yellow cut under UV light.

Gas readings were obtained by mixing 400cc of wet cuttings and 20 cc of water in a blender and manually injecting the freed gas into a chromatograph giving a C1, C2, C3, iC4 and nC4 percentage.

SECTION # 5 (11200ft-11576ft.)

A CONGLOMERATE typified this section. Many litho-types were present up to cobble size, but predominately QUARTZITE, light red, orange or pink, hard with a sucrose texture and SCHIST. The matrix was chloritic with abundant calcite and pyrite mineralization.

No oil or gas was observed in the CONGLOMERATE, although a thin SHALE bed at 11300ft-11320ft. yielded some hydrocarbon gases and a pale yellow cut.

Drilling rates in the CONGLOMERATE were very slow and TD was announced at 11576ft.

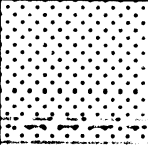

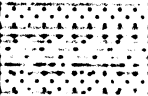
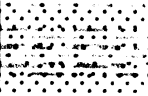
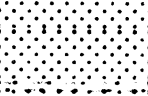
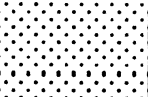
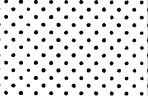



Scale 1/ 5000

	Formation	Lithology	Depth	Description	
			500		
			1000	SD. CLR, F-MG, S. ANG-S. ANG, TH. MICA.	
			1500	SLTST. BRN/BRN-LK BRN, V. SLTY, PYR, GLAUC. SD. CLR, F-MG, S. ANG-S. ANG, PYR, MICA	
			2000	CLYST. LT. GY/BRN-LK BRN, SLTY, PYR.	
			2500	SLTST. BRN/BRN-LK BRN, V. SLTY, PYR, GLAUC. SD. CLR, F-MG, S. ANG-S. ANG, PYR, MICA	
			3000	MUDST. LK BRN, V. SLTY, NON CALC, PYR.	
			3500	MUDST. BRADJ ANG SLT ...	
			4000	SD. CLR, F-MG, S. ANG-S. ANG, MICA. MUDST.	
			4500	MUDST. DK BRN, SLTY, V. PYR, GLAUC. MUDST. LK BRN.	
			5000	SD. CLR, VF-F, OCC. US, S. ANG-S. ANG. SLTST. GY BRN-BRN, SDY, SFT. SD. CLR, F-MG, S. ANG-S. ANG, TH. GLAUC SLTST. BRN, ANG, SLT. CALC SD. CLR, UFG, F-MG, S. ANG-S. ANG	

Scale 1/ 5000

	Formation	Lithology	Depth	Description	
	EOCENE		5500	LST. WH, XLN, HD. MIDST. BRN, SILTY. MIDST. BRN, SILTY-SBY. SS. LT GY, F-MG, S. ANG-S. RND. SLTLY BRN, XLN, FT. DULY.	
			6000	SS. LT GY, F-MG, S. ANG-S. RND.	
			8500	SLTST. LK GY/BRN, ANG, OCC CL. SS. CLR, F-MG, S. RND.	
			7000	SS. WH, F-CG, S. RND-FND, CLAY, SLATE.	
			7500	SLTST. LK BRN, ANG. SS. RND, F-CG, S. RND-FND, CLAY, SLATE.	
	PALAEOCENE		8000		
			8500	SLTST. LK BRN-BLK, MICA.	
			9000	SS, LT GY/BRN, F-VCG, LITH CLSTS. SS, VC, GRAD) CONGLOMERATE	
	CRETACEOUS		9500	TR. CLYST, LT BRN/YEL, SFT, SILTY.	
			10000		

Scale 1/ 5000

	Formation	Lithology	Depth	Description	
	CRETACEOUS				
					
			10500	SS. WH. CLR. F-MG. S.A. SH. GY/BN. COAL. B.R. CONC. EBAC. CLYST. GY/BN. SFT	
				SH. BN. CADE. SS. WH. GY. F-MG. S.A.	
			11000		
				MICROCONGLOMERATE	
				CONGLOMERATE	
			11500		
			12000		
			12500		
			13000		
			13500		
			14000		
			14500		
			15000		

A GEOHISTORY ANALYSIS OF THE CAPE SORELL-1 WELL,
DRILLED OFFSHORE WEST TASMANIA

by

G.W. Hughes

Introduction

The Cape Sorell-1 well was submitted for biostratigraphic examination by Amoco Australia Petroleum Company. The stratigraphic results are listed in Tables I and II, and are discussed fully in the Robertson Research Report No. 1176. Palaeobathymetric data is available, but not combined within this memorandum. A basic geochemical evaluation of eight sidewall cores from the well was also carried out (R.R.S. Report No. 1170).

A geohistory diagram of the well has been constructed (Figure 1), in which stratigraphic and lithological data have been combined to produce a subsidence and sedimentation picture for the well section examined, spanning the Palaeocene to Early Miocene. An unconformity is present at the Eocene-Oligocene boundary, and one is also probably present at the top of the Early Miocene section studied.

Structural and Sedimentological Conclusions

The basement of the site of deposition subsided at a relatively rapid rate during the Palaeocene (11576' TD.-5770'), during which time sandy breccio-conglomerates, overlain by interbedded shales and sandstones, were deposited. A high rate of sedimentation maintained the site of deposition within a possibly supralittoral to brackish littoral, possibly shallow inner sublittoral environment.

During the Early Eocene (5770'-2550') the rate of subsidence is considered to have decreased, as illustrated by the less steeply dipping subsidence curves for T.D. and top shales. Sandstones, with thin, scattered shale beds were deposited sufficiently rapidly to maintain the site of deposition within a possibly supralittoral to possibly middle sublittoral range of environments.

During the Early to Middle Eocene (2550'-1360'), sandstone deposition continued and maintained the site of deposition within the middle sublittoral environment, except during the latter part (1470'-1360'), when rate of sedimentation was insufficient to maintain a constant water depth at the site of deposition, and deepening to the outer sublittoral regime took place.

The absence of Late Eocene sediments suggests either uplift and erosion of the Late Eocene sediments, or a period of non deposition owing to submarine scour. The subsidence rate has been extrapolated from the Early Eocene, but the correct rate is unknown for the Late Eocene.

During the Early Oligocene (1360'-1230'), deposition of sandstones continued, and the subsidence rate was further reduced. The sedimentation rate maintained the depth of deposition within the deep middle sublittoral.

During the Late Oligocene (1230'-990') sandstones were deposited in a deep middle sublittoral regime (1230'-1110') followed by bryozoan limestones in an outer sublittoral environment, thus testifying to a rate of basement subsidence which exceeded that of sediment accumulation.

Further subsidence took place during the Early Miocene (990'-690'), and the deposition of bryozoan limestones was sufficiently great to maintain the site of deposition within the outer sublittoral environment.

The post Early Miocene history of the site is unknown, but as the sea floor lies at 309', the 381' (690'-309') of sediment which overlies the Early Miocene is abnormally thin to accommodate the expected thickness of Middle Miocene to Recent marine sediments. This situation may be explained either by the presence of a condensed sequence, or removal of the post Early Miocene sediments by erosion.

Organic Maturation Implications from the Geohistory History

The geothermal gradient of the Cape Sorell-1 well has been determined by obtaining the bottom hole temperature of 87°C (190°F) log, and calculating the gradient up well to 9002' at 70°C (158°F)

and 4144' at 39°C (102°F), thus providing gradients of 6.6°C and 6.4°C per 1000 ft respectively. If a surface temperature of 10°C is assumed, an overall geothermal gradient of 6.85°C per 1000 ft is concluded (for well section thickness of 11267' (11576'T.D.-309')). This geothermal gradient differs considerably from that of the Bass Basin, where a gradient of 10.67°C per 1000 ft exists (Middleton, 1982).

Intervals of 10°C have been plotted on the geohistory diagram, each interval occupying 1480', and the total thermal maturity index (TTI) is calculated at T.D. for each interval as follows:

<u>Temperature Interval</u>	<u>Time (Ma)</u>	<u>Lopatin's temperature factor r</u>	<u>Interval TTI</u>	<u>Cumulative TTI</u>
10-20	2.25	r^{-9}	0.0043	
20-30	2.25	r^{-8}	0.0087	0.013
30-40	2.25	r^{-7}	0.0175	0.030
40-50	2.25	r^{-6}	0.035	0.065
50-60	2.25	r^{-5}	0.070	0.135
60-70	7.0	r^{-4}	0.437	0.572
70-80	7.0	r^{-3}	0.875	1.447
80-90	18	r^{-2}	4.5	5.947

The cumulative TTI at 11576' T.D. is 5.947, which is equivalent to a vitrinite reflectance value of 0.55, using Waples (1980, Figure 5). At approximately 10250', a cumulative TTI value of 1.447 is equivalent to a vitrinite reflectance value of 0.45.

These results compare well with those measured and listed in Appendix I (RRS Report 1170, Table 1), and support the conclusion given therein as "early mature to just mature for liquid hydrocarbon generation for suitable oil-prone kerogen".

As the above calculations are calculated to the Early Miocene, the effects of the Late Eocene unconformity, and maturity effects since the Early Miocene have been ignored. If, however, the Late Eocene unconformity was produced by uplift in the order of 1000 ft then the thermal maturity would have been little affected at this low geothermal gradient. Similarly, if the well site had been uplifted and then subsided to the present site of deposition, the effect of such uplift, within 1000' margin, would have placed the vitrinite reflectance value at T.D. for the Recent, at between 5.50 and 0.6.

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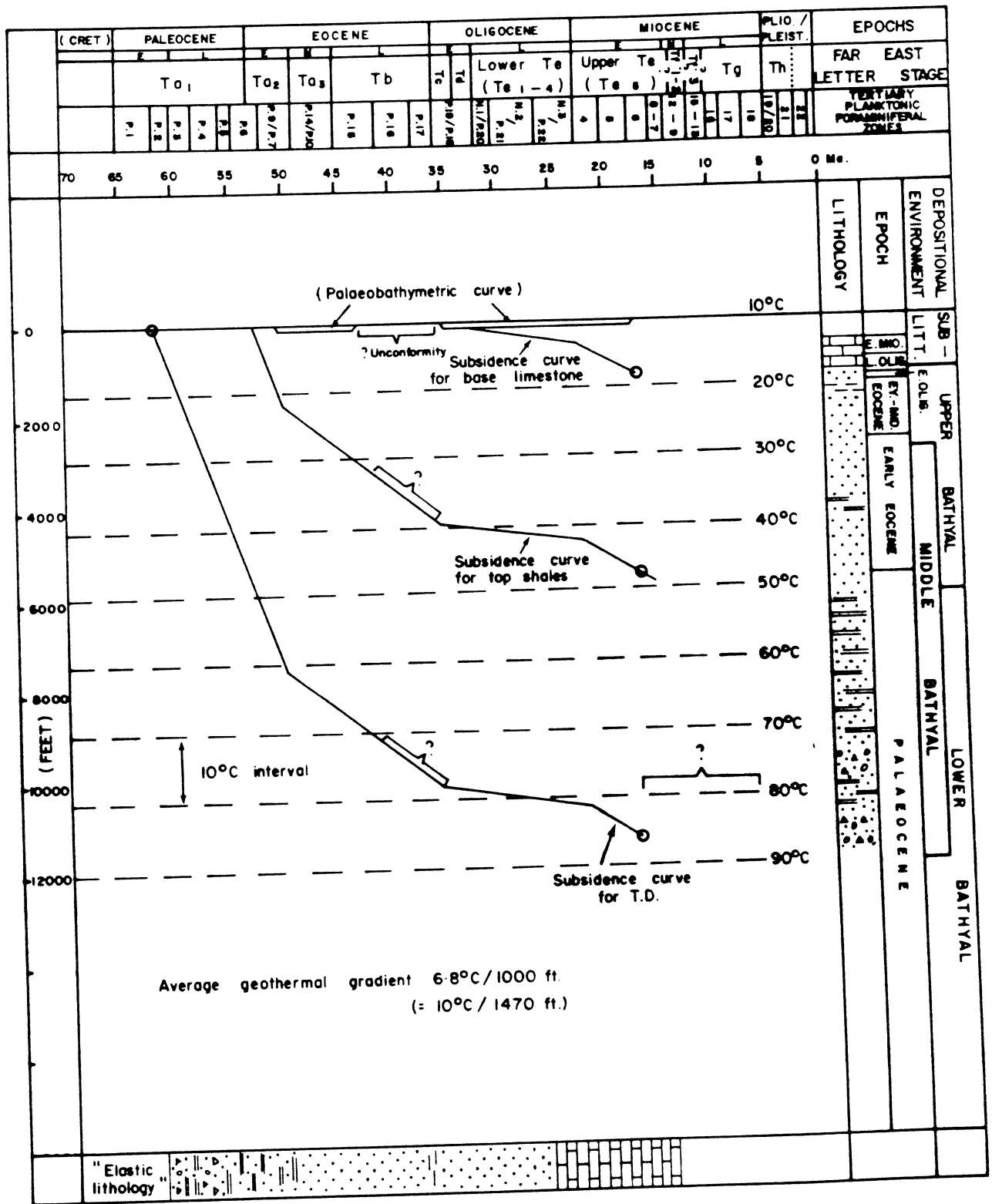


Figure 1. Geohistory diagram for Cape Sorell-1

TABLE I

BIOSTRATIGRAPHIC SUMMARY

<u>Interval</u> (Feet)	<u>Floral Zone</u>	<u>Calcareous</u> <u>Nannofossil</u> <u>Zone</u>	<u>Age</u>
690)		<u>H. ampliaperta</u>)	EARLY MIOCENE
690- 720)		<u>S. belemnos</u>)	
720- 990)	<u>Proteacidites</u>	<u>T. carinatus</u>)	
	<u>tuberculatus</u>	<u>S. ciperoensis</u>	LATE OLIGOCENE
990- 1230)	and	<u>S. predistentus</u>	
	?younger		
1230- 1350)		<u>H. reticulata</u>	EARLY OLIGOCENE
	----- ? UNCONFORMITY -----		
1350- 1410)		<u>D. sublodoensis</u>)	MIDDLE-EARLY EOCENE
1410- 2550)	Lower		
	<u>Nothofagidites</u>		
2550- 2580)	<u>asperus</u>		
2580-?4050	<u>Proteacidites</u>		EARLY EOCENE
	<u>asperopolus</u>		
?4050- 5770	<u>Malvacipollis</u>	<u>D. lodoensis</u>	
	<u>diversus</u>	<u>D. mohleri</u>	
5770- 7170	<u>Lygistepollenites</u>		
	<u>balmei</u>		
7170- 7590)	<u>Lygistepollenites</u>		PALAEOCENE
	<u>balmei</u>		
7590-10270)	<u>Tricolpites longus</u>	<u>?D. mohleri</u>	
		and older	
10270-11576TD	<u>Tricolpites longus</u>		

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TABLE II

DEPOSITIONAL ENVIRONMENT SUMMARY

<u>Depth (Feet)</u>	<u>Microfaunal Assemblage Subzones</u>	<u>Microfaunal Assemblage Zones</u>	<u>Local Pollen Assemblage Zones</u>	<u>Depositional Environment</u>
690- 720	<u>Sphaeroidina</u>))))
	)	)	)	) Outer
	)	)	)	) sublittoral
720- 1110	<u>Guttulina/</u>))))
	<u>Clavulina/</u> )	)	CS-1-I)
	<u>Bryozoa</u>))))
))))
))))
1110- 1140 )	)	) <u>Globocassidulina/</u>)))
)	<u>Triloculina</u> )	) "Planktonic" )	)	) Deep middle
)	)	)	)	) sublittoral
1140- 1350)))))
	)	)	CS-1-II)
))))
1350-1410 )	)	)	)	) Shallow
)	<u>Pullenia</u> )	)	)	) outer
)	)	)	)	) sublittoral
1410- 1470)))))
))))
))))
1470- 1950	)	<u>Lenticulina/</u> )	)	) Middle
	)	<u>Eponides</u> )	)	) sublittoral
	)	)	CS-1-III)
))))
1950- 2460	)	<u>Eponides/</u> )	)	) Deep middle
	)	"Planktonic" )	)	) sublittoral
))))
))))
2460- 2490)))))
)	<u>Lenticulina/</u> )	)	)	) ?Middle
)	<u>Ammodiscus</u> )	)	)	) sublittoral
2490- 2970)))))
	)	<u>Cyclammina/</u>)))
	)	<u>Ceratobulimina</u>)))
2970- 3510	"Poor Fauna"/ )	)	)	) ?Inner
	<u>Cyclammina</u> )	)	)	) sublittoral
	)	)	CS-1-IV)
))))
3510- 4020	<u>Lenticulina/</u> )	)	)	) ?Middle
	<u>Amphicoryna</u> )	)	)	) sublittoral

TABLE II (cont'd.)

<u>Depth (Feet)</u>	<u>Microfaunal Assemblage Subzones</u>	<u>Microfaunal Assemblage Zones</u>	<u>Local Pollen Assemblage Zones</u>	<u>Depositional Environment</u>
4020- 4050))))
	)	"Barren" I	)	) ?Brackish
4050- 4200	)	)	)	) littoral
)))) -
	)	)	)	) ?Inner
4200- 5040		"Arenaceous"/ <u>Cyclammina</u>	)	) sublittoral
		)	CS-1-V)
5040- 5310		"Barren" II	)	) ?Supra-
		)	)	) littoral
)))
5310- 5770	)	)	)	) Brackish
	)	<u>Cyclammina</u>/	)	) littoral-
	)	<u>Ammodiscus</u>	)	) Shallow
5770- 6450	)	)	)	) inner
		)	)	) sublittoral
)))
6450- 6950	"Arenaceous"))))
	)	"Poor Fauna"	CS-1-VI	) Brackish
	)	)	)	) littoral
6950- 7430	<u>Cyclammina</u>))))
)))
7430- 7610))))
	)	"Barren" III	)	) ?Supra-
	)	)	)	) littoral
7610- 7910	)	)	CS-1-VII)
)))
7910- 9250))))
	)	"Poor Fauna"/	)	) Brackish
	)	"Arenaceous"	)	) littoral
9250- 9320))))
)))
9320-10230		"Barren" IV	CS-1-VIII	?Supra-
		)	)	) littoral
10230-10270	)	)	)	) Brackish
	)	)	)	) littoral-
	)	<u>Trochammina</u>	)	) ?Shallow
	)	)	)	) inner
10270-11170)))) sublittoral
)	CS-1-IX)
11170-11576 TD		"Barren"/)) Supra-
		"Poor Fauna"))) littoral

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THERMAL MATURITY AND KEROGEN COMPOSITION DATA

LOCATION: TASMANIA

Trace	if	observed
Minor	if	$< 0.5\%$
Lean	if	5-20%
Moderate	if	20-50%
Common	if	50-80%
Rich	if	80/90+ \rightarrow 100%

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THE BIOSTRATIGRAPHY OF THE
AMOCO AUSTRALIA PETROLEUM CO.
CAPE SORELL-1 WELL,
OFFSHORE WEST TASMANIA, AUSTRALIA

BUREAU OF MINERAL RESOURCES



100001594

ROBERTSON RESEARCH (SINGAPORE) PRIVATE LIMITED

Report No. 1176

THE BIOSTRATIGRAPHY OF THE
AMOCO AUSTRALIA PETROLEUM CO.
CAPE SORELL-1 WELL,
OFFSHORE WEST TASMANIA, AUSTRALIA

by

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Project No. S/I/823/41
January 1983

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Enclosures

Micropalaeontological Analysis Chart
Palynological Analysis Chart
Calcareous Nannofossil Analysis Chart
Biostratigraphic Data Summary Log

SUMMARY

Analysis of the section 690'-11576' T.D. of the Cape Sorell-1 well provide the following lithological, biostratigraphic and palaeoenvironmental information:

1. The well section studied consists of a limestone succession between 720' and 1110', which is underlain by a thick sequence of calcareous sandstones between 1110' and 4150' approximately. Silty and shaley sandstones form a variable succession between 4150' and 6450' approximately, where they are replaced by a predominantly shale sequence, with inter-bedded silty sandstones, between 6450' and 9300'. The basal section consists predominantly of sandy breccio conglomerates and extends from 9300' to 11576' T.D., interrupted by a unit of silty sandstones with shales between 10300' and 10950'.
2. The sediments recovered are dated to range from the Early Miocene to Palaeocene; caved Middle Miocene to ?Pleistocene foraminiferal species are also present. A summary of the biostratigraphic results is presented in Table 1.
3. The environments of deposition for the sediments penetrated are interpreted to range from outer sublittoral to supra-littoral. A summary of the depositional environments is presented in Table II.

to extremely poor or barren. Taxonomic nomenclature and identification of forms is based mainly on Stover and Partridge (1973) and Stover and Evans (1973), with the assistance of Harris (1965), Cookson (1950, 1953, 1959) and Martin (1973, 1974, 1978).

Nine local pollen assemblage zones have been determined. These zones have been given the suffix CS-1 to indicate that they relate only to this well section. However, through examination of ranges of marker taxa and comparison with zones described in other studies in S.E. Australia (Stover and Partridge, 1973; Stover and Evans, 1973) a scheme of age diagnostic floral zones has been identified (Appendix I). Supportive evidence for the ages presented comes from quantitative fluctuations of the pollen data, described by Martin (1978).

A total of 186 ditch cutting samples, spanning the section 690'-11576' were examined for their calcareous nannofossil content, using the smear slide technique. Calcareous nannofossil recovery is moderate to good between 690' and 2610', whereas between 2610' and 11576' T.D. samples are either barren or recovery is poor. The zonal scheme of Bukry (1973) is followed for age determination.

Preparation of samples followed standard micropalaeontological and palynological techniques.

All foraminifera and other microfauna identified in this investigation are plotted on the Micropalaeontological Analysis Chart. Pollen, spores and other palynomorphs are plotted on the

Palynological Analysis Chart, graphically on a percentage basis when the pollen sum is greater than 30, and on a presence/absence basis when the pollen sum is less than 30. Calcareous nannofossils identified are plotted on the Calcareous Nannofossils Analysis Chart. Inferred biostratigraphic and palaeoenvironmental conclusions are plotted on the Biostratigraphic Data Summary Log.

Environmental nomenclature is based upon a Robertson Research (Singapore) (1981) modification of Hedgpeth (1957), Murray (1973), Berggren (1978) and Ingle (1980), a summary of which is included as Appendix II.

II

GENERAL LITHOLOGY, BIOSTRATIGRAPHY AND
ENVIRONMENTS OF DEPOSITION

EARLY MIOCENE, Interval 690'-990'

General Lithology

The highest sample, at 690', consists of a microconglomerate with coarse sands and with common shell fragments and foraminifera. Samples collected below the casing point, at 693', are comprised of grey calcareous silty claystone, so rich in bryozoan fragments that an impure biocalcarenite limestone is produced, and persists throughout the section 693'-990'.

Biostratigraphy

Foraminifera

Foraminifera are common within this interval, and display a high diversity. Calcareous benthonic species predominate, with less well represented planktonic species. Arenaceous forms are rare, but present throughout most of the interval. Miliolids are rare and confined to the top of the section (690'-720'). The abundance and presence of species of mixed stratigraphic range suggests the presence of caved Plio-Pleistocene sediments above and immediately below the casing point, at 693'. One microfaunal assemblage zone and two subzones have been erected.

The Globocassidulina/"Planktonic" microfaunal assemblage zone (part) (690'-990') is characterized by the consistent and common

presence of a variety of calcareous benthonic species, especially Globocassidulina subglobosa, and planktonic species with rare arenaceous forms.

The Sphaeroidina assemblage subzone (690'-720') contains features which are common to the host assemblage zone but, in addition, contains a higher abundance and diversity of species, with rare arenaceous and miliolid specimens. A number of calcareous benthonic species are either particularly common or confined to this subzone, including Sphaeroidina bulloides, Pullenia bulloides, Eponides sp. cf. suturicrassus, Siphonina pulchra, Uvigerina senticosa and Trifarina bradyi. Planktonic species display their greatest diversity within this subzone, with Globigerina bulloides/praebulloides and G. nepenthes being the predominant, but probably caved, species. Three rare arenaceous species and two rare miliolid forms are also present.

N. 17
N. 12

The Guttulina/Clavulina/Bryozoa microfaunal assemblage subzone (part)(720'-990') is characterized by good recovery of foraminifera, especially of calcareous benthonic forms. Planktonic species are less well represented, and rare arenaceous forms are also present. The calcareous benthonic assemblage is dominated by Globocassidulina subglobosa, Cibicides spp., Guttulina elegantissima, Cassidulina delicata, Parellina vericulatus, Nonion sp. cf. maoricum, Guttulina pacifica, Heterolepa mediocris and Sphaeroidina bulloides. The planktonic assemblage is dominated by Globigerina bulloides/praebulloides and Globigerinoides triloba.

N. 17

Clavulina pacifica is the most consistent arenaceous species, and is accompanied by less well represented Textularia sp., T. sp. cf. abbreviata and Bigenerina cylindrica.

Other Microfauna

Echinoid spines and bryozoa are common throughout this interval. Rare microfauna include an echinoid plate, lamellibranch and brachiopod.

Calcareous Nannofossils

Species recovery is variable within this interval, being moderately common and diverse at the top, but becoming poorer towards the base; recovery is probably affected by the casing point at 693'.

Species recovered include Cyclicargolithus gammatum, Helicosphaera euphratis, Sphenolithus belemnoides, Sphenolithus heteromorphus, Sphenolithus moriformis, Helicosphaera carteri, Cyclicargolithus abisectus and Coccolithus pelagicus. The presence of Helicosphaera recta at 750' is possibly due to reworking.

Palynomorphs

Recovery from the interval is extremely poor, with only rare pollen and spores recorded, including Proteacidites spp., Myrtaceidites spp., Acacia sp., Psilatricolporites spp., Podocarpidites spp., Phyllocladidites spp. (bisaccate), Gleicheniidites spp. and Verrucosisporites spp. Dinocysts were commonly identified in the

sample at 780'. The spectrum has been assigned as part of local pollen assemblage zone CS-1-I.

Age

The presence of the calcareous nannofossil species Sphenolithus heteromorphus and Sphenolithus belemnos at sample 690' indicates the presence of the Helicosphaera ampliaperta zone.

The presence of Sphenolithus belemnos, in the absence of the younger taxon Sphenolithus heteromorphus, indicates the presence of the Sphenolithus belemnos zone for sample 690'-720'.

The section between 720'-990' is assigned to the Triquetrorhabdulus carinatus zone, in the absence of younger taxon Sphenolithus belemnos and the older taxa Zygrhablithus bijugatus and Helicosphaera recta. Further subdivision is difficult due to the presence of caved species.

All the above mentioned zones are of Early Miocene age.

No definite age diagnostic palynomorphs were recovered from the interval. However, the presence of Acacia sp. is suggestive of a Miocene and/or younger age.

The planktonic foraminifera indicative of a Pliocene-Pleistocene age at the top of this interval, including Sphaeroidinella dehiscens immatura and Globorotalia pseudopima, are

considered to be caved. The presence of Pararotalia sp. cf. mecatepecensis, at 930' suggests proximity to the Oligocene-Miocene boundary.

Environments of Deposition

The depositional environment for the Globocassidulina/ "Planktonic" assemblage zone (part) (690'-990') ranges from the middle to outer sublittoral regime.

An outer sublittoral environment is suggested for the Sphaeroidina assemblage subzone (690'-720') by the presence of various deep water species, such as Sphaeroidina bulloides, Pullenia bulloides, Uvigerina senticosa. Further supportive evidence is provided by the relatively high planktonic component of the total population in which keeled species, Sphaeroidinella and Sphaeroidinellopsis, usually characteristic of upper bathyal and deeper conditions, are present, though rare. Most of the species present in this subzone are considered to be caved, as they are either absent or less well represented below the casing point.

An outer sublittoral depositional environment is also concluded for the Guttulina/Clavulina/Bryozoa assemblage subzone (part) (720'-990') based upon the rich calcareous benthonic component, in which upper bathyal species are less well represented. The assemblage includes poorly represented Pullenia bulloides and Sphaeroidina bulloides, but common to abundant Globocassidulina subglobosa and typical sublittoral forms such as species of

Guttulina. The presence of common bryozoa support an outer sublittoral environment, as there have been found in southern Australia between depths of 120m to 240m (Wass et. al., 1970).

Poor pollen recovery, together with the recovery of dino-cysts, supports a marine environment of deposition.

TABLE I

BIOSTRATIGRAPHIC SUMMARY

<u>Interval</u> (Feet)	<u>Floral Zone</u>	<u>Calcareous</u> <u>Nannofossil</u> <u>Zone</u>	<u>Age</u>
690	)	<u>H. ampliaperta</u>)	EARLY MIOCENE
690- 720	)	<u>S. belemnus</u>)	
720- 990	) <u>Proteacidites</u>	<u>T. carinatus</u>)	
	) <u>tuberculatus</u>		
990- 1230	) and	<u>S. ciperoensis</u> -	LATE OLIGOCENE
	) ?younger	<u>S. predistentus</u>	
1230- 1350	)	<u>H. reticulata</u>	EARLY OLIGOCENE
	) ----- ? UNCONFORMITY -----		
1350- 1410	)	<u>D. sublodoensis</u>)	MIDDLE-EARLY EOCENE
1410- 2550	) Lower)	
	) <u>Nothofagidites</u>)	
2550- 2580	) <u>asperus</u>)	
2580-?4050	) <u>Proteacidites</u>	)	EARLY EOCENE
	) <u>asperopolus</u>)	
?4050- 5770	) <u>Malvacipollis</u>	<u>D. lodoensis</u>)	
	) <u>diversus</u>	-)	
	)	<u>D. mohleri</u>	
5770- 7170	) <u>Lygistepollenites</u>	)	PALAEOCENE
	) <u>balmei</u>)	
7170- 7590	) <u>Lygistepollenites</u>)	
	) <u>balmei</u>)	
7590-10270	) <u>Tricolpites longus</u>)	
	)	<u>?D. mohleri</u>	
	)	and older	
10270-11576TD	<u>Tricolpites longus</u>)	

TABLE II

DEPOSITIONAL ENVIRONMENT SUMMARY

<u>Depth (Feet)</u>	<u>Microfaunal Assemblage Subzones</u>	<u>Microfaunal Assemblage Zones</u>	<u>Local Pollen Assemblage Zones</u>	<u>Depositional Environment</u>
690- 720	<u>Sphaeroidina</u>))))
))))
720- 1110	<u>Guttulina/</u>))))
	<u>Clavulina/</u>))))
	<u>Bryozoa</u> )	)	CS-1-I)
))))
1110- 1140 )	)	) <u>Globocassidulina/</u>)))
)	) <u>Triloculina</u> )	) "Planktonic")))
)))))
1140- 1350)))))
	)	)	CS-1-II)
))))
1350-1410)))))
)	) <u>Pullenia</u>))))
)))))
1410- 1470)))))
))))
1470- 1950	)	) <u>Lenticulina/</u>)))
	)	) <u>Eponides</u>)))
	)	)	CS-1-III)
1950- 2460))))
	)	) <u>Eponides/</u>)))
	)	) "Planktonic")))
))))
2460- 2490)))))
)	) <u>Lenticulina/</u>))))
)	) <u>Ammodiscus</u>))))
2490- 2970)))))
	)	) <u>Cyclammina/</u>)))
	)	) <u>Ceratobulimina</u>)))
2970- 3510	"Poor Fauna"/))))
	<u>Cyclammina</u>))))
	)	)	CS-1-IV)
))))
3510- 4020	<u>Lenticulina/</u>))))
	<u>Amphicoryna</u>))))

TABLE II (cont'd.)

Depth (Feet)	Microfaunal Assemblage Subzones	Microfaunal Assemblage Zones	Local Pollen Assemblage Zones	Depositional Environment
4020- 4050))))
	)	"Barren" I	)	) ?Brackish
4050- 4200	)	)	)	) littoral
)))) -
4200- 5040	)	"Arenaceous"/ <u>Cyclammina</u>	)	) ?Inner
	)	)	)	) sublittoral
	)	)	CS-1-V)
5040- 5310	)	"Barren" II	)	) ?Supra-
	)	)	)	) littoral
5310- 5770))))
	)	<u>Cyclammina</u> / <u>Ammodiscus</u>	)	) Brackish
5770- 6450	)	)	)	) littoral-
	)	)	)	) Shallow
	)	)	)	) inner
	)	)	)	) sublittoral
6450- 6950	"Arenaceous"))))
	)	"Poor Fauna"	CS-1-VI	) Brackish
6950- 7430	<u>Cyclammina</u> )	)	)	) littoral
))))
7430- 7610))))
	)	"Barren" III	)	) ?Supra-
7610- 7910	)	)	)	) littoral
	)	)	CS-1-VII)
7910- 9250))))
	)	"Poor Fauna"/	)	) Brackish
9250- 9320	)	"Arenaceous"	)	) littoral
))))
9320-10230	)	"Barren" IV	CS-1-VIII	) ?Supra-
	)	)	)	) littoral
10230-10270	)	)	)	) Brackish
	)	)	)	) littoral-
	)	<u>Trochammina</u>	)	) ?Shallow
10270-11170)))) inner
)))) sublittoral
))	CS-1-IX)
11170-11576 TD)	"Barren"/)) Supra-
)	"Poor Fauna")) littoral

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Note

Environmental determinations of the Palaeogene section of the succession are based mostly on the arenaceous foraminiferal assemblage. The apparent inconsistency of placing Cyclammina species in the shallow inner sublittoral, when extant forms of this genus are recorded as occupying the bathyal regime, is based on Robinson (1970) and Ludbrook (1977). These authors examine the distribution of fossil Cyclamminids, and conclude a sublittoral environment for Palaeogene forms.

I

INTRODUCTION

This report presents the results of biostratigraphic analysis of ditch cutting samples over the section 690'-11576' T.D. and of sidewall core samples over the section 9586'-11380', from the Amoco Australia Petroleum Company, Cape Sorell-1 well, drilled offshore West Tasmania, Australia (Figure 1) (40° 08' 09.54" S; 145° 01' 47.06"E), at 309' water depth.

Lithological descriptions are based upon an examination of washed ditch cutting residues, supplemented by a summary lithological log supplied by the client.

A total of 425 ditch cuttings at intervals of 30', spanning the entire well section, together with eight sidewall cores between 9586' and 11380', were examined for their foraminiferal content. The scarcity of stratigraphically useful species precludes detailed age determination. The presence of foraminifera throughout most of the well, however, enables conclusions regarding the environment of deposition to be obtained.

A palynological investigation was performed on 121 ditch cutting samples over the entire well section, together with 8 sidewall cores between 9586' and 11380'. Palynomorph recovery was extremely variable, with assemblages ranging from rich and diverse

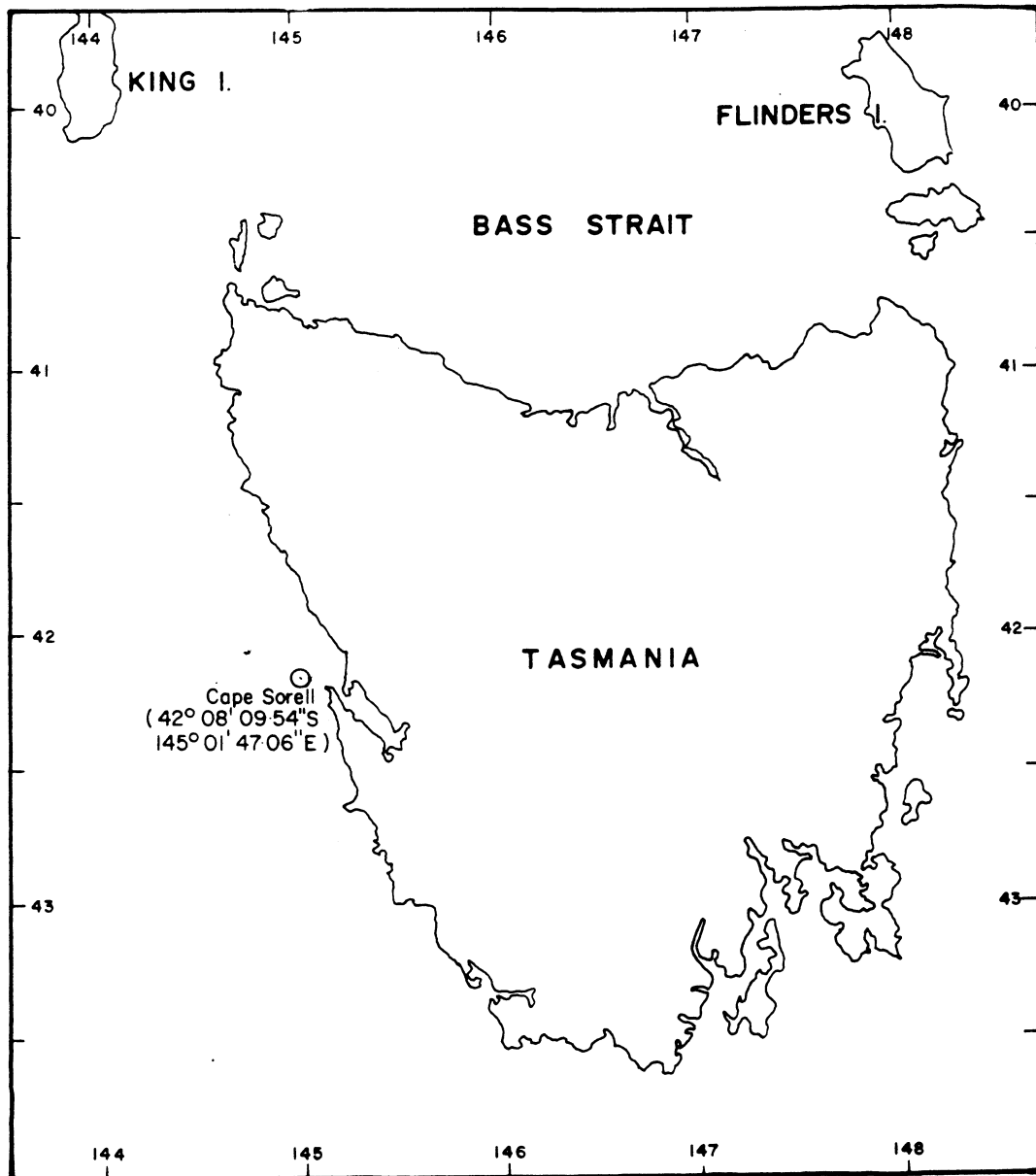


FIGURE 1 : LOCALITY OF AMOCO INTERNATIONAL
AUSTRALIA CAPE SORELL-1 WELL,
OFFSHORE W. TASMANIA

LATE OLIGOCENE, Interval 990'-1230'

General Lithology

This interval is comprised of an upper unit (990'-1110') of a grey impure biocalcarenite limestone, rich in bryozoa, and a lower unit (1110'-1230') of white, calcareous quartz sandstones which are slightly silty.

Biostratigraphy

Foraminifera

Foraminifera are common throughout most of this interval, but their relative abundance is gradually reduced towards the base. Calcareous benthonic species predominate, with subsidiary planktonic forms, rare arenaceous and miliolid forms. One microfaunal assemblage zone (part) and two assemblage subzones (part) have been erected.

The Globocassidulina/"Planktonic" microfaunal assemblage zone (990'-1230') consists of a foraminiferal association which has been described in the previous interval.

The Guttulina/Clavulina/Bryozoa assemblage subzone (part) (990'-1110') has been described in detail in the previous interval.

The Triloculina assemblage subzone (part) (1110'-1230') is characterized by the consistent presence of rare to common miliolid forms, including species of Triloculina and Quinqueloculina. Arenaceous species, though rare, are especially concentrated at the

upper part of this subzone, but Textularia spp. maintain a presence throughout. A rich calcareous benthonic assemblage is maintained throughout the subzone, in which the most consistently occurring species include Pullenia bulloides, Globocassidulina subglobosa, Sphaeroidina bulloides, Eponides spp. and Anomalinoides sp. cf. cavus. Planktonic species diversity is very low, but Globigerina bulloides/praebulloides and G. sp. cf. apertura are well represented in high numbers of individuals.

Other Microfauna

Bryozoa are relatively common throughout most of this interval, and are accompanied by echinoid spines in the lower part. Ostracoda are also present.

Calcareous Nannofossils

Cyclicargolithus gammatum and Cyclicargolithus abisectus are the most common species in this interval together with Zygrhablithus bijugatus and Sphenolithus moriformis. Also, rare occurrences of Coccolithus pelagicus, Braarudosphaera bigelowi, Helicosphaera recta, and Reticulofenestra bisecta were recorded.

Palynomorphs

Two local pollen assemblage zones, CS-1-I and CS-1-II were, in part, identified within the interval.

Zone CS-1-I (990'-1140', in part), as in the previous interval, is characterized by poor recovery. Within the Late

Oligocene, forms recorded include Nothofagidites spp. (brassii group), Proteacidites spp., Myrtacidites spp., Sapotaceoidaepollenites sp., Tricolporopollenites endobalteus, Psilatricolporites spp. and Podocarpidites spp.

Within zone CS-1-II (1140'-1230', in part), in contrast to the above, recovery was moderate with fairly diverse assemblages. Relatively high percentages of Nothofagidites spp. (brassii group) (33-47%) are the dominant feature of the zone, together with Nothofagidites spp. (fusca group) (0-5%), Proteacidites spp. (0-5%), Tripoporopollenites spp. (0-6%), cf. Casuarina (2-5%), Myrtacidites spp. (15-18%), Malvacipollis subtilis (0-1%), Liliacidites spp. (2-5%), Podocarpidites spp. (2-6%) and Dacrydiumites spp. (0-2%). Several other forms were sporadically represented and dinocysts and chitinous foraminiferal tests were consistently recorded.

Age

The presence of the calcareous nannofossil species Helicosphaera recta and Zygrhablithus bijugatus, in the absence of older taxon Reticulofenestra umbilica, indicates the Sphenolithus cipoensis zone to Sphenolithus predistentus zone which is of Late Oligocene age. Further subdivision is impossible due to scarcity or absence of other marker species and caving.

No age diagnostic palynomorphs were recovered from the interval. However, the high frequencies recorded for Nothofagidites spp. provides supportive evidence for the age determined by calcareous nannofossils (Martin, 1978).

No age diagnostic foraminifera were recovered; most forms present, including the Miocene to Pleistocene species Globigerinoides triloba, are considered to be caved.

Environments of Deposition

An outer sublittoral depositional environment is concluded for the Guttulina/Clavulina/Bryozoa assemblage subzone (part) (990'-1110') based upon evidence discussed for this subzone in the previous interval.

The presence of the miliolid genera Quinqueloculina, Triloculina, Cornuspira and Pyrgo in the Triloculina assemblage subzone (part) (1110'-1230') suggests a slightly shallower depositional environment, and a deep middle sublittoral regime is concluded. This determination is supported by the consistent presence of common Eponides spp., Anomalinoides sp. cf. cavus, Oolina hexagona, Trifarina bradyi, Guttulina pacifica, Globocassidulina subglobosa, Pullenia bulloides and Sphaeroidina bulloides.

Between 1140' and 1230' the palynomorph assemblage suggests a slightly shallower environment, although the increased recovery may be a reflection of pollen preservation in less hostile conditions. The recovery of dinocysts and foraminiferal tests continue to support a marine influence.

EARLY OLIGOCENE, Interval 1230'-1350'

General Lithology

This interval is comprised of calcareous quartz sandstones, which become increasingly silty towards the base.

Biostratigraphy

Foraminifera

Foraminiferal recovery is poor within this interval, with calcareous benthonic species predominating and planktonic forms being less well represented. Miliolid and arenaceous forms are rare. This assemblage is assigned to the Triloculina microfaunal assemblage subzone (part) (1230'-1350') of the Globocassidulina/ "Planktonic" assemblage zone (part) (1230'-1350').

Calcareous benthonic species which are present throughout much the subzone in this interval include Globocassidulina subglobosa, Sphaeroidina bulloides, Discorbis spp., Nonion sp., Vaginula sp. cf. margaritifera and Lenticulina sp. Planktonic species are restricted to well represented Globigerina praebulloides with a few rare species. Triloculina and Quinqueloculina species are rare, and arenaceous forms are restricted to a single occurrence of Textularia sp.

Other Microfauna

Other microfauna are rare, and confined to echinoid spines, ostracoda and bryozoa.

Calcareous Nannofossils

Calcareous nannofossil recovery is moderately good. Species recovered include Zygrhablithus bijugatus, Reticulofenestra umbilica, Cyclicargolithus gammatum, Sphenolithus moriformis, Cyclicargolithus abisectus, Cyclococcolithus formosus and Reticulofenestra bisecta.

Palynomorphs

The interval falls entirely within local pollen assemblage zone CS-1-II described above.

Age

The presence of Reticulofenestra umbilica in the absence of any older marker taxon indicates the Helicosphaera reticulata zone which is of Early Oligocene age.

No stratigraphically useful palynomorphs nor foraminifera were recovered from this interval.

Environments of Deposition

The combined presence of Globocassidulina subglobosa, Eponides spp., Lenticulina sp. in the localized rare occurrence of Pullenia bulloides and Sphaeroidina bulloides within this interval, suggests a deep middle sublittoral environment.

MIDDLE-EARLY EOCENE, Interval 1350'-2550'

General Lithology

This interval is comprised of poorly calcareous quartz sandstones with localized development of calcareous claystones (1420'-1530'), silty claystones (1600'-1720') and shales (2380'-2550').

Biostratigraphy

Foraminifera

Foraminiferal recovery is poor within this interval, but no samples are barren of foraminifera. Calcareous benthonic species predominate, while planktonic foraminiferal abundance decreases sharply below 1470'; most samples below 1470' do not contain planktonic species. Arenaceous forms appear at 2460' and increase rapidly in relative abundance below this datum. Miliolids are rare, and present only at the top of the interval, and in three isolated samples within the interval.

Four microfaunal assemblage zones are recognized, together with one assemblage subzone each from the uppermost and lowest zones.

The Globocassidulina/"Planktonic" microfaunal assemblage zone (part) (1350'-1470') is represented by the Pullenia assemblage subzone (1350'-1470'). This subzone is characterized by the localized reappearance of Pullenia bulloides, the continued presence of Globocassidulina subglobosa and Eponides spp. Planktonic forms are well represented only by Globigerina praebulloides; miliolids are

rare. The base of this zone is marked by the distinct final presence of G. subglobosa and planktonic species.

The Lenticulina/Eponides assemblage zone (1470'-1950') is characterized by a reduced number of calcareous benthonic species, when compared with the younger assemblage zone. Certain calcareous benthonic species are consistently present throughout the zone, and include Eponides sp. cf. subhaidingeri, E. spp., Lenticulina spp. and Anomalinoides spp.. Baggina sp., Astacolus sp., Guttulina sp. and Globocassidulina subglobosa maintain a scattered, rare to common presence throughout the zone. Other foraminifera are rare, but a slight concentration of rare arenaceous genera is present at 1740', where Textularia sp., Alveophragmium, Trochammina and ?Clavulina species are present.

The Eponides/"Planktonic" assemblage zone (1950'-2450') is characterized by a poor foraminiferal recovery in which Eponides spp. is the only calcareous benthonic species which is consistently present. The planktonic species Globigerina praebulloides is rare, but present throughout most of the zone. Rare Quinqueloculina spp. are also present towards the base of the zone.

Only the upper part of the Cyclammina/Ceratobulimina assemblage zone (part) (2460'-2550') is present within this interval, the general characteristics will therefore be discussed in detail in the following interval. The Lenticulina/Ammodiscus assemblage subzone (part) (2460'-2550') is recognized by the slight increase

in foraminiferal recovery, with the first appearance of Ceratobulimina pacifica and the reappearance of Lenticulina spp., Amphicoryna hirsuta, Nodosaria albatrossi and increased occurrence of Astacolus sp. A marked increase in arenaceous forms is manifest by the initial and continued common presence of Ammodiscus incertus, Cyclammina incisa and C. rotundata. Rare, possibly caved planktonic species are present.

Other Microfauna

Other microfauna, though rare, are restricted to the upper (1350'-1830') and lower (2790'-2550') parts of the interval. In the upper part, echinoid spines, bryozoa, lamellibranchs, gastropods, pteropods, calcareous alga and solitary corals are present. In the lower part, this assemblage is reduced to include rare echinoid spines, bryozoa, lamellibranchs, calcareous alga, ostracoda and, below 2430', common and consistent solitary corals.

Calcareous Nannofossils

Species recovered include Discoaster lodoensis, Zygrhablithus bijugatus, Coccolithus pelagicus, Cyclicargolithus gammatum, Sphenolithus moriformis, Helicosphaera seminulum, Cyclicargolithus reticulatus, Transversopontis spp. and Rhabdosphaera spp.

Palynomorphs

No samples between 1350' and 1410' were examined for palynomorphs. That part of the section, therefore has been assigned to zone CS-1-II. Within the remainder of the interval two pollen assemblage zones were identified, CS-1-III (1410'-2490') and

CS-1-IV (2490'-2550', in part). Zone CS-1-III is characterized by reduced frequencies for Nothofagidites spp. (brassii group) (7-17%) and, conversely, increased percentages for Proteacidites spp. (7-15%), Triporopollenites spp. (6-13%) and Myrtaceidites spp. (25-33%). Proteacidites latrobensis and Tricolpites simatus make their first downhole appearance at 1410' and Proteacidites leightonii, P. asperopolus and P. kopiensis first occur slightly below that level. Other forms which define the top of the assemblage zone include Ephedripites spp., Dicolpopollis spp., Polycolpites esobalteus, Tricolporites prolata/Tricolpites prolata, Psilatricolpites operculatus, Periporopollenites demarcatus, Podocarpidites australiensis, Dacrydiumites spp. (type 1) and Baculatisporites disconformis. The last downhole occurrence of Tricolpites simatus was identified at 2340'.

Zones CS-1-IV will be described within the underlying interval.

Age

The presence of the calcareous nannofossil Discoaster lodoensis in the absence of older taxon Marthastrites tribranchiatus indicates the Discoaster sublodensis zone which is of Middle to Early Eocene age.

The zones between Helicosphaera reticulata to Discoaster sublodensis are not recorded and therefore suggest the possible presence of an unconformity at 1350'.

The recovery of the palynomorphs Proteacidites latrobensis and Tricolpites simatus at 1410' indicates penetration of the lower Nothofagidites asperus zone of Early-Middle Eocene age. This conclusion is supported by the identification of Proteacidites leightonii and P. asperopolus, at slightly lower levels. These forms become extinct at the top of and during the lower N. asperus zone respectively. Furthermore, as Tricolpites simatus is restricted to within the Lower N. asperus zone, its recovery at 2340' again supports an Early-Middle Eocene age at that depth, as determined by calcareous nannofossils.

Additional evidence for the age suggested is provided by quantitative analysis of the pollen data. Reduced frequencies for Nothofagidites spp. and, conversely, increased percentages for Proteacidites spp., have been noted elsewhere (Martin, 1978), within the Early-Middle Eocene.

From the composite evidence supplied by age diagnostic microfossils, therefore, a major unconformity appears present at 1350'. Material from possibly Early-Middle Eocene to Early Oligocene appears to be missing from the section. Such an unconformity has been recognised in all ocean basins (Moore et al. 1978).

No age diagnostic foraminifera were recovered from this interval. A single specimen of the Early to Middle Miocene planktonic species Praeorbulina glomerosa at 2100' is considered to be caved.

N8

Environments of Deposition

A shallow outer sublittoral depositional environment is concluded for the Pullenia assemblage subzone (1350'-1470') of the Globocassidulina/"Planktonic" assemblage zone (part) (1350'-1470'), based upon the consistent localized presence of Pullenia bulloides and the planktonic species Globigerina praebulloides. The relatively sparse assemblage is considered to be related to the presence of sandstones slightly higher in the assemblage (1350'-1420') which were possibly deposited during a relatively high energy submarine environment.

The Lenticulina/Eponides assemblage zone (1470'-1950') is considered to have been deposited in a middle sublittoral environment, based upon the common, consistent presence of the two nominate genera, together with Astacolus sp. This conclusion is supported by the absence of outer sublittoral forms such as Pullenia bulloides, Sphaeroidina bulloides, and rare Globocassidulina subglobosa, together with rare planktonic species.

The Eponides/"Planktonic" assemblage zone (1950'-2460') was probably deposited in a deep middle sublittoral environment, based upon the combined presence of scattered Globocassidulina subglobosa and planktonic species.

A middle sublittoral depositional environment is tentatively concluded for the Lenticulina/Ammodiscus assemblage subzone (part) (2460'-2550') of the Cyclammmina/Ceratobulimina assemblage zone

(part) (2460'-2550'), based upon the relatively high proportion of arenaceous forms within the assemblage. The arenaceous assemblage has a low diversity, but a relatively high number of individuals, of Ammodiscus incertus, Cyclammina incisa and C. rotundata. Lenticulina and Eponides species are consistently well represented, and suggest a sublittoral environment. There is evidence (Robinson, 1970; Lubdook, 1977) to suggest that the genus Cyclammina was able to survive in the sublittoral environment during the Palaeogene, unlike its present day confinement to the bathyal regime. The significance of the localized concentration of simple corals is not known.

The recovery of dinocysts from the interval supports a marine environment of deposition. On the basis of the diverse and rich nature of the palynomorph assemblage, however, nearshore environment should be considered, with the possibility of a slighter deeper environment in the zone of poor recovery between 1680' and 2310'.

EARLY EOCENE, Interval 2550'-5770'

General Lithology

This interval is comprised of an upper unit of slightly calcareous quartz sandstones with scattered, thin shale beds (2550'-4180') and a lower unit (4180'-5770') of mixed quartz sandstones, silty sandstones, siltstones with shales, and shales. Shales are especially well developed at 4180'-4480' and 5530'-5680'; the former group are pyritic.

Biostratigraphy

Foraminifera

Foraminiferal recovery is very poor throughout this zone, with barren samples present at 4020'-4140' and 5040'-5310'. Calcareous benthonic forms and arenaceous forms occupy approximately equal proportions of the assemblage, with rare, sporadic and possibly caved planktonic forms also present.

Three microfaunal assemblage zones and two barren zone are recognized, one zone is comprised of three subzones.

The Cyclammina/Ceratobulimina assemblage zone (part) (2550'-4020') is characterized by the common and consistent presence of Cyclammina species, together with the rare and scattered occurrence of Ceratobulimina pacifica. Both the arenaceous and calcareous benthonic assemblages display a low species diversity, but the latter does contain a comparatively greater variety of species. These include Lenticulina spp., Amphicoryna spp., Guttulina sp.

cf. yabei, Eponides spp., Astacolus sp., Nodosaria albatrossi and Nodosaria radicula glanduliniformis. Planktonic forms are rare and considered to have been caved.

The Lenticulina/Ammodiscus assemblage subzone (part) (2550'-2970') is characterized by the consistent and common presence of Lenticulina spp., Nodosaria albatrossi, together with the arenaceous form Ammodiscus incertus, Cyclammina incisa and C. rotundata.

The "Poor Fauna"/Cyclammina assemblage subzone (2970'-3510') is characterized by the predominance of Cyclammina incisa and C. rotundata in the presence of rare, scattered calcareous benthonic species. Lenticulina spp. persist throughout the upper part of this subzone (2970'-3270'), but are absent in the lower part.

The Lenticulina/Amphicoryna assemblage subzone (3510'-4020') is characterized by the consistent presence of Lenticulina spp. and Amphicoryna sp., together with the scattered presence of Eponides spp., Ceratobulimina pacifica and Nodosaria radicula glanduliniformis. Cyclammina species maintain a common and consistent presence throughout the subzone, together with rare ?Psammionopelta sp. The absence of foraminifera between 4020'-4200' enables designation of the "Barren" I zone.

The "Arenaceous"/Cyclammina assemblage zone (4200'-5040') is characterized by an entirely arenaceous, low diversity, foraminiferal assemblage in which Cyclammina incisa and C. rotundata predominate, with scattered ?Trochammina spp.

The absence of foraminifera between 5040'-5310' enables designation of the "Barren" II zone.

The Ammodiscus/Cyclammina assemblage zone (part) (5310'-5770') is characterized by an entirely arenaceous, low diversity, foraminiferal assemblage in which Cyclammina incisa, C. rotundata and Ammodiscus incertus predominate.

Other Microfauna

Other microfauna are rare, and confined to the upper part (2550'-4020') of this interval. These include relatively consistent presence of solitary corals, calcareous algae and gastropods, with a less common, scattered presence of lamellibranchs, bryozoa, echinoid spines and ostracoda.

Calcareous Nannofossils

Calcareous nannofossil recovery is very poor in this interval. The section from 2550' to 2610' and 4110' to 4170' contains rare calcareous nannofossils while the remainder of interval is barren. Species recovered include Transversopontis pulcher, Zygrhablithus bijugatus, Marthastrites tribranchiatus and Coccolithus pelagicus.

Palynomorphs

Two local pollen assemblage zones were identified within the interval. These are CS-1-IV (2550'-4050', in part) and CS-1-V (4050'-5770').

Zone CS-1-IV is marked by higher recorded frequencies for Triporopollenites spp. (16-45%) and, conversely, lower levels for Myrtaceidites spp. (0-19%). Percentages for Nothofagidites spp. (brassii group) (0-32%) are low at the top of the zone, peaking towards the base. Proteacidites spp. (10-26%) were commonly recovered, together with Retitricolpites spp. (2-12%), Retitricolporites spp. (0-10%), Cyathidites spp. (0-8%), Podocarpidites spp. (0-5%) and dinocysts (4-14%). At 2580' Proteacidites grandis makes its first downhole occurrence, with Spinizonocolpites prominatus present below 2760'. Periporopollenites demarcatus and Tricolporopollenites endobalteus both make their last downhole appearance within the zone and further significant contributors to the pollen sum include Proteacidites annularis, P. reticulatus, P. adenanthoides, P. pachypolus and Malvacipollis diversus. P. pachypolus is only found within this assemblage zone.

Zone CS-1-V is characterized by generally poorer recovery. The upper boundary is located at the basal occurrence of Proteacidites pachypolus, P. asperopolus and P. leightonii. Within the zone, Proteacidites spp. were consistently identified and were the most common forms recorded. Triporopollenites spp. and Myrtaceidites spp. were also recovered throughout CS-1-V, together with Cyathidites spp., Gleicheniidites sp. and, more rarely dinocysts. Other important features of the zone include the recovery of Intratriporopollenites notabilis at 4050' and the basal occurrences of Proteacidites grandis, P. latrobensis and Spinizonocolpites prominatus within its boundaries. Proteacidites reticulatus was recorded in the sample at 5770'.

Age

The presence of the calcareous nannofossil Marthastrites tribranchiatus at 2550' indicates the penetration of Discoaster lodoensis zone which is of Early Eocene age.

The first downhole occurrence of the palynomorph Proteacidites grandis at 2580' indicates penetration of the Proteacidites asperopolus zone of Early Eocene age. This conclusion is supported by the recovery of Spinizonocolpites prominatus below 2760' and the presence of Periporopollenites demarcatus and Tricolporopollenites endobalteus above 3300'. The lower boundary of the P. asperopolus zone is tentatively placed at 4050', based on the record for Proteacidites pachypolus above that depth. Although it is known to extend into the underlying Malvacipollis diversus zone, Stover and Partridge (1973) and Stover and Evans (1973) note that increased frequencies of P. pachypolus are characteristic of the P. asperopolus zone. Supportive evidence is provided by the recovery of Nothofagidites spp. (menziesii group) at 4110'. This form makes its first evolutionary appearance around the M. diversus-P. asperopolus boundary.

Between 4050' and 5770' the section has been ascribed to the Malvacipollis diversus zone, also of Early Eocene age. The recovery of Proteacidites grandis, P. latrobensis, P. reticulatus and Spinizonocolpites prominatus, which all make evolutionary appearances during the zone, is not thought to be a result of caving, due to the presence of a casing point at 4144'. The base

of the zone, marking the Palaeocene-Eocene boundary, has been placed to coincide with the bottom occurrence of Proteacidites reticulatus, which is at the same level as the uppermost occurrence of the older markers Gambierina edwardsii and Tricolpites waiparaensis.

Environments of Deposition

A middle sublittoral depositional environment is tentatively concluded for the Lenticulina/Ammodiscus assemblage subzone (part) (2550'-2970') based upon the consistent and common presence of species which are common to that regime, and include Lenticulina spp., Nodosaria albatrossi, with rare planktonic forms and a common, though low diversity, arenaceous component comprised of Ammodiscus incertus and Cyclammina species. It is the presence of the latter species, together with the comparatively poor fauna, which enables a middle sublittoral depositional environment to be concluded, as Ludbrook (1977) states "They (Cyclammina) are all assumed to have been deposited in shallow water".

A possibly inner sublittoral depositional environment is tentatively concluded for the "Poor Fauna"/Cyclammina assemblage subzone (2970'-3510'), based upon the reduced faunal recovery and also upon the dominance of Cyclammina.

A possibly middle sublittoral depositional environment is concluded for the Lenticulina/Amphicoryna assemblage subzone (3510'-4020') based upon the faunal similarity, though less rich, between this zone and that at 2550'-2970'.

A brackish littoral to inner sublittoral environment is tentatively concluded for the "Barren" I zone (4020'-4200') and "Arenaceous"/Cyclammina assemblage zone (4200'-5040'), based upon the sparse foraminiferal population in which Cyclammina species are consistently present. The barren zone is considered to be lithologically controlled as it coincides approximately with the presence of clean quartz sands.

A supralittoral environment is tentatively concluded for the "Barren" II zone (5040'-5310'), although the absence of foraminifera may be lithologically controlled.

A brackish littoral to shallow inner sublittoral depositional environment is concluded for the Cyclammina/Ammodiscus assemblage zone (part) (5310'-5770') based upon the entirely arenaceous assemblage. This assemblage has a present day equivalent in the lower bathyal regime, but a similar environment of stress is considered to have existed in the marginal marine regime of the Palaeogene.

The decrease in relative abundance of dinoflagellate cysts of marine origin in the section 4050'-5770' supports the shallower marginal marine conditions suggested in the above discussion.

PALAEOCENE, Interval 5770'-11576' T.D.

General Lithology

A varied sedimentary succession is present within this interval, which may be grouped into an upper sandy shale unit (5770'-9600') and a lower breccio-conglomerate/sandy shale unit (9600'-11576' T.D.).

The upper unit consists of silty shales (5770'-6100') which grade downhole into haematite-stained shales with silty sandstones (6100'-6750'). Interbedded shales with quartz silty sandstones form a thick, monotonous succession (6750'-9300'), with haematite-stained basal beds. These overlie a unit of clean, quartz sandstones (9300'-9600').

A polymictic breccio-conglomerate underlies the sandstone and continues to the base of the well (9600'-11576' T.D.), enclosing a unit of sandstones with shales at 10300'-10950'.

Biostratigraphy

Foraminifera

Foraminiferal recovery is very poor within this interval, and many samples are barren of foraminifera. Five arenaceous microfaunal assemblage zones have been erected, together with two barren zones.

The Cyclammina/Ammodiscus assemblage zone (part) (5770'-6450') is characterized by the entirely arenaceous assemblage, with low diversity, in which Cyclammina incisa, C. complanata and Ammo-

discus incertus are predominant.

The "Poor Fauna" assemblage zone (6450'-7430') consists of two assemblage subzones, both of which are predominantly arenaceous, but in which rare calcareous benthonic forms are found in the lower subzone (6950'-7430'). The "Arenaceous" assemblage subzone (6450'-6950') contains many barren samples, and a sparse, low diversity arenaceous assemblage in which Cyclammina and ?Trochammina species are marginally more consistently present than other forms. The Cyclammina assemblage subzone (6950'-7430') is characterized by a low diversity arenaceous assemblage in which Cyclammina species predominate, despite their rare presence, together with rare, scattered calcareous benthonic forms, which may possibly be caved, and include Eponides sp.

The absence of foraminifera between 7430'-7910' enables designation of the "Barren" III zone.

The "Poor Fauna"/"Arenaceous" assemblage zone (7910'-9320') is characterized by the reappearance of scattered arenaceous forms, interspersed with barren samples. Cyclammina species are scattered throughout the upper part of this zone. -

The absence of foraminifera between 9320'-10230' enables designation of the "Barren" IV zone.

The Trochammina assemblage zone (10230'-11170') is characterized by the reappearance of a comparatively rich arenaceous

assemblage in which Trochammina sp. cf. squamata is consistently present, and accompanied by indeterminate forms, with ?Ammobaculites spp. and Trochammina spp.

The rare, scattered presence of arenaceous foraminifera in an otherwise barren section enables designation of the "Barren"/"Poor Fauna" assemblage zone (11170'-11576' T.D.).

Other Microfauna

Other microfauna are rare within this interval, and confined to the rare, scattered occurrence of Ostracoda.

Calcareous Nannofossils

In this interval only samples 6320', 7110' and between 7590' and 7620' contained very poor calcareous nannofossils; the remainder of interval is barren. Species recovered include Cruciplacolithus tenuis, Chiasmolithus danicus and Coccolithus pelagicus.

Palynomorphs

Four local pollen assemblage zones were identified from the interval.

Zone CS-1-VI (5770'-7610') is characterized by increased recovery, when compared with the overlying zone. Higher percentages for Proteacidites spp. (9-39%), Retitricolpites spp. (0-24%), Nothofagidites spp. (brassii group) (0-15%) and dinocysts are evident. The dominant feature of the zone, however, is the record

for gymnosperms, both in terms of frequency and diversity. Forms identified include Podocarpidites spp., Dacrydiumites spp. (type 1), Dacrydiumites spp. (type 2), Phyllocladidites spp. (bisaccate), Phyllocladidites mawsonii, Phyllocladidites reticulosaccatus, Phyllocladidites spp. (trisaccate) and trisaccate undifferentiated grains. Also recorded regularly within the zone were Proteacidites annularis, Tripoporopollenites spp., Gambierina edwardsii, G. rudata, Myrtaceidites spp., Tricolpites confessus, T. gillii, Retitricolporites spp., Cyathidites spp., and Gleicheniidites spp. Tricolpites waiparaensis and Proteacidites adenanthoides were recorded at the top of the zone and T. phillipsii at 7170'.

Zone CS-1-VII (7610'-9250') is marked by reduced levels of palynomorph recovery. Nevertheless, Nothofagidites spp. (brassii group), Nothofagidites spp. (fusca group), Proteacidites spp., Tripoporopollenites spp., Retitricolpites spp., Podocarpidites spp., Cyathidites spp. and dinocysts are well represented within its boundaries, together with sporadic occurrences of Tricolpites gillii. Gymnosperm pollen occurs more commonly in the top of the zone.

Zone CS-1-VIII (9250'-10270') is a zone of particularly poor recovery with only rare grains recorded.

In contrast, zone CS-1-IX (10270'-11576' T.D.) is characterized by slightly increased recovery, although the assemblages recovered are not very diverse. Nothofagidites spp. (brassii

type), Nothofagidites spp. (fusca type), Proteacidites spp., Triporopollenites spp., Triporopollenites sectilis, Gambierina rudata, Retitricolpites spp., Tricolporites lilliei, Retitricolporites spp., Podocarpidites spp., Phyllocladidites spp. (bisaccate), Cyathidites spp. and several other pteridophyte taxa were recorded from the zone.

Age

The presence of the calcareous nannofossil Cruciplacolithus tenuis at 7590' indicates the penetration of the ?Discoaster mohleri zone and older which is of Palaeocene age.

The occurrence of the palynomorph Gambierina edwardsii below 5770' indicates penetration of Palaeocene sediments. This is confirmed by the recovery of Phyllocladidites reticulosaccatus, and Gambierina rudata at a slightly lower level. The identification of Tricolpites phillipsii at 7170' and Proteacidites annularis down to 7070' more specifically suggests the Lygistepollenites balmei zone of Middle to Late Palaeocene age.

Between 7170' and 10270' there is no evidence of age from marker taxa.

Below 10270', however, the presence of Triporopollenites sectilis is indicative of the Tricolpites longus floral zone, Early to Middle Palaeocene. This is supported by the recovery of Quadraphanus brossus and Tricolporites lillei at 10470' and below 10960'

respectively. The continuous record for Nothofagidites spp. (fusca group) to the base of the section, if in situ, indicates that Cretaceous sediments have not been penetrated. The entire interval has therefore been assigned to the Palaeocene.

Reworked Vitreisporites pallidus and Striatopodacarpidites sp. were recorded around 6050'-6150'.

Environments of Deposition

A brackish littoral to shallow inner sublittoral depositional environment is concluded for the Cyclammina/Ammodiscus assemblage zone (part) (5770'-6450') based upon evidence presented in the previous interval.

A brackish littoral, possibly estuarine, environment is concluded for the "Poor Fauna" assemblage zone (6450'-7430') based upon the poor recovery of foraminifera. The scattered calcareous benthonic species present in the lower subzone of the zone (6950'-7430') are possibly either washed in from the marine environment, or caved.

A supralittoral, possibly fluvial, depositional environment is tentatively concluded for the "Barren" III zone (7430'-7910'), as there is no obvious lithological change which would possibly indicate a higher energy environment.

A brackish littoral environment is concluded for the "Poor Fauna"/"Arenaceous" assemblage zone (7910'-9320'), based upon the reappearance of an arenaceous foraminiferal assemblage.

Supralittoral conditions are tentatively concluded for the "Barren" IV zone (9320'-10230'). The absence of foraminifera is easily explained by the presence of clean, quartz sands and breccio-conglomerates which indicate high energy, probably fluvial flood depositional conditions.

A brackish littoral to possibly shallow inner sublittoral depositional environment is concluded for the Trochammina assemblage zone (10230'-11170'), based upon the arenaceous foraminifera in which Trochammina sp. cf. squamata is well represented.

A supralittoral, probably fluvial environment is concluded for the deposition of the "Barren"/"Poor Fauna" assemblage zone (11170'-11576'T.D.). This zone lies within a breccio-conglomerate lithology, which probably represents an immature, flood transported, environment.

III

CONCLUSIONS

The Palaeocene to Early Miocene history of the Cape Sorell-1 well is traced in this report.

During the Palaeocene (11576'T.D.-5770') deposition of breccio-conglomerates took place in a supralittoral environment (11576'T.D.-9600') which temporarily became affected by a brackish to marine influence to allow the deposition of sandstones and claystones (10950'-10300'). Deposition of interbedded sandstones and shales continued in environments which fluctuated between brackish littoral and supralittoral, probably fluviatile (9600'-6100'). Haematite-staining of the uppermost part of this shale sequence suggests oxygenated conditions which support the marginal environment envisaged at this time. The siltstones with thin shale beds (6100'-5770') were deposited in a possibly deeper environment which spanned the brackish littoral to shallow inner sublittoral regimes.

During the Early Eocene (5770'-2550'), deposition of a predominantly sandstone sequence took place in a variety of environments which initially spanned the brackish littoral to shallow inner sublittoral regime (5770'-5310') but gradually the site of deposition deepened to a possibly middle sublittoral regime during the upper part of the Early Eocene (2970'-2550').

Deposition of calcareous sandstones took place during the Early to Middle Eocene (2550'-1350') in an environment which fluctuated between the shallow outer sublittoral (2460'-1950'; 1470'-1350') and middle sublittoral (2550'-2460'; 1950'-1470').

Calcareous sandstones continued to be deposited, despite the possible presence of an unconformity at 1350', during the Early Oligocene (1350'-1230') in a deep middle sublittoral regime. The presence of such an unconformity is in agreement with the global unconformity at this datum, which is detected in deep marine sequences. Submarine erosion, rather than uplift and subaerial erosion, is cited as the erosive mechanism, hence the apparent lack of change in the detectable depositional environment.

Calcareous sandstones were deposited during the Late Oligocene (1230'-990'), in a deep middle to outer sublittoral environment.

Further deepening of the site of deposition to an outer sublittoral regime is concluded for the deposition of the pelagic bryozoan rich limestones of Early Miocene age (990'-690').

The site of deposition was, therefore, subject to the marginal effects of a nearby sea during the Palaeocene and Early Eocene. During the Early Eocene, a relative marine transgression took place and continued with minor regressions during the Early to Middle Eocene. A single major marine transgressive phase took

place during the Early Oligocene to Early Miocene. During this time, the well section studied provides evidence for basement subsidence (at T.D.) of at least 10886'.

IV

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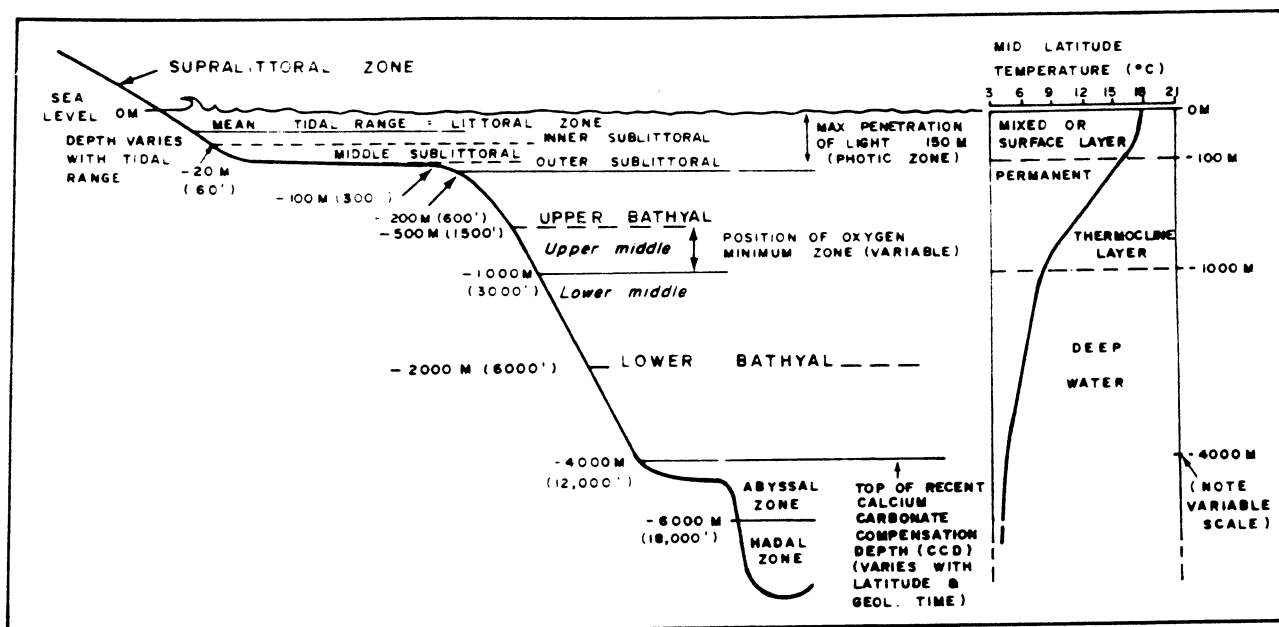
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APPENDIX I

SOUTH EAST AUSTRALIAN FLORAL ZONATION SCHEME		
AGE		FLORAL ZONE
MIDDLE - EARLY MIOCENE	M	<i>Triporopollenites bellus</i>
	E	<i>Proteacidites tuberculatus</i>
OLIGOCENE		Upper <i>Nothofagidites asperus</i>
EOCENE	LATE - MIDDLE	Lower <i>Nothofageidites asperus</i>
	EARLY	<i>Proteacidites asperopolus</i>
		<i>Malvacipollis diversus</i>
PALAEOCENE	LATE - MIDDLE	<i>Lygistepollentes balmei</i>
	MIDDLE - EARLY	<i>Tricolpites longus</i>
LATE - CRETACEOUS		<i>Tricolporites lilliei</i>

AFTER STOVER AND EVANS (1973) ,
STOVER AND PARTRIDGE (1973)

APPENDIX II




Note: Sublittoral is equated with "shelf" of other authors, and is the benthonic equivalent of the neritic water mass.

CLASSIFICATION OF BENTHONIC MARINE ENVIRONMENTS ADAPTED FROM HEDGPETH (1957), MURRAY (1973), BERGGREN (1978) AND INGLE (1980)



BIOSTRATIGRAPHIC DATA

LOG

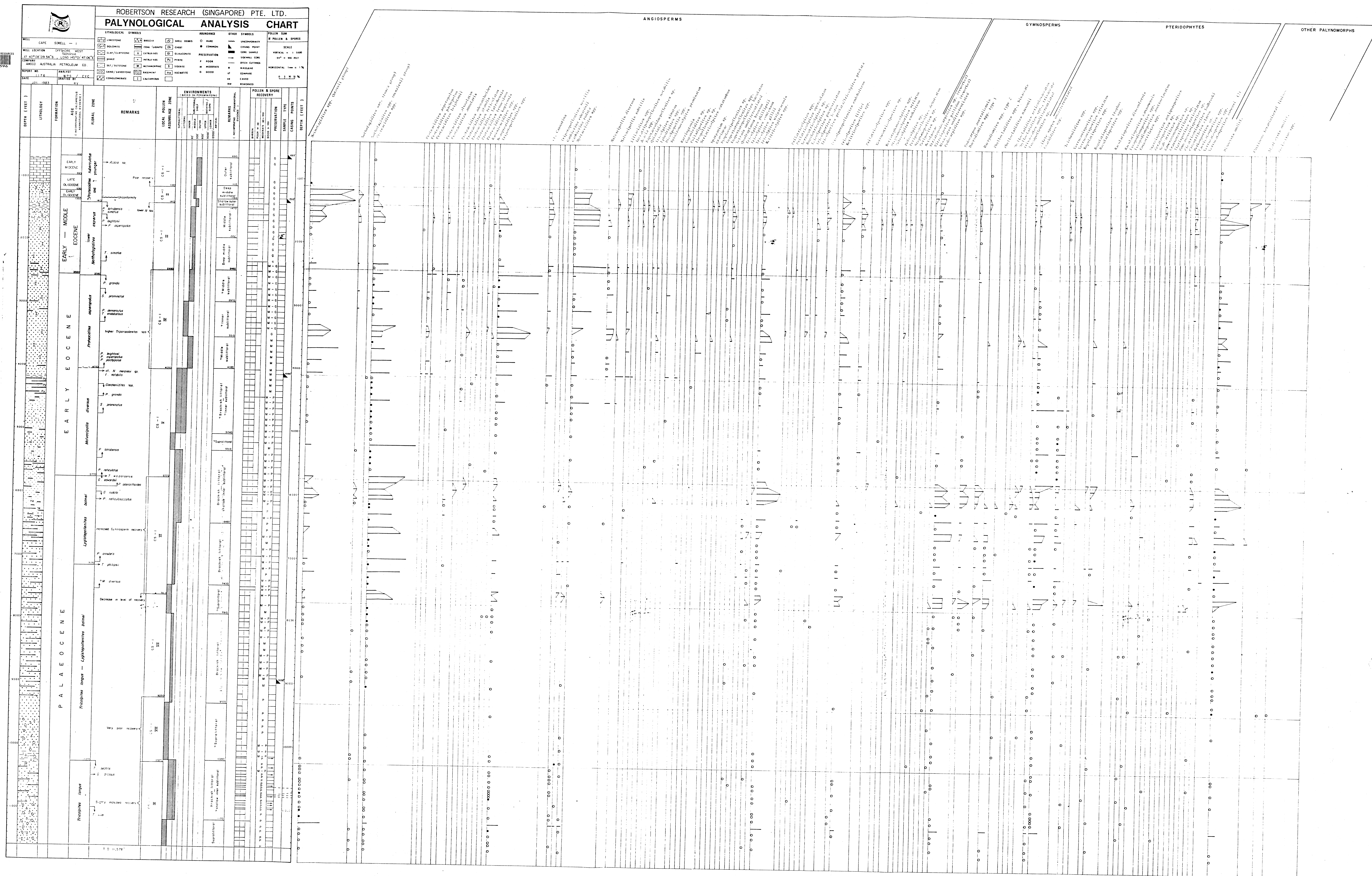
BUREAU OF MINERAL RESOURCES

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CAPE SORELL No. 1

Date : JAN, 1983 Scale 1:5000

Report No. 1170

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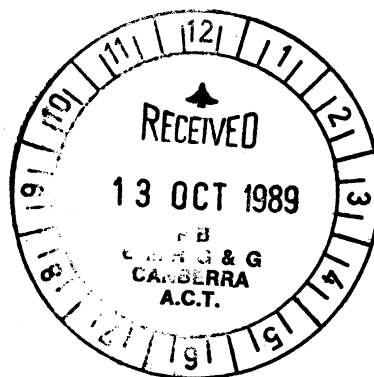
82/1056

**Biostratigraphic, Paleoenvironmental &
Geochemical Analysis of the
Amoco Australia Petroleum Company
Cape Sorell 1 Well
Offshore Western Tasmania, Australia**

**Prepared for: Maxus Energy Corporation
Dallas, Texas**

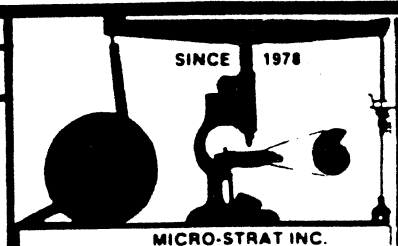
Project No: MSI 89-10

Date: August 1989



MICRO-STRAT INC.

**Sequence Stratigraphy Analysis
Palynology-Palynofacies
Micropaleontology
Geochemistry**



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DOMESTIC

BIOSTRATIGRAPHIC, PALEOENVIRONMENTAL AND GEOCHEMICAL ANALYSIS
OF THE AMOCO AUSTRALIA PETROLEUM COMPANY CAPE SORELL 1 WELL,
OFFSHORE WESTERN TASMANIA, AUSTRALIA

for Maxus Energy Corporation, Dallas, Texas

Introduction

Samples from the Amoco Australia Petroleum Company Cape Sorell-1 well, offshore western Tasmania, Australia were submitted by Maxus Energy Corporation of Dallas, Texas to MICRO-STRAT INC. of Denver, Colorado (Figure 1). These samples were analyzed for biostratigraphic determination and paleoenvironmental interpretation on the basis of palynomorphs and calcareous nannofossils. The samples were also analyzed for source rock geochemistry. The results of these analyses follow in this report.

The section covered by these samples can be related to eustatic sea level changes by means of a global chart presented in Figure 2. The large chart (in pocket) summarizes, in graphic form, all results of the analyses.

Maxus Energy Corporation contracted with MICRO-STRAT INC. for the analysis of these samples.

SUMMARY

- o Based on the stratigraphic occurrences and ranges of stratigraphically significant palynomorphs and calcareous nannofossils, the samples from the Cape Sorell 1 well can be grouped into the following ages:

5,100- 7,750 feet - Paleocene

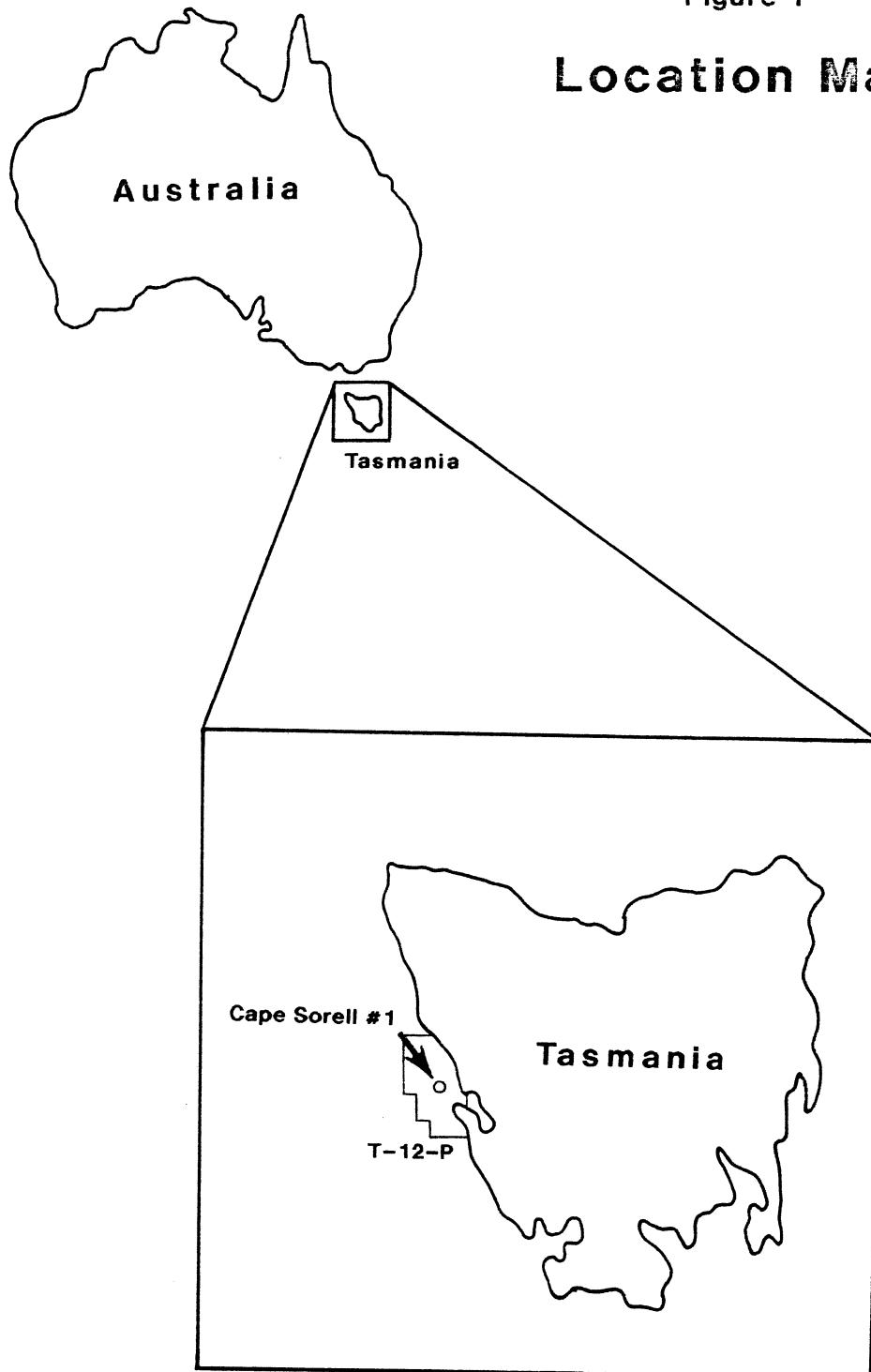
7,790-10,010 feet - Transitional Paleocene to Cretaceous

10,210-11,570 feet - Upper Cretaceous, Maastrichtian

- o Preservation of palynomorphs is generally fair to poor.
- o The paleoenvironment is marginal marine.
- o The values of Thermal Alteration Index (TAI) range from 2- to 2.
- o The Total Organic Carbon (TOC) ranges from 0.08 to 3.70 % .

Figure 1

Location Map



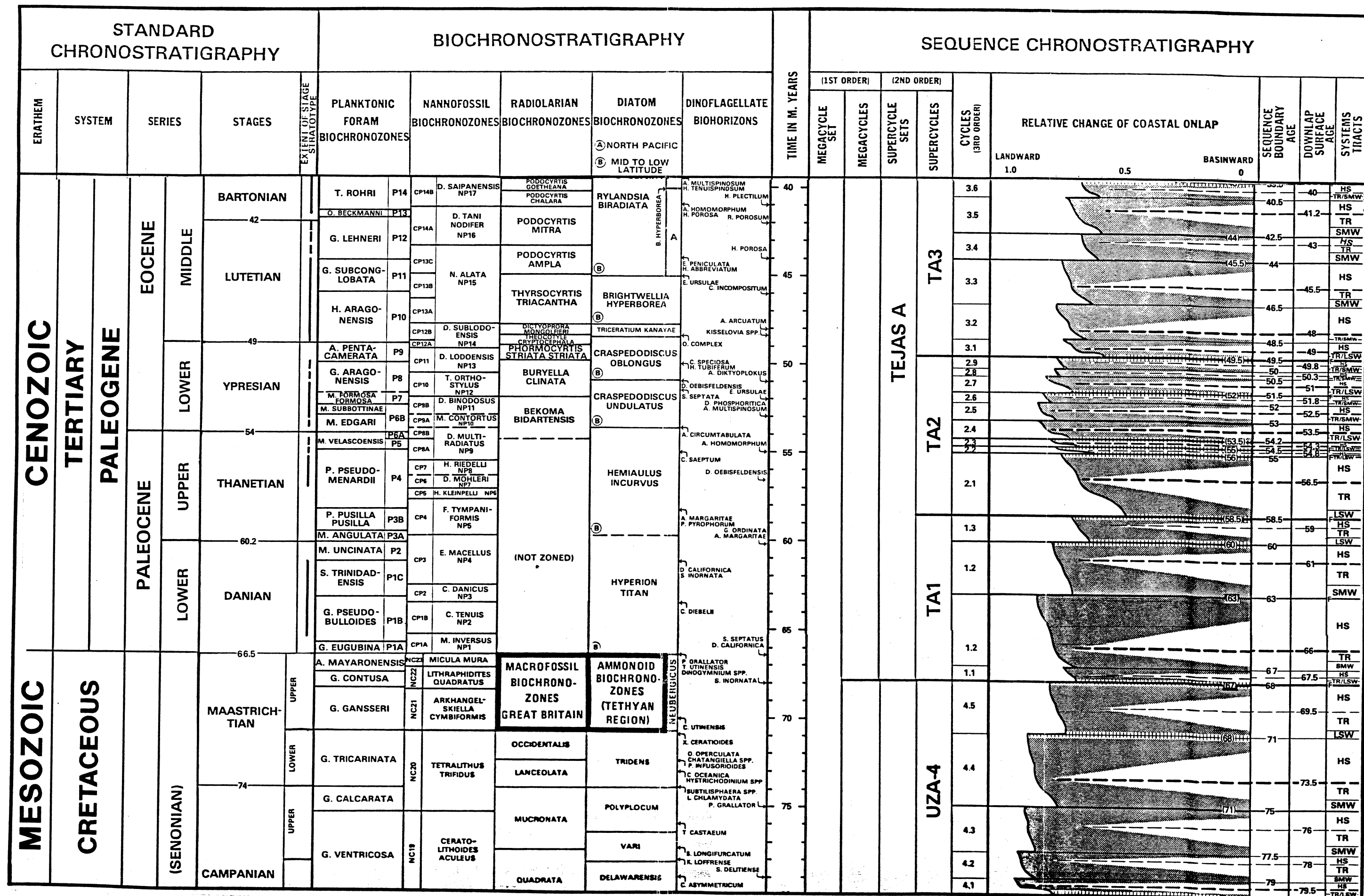


Figure 2 After Haq, B.U., J. Hardenbol and P.R. Vail, The new chronostratigraphic basis of Cenozoic and Mesozoic sea level cycles, Cushman Foundation for Foraminiferal Research, Special publication No. 24, 1987.

RESULTS OF PALYNOLOGICAL ANALYSIS

Thirty-eight (38) samples in two lots from 5,100 to 11,570 feet from the Cape Sorell 1 well, offshore Tasmania were processed and analyzed for palynomorphs, thermal maturation and kerogen analysis. Sample depths are as follows:

5100-5130	7310-7330	9090- 9110
5650-5670	7430	9330- 9350
6150-6170	7490	9630- 9650
6690-6710	7610	9990-10,010
6790	7670	10,210-10,230
6850	7710-7750	10,530-10,540
6970	7790	10,760-10,770
6990-7010	8090-8110	10,970-10,980
7050	8190	11,120-11,130
7110	8310	11,310-11,315
7190	8470-8490	11,565-11,570
7250	8510	Sample #1
7310	8850-8870	

Biostratigraphic interpretations follow. Refer to the accompanying Checklist (Chart 1, in pocket) for species occurrence versus sample depth. Thermal Alteration Index (T.A.I.) for all samples, plus kerogen analysis for the 14 samples containing sufficient organic matter are summarized on Chart 2.

Palynomorphs are very rare to sparse in the well samples, even in those with abundant organic matter. They include spores and pollen from land plants, and marine dinoflagellate cysts, which suggest a marginal marine paleoenvironment. Preservation is fair to poor. In the upper part of the sampled interval (from 5,100 to 7,750 feet), dinocysts are generally not well preserved, though they are sufficient to indicate a Paleocene age.

The middle portion of the sampled interval (from 8,090 to 10,010 feet) includes samples with little organic matter and extremely rare non-age diagnostic palynomorphs. The lower part of the interval (from 10,210 to 11,570 feet) includes both pollen and dinocysts that are indicative of Maastrichtian age. The following summary outlines these results.

The sampled section of this well, 5,100 to 11,570 feet, can be divided into three intervals:

5,100 to 7,750 feet	Paleocene
7,790 to 10,010 feet	Transitional Cretaceous/Paleocene
10,210 to 11,570 feet	Maastrichtian

Interval 5,100 to 7,750 feet

Epoch: Paleocene

Paleoenvironment: Marginal Marine

The samples in this interval yield spores and pollen that are mostly long-ranging, and a few that are typical of Paleocene and younger strata, including Haloragacidites harrisii, and Rhoipites spp. The dinocysts through these 2,650 feet of sediments include poorly-preserved species of the Deflandrea-Cerodinium complex, including Cerodinium dartmoorium (in the sample at 6,690-6,710 feet) and C. ?striatum (in the sample at 7,310-7,330 feet), plus ?Danea sp. and Glaphrocysta retiintexta.

Cerodinium dartmoorium is restricted to the Paleocene and early Eocene in the southeast Australia-New Zealand region and C. striatum is restricted to the lower Paleocene (Danian) in this area. Danea is

typical of the Paleocene-Eocene, and G. retiintexta, although it may range down into the Cretaceous, is typical of the Paleocene-early Eocene in this area. This assemblage suggests a Paleocene age for this interval.

Rare specimens of Manumiella, including M. druggii (in the sample at 6,690-6,710 feet), are also recognized in this well. These are typical Cretaceous forms, and M. druggii characterizes the late Maastrichtian (see below). They may be reworked (a common phenomenon in marginal marine environments) or in place in basal Paleocene beds. A few specimens of the M. druggii-M. seelandica complex range upward into basal Teurian (basal Paleocene) in Cretaceous/Tertiary boundary sections in New Zealand (e.g., Wilson, 1987; Wilson & Moore, 1989), where they might be in place or reworked, and in Antarctica (Jacobson, unpubl. data).

A relatively well-preserved specimen of the middle early Eocene dinocyst Wilsonidium ornatum in the sample at 7,310-7,330 feet is believed to be derived from uphole caving contamination.

Interval 7,790 to 10,010 feet

Epoch: Transitional Paleocene to Late Cretaceous

Paleoenvironment: Non-Marine?

This interval contains samples with little to almost no organic residue and extremely rare, non-age diagnostic palynomorphs. In some samples, distinctive reworked Permian spores and pollen are more common than presumed in-place palynomorphs. Reworking is commonplace

during periods of regression (and downcutting), and Permian "Gondwana" outcrops surround this area.

Interval 10,210 to 11,570 feet

Epoch: Late Cretaceous

Age: Maastrichtian

Paleoenvironment: Marginal Marine

The interval from 10,210 to 11,570 feet is assigned to the Tricolpites longus Zone of Late Cretaceous, Maastrichtian Age based on the restricted range of the palynomorphs Triporopollenites sectilis (in the sample at 10,270-11,050 feet) and Tubulifloridites (Tricolporites) lilliei (in the sample at 11,120-11,230 feet). These species are restricted to the Late Cretaceous and range no higher than Maastrichtian Age in New Zealand-southeast Australia (e.g., Helby, et al., 1987) and disappear at the Cretaceous/Tertiary boundary throughout the high southern latitudes.

The aforementioned palynomorphs are characteristic of the Tricolpites longus Zone. This zone is now placed in the Late Cretaceous, Maastrichtian Age, whereas in earlier papers, the T. longus Zone was placed in the early to middle Paleocene.

Partridge (1976) and subsequent authors (e.g., Helby, et al., 1987) have moved the T. longus Zone down into the Maastrichtian, based on improved biostratigraphic control and data from other fossil groups such as foraminifers. Because Manumiella specimens sometimes occur in the basal Danian in this area, the top of the T. longus Zone is

accepted by many workers as in the basal Danian.

Samples through this interval also yield spores, pollen and dinocysts including Gambierina edwardsii and common G. rudata. G. edwardsii and G. rudata range from upper Campanian through the Paleocene, though they are particularly common in the Maastrichtian, T. longus Zone in the Gippsland-Bass basin area, southeast Australia (Helby, et al., 1987).

The nonmarine palynomorphs in this interval provide a correlation with the T. longus Zone of latest early to late Maastrichtian age (to possibly very basal Danian) (see Helby, et al., 1987 for the most recent definition of this zone).

Rare dinocysts in these samples also indicate a Maastrichtian age for this stratigraphic interval. The diagnostic forms are species of Manumiella (including M. druggii and M. conorata) that indicate correlation with the M. druggii Zone (the marine equivalent of the upper T. longus Zone), of late Maastrichtian age (?to very basal Danian). As noted above, a few specimens of Manumiella occur in the basal Tertiary (Wilson, 1987; Wilson & Moore, 1989; Helby, et al., 1987).

"Sample #1"

(?outcrop sample from adjacent Tasmania?) This is a low diversity assemblage (nonmarine, possibly locally derived ?swamp flora) which includes Haloragacidites harrisii, and species of Triporopollenites, Spinizonocolpites prominatus, Arecipites sp., Tiliaepollenites notabilis, Malvacipollis sp., Margocolporites sp., etc. Presence of S. prominatus and T. notabilis indicate correlation to the Malvacipollis diversus - Proteacidites asperopolus zones, and an uppermost Paleocene to Middle Eocene age.

Evaluation of the Robertson Research results
for the interval from 5,100 to 11,570 feet

Based on the range chart provided, this previous report correctly assigned the interval from 5,770 to 7,170 feet to the Lygistepollenites balmei Zone and to the upper Paleocene. Recently (for the interval from approximately 5,100 to 5,770 feet) the lower part of Stover & Evans' (1973) Malvacipollis diversus Zone (then assigned to the Eocene), has been moved down into the upper Paleocene. Therefore the Lygistepollenites balmei Zone was moved down into the middle Paleocene.

The interval from 10,270 to 11,570 feet was assigned to the T. longus Zone of Paleocene Age. These 1,300 feet of section is characterized by the palynomorphs, Triporopollenites sectilis (10,270-11,050 feet), Quadraplanus brossus (10,470 feet) and Tubulifloridites (Tricolporites) lilliei (in 11,120-11,230 feet). These species are restricted to the Late Cretaceous and range no higher than Maastrichtian Age in Australia.

As originally defined by Stover & Evans (1973), both the L. balmei and T. longus Zones were assigned a Paleocene age, and this usage was followed by Robertson Research. They therefore assigned the entire interval from 5,770 to T.D. to the Paleocene.

Partridge (1976) and subsequent authors (e.g., Helby, et al., 1987) have moved the T. longus Zone down into the Maastrichtian, based on improved biostratigraphic control and data from other fossil groups

such as foraminifers. Because Manumiella specimens sometimes occur in the basal Danian in this area, the top of the T. longus Zone is accepted by many workers as in the basal Danian.

It is clear that the T. longus Zone as delimited by Robertson Research (below 10,270 feet) should be assigned to the Maastrichtian, based on recent biostratigraphic refinements of the zonation.

The presence of "consistent Nothofagus brassii type and rare N. fusca type is restricted to Paleocene or younger sediments" according to the Robertson Research Report. According to this recent publication, in Australia and Antarctica these two species range into the Late Cretaceous, Campanian Age and are not restricted to the Paleocene and younger sediments.

ROBERTSON RESEARCH RESULTS

Interval (feet)	Floral Zone	Calcareous Nannofossil Zone	Age
?4050- 5770	Malvacipollis diversus		Early Eocene
5770- 7170	Lygistepollenites balmei	D. lodoensis - D. mohleri	
7170- 7590	Lygistepollenites balmei/Tricolpites longus		Paleocene
7590-10270			
10270-11576 (T.D.)	Tricolpites longus	?D. mohleri and older	

MICRO-STRAT RESULTS

Interval (feet)	Floral Zone	Calcareous Nannofossil Zone	Age	TAI
5100- 5770			Early Eocene	
5770- 7010	Lygistepollenites balmei	D. lodoensis / D. mohleri	Paleocene	2 to 2-
7310- 7350	(based on 2 poorly- preserved dinos.)		Maastrichtian?? L. Cretaceous??	----- ?
7710-10010	very sandy, indeterminate			
10210-11576 (T.D.)	Tricolpites longus		Maastrichtian L. Cretaceous	2 woody

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- Wilson, G.J., 1987. Dinoflagellate stratigraphy of the Cretaceous-Tertiary boundary, mid-Waipara River section, North Canterbury, New Zealand. N.Z. Geol. Surv. Rec. 20:8-15.
- Wilson, G.J., 1988. Paleocene and Eocene dinoflagellate cysts from Waipara, Hawkes Bay, New Zealand. N.Z. Geol. Surv. Paleont. Bull. 57:96pp.
- Wilson, G.J. and P.R. Moore 1989. Cretaceous-Tertiary boundary in the Te Hoe River area, western Hawkes Bay. N.Z. Geol. Surv. Rec. :34-37.

RESULTS OF CALCAREOUS NANNOFOSSIL ANALYSIS

Thirty-seven (37) samples in two lots from the Cape Sorrel 1 well from the interval from 5,100 to 11,570 feet were examined for possible calcareous nannofossil age determinations. One sample, 7,310-7,330 feet, was present in both lots. Extremely rare calcareous nannofossils are noted in five samples from 6,150 to 7,210 feet and in one sample at 9,090-9,110 feet. If these occurrences are in place, a Lower Paleocene (Danian) age is probable. The samples examined and the results of the analysis are presented below:

Samples analyzed:	5,100-5,130	7,430-7,450	9,330- 9,350
(depths in feet)	5,650-5,670	7,490-7,510	9,630- 9,650
	6,150-6,170	7,610-7,630	9,990-10,010
	6,690-6,710	7,670-7,690	10,210-10,230
	6,790-6,810	7,710-7,750	10,530-10,540
	6,850-6,870	7,790-7,810	10,760-10,770
	6,990-7,010	8,090-8,110	10,970-10,980
	7,050-7,070	8,190-8,210	11,120-11,130
	7,110-7,130	8,310-8,330	11,310-11,315
	7,190-7,210	8,470-8,490	11,565-11,570
	7,250-7,280	8,510-8,530	Sample #1
	7,310-7,330	8,850-8,870	
	7,310-7,330	9,090-9,110	

Samples 5,100-5,130 and 5,650-5,670 feet

Age: Indeterminate

These two samples are barren of calcareous nannofossils.

Sample 6,150-6,170 feet

Epoch: Paleocene

Age: Danian

A single occurrence of Coccolithus cavus (= Coccolithus pelagicus?) is noted in this sample. This species is not particularly age diagnostic, but is a common constituent of early Paleocene Danian assemblages.

Sample 6,690-6,710 feet

Epoch: Paleocene

Age: Danian

A single occurrence of each of Coccolithus cavus and Transversopontis obliquipons is recorded in this sample. T. obliquipons is a middle to upper Eocene form and is considered a downhole contaminant.

Samples 6,790-6,810 and 6,850-6,870 feet

Age: Indeterminate

These two samples are barren of calcareous nannofossils.

Sample 6,990-7,010 feet

Epoch: Paleocene

Age: Danian

One occurrence of Chiasmolithus danicus is recognized in this sample. Although this species ranges into the middle Paleocene, its first evolutionary appearance in the Danian is an important bioevent.

Sample 7,050-7,070 feet

Age: Indeterminate

This sample is barren of calcareous nannofossils.

Sample 7,110-7,130 feet

Epoch: Paleocene

Age: Danian

This sample yields a single occurrence of Coccolithus cavus, which is a non-diagnostic form characteristic of Lower Paleocene (Danian) assemblages. A large form of Coccolithus pelagicus (C. eopelagicus) is also noted, which has probably caved from the Eocene section.

Sample 7,190-7,210 feet

Epoch: Paleocene

Age: Indeterminate

This sample yields a single occurrence of Coccolithus cavus.

<u>Samples</u>	7,250-7,280	7,610-7,630	8,190-8,210
	7,310-7,330	7,670-7,690	8,310-8,330
	7,310-7,330	7,710-7,750	8,470-8,490
	7,430-7,450	7,790-7,810	8,510-8,530
	7,490-7,510	8,090-8,110	8,850-8,870 feet

Age: Indeterminate

These 15 samples are barren of nannofossils.

Sample 9,090-9,110 feet

Epoch: Paleocene

Age: Early Danian

A single occurrence of Crucioplacolithus tenuis is recorded in this sample. The first appearance of C. tenuis in the early Danian (below the C. danicus datum) is an important bioevent.

<u>Samples</u>	9,330- 9,350	10,760-10,770
	9,630- 9,650	10,970-10,980
	9,990-10,010	11,120-11,130
	10,210-10,230	11,310-11,315
	10,530-10,540	11,565-11,570 feet

Age: Indeterminate

These ten samples are barren of calcareous nannofossils.

Sample #1

Age: Indeterminate

This sample is barren of calcareous nannofossils.

RESULTS OF SOURCE ROCK GEOCHEMICAL ANALYSIS

Twenty-two (22) samples were analyzed for source rock geochemistry, specifically Total Organic Carbon (TOC) and Thermal Alteration Index (TAI).

Results of these analyses are presented on Chart 2 (following page) along with kerogen types (in percent) and preservation.

Refer to Figure 3 for a correlation between maturation indices and petroleum generation and destruction.

TRANSMITTED LIGHT MICROSCOPY DATA

Transmitted light slides are prepared from isolated kerogens using elvacite as a mounting medium. Analysis is done with a tungsten light source on a Zeiss Universal microscope. Blue light fluorescence using a xenon light source is used to help identify kerogen type.

TAI color values are normally recorded only on spores and pollen but when this material is absent, amorphous kerogen is substituted. In such cases the TAI value is preceded by an "*" on the data table. Kerogen color is usually slightly darker for amorphous material than spores and pollen in the sample and this must be considered when evaluating the TAI results.

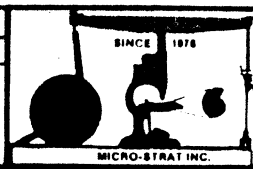
A brief description of the color for each TAI unit is as follows:

TAI COLOR SCALE

1-	straw yellow	3-	reddish brown
1	pale yellow	3	medium brown
1+	yellow	3+	dark brown
2-	yellow-orange	4-	brown-black
2	golden	4	black with structure
2+	amber	5	black without structure

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Results of Source Rock Geochemical Analysis

Chart 2

Depth (feet)	TOC	Source Material in % (Kerogen types)						Preser- vation			TAI						Color		Age
		Finely disseminated	Amorphous	Herbaceous	Woody plant debris	Coal fragment	Algal fragments	Barren	Good	Fair	Poor	2- Slightly altered	2	2+ Moderately altered	3- 3	3+ 3+	4- Strongly altered	4	
		+	13	5	70	12	+		X	X	X	X							
Sample #1	21.26																		Paleocene
5100-5130	0.24	55	10	3	13	19	+		X	X		X					X		Paleocene
5650-5670	0.35	10	26	7	38	19	+			X		X					X		Paleocene
6150-6170	1.18	15	16	2	59	8	+			X		X					X		Paleocene
6690-6710	0.17	5	21	4	23	47	+				X	X					X		Paleocene
6990-7010	0.26	5	35	6	42	12	+				X	X					X		Paleocene
7310-7330	0.10	5	26	8	32	29	+			X		X					X		Paleocene
7710-7750	0.09	10	13	12	19	46	+				X	X					X		Paleocene
8090-8110	0.22							X			X	X					X		Indeterminate
8470-8490	0.35							X			X	X					X		Cret.\Tertiary
8850-8870	0.12							X		X		X					X		Cret.\Tertiary
9090-9110	0.19							X			X		X					X	Indeterminate
9330-9350	0.11							X			X		X					X	Indeterminate
9630-9650	0.11							X			X								Indeterminate
9990-10010	0.08							X			X								Indeterminate
10210-10230	0.79	2	12	5	53	28	+			X		X					X		Maastrichtian
10530-10540	3.70	10	14	2	45	29	+			X		X					X		Maastrichtian
10760-10770	1.83	15	10	+	34	41	+				X	X					X		Maastrichtian
10970-10980	1.34	5	14	+	48	33	+				X	X					X		Maastrichtian
11120-11130	2.85	2	2	+	38	58	+			X		X					X		Maastrichtian
11310-11315	2.20	15	15	3	45	22	+			X		X					X		Maastrichtian
11565-11570	0.22							X			X	X					X		Indeterminate

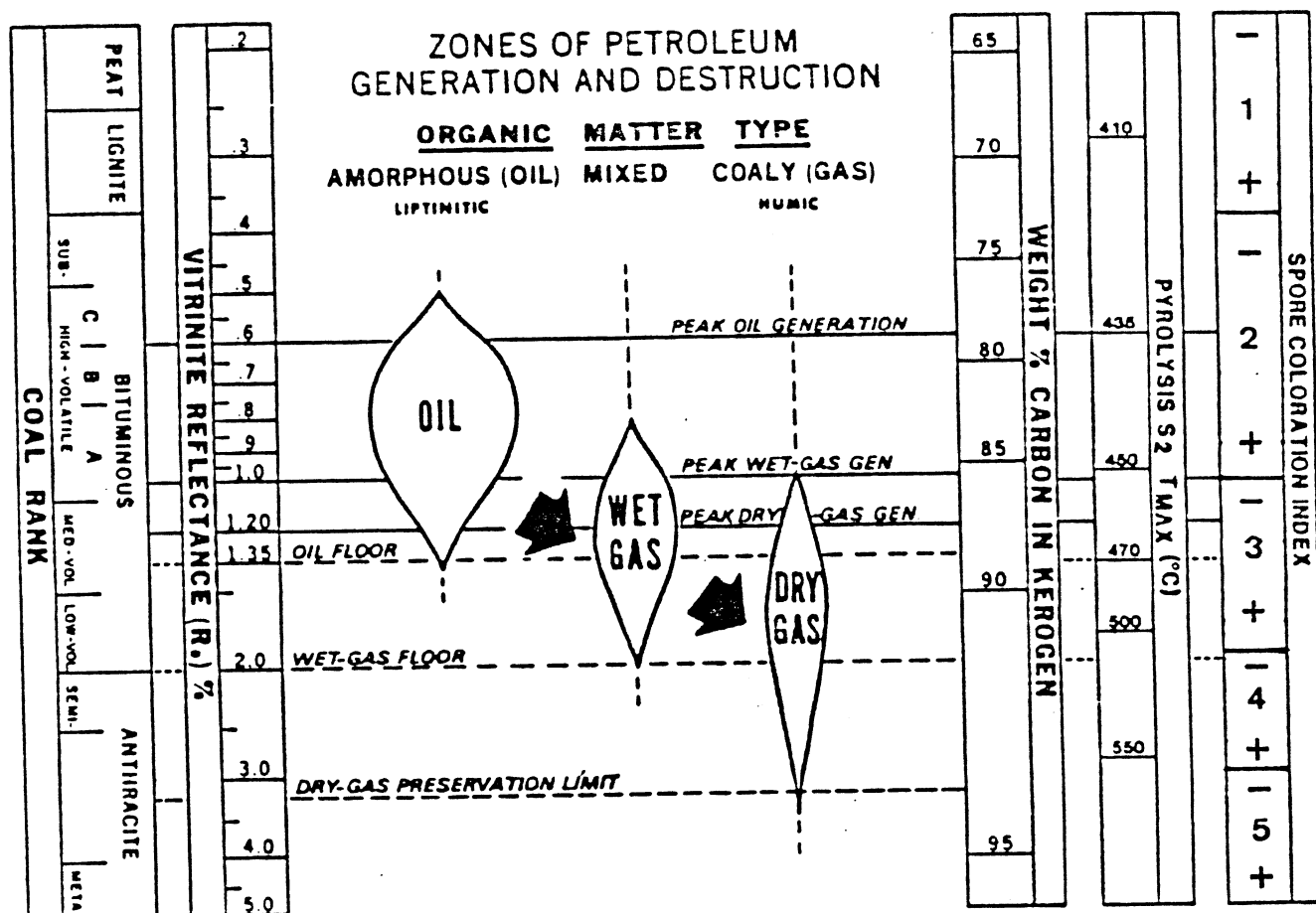


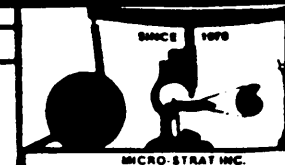
Figure 3. Correlation of various maturation indices and zones of petroleum generation and destruction.



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Key to Symbols

- = RARE
■ = FEW
■ = COMMON
■ = ABUNDANT
? = Questionably Present
- = Not Present

SPECIES LOCATION INDEX

Index numbers are the columns in which species appear.

INDEX
NUMBER SPECIES

- 72 ?BATIACASPHAERA SP.
47 ?CORDOSPHAERIDIUM SP.
25 ?DANEA SP.
58 ?GLAPHROCYSTA RETIINTEXTA
47 ?GLAPHROCYSTA SP.
74 ?IMPLETOSPHAERIDIUM SP.
95 ?OSMUNDACIDITES MELLMANII
51 ?PALAECYSTODINIUM SP.
76 ?PERIDINIID DINOXYST (INDET.)
48 ?PHELODINIUM SP.
43 ?PROTEACIDITES SP.
77 ?SPINIDIUM SP.
19 ?SPINIFERITES SP.
55 APICULATE SPORE (INDET.)
52 APICULATISPORIS SP.
37 ARALCARIACITES AUSTRALIS
108 ARECIPITES SP.
26 BATIACASPHAERA SP.
81 BILATERAL MONOSACCATE (INDET.)
84 BISACCATE POLLEN (INDET.)
27 CERATOSPORITES EQUALIS
28 CERODINIUM DARTHOORIUM, C. SP.
12 CERODINIUM SP.
59 CERODINIUM SP., C. ?STRAITUM
44 CERODINIUM SPP.
75 CF. CYATHIDITES SP.
29 CHORATE DINOXYST (INDET.)
1 CLAVIFERA TRIPLEX
13 CONCAVISSIMISPORITES SP.
49 CYATHIDITES MINOR
48 CYATHIDITES SP.
2 CYATHIDITES SPP.
109 DACRYDIUMITES SP.
46 DEFLANDREA SP.
100 DINOXYST (INDET.)
14 FROMEA CHYTRA
104 GAMBIERINA EDWARDSII
89 GAMBIERINA RUDEA
30 GLAPHROCYSTA RETIINTEXTA
69 GLAPHROCYSTA RETIINTEXTA, G. SP.
3 BLEICHENIIDITES CIRCHINIIDITES
53 GRANULATISPORITES TRISINUS
4 HALORAGACIDITES HARRISII
56 IMPLETOSPHAERIDIUM SP.
60 ISABELINIUM SP.
105 ISABELINIUM SP. CF. I. PELLUCIDUM
66 LAEVIGATOSPORITES MAJOR
20 LAEVIGATOSPORITES OVATUS
110 LILIACIDITES SP.
50 LUNATISPORITES SP.
73 MANUMIELLA ?CONORATA
80 MANUMIELLA ?DRUGBII
106 MANUMIELLA CONORATA
101 MANUMIELLA CONORATA, M. ?DRUGBII
38 MANUMIELLA DRUGBII
51 MANUMIELLA SP.
90 MANUMIELLA SP. (INDET.)
96 MANUMIELLA SPP., INCL. M. CONORATA
111 MARSCOLPORITES SP.
45 MICROTHYRIACEOUS FUNGUS
88 MONOSACCATE POLLEN
91 MYRTACEIDITES SP.
97 NOTHOFAGIDITES SPP. (FUSCA & BRASSII GROUPS)
107 NOTHOFAGIDITES SPP. (FUSCA GROUP)
112 NOTHOFAGIDITES SPP. (INCL. FUSCA GROUP) (N. FLEMINGII), BRASSII
39 OSMUNDACIDITES MELLMANII
15 PALAECYSTODINIUM GOLZOWENSE
5 PARALECANIELLA INDENTATA
63 PARASACCITES SP.
75 PENINSULAPOLLIS (TRICOLPORITES) GILLII
40 PERIDINIID DINOXYST (INDET.)
32 PHELODINIUM ?MAGNIFICUM
21 PHELODINIUM SP.
6 PHYLLOCLADITES MANSONII
82 PHYLLOCLADITES VERRUCOSUS
54 PLICATIPOLLENITES SP.
35 PODOCARPIDITES SP.
22 PODOCARPIDITES SP.
16 PODOCARPIDITES SPP.
36 POLLEN (INDET.)
78 POLYCOLPATE POLLEN (INDET.)
7 PROPYLIPOLLIS CF. P. MICROVERRUCATUS
57 PROPYLIPOLLIS SP.
61 PROTEACIDITES ?SUBSCABRATUS
17 PROTEACIDITES SP.
94 PROTEACIDITES SPP.
33 PROTEACIDITES SPP., INCL. P. CF. P. ADENATHOIDES
8 PROTEACIDITES SPP., INCL. P. SUBSCABRATUS
79 PROTEACIDITES SUBSCABRATUS
64 PROTHAPLOXYPINUS SP.
23 RETITRILETES AUSTRALAVATIDITES
95 RETITRILETES SP.
18 RHODIPITES SP.
9 SPINIFERITES RAMOSUS
41 SPINIFERITES SP.
113 SPINIZONCOLPITES PROMINATUS
87 SPORES (INDET.)
10 STEREISPORITES ANTIQUASPORITES
98 STEREISPORITES REGIUM
34 STRIATOPODOCARPITES SP.
70 TAENIATE BISACCATE (INDET.)
114 TETRACOLPORITES SP.
102 TRICHOIDOMUSCITES SUBGRANULATUS
71 TRICOLPORITES SP.
71 TRICOLPORATE POLLEN (INDET.)
83 TRICOLPORITES SP.
84 TRILETE SPORE (INDET.)
99 TRIPOROPOLLENITES SECTILIS, T. SP.
24 TRIPOROPOLLENITES SP.
42 TRIPOROPOLLENITES SPP.
103 TUBULIFLORIDITES (TRICOLPORITES) LILLIEI
65 VITTATINA SP.
62 WILSONIDIUM ORNATUM

MICRO-STRAT'S STRATIGRAPHIC CHART

CHART 1

AMOCO AUSTRALIA PETROLEUM CO.

CAPE SORELL #1

OFFSHORE WESTERN TASMANIA BLOCK T-12-P

PROJECT MBI 89-10

AUGUST 1989

GRAPHIC ABUNDANCES WITH
FIRST APPEARANCE DOWNHOLE

CHECKLIST OF PALYNOFORMS

AS BASED ON
MICRO-STRAT'S ANALYSISPERIOD
EPOCH
AGE

SPECIES

DEPTH
(FEET)

05100-05130

05650-05670

06150-06170

06690-06710

06790

06850

06920

06980

07010

07100

07190

07250

07310

07330

07430

07490

07610

07770

07790

08090-08110

08190

08310

08470-08490

08850-08870

09090-09110

09330-09350

09630-09650

09990-10010

10210-10230

10530-10540

10760-10770

10970-10980

11120-11130

11310-11315

11565-11570

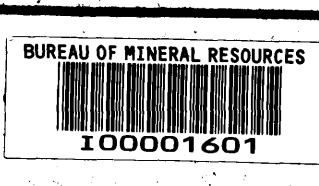
Simple #1

TRANSITIONAL
CRET. (MAAS.)

TO

PALEOCENE

MAASTRICHTIAN



BIOSTRATIGRAPHIC,
PALEOENVIRONMENTAL AND GEOCHEMICAL ANALYSIS
of the Amoco Australia Petroleum Co.
CAPE SORELL - 1 WELL
Offshore West Tasmania, Australia
for Maxus Energy Corporation

● Samples Analyzed
Date: 8/89
Project No.: MSI 89-10

MICRO-STRAT INC.
CONSULTING PALYNOLOGY
MICROPALAEONTOLOGY
PALEOENVIRONMENTS
GEOCHEMISTRY

5755 Rockwood, Suite 405, Houston, TX 77056 713-477-2128 718 17th St., Suite 1500, Denver, CO 80202 303-432-5410

NANNOFOSSILS			PALYNOMORPHS			GEOCHEMISTRY TAI	COMPOSITE WELL LOG	LITHOLOGICAL DESCRIPTION	PALEO- ENVIRONMENT	
PERIOD	EPOCH	AGE	PERIOD	EPOCH	AGE				MARGINAL MARINE	
INDETERMINATE		Barren				2-		<p>Barren</p>	8100 ●	
		Barren				2-			8650 ●	
		Barren				2-			8900 ●	
		Danlian				2-			9100 ●	
		Barren				2-			9600 ●	
		Barren				2-			9700 ●	
		Barren				2-			9850 ●	
		Danlian				2- to 2			9970 ● 9990 ●	
		Barren				2- to 2			7060 ●	
		Danlian				2- to 2			7110 ●	
TERTIARY LOWER PALEOCENE		Danlian	TERTIARY PALEOCENE			2-		<p>Barren</p>	7190 ●	
		Barren				2-			7280 ●	
		Barren				2- to 2			7310 ●	
		Barren				2- to 2			7420 ●	
		Barren				2- to 2			7480 ●	
		Barren				2- to 2			7610 ●	
		Barren				2- to 2			7670 ●	
		Barren				2- to 2			7710 ●	
		Barren				2- to 2			7790 ●	
		Barren				2- to 2			8090 ●	
INDETERMINATE		Barren	TRANSITIONAL MAASTRICHTIAN TO PALEOCENE			2- to 2		<p>Barren</p>	8190 ●	
		Barren				2- to 2			8310 ●	
		Barren				2- to 2			8470 ● 8510 ●	
		Barren				2- to 2			8890 ●	
		Barren				2- to 2			9090 ●	
		Danlian				2			9330 ●	
		Barren				2			9630 ●	
		Barren				2			9990 ●	
		Barren				2			10210 ●	
		Barren				2			10830 ●	
TERTIARY LOWER PALEOCENE		Barren	UPPER CRETACEOUS			2		<p>Barren</p>	10760 ●	
		Barren				2			10970 ●	
		Barren				2			11120 ●	
		Barren				2			11310 ●	
		Barren				2			11510 ●	
		Barren				2			11680 ●	
		Barren				2			11880 ●	
		Barren				2			12080 ●	
		Barren				2			12280 ●	
		Barren				2			12480 ●	
INDETERMINATE		Barren				2		<p>Barren</p>	12680 ●	
		Barren				2			12880 ●	
		Barren				2			13080 ●	
		Barren				2			13280 ●	
		Barren				2			13480 ●	
		Barren				2			13680 ●	
		Barren				2			13880 ●	
		Barren				2			14080 ●	
		Barren				2			14280 ●	
		Barren				2			14480 ●	
Total Depth: 11,576' Driller: 11,576' Logger: 11,580'										



REPORT
of
SUB-SURFACE
DIRECTIONAL
SURVEY



BUREAU OF MINERAL RESOURCES



I00001605

82/1056

AMOCO AUSTRALIA PETROLEUM COMPANY
COMPANY

CAPE SORELL I
WELL NAME

TASMANIA
LOCATION

JOB NUMBER

1. & 2.

TYPE OF SURVEY

DROP MULTISHOT

DATE

JULY, 8,
17, 1982.

SURVEY BY
C. R. MCLEOD.

OFFICE SALE VIC:

EASTMAN WHIPSTOCK, INC.

AMOCO AUSTRALIA PETROLEUM COMPANY

CAPE SORELL WELL NO. 1

RECORD OF SURVEY

SHEET 1 OF 2

DROP-TYPE MULTISHOT

JOB NO. _____

DATE 8.7.82 /17.7.82

CHECKED BY _____

STATION	MEASURED DEPTH		DRIFT ANGLE	TRUE VERTICAL DEPTH		VERTICAL SECTION	COURSE DEVIATION	DRIFT DIRECTION	RECTANGULAR COORDINATES				
									NORTH	SOUTH	EAST	WEST	
	693	00											
	733	07						0	0		0		
	824	57	.50°					N25W		36			17
	916	07	.75°					N47W	1	16			75
5	1007	57	.80°					N45W	2	02			1 64
	1099	07	.80°					N29W	3	04			2 41
	1190	57	.75°					N47W	4	01			3 17
	1282	07	.50°					N59W	4	61			3 96
	1373	57	.40°					S57W	4	60			4 64
10	1422	53	.25°					S18W	4	38			4 81
	1460	50	2.60°					N22W	4	35			5 54
	1552	00	2.70°					N16W	8	35			6 91
	1643	50	2.60°					N18W	12	40			8 15
	1735	00	2.60°					N15W	16	38			9 33
15	1826	50	2.20°					N12W	20	10			10 22
	1918	00	2.30°					N11W	23	62			10 94
	2009	50	2.40°					N23W	27	20			12 03
	2101	00	3.10°					N28W	31	17			13 92
	2192	50	4.00°					N29W	36	14			16 63

EASTMAN WHIPSTOCK, INC.

RECORD OF SURVEY

SHEET 2 OF 2

AMOCO AUSTRALIA PETROLEUM COMPANY CAPE SORELL WELL NO. 1

DROP MULTISHOT

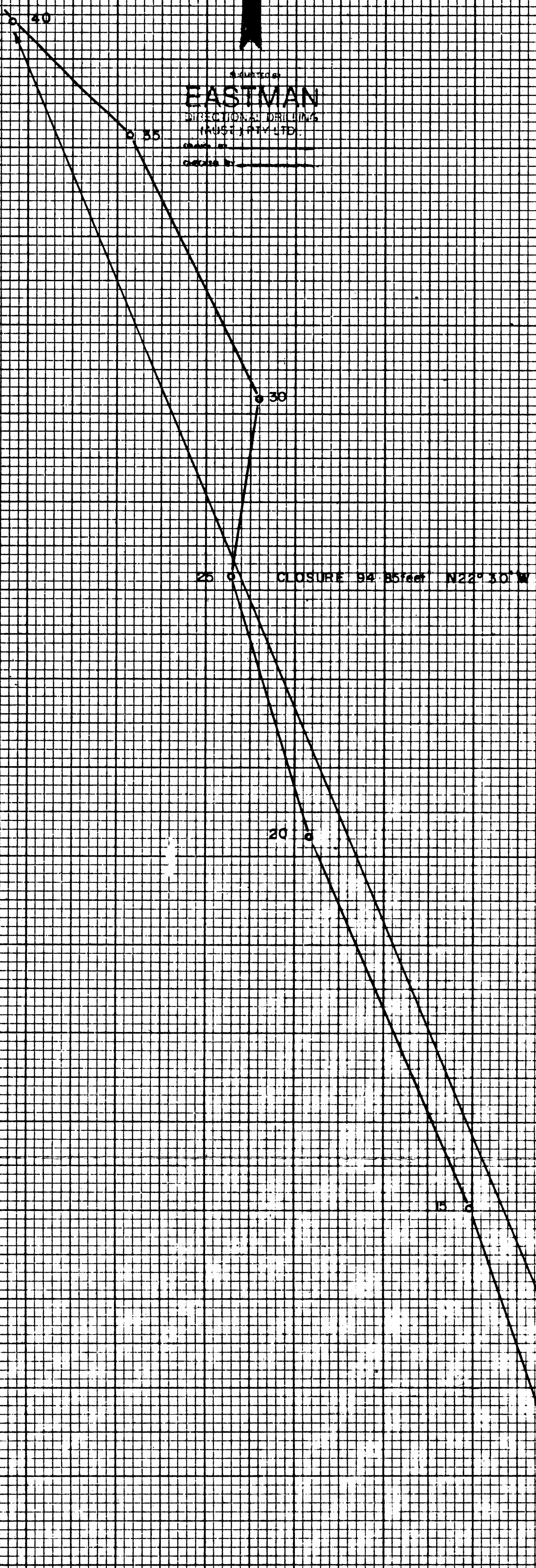
JOB NO. _____ DATE 17.7.82

CHECKED BY _____

STATION	MEASURED DEPTH		DRIFT ANGLE	TRUE VERTICAL DEPTH		VERTICAL SECTION		COURSE DEVIATION		DRIFT DIRECTION	RECTANGULAR COORDINATES							
											NORTH		SOUTH		EAST		WEST	
20	2284	00	3.00°	2282	97					N25W	41	12					19	16
	2375	50	2.80°	2374	36					N25W	45	32					21	12
	2467	00	1.80°	2465	78					N19W	48	72					22	49
	2558	50	1.50°	2557	24					N14W	51	24					23	24
	2650	00	1.60°	2648	71					N05W	53	66					23	65
25	2741	50	1.00°	2740	19					N06E	55	76					23	63
	2833	00	1.00°	2831	67					N13E	57	33					23	37
	2924	50	1.60°	2923	15					N07E	59	37					23	01
	3016	00	1.40°	3014	62					N14E	61	73					22	57
	3107	50	1.10°	3106	09					N10E	63	68					22	16
30	3199	00	1.60°	3197	57					N08W	65	83					22	12
	3290	50	2.20°	3289	02					N22W	68	75					22	90
	3382	00	2.60°	3380	44					N21W	72	31					24	31
	3473	50	2.50°	3471	85					N31W	75	97					26	09
	3565	00	1.75°	3563	28					N33W	78	84					27	89
35	3656	50	1.20°	3654	75					N45W	80	67					29	37
	3748	00	.90°	3746	24					N55W	81	75					30	65
	3839	50	1.25°	3837	72					N53W	82	76					32	04
	3931	00	1.40°	3929	20					N41W	84	20					33	58
	4022	50	1.00°	4020	68					N36W	85	70					34	77
40	4114	00	1.25°	4112	16					N40W	87	11					35	86
	4143	00	1.40°	4141	15					N38W	87	63					36	30
42	4158	00																
T.D.																		
CLOSURE DISTANCE 94.85' at N22°30'W																		



EASTMAN
DIRECTIONAL DRILLING
AUSTRALIA LTD.



ANOCO AUSTRALIA PETROLEUM COMPANY

CAPE SORELL I.

SCALE 1" = 5 feet

82/1056.

82336ART0041

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

SOURCE ROCK EVALUATION

Amoco No. 1 Cape Sorell Well, Offshore Tasmania, Australia

Geochemistry Services Group

L. M. Ross

Technical Service 825385CF
Requested by Meridee J. Fockler
APC (INT'L), HOUSTON

*Refined (12/6/82)
RRJ*

Distribution: W. R. Moehl, Attn: M. J. Fockler, APC (Int'l), Houston
I. W. Herrick, APC (Int'l), Houston
D. B. Felio, APC (Int'l), Houston
M. J. Fryer, APC (Int'l), Chicago
R. R. Thompson/E. R. Michaelis

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other wholly owned subsidiaries of Standard Oil Company (Indiana).

82/1056

AMOCO PRODUCTION COMPANY
Tulsa, Oklahoma
December 2, 1982

BUREAU OF MINERAL RESOURCES



82336ART0038

FILE: Technical Service 825385CF

TO: W. R. Moehl, APC (Int'l), Houston (Greenspoint)

ATTN: M. J. Fockler

SUBJECT: Source Rock Evaluation, Amoco No. 1, Cape Sorell Well, Offshore
Tasmania, Australia

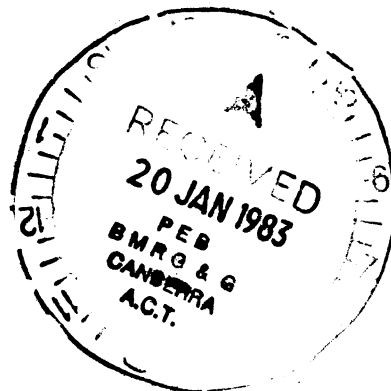
Organic material in both the shallow (4162-4590 ft) and deep zones (10,230-10,610 ft) is in a pregeneration stage. The shallow section appears to be oxidized and gas prone; the deeper interval is unoxidized, good to very good quality, and has kerogen with gas + oil potential. The deep zone requires deeper burial or higher geothermal gradients before the organic material will reach the oil generation window.

ERIC R. MICHAELIS

By R R Thompson
R. R. Thompson

LMR:lmw

cc: D. B. Felio, APC (Int'l), Houston (Greenspoint)
M. J. Fryer, APC (Int'l), Chicago
I. W. Herrick, APC (Int'l), Houston (Greenspoint)



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Amoco Production Company

Subject: Amoco No. 1 Cape Sorell Well, Offshore Tasmania, Australia

INTRODUCTION

Six cuttings samples from two widely spaced intervals (4162-4590 ft; 10,230-10,610 ft) in the Amoco No. 1 Cape Sorell well were submitted for geochemical characterization. Visual examination of the cuttings samples found the 4162-4590 ft (shallow) interval to contain dark gray and black organic-rich appearing shales; whereas the 10,230-10,610 ft (deep) zone contained medium to dark grey shales and coaly material. The coaly material from our experience will impart an untrue oil prone character to the interval if the pyrolysis data (Table 2, gen HC/TOC) is used to characterize the kerogen type. In this instance, elemental analysis and kerogen morphology will be the diagnostic tools for interpreting the type of hydrocarbons to be generated.

SUMMARY

Organic material in both the shallow and deep zones is immature and ranked at a pregeneration stage. The shallow zone (4162 ft) rates as very good but the organic material is oxidized and has only a gas potential; the deeper zone (10,230 ft-10,610 ft) does not look oxidized, is good-very good quality, and is gas + oil prone. Deeper burial or higher geothermal gradients are required before organic material in the deeper zone will reach peak oil generation.

EVALUATION

The analyzed interval contains organic material interpreted to be in a pregeneration stage. This immature character is interpreted from a low vitrinite reflectance (0.45-0.55% R_o , Table 4, Fig. 2), strong odd-carbon predominance of the distribution of hydrocarbons on the total extract chromatograms (Fig. 1), and position of data on the H/C vs O/C plot (Fig. 3).

The types of hydrocarbons that the organic material should generate are interpreted from the position of data on the H/C vs O/C plot (Fig. 3), morphology of the kerogen determined by visual analysis, and convertibility (gen HC/TOC, Table 2). Based on a combination of amorphous kerogen morphology and position of data on the H/C vs O/C plot (Fig. 3), the kerogen in the 4162-4380 ft interval appears to be oxidized and the 4162 ft sample even though it contains amorphous kerogen is only a source for gaseous hydrocarbons. The 10,230-10,610 ft section is coaly (which imparts an overly optimistic liquid character, shown by the convertibility), contains mixed-type kerogen and plots close to the gas generating Type III kerogen track. All of these data suggest this section will generate gas and perhaps minor quantities of oil.

The richness rating of these beds is based on the amount of hydrocarbons generated by Rock-Eval pyrolysis, and they are classified either nonsource (4380 ft, 4590 ft) or good to very good (4162 ft, 10,230-10,610 ft).



L. M. Ross

LMR:lmw

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE APC (INTL) DISTRICT CEN/S AMER/FAR EAST
AUTHORIZED BY MERIDEE J FOCKER
TECHNICAL SERVICE NUMBER 825385

SOURCE ROCK SUMMARY
TABLE 1.
DATE 11/24/82

SAMPLE NUMBER	SMPL				FIELD NO. OR	PETROLEUM	KEROGEN	STAGE
LAB NO.	TYPE	FORMATION	AGE	LITHOLOGY	DEPTH FEET	GENERATION	TYPE	OF
					TOP***BASE	CAPABILITY	(OIL/GAS)	DIAGENESIS
STATE AUSTRALI COUNTY TASMANIA				WELL LOCATION				
WELL NAME AMOCO AUSTRALIA PET.				LEASE CAPE SORELL #1				
F-1210	CT		PALEOGENE		4162	VERY GOOD	GAS	PREGENERATION
F-1211	CT		}		4380	NON	SOURCE	
F-1212	CT				4590	NON	SOURCE	
F-1213	CT			?	10230	10250 GOOD	GAS+OIL	PREGENERATION
F-1214	CT			?	10380	10400 VERY GOOD	GAS+OIL	PREGENERATION
F-1215	CT			?	10590	10610 VERY GOOD	GAS+OIL	PREGENERATION

Fm Temperature 4144 ft = 102°F

BHT 11576 ft = 186°F

Current geothermal gradient about 11.3°F/1000 ft.

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Amoco Production Company

Table 2

15:55 MONDAY, NOVEMBER 22, 1982

R825385 ROCKEVAL PYROLYSIS DATA

* * *	SAMPLE NO.	TOP OF ANALYZED INTERVAL	FORMATION	TOTAL ORGANIC CARBON WT% (TOC)	PPM VOLATILE HYDROCARBONS (S1 X 1000)	VOL/ TOC	PPM GENERATED HYDROCARBONS (S2 X 1000)	GEN/ TOC	TEMP OF MAX GEN	VOL/ VOL + GEN	POTENTIAL YIELD (PPM)
	F-1210	4162		5.8	120	0.00	4550	0.08	425	0.03	4670
	F-1211	4380		3.3	40	0.00	290	0.01	426	0.12	330
	F-1212	4590		2.0	70	0.00	180	0.01	417	0.28	250
	F-1213	10230		1.6*	230	0.01	2490*	0.16*	429	0.08	2720
	F-1214	10380		8.2*	2790	0.03	29680*	0.36*	419	0.09	32470
	F-1215	10590		5.6*	1330	0.02	17830*	0.32*	418	0.07	19160

* Samples contain coal which imparts an inaccurate oil prone character (gen/TOC).

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE APC (INTL)
CHEMICAL SERVICE NUMBER

DISTRICT CEN/S AMER/FAR EAST
825385

SOURCE ROCK DATA
TABLE 3.
DATE 11/24/82

SAMPLE NUMBER	FIELD NO. OR DEPTH FEET TOP***BOTTOM	GEOL. AGE	INSOL RESID%	TOTAL ORG C WT%	BITUMEN BBL/AF PPM	SAT HC BBL/AF PPM	SAT HC/ BITUMEN/TL ORG C	REMARKS
								BBL/AF = (PPM X .0180)
STATE AUSTRALIA COUNTY TASMANIA				WELL LOCATION				
WELL NAME AMOCO AUSTRALIA PET.				LEASE CAPE SORELL #1				
F-1210	4162	PALE	88	5.8	6	339		.01
F-1211	4380	PALE	72	3.3	3	151		<.01
F-1212	4590	PALE	72	2.0	8	417		.02
F-1213	10230	10250 PALE	88	1.6	11	606		.04
F-1214	10380	10400 PALE	90	8.2	78	4339		.05
F-1215	10590	10610 PALE	89	5.6	9	515		.01

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AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE APC (INTL)
TECHNICAL SERVICE NUMBER

DISTRICT GEN/S AMER/FAR EAST
825385

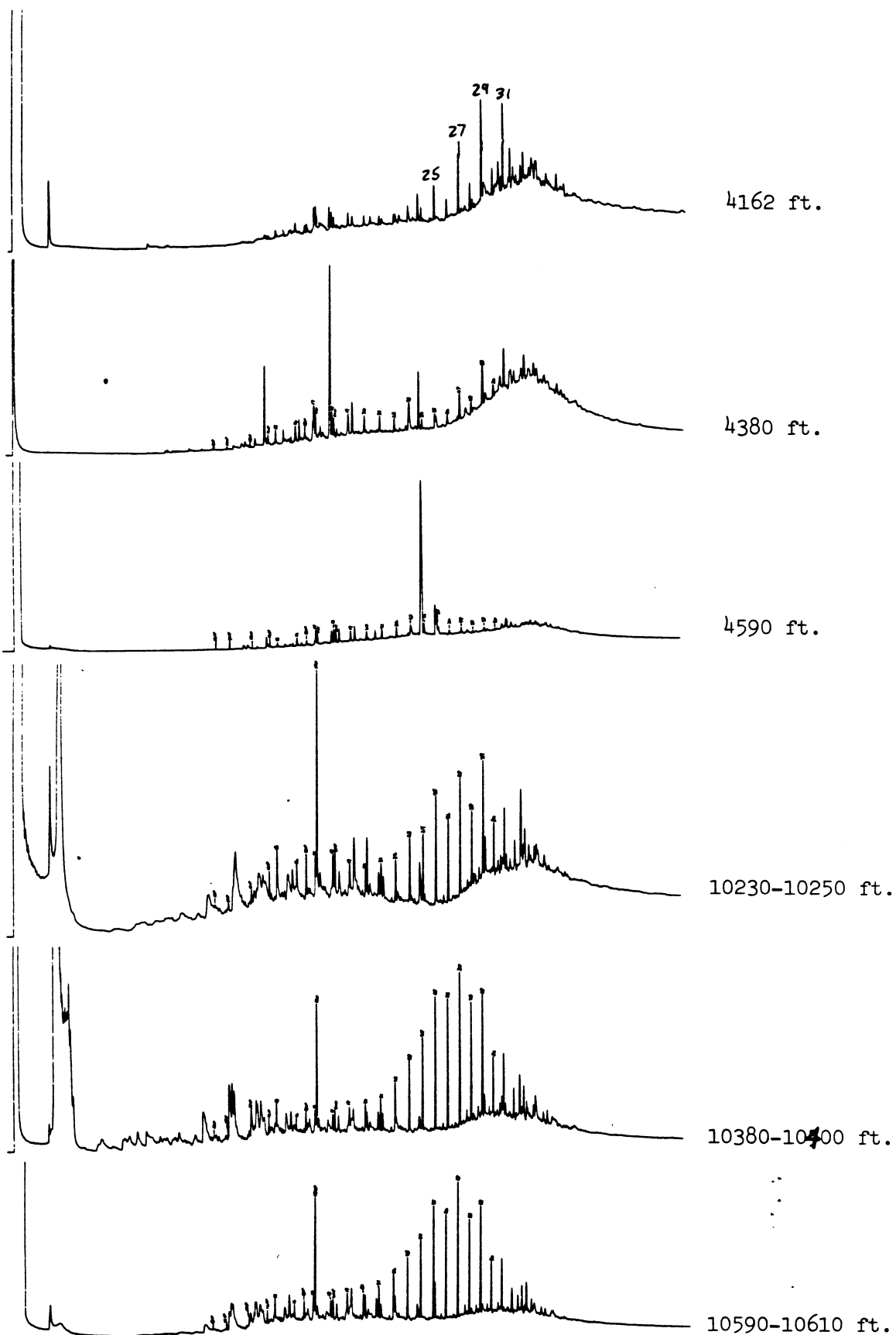
KEROGEN DATA
TABLE 4.
DATE 11/24/82

LAB SAMPLE NUMBER	FIELD NO. OR DEPTH FEET		GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT.				ATOMIC	ATOMIC	VISUAL KEROGEN TYPE	CARBNZ. SCALE	VIT
	TOP***BOTTOM			CARBON	HYDROGEN	OXYGEN	NITROGEN	RATIO	RATIO			REFLECT
STATE AUSTRALI COUNTY TASMANIA				WELL LOCATION								
WELL NAME	AMOCO AUSTRALIA PET.			LEASE	CAPE SORELL #1							
F-1210	4162		PALE	72	4.5	22	1.5	.22	.75	AMORPHOUS		.48
F-1211	4380		PALE	70	4.1	24	2.0	.25	.70	AMORPHOUS		.55
F-1212	4590		PALE									
F-1213	10230	10250	PALE									
F-1214	10380	10400	PALE	80	6.0	13	1.3	.12	.91	MIXED		.45
F-1215	10590	10610	PALE	80	5.9	13	1.4	.11	.89	MIXED		.45

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Amoco Production Company

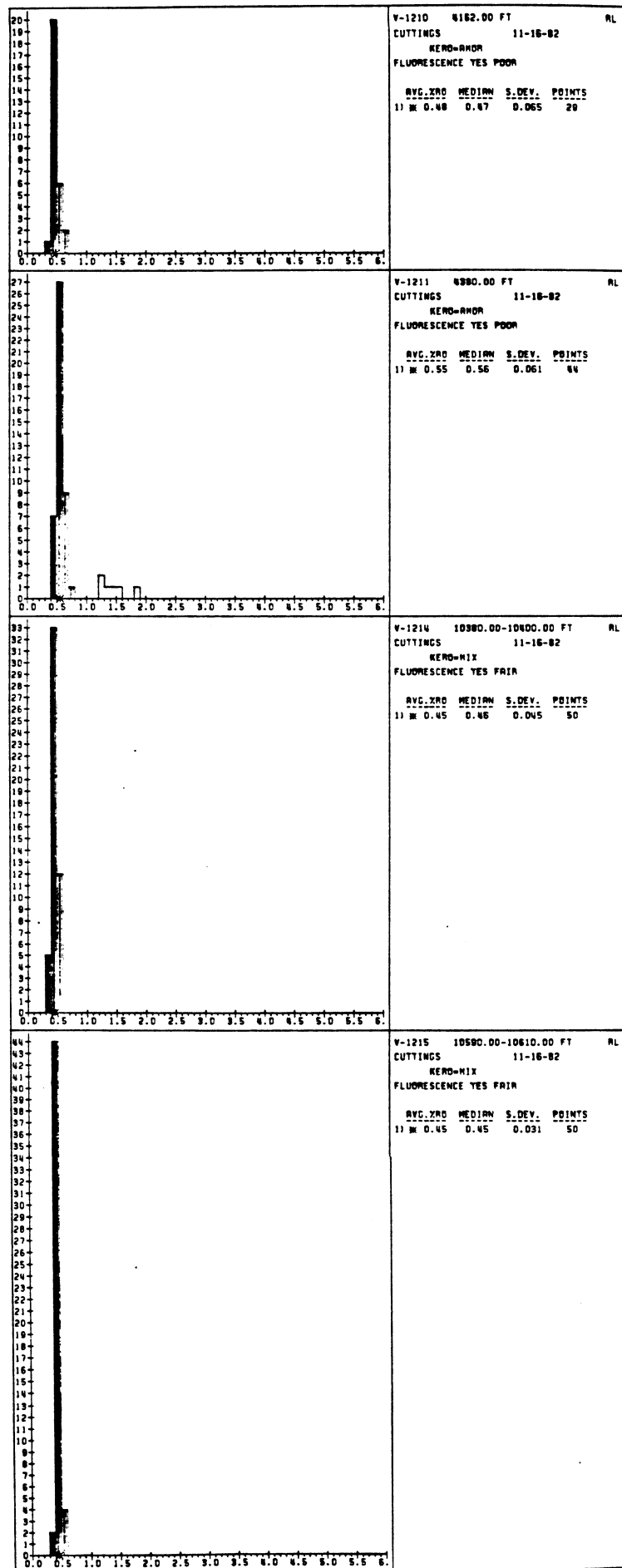
Total Extract Chromatograms

Amoco #1 Cape Sorell - Tasmania



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Amoco Production Company

TS 825385CF
Figure 1



X-AXIS = PERCENT REFLECTANCE OF VITRINITE (XRD)
Y-AXIS = FREQUENCY
AVERAGE XRD FOR POP.1 = 0.48

11-18-82 - To Be Maintained In Confidence

Fig. 2
TS825385CF

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

KEROGEN EVOLUTION PATHS

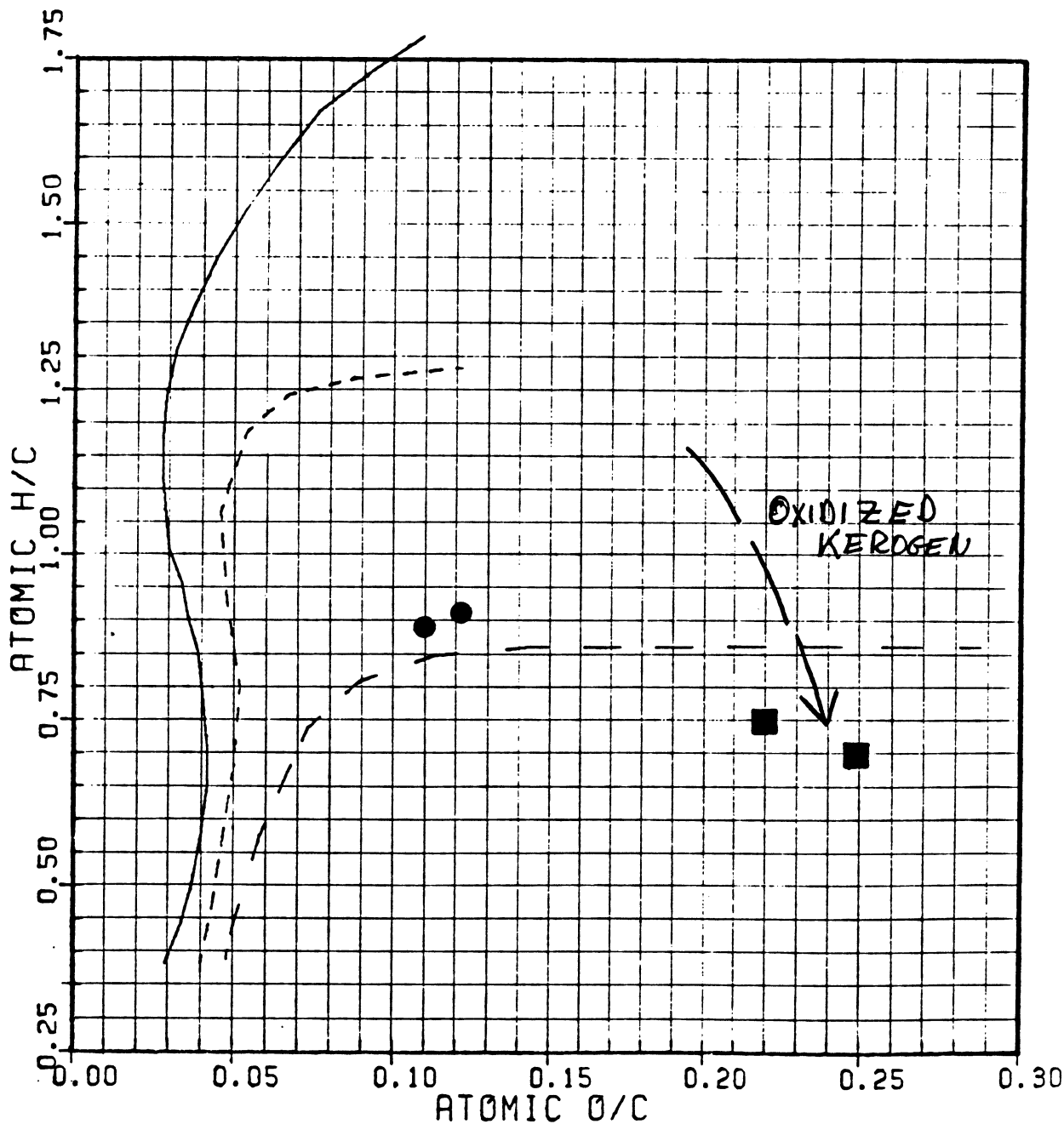
—— TYPE I
- - - - TYPE II
- - - - TYPE III

TECH SERVICE

WELL LEGEND AMOCO #1 CAPE SORELL

■ 4162-4380 ft.

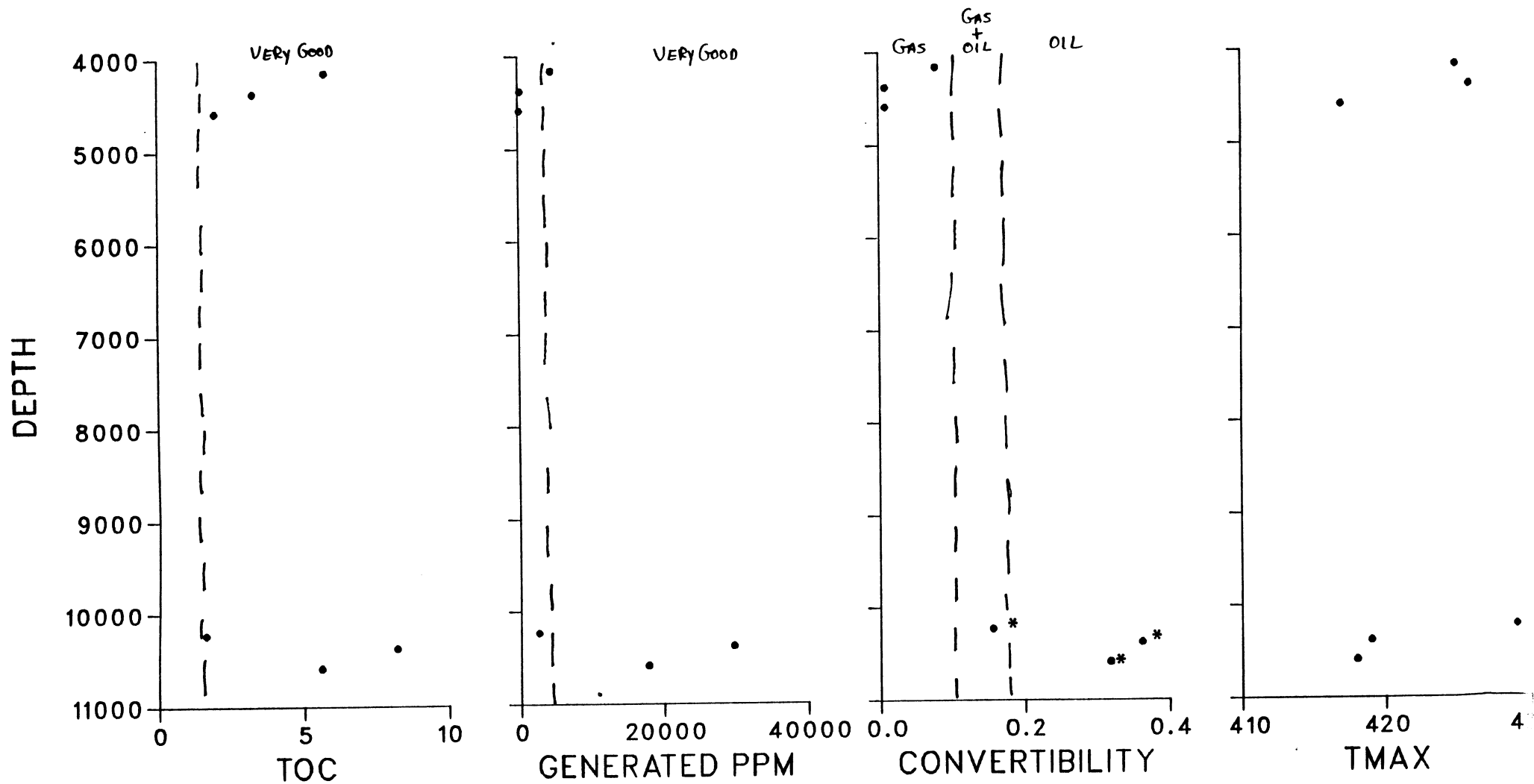
● 10380-10610 ft.



Proprietary - To Be Maintained In Confidence
Amoco Production Company

F16.3
TS 825385CF

Technical Service 825385CF



* Coaly intervals therefore these samples are not really as liquid prone as the position of data on the plot may infer.

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ROBERTSON RESEARCH (SINGAPORE) PRIVATE LIMITED

Report No. 1170

A BASIC GEOCHEMICAL EVALUATION OF
EIGHT SIDEWALL CORES FROM THE
CAPE SORELL-1 WELL
DRILLED IN AUSTRALIA

by

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SUMMARY

Eight sidewall cores for the Cape Sorell-1 well have been analysed for thermal maturity and source rock potential. The results of the maturity study, although not fully conclusive, indicate that the section analysed is thermally early mature, approaching full maturity for liquid hydrocarbon generation from oil-prone kerogen. Source rock potential study reveals that the samples from 10313, 10608, 10771 feet have fair to good gas or gas/oil source potential. Visual kerogen analysis reveals that humic material (gas-prone) dominates but minor amounts of liptinitic material (oil-prone) have also been identified.

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INTRODUCTION

A total of eight sidewall cores from the 10180 to 10974 feet section of the Cape Sorell-1 well were utilized in a basic geochemical evaluation of thermal maturity and hydrocarbon source potential. In two cases differing lithologies were selected from the sidewall cores and examined for hydrocarbon source potential separately. The results of the thermal maturation analyses are given in Table 1. Hydrocarbon source potential results can be found in Table 1 and 2.

II

RESULTS AND DISCUSSION

(1) THERMAL MATURITY EVALUATION

(a) Vitrinite Reflectance (Table 1)

Vitrinite reflectance analyses were carried out on six of the sidewall cores, however, only two of these produced fair quality data, one gave poor data and the remaining three could not be determined for thermal maturity using this method. Samples taken from 10437 feet and 10608 feet gave average reflectance values of 0.46% R_o (8 readings) and 0.47% R_o (10 readings) respectively. The sample taken from 10771 feet gave one reading of 0.54% R_o and this is not considered to be as reliable as those obtained from the previous samples mentioned. The remaining three samples yielded only very minor amounts of kerogen and no accurate determination of vitrinite reflectance could be made.

(b) Spore Colour Index (Table 1)

Spore colour index determinations were attempted on six sidewall cores. Poor sporomorph recovery precluded any determination in three samples. In the first two samples analysed (10180', 10437') two populations of spores, according to spore colour index, were recorded. The lower population was in the range 3½-4 whereas the higher population was less well developed in terms of numbers of spores and gave more scattered results. In the first samples (10180') the higher population was in the range 5½-6, while in the

second sample (10437') a determination of 5 was made for the second population. The final sample gave poor sporomorph recovery and only a tentative estimation of spore colour index was possible, a value of $4\frac{1}{2}$ -5.

The thermal maturity evaluation data may be summarized as follows:

- Relatively poor kerogen and sporomorph recovery has precluded the establishment of good reliable data, only 'fair' determinations could be made for some samples.
- The vitrinite reflectance values of 0.46% R_o and 0.47% R_o obtained at 10437 feet and 10608 feet suggest that this part of the analysed section is at an early stage of thermal maturity for hydrocarbon generation from oil-prone kerogen.
- Spore colour index determinations made at 10180 feet and 10437 feet with values of 4 and $3\frac{1}{2}$ -4 respectively, also suggest early maturity and show reasonable agreement with the vitrinite reflectance determinations.
- High spore colour index values obtained for the above mentioned samples are not considered to be indicative of the present thermal maturity and are thought to be a result of reworking.

- Only tentative estimates of thermal maturity were possible below 10608 feet of 0.54% R_o at 10771 feet and S.C.I. 74½-5 at 10974. Both readings indicate that the samples are just mature for liquid hydrocarbon generation from oil-prone kerogen.

(2) HYDROCARBON SOURCE POTENTIAL

(a) Total Organic Carbon (Table 2, Figure 1)

Total organic carbon determination were performed on all side-wall cores received, in some depth differing lithologies were selected from the same core and analysed separately. The results show that with only two exceptions the samples analysed are organically 'rich' with 'average' to 'above average' TOC contents (in the range 1.07% to 18.60%). The two exceptions are at 10437 and 10974 feet with total organic carbon contents of 0.97% and 0.80% respectively, these are considered to be organically 'fair'.

(b) "Rock-Eval" Pyrolysis Analysis (Table 2, Figure 1)

"Rock-Eval" pyrolysis analysis was performed on all samples. The data obtained shows variable hydrogen indices (HI) ranging from 61 to 349. Hydrogen indices greater than 250, in general, indicate that the analysed rock has some liquid hydrocarbon generating potential. Those samples with H.I. values in the range 274 to 349 are considered to be typical of mixed gas/oil-prone kerogens. Hydrogen poor (gas-prone) kerogen has also been identified in some samples, particular those from the 10892 to 10974 feet interval. Hydrogen indices in these samples range from 61 to 112.

Potential yield is variable throughout, but a distinct division between 'very poor' and 'fair' to 'very good' can be made. It is noticeable that the analysed rocks with the 'fair' to 'very good' potential (6.16 to 71.60 kg/ton) are those with relatively high hydrogen indices.

Production indices (PI) are also variable, particularly towards the base of the analysed section where a significant 'increase' in P.I. can be observed between 10771 and 10974 feet. It is considered that the relatively 'high' production indices found within the analysed section are a reflection of the relatively lean nature of the some samples rather than a significant oil show. This arises through the calculation of P.I.: S_1 (free hydrocarbons)/ S_1 (free hydrocarbons) plus S_2 (bound hydrocarbons) where quantities of S_1 and S_2 became lean (i.e. P.Y. less than 2 kg/ton).

(c) Visual Kerogen Analysis (Table 1)

Visual kerogen analysis was completed on six samples. All samples showed dominant humic kerogen (Vitrinite and Inertinite) with four samples principally inertinitic and two (10437 and 10608 feet) vitrinitic. The humic material is generally degraded and only minor amounts of liptinite are observed in most samples. One sample (10771') shows moderate amounts of liptinite and the overall kerogen composition determined indicates that it is of a mixed humic/liptinitic type.

III

CONCLUSIONS

Based on the data obtained from the geochemical analysis of eight sidewall core samples from the Cape Sorell-1 well the following conclusions have been drawn:

- The section analysed is considered to be early mature to just mature for liquid hydrocarbon generation from suitable oil-prone kerogen. The thermal maturity data is not fully conclusive on this however, pyrolysis Tmax also indicates early mature sediments.
- The analysed section is organically relatively 'rich' overall with 'average' to 'above average' TOC contents in the majority of samples. Only two samples are considered to be organically 'fair'.
- "Rock-Eval" pyrolysis indicates a mixing of kerogen in some samples, particularly those of a carbonaceous or coaly nature. Relatively 'high' hydrogen indices suggest some liptinite present in these samples (particularly those with H.I. values of between 274 and 349).
- Visual kerogen analyses confirms the presence of minor amounts of liptinite (oil-prone) in most samples but with humic (gas-prone) kerogens prevailing throughout. In the 10771 sidewall

core sample, liptinite quite significant in the kerogen composition of the sample.

- Potential yield values indicate that Coals and carbonaceous siltstones/shales from 10313, 10608 and 10771 feet have 'fair' to 'good' hydrocarbon source potential (possibly gaseous hydrocarbon) at the optimum level of thermal maturity.

TABLE 1

THERMAL MATURITY AND KEROGEN COMPOSITION DATA

COMPANY: AMOCO AUSTRALIA

WELL: CAPE SORELL-1

LOCATION: TASMANIA

DEPTH (FEET)	VR (%)	TAI (T) SCI	KEROGEN COMPOSITION			
			VITRINITE	INERTINITE	AMORPHOUS	LIPTINITE
10180 3107.2	NDP	$\frac{4}{5\frac{1}{2}-6}$ ✓	Moderate	Common	-	Minor
10437 3107.2	0.46(8) ✓	$\frac{3\frac{1}{2}-4}{5}$ ✓	Common	Moderate	-	Minor
10608 3233.3	0.47(10) ✓	NDP	Rich	Lean	-	Minor
10771 3271.1	0.54(1) ✓	NDP	Moderate	Moderate	-	Moderate
10892	NDP	NDP	-	Rich	-	-
10974 3354.2	NDP	$?4\frac{1}{2}-5$ ✓	-	Rich	-	Minor
		Trace	if	observed		
		Minor	if	< 0.5%		
		Lean	if	5-20%		
		Moderate	if	20-50%		
		Common	if	50-80%		
		Rich	if	80/90+ → 100%		

COMPANY: AMOCO AUSTRALIA

WELL: CAPE SORELL-1

LOCATION: TASMANIA

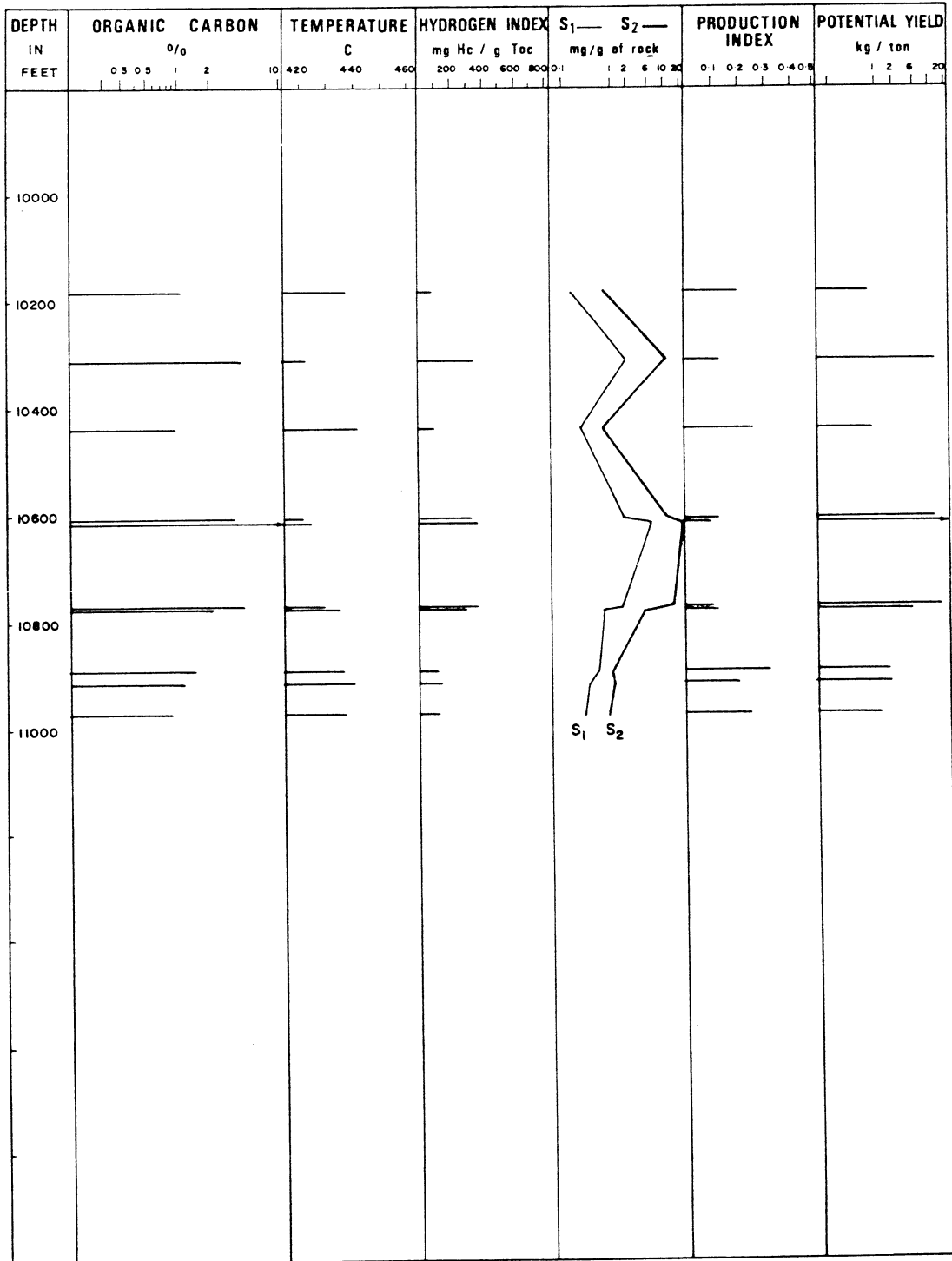
DEPTH (FEET)	ANALYSED LITHOLOGY	TOC %	P Y R O L Y S I S					D A T A		POTENTIAL YIELD (kg/ton)
			T MAX °C	HI (mg/g TOC)	OI (mg/g TOC)	S1 FREE HYDROCARBON (mg/g OF ROCK)	S2 BOUND HYDROCARBON (mg/g OF ROCK)	S3 CO ₂ (mg/g OF ROCK)	PRODUCTION INDEX	
(SWC) 10180	Sltst, med gy, f. sndy, sl. coaly + coal particles	1.07	436	61	37	0.14	0.65	0.40	0.18	0.79
" 10313	Sltst, med dk gy, f. sndy, coaly lam	3.97	421	325	20	1.92	12.90	0.79	0.13	14.82
" 10437	Sltst, blk, sndy, sl. shly	0.96	440	65	69	0.22	0.62	0.66	0.26	0.84
" 10608	Sltst, dk gy, f. sndy, sl. coaly	3.83	420	318	27	1.75	12.18	1.05	0.13	13.93
" "	Coal + Sh, mn. lam	18.60	422	349	24	6.75	64.85	4.55	0.09	71.60
" 10771	Sh, gy-blk, slty, sl. carb	4.46	428	345	19	1.63	15.37	0.84	0.10	17.00
" 3280	Sh, dk gy, f. slty + coal particles	1.99	432	274	18	0.71	5.45	0.35	0.12	6.16
" 10892	Sst, gy, slty + Qtz grains + Coal frags	1.34	435	79	31	0.48	1.06	0.42	0.31	1.54
" 10914	Sltst, gy-blk, sndy, sl. carb	1.14	438	112	34	0.32	1.28	0.39	0.20	1.60
" 10974	Sltst, gy-blk, sndy, shly, sl. coaly	0.80	436	106	16	0.27	0.85	0.13	0.24	1.12

TABLE 2 : TOTAL ORGANIC CARBON CONTENTS & "ROCK EVAL" PYROLYSIS DATA

FIGURE 1

PYROLYSIS SUMMARY CHART

COMPANY: AMOCO AUSTRALIA WELL: CAPE SORELL-1 LOCATION: TASMANIA



ABBREVIATIONS USED IN ANALYTICAL DATA SHEETS

-	-	Sample not analysed
*	-	No results obtained
N.D.P.	-	No Determination Possible
N.O.F.	-	No Organic Fluorescence
N.D.O.F.	-	No Determination Organic Fluorescence

LITHOLOGY

Aren	-	Arenaceous	Sft	-	Soft
Arg	-	Argillaceous	Tr	-	Trace
Calc	-	Calcareous			
Carb	-	Carbonaceous			
Cmt	-	Cement			
Chk	-	Chalk			
Cht	-	Chert	Blk	-	Black
Cly	-	Clay	Bl	-	Blue
Clyst	-	Claystone	Brn	-	Brown
Crs	-	Coarse	Dk	-	Dark
Cgl	-	Conglomerate	Gn	-	Green
Dol	-	Dolomite	G	-	Gold
Fer	-	Ferruginous	Gy	-	Grey
F	-	Fine	Lt	-	Light
Frgs	-	Fragments	Mtl	-	Mottled
Hd	-	Hard	Ol	-	Olive
Lam	-	Laminae/laminated	O	-	Orange
Lig	-	Lignite	Ppl	-	Purple
Lmst	-	Limestone	Rd	-	Red
Med	-	Medium	Wht	-	White
Mic	-	Micaceous	Yel	-	Yellow
Mnr	-	Minor	Vgt	-	Variegated
Mdst	-	Mudstone	Pk	-	Pinkish
Musc	-	Muscovite			
Ool	-	Oolitic			
Pyr	-	Pyrite/pyritic			
Qtz	-	Quartz	Ctg	-	Ditch cuttings
Snd	-	Sand	L.C.M.	-	Lost Circulation
Sst	-	Sandstone			Material
Sndy	-	Sandy	S.W.C.	-	Sidewall Core
Sh	-	Shale	Sl	-	Slightly
Shly	-	Shaley	V	-	Very
Sil	-	Siliceous	Occ	-	Occasional
Slt	-	Silt			
Sltst	-	Siltstone			
Slty	-	Silty			
Gy-gn	-	Greyish green	Gn-gy	-	Greenish grey
Gn/qy	-	Green and/to grey			