

ANADRILL

Schlumberger

312001

WELL COMPLETION REPORT

FOR

AMOCO AUSTRALIA PETROLEUM COMPANY LTD

YOLLA NO 1

BLOCK T-14/P, BASS STRAIT, OFFSHORE TASMANIA, AUSTRALIA

SOUTH $39^{\circ} 50' 18.89''$

EAST $145^{\circ} 48' 20.55''$

SPUD DATE : 08 JUNE 1985

T.D. DATE : 21 AUGUST 1985

T.D. : 3446.8m (10,982 ft)

OR. 318

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1. GENERAL INFORMATION

RIG	:	GLOMAR R.F. BAUER - DRILLSHIP
CONTRACTOR	:	GLOBAL MARINE DRILLING COMPANY
OPERATOR	:	AMOCO AUSTRALIA PETROLEUM COMPANY LTD.
STATE	:	TASMANIA, AUSTRALIA
BASIN	:	BASS BASIN
AREA	:	BASS STRAIT, BLOCK T-14/P
WELL	:	YOLLA NO. 1
LATITUDE	:	SOUTH 39 ^o 50' 18.89"
LONGITUDE	:	EAST 145 ^o 48' 20.55"
WATER DEPTH	:	79.5m (261ft)
RKB ELEVATION	:	11m (36ft)
RKB - ML	:	90.5m (297ft)
SPUD DATE	:	8th June 1985
TD REACHED	:	21st August 1985
FINAL DEPTH	:	3446.8m (10981ft)
30" CASING SHOE	:	189m (621ft)
20" CASING SHOE	:	399m (1309ft)
13 1/8" CASING SHOE	:	1752m (5748ft)
9 5/8" CASING SHOE	:	3339m (10955ft)
MUD SYSTEM	:	Salt Water/Gel/Polymer to 1752m Fresh Water/Gel/Polymer from 1752m to T.D.

ANADRILL PERSONNEL

C. CHAPMAN	:	Cell Manager
K.T. YEO	:	Senior Logging Engineer
J. HYLAND	:	Logging Engineer
H. MARCKS-FRANKE	:	Logging Engineer
M. DUVALL	:	Logging Engineer
A. WRIGHTSTONE	:	Logging Engineer
I. HANSEN	:	Logging Engineer
C. POWER	:	Engineer Grade 2
A. ELLIS	:	Engineer Grade 1
P. LANGE	:	Engineer Grade 1
M. WOODMANSEE	:	Engineer Grade 1

SERVICES PROVIDED

A fully pressurised Anadrill unit was provided utilising the Advisor logging system. The following parameters were continuously monitored :-

Heave and Tide compensated depth and bit tracking
Kelly height
Rate of penetration
Weight on bit
Revolutions per minute and total revolutions
Strokes per minute and total strokes
Pump pressure
Casing pressure
Temperature in/out
Mud weight in/out
Mud flow in/out
Mud conductivity in/out
Total pit volume - active and reserve pits
Trip tank volume
Total gas
Gas chromatograph
Cutting gas
H2S - 3 channels
CO2 Monitor
Shale density
Shale factor
Calcimetry

The following logs were provided :

- a hand-drawn Mud Log (see enclosure 1)
- a computer-generated IDEL (pressure detection) Log (see enclosure 2)
- a hand-drawn Pressure Evaluation Profile (PEP) Log (see enclosure 3)
- a computer-generated Drilling Rate Plot (see enclosure 4)

2. INTRODUCTION

Yolla No. 1 was drilled in the Bass Basin on a structurally 'high' feature, in an area with no predicted major faults and geologically similar to the Gippsland Basin. The nearest offset well was Bass No. 1 (ESSO/BHP), located 10km from Yolla 1, which encountered only minor hydrocarbon shows.

Yolla No. 1 was predicted to drill to a total depth of 4256m (13964 ft.) with a primary objective of the early Eocene to late Cretaceous and a secondary objective of the mid to late Eocene, both within the Eastern View Coal Measures. The total thickness of the primary and secondary objectives was estimated at 2538m (8328 ft.)

The Bass Basin had not been tested from 10,000 - 14,000 ft before and so this well was of particular interest to evaluate the deeper sections of the Basin.

3. R I G A C T I V I T Y

S U M M A R Y

RIG ACTIVITY SUMMARY

(see enclosure 4, Drilling Rate Plot)

<u>Date</u>	<u>Days from Spud</u>		<u>Midnight Depth</u>
8th June	0	Spud. Drill 36" hole, cement conductor	
9th	1	WOW.	
10th	2	WOW.	
11th	3	WOW. Lose one anchor, drag two.	
12th	4	Anchor repair	
13th	5	Anchor repair	
14th	6	Anchor repair	
15th	7	WOW.	
16th	8	WOW.	
17th	9	Retrieve anchor, run marine riser.	
18th	10	Drill 17½" pilot hole.	
19th	11	Pull riser, run 26" hole opener. WOW. Lose latch pin to guide base. Send down divers.	
20th	12	Drill with 26" hole opener, run 20" casing.	
21st	13	Cement casing.	
22nd	14	Drill out 20" shoe	399m
23rd	15	Drill ahead. WOW.	720m
24th	16	Drill ahead.	1027m
25th	17	Drill ahead.	1250m
26th	18	POOH. Unlatch riser, WOW.	1250m
27th	19	WOW. Test B.O.P.	1256m
28th	20	Drill ahead.	1372m
29th	21	Drill ahead.	1462m
30th	22	WOW. Non-essential crew depart ship	1462m
1st July	23	WOW.	1462m
2nd	24	WOW.	1462m
3rd	25	WOW.	1462m
4th	26	Commence drilling.	1568m
5th	27	Drill ahead.	1725m
6th	28	Drill ahead.	1759m
7th	29	C.B.U. POOH to run 13 3/8" casing.	1759m
8th	30	WOW.	1759m
9th	31	WOW.	1759m

RIG ACTIVITY SUMMARY

<u>Date</u>	<u>Days from Spud</u>		<u>Midnight Depth</u>
10th July	32	Run 13 3/8" casing.	1759m
11th	33	Run wear bushing, pressure test lines, RIH. Drill float and shoe, perform leak off test.	1759m
12th	34	Drill ahead, flow check, C.B.U. POOH to rig up core barrel.	1838m
13th	35	Recover core No. 1 (28.8% recovery) RIH	1848m
14th	36	Pull to shoe, unlatch riser, WOW.	1982m
15th	37	WOW.	1982m
16th	38	WOW.	1982m
17th	39	WOW. Run riser.	1982m
18th	40	Latch riser, continue drilling.	2016m
19th	41	POOH to run 'E' logs. RIH. Resume drilling.	2176m
20th	42	POOH, swab 2.5 bbls pull riser. WOW.	2176m
21st	43	WOW.	2176m
22nd	44	WOW.	2176m
23rd	45	Run riser, re-run anchor chain, retrieve hang off tool. RIH drill ahead.	2355m
24th	46	C.B.U. WOW.	2355m
25th	47	WOW.	2355m
26th	48	WOW. C.B.U. POOH. Test stack	2355m
27th	49	RIH. C.B.U. drill ahead, pull to shoe.	2439m
28th	50	WOW.	2439m
29th	51	WOW.	2439m
30th	52	WOW.	2439m
31st	53	WOW.	2439m
1st August	54	WOW. Resume drilling.	2467m
2nd	55	Circ. drilling gas (52.6%) Drill ahead.	2591m
3rd	56	POOH. WOW.	2713m
4th	57	WOW.	2713m
5th	58	WOW.	2713m
6th	59	RIH. Ream to bottom. Drill ahead.	2830m
7th	60	Drill ahead, low ROP, high torque POOH.	2901m
8th	61	Test stack, RIH, Ream tight section at 2600m, controlled drilling.	2923m
9th	62	Drill ahead, minor drill breaks with associated gas.	3031m

RIG ACTIVITY SUMMARY

<u>Date</u>	<u>Days from Spud</u>		<u>Midnight Depth</u>
10th	63	Drill ahead slowly (3m/hr) Igneous rock.	3079m
11th	64	POOH for bit change, $\frac{1}{2}$ cone and many teeth missing.	3109m
12th	65	RIH, ream to bottom, drill ahead slowly. POOH with high torque.	3173m
13th	66	RIH, drill ahead, erratic torque.	3229m
14th	67	Drill ahead.	3305m
15th	68	POOH for bit change, RIH to drill.	3319m
16th	69	POOH. WOW. RIH to drill, POOH before drilling, anchor chain breaks, close shear rams in drill string.	3344m
17th	70	WOW.	3344m
18th	71	WOW.	3344m
19th	72	WOW. Re-run anchor, RIH mill on drill pipe prior to fishing.	3344m
20th	73	Mill and fish for drill string, POOH with fish, RIH, CBU.	3344m
21st	74	POOH. RIH with core barrel for 2m core.	3346.8m
22nd	75	POOH. with 2m core (64% recovery). Run 'E' logs.	3346.8m
23rd	76	Schlumberger out of hole. RIH. for wiper trip.	3346.8m
24th	77	POOH	3346.8m
25th	78	Schlumberger run RFT's, unlatch riser. WOW.	3346.8m
26th	79	WOW. Prior to side wall cores and running 9 5/8" casing for test program.	3346.8m

4. GEOLOGICAL SUMMARY

GEOLOGICAL SUMMARY

(see enclosure 1 - Mud Log
and enclosure 3 - PEP Log)

Interval 190m - 680m - Shell Debris

Shell and fossil debris comprised up to 100% of the samples obtained throughout this interval. Fragments of bryozoans corals, shell fragments, spicules and foraminifera made up the bulk of recognisable bioclasts. All of the calcareous bioclasts dissolved in cold 10% hydrochloric acid. The samples ranged in colour from grey to light grey with cream to buff and pale brown zones.

The character of the samples from 450m was biocalcarenite, due to an increase in clay and matrix materials. Glauconite aggregates were noted in trace amounts in many samples. The coarser bioclastic component progressively decreased in the samples, producing a calcarenite. Bioclasts were still recognisable, though very fragmented. The calcarenite was cream to light grey in colour, medium grained with a predominantly clay matrix containing silt and microcrystalline calcite. Calcimetry readings throughout the interval were consistent with the lithology, readings of 95% CaCO₃ being regularly obtained. Background gas levels were negligible over the interval with an average ROP (rate of penetration) of 50 - 100m/hr.

Interval 680m - 1205m - Calcareous Claystone

This interval was defined by an increase in clay content. The samples changed rapidly from the calcarenite of the previous interval into a calcilutite which persisted for 140m (680m - 820m) before grading into a calcareous claystone below 820m.

The calcilutite was light to medium grey in colour and was extremely soft and sticky. The samples contained abundant macro and micro-fossil fragments and traces of glauconite. Small quantities of fine sand and silt were noted in the matrix. Calcimetry readings indicated a dolomite content of up to 15%, at depths between 660m and 820m, decreasing to trace amounts over the remainder of the interval.

The calcareous claystone was light grey to grey in colour, soft and occasionally silty. Small amounts of fossil fragments, microcrystalline calcite and traces of polycrystalline euhedral pyrite were also present in the samples. Below 1125m the claystone became darker grey in colour, more fissile and shaley. The increasing clay content was reflected in the calcimetry readings - dropping from 70% CaCO₃ initially, to 10% CaCO₃ at 1250m. The total gas readings increased to an interval-background level of 0.5%, with peaks of 2% occurring at 1105m and 1200m. The ROP was averaged at 25-35m/hr over the interval.

Interval 1205m - 1330m - Shales, Volcanics, Sands

The lithology during this section was initially a subfissile to fissile shale, light to medium grey in colour, with some fragments being dark grey. The shale hardness was variable, ranging from hard to soft, and was also slightly calcareous.

From 1265m the predominantly shale samples were interspersed with volcanic material. The volcanic fragments were blue - white and mottled grey, some fragments appearing to be tuffaceous. Alteration of the volcanics was inferred from the clays within the fragments and carbonate in the groundmass. No recognisable minerals were present.

Sands and sandstones were associated with the volcanics. The sands and sandstones were fine to medium grained with grains rounded to angular in shape. The matrix of the sandstones was slightly calcareous but predominantly clay. Scattered throughout the sands were clear colourless quartz grains.

At 1263m, a significant total gas peak of 10.2% occurred, coinciding with the first appearance of the volcanics and associated sands and sandstones. Chromatographic analysis at this point gave a breakdown of C1:3.3%, C2:0.3%, C3:0.27%, iC4:0.06%, nC4:0.1%. It should be noted that the first occurrence of 'heavy' gases (C3-nC4) was observed in the trip gas from 1249m where a total peak gas reading of 7.6% was obtained.

Traces of dull brown oilstain were seen in some sandstone cuttings around 1275m, with occasional traces of pinpoint pale yellow fluorescence giving a faint pale yellow crush cut fluorescence. The average ROP over the interval was around 25m/hr, decreasing to 10m/hr below 1270m.

Calcimetry readings increased from 10% to 20% CaCO₃ over the interval with only traces of dolomite being detected.

Interval 1330m - 1630m - Sandstones, Dolomite & Claystone Interbeds

Sand and sandstones interbedded with claystone were the predominant lithologies of the interval, with the occurrence of thin layers of dolomitic limestone in the lower part of this section.

The sandstones in the early part of the section were white to colourless, very fine grained, grains being sub-rounded, moderately well sorted and occasionally calcareous. Euhedral, colourless, clear quartz crystals were present in small quantities. The sandstone became a light brown to buff colour from 1540m, and was fine to medium grained, poorly sorted with grains angular to sub-angular, with poor visible porosity. The sandstone in this region contained abundant pyrite as small nodules (euhedral aggregates). In places a carbonate cement was evident and glauconite was found in the matrix. Some sandstones exhibited dull to bright yellow fluorescence with a milky white to occasionally yellow crush cut leaving a dessication ring varying from blue white to bright yellow.

Claystones throughout the interval 1330m - 1630m were light grey, grey to tan in colour, soft and amorphous with some zones being subfissile and grading into siltstone.

The limestone occurred as stringers white to cream in colour, the rock was competent, blocky and micro-crystalline in texture. The limestone gave a dull yellow mineral fluorescence.

Towards the base of the section layers of dolomitic limestone occurred. The dolomitic limestone was light brown to buff in colour, occasionally being of a reddish colour. The rock was hard and brittle, blocky, also micritic to finely microcrystalline with some silt. A dull yellow mineral fluorescence was evident similar to that occurring in the limestones above.

Calcimetry gave values of 10 - 30% CaCO₃ and 2 - 20% CaMg(CO₃)₂, varying over the interval. Total gas values through the interval were generally less than 2%, mainly C₁ and C₂. However, minor gas peaks occurred at 1445m and 1523m, total gas 2.9% and 2.4% respectively, with traces of C₃ and C₄ evident although only the C₃ persisted (as a trace).

ROP values through the interval averaged 5 - 10m/hr, reaching 18m/hr in places.

Interval 1630m - 1825m - Silty Claystones with Limestone Interbeds

This interval was marked by the appearance of a darker silty claystone, predominantly brown to dark brown but also reddish brown in colour. The material was blocky to sub-fissile with occasional platy fragments. The claystone was slightly calcareous with nodules of pyrite present. The material graded to a siltstone with increasing depth and was interbedded with very fine sand grade intervals. Other calcareous siliciclastics occurred in small zones within the interval. Also present was a sandy dolomitic limestone, reddish tan to light brown in colour, very hard and brittle. The rock contained some micritic components but graded to a dolarenite interbedded with very fine to fine grained sandstones. The dolarenite and sandstones were white to light brown in colour, moderately well sorted with rounded and frosted grains in a calcareous clay matrix. Beyond 1745m claystone became the dominant lithology with an increasing silt and sand content. Throughout the interval 1630m - 1825m, calcimetry readings remained low, with values of 15% CaCO₃ and 5-10% CaMg (CO₃)₂. Total gas however increased from an average of 0.6% at 1630m to peaks up to 8% at 1817m. The ROP values averaged 8m/hr initially but increased to a maximum of 40m/hr at 1825m.

Interval 1825m - 2203m - Sandstones, Coals, Minor Shales

A sudden increase in total gas associated with a drilling break marked the beginning of this interval. The drilling break peaked at 130m/hr, at 1827m, with a maximum gas peak of 33% at 1833m. The gas associated with this peak contained hydrocarbons up to C₅ (816 ppm, 0.0186%). A core was taken from 1838m - 1847.8m with 2.8m of core being recovered. The recovery showed a very fine to fine grained sandstone of light grey to grey colour.

The sandstone was poorly sorted with angular to sub-angular grains, having an argillaceous with occasional dolomite matrix. Pale brown oil staining was visible with pale to strong yellow fluorescence and a bright yellow crush cut leaving a thin, yellow dessication ring. IDEL Porosity values of up to 30% were obtained during this section. Beyond this depth the interval was composed of interbedded sandstones and coals with minor shales and siltstones.

The sandstone was similar to that found in the core at the beginning of this section, but varied from a light brown tan to light grey colour. The rock was fine to medium grained, poorly sorted and friable with some frosted grains.

The matrix was non-calcareous, with some clay (possibly kaolinite), carbonaceous inclusions and abundant mica. Traces of residual oil were observed producing white-yellow fluorescence with a dull yellow crush out fluorescence, leaving a bright, pale yellow dessication ring.

The shales throughout this section were generally very silty and sandy, grading into siltstones and very fine grained sandstones. 20-30% shale was observed in the samples, the shales being of a dark to chocolate brown colour, moderately hard, fissile to highly fissile, splintery, non-calcareous, microcarbonaceous, and containing finely disseminated pyrite. These shales gave a pale yellow, bright crush cut fluorescence as observed in the siltstone/sandstone section.

Coal was the dominant lithological component of the samples from the latter part of the interval, constituting up to 80% of the samples from 2150m - 2185m. The coal was dark brown to black in colour, the black material being bituminous and vitreous. The coal samples were hard, very brittle, glossy to vitreous with conchoidal fracturing and contained traces of pyrite. Crush cut, bright yellow in colour was obtained from the coals, leaving a bright intense yellow dessication ring.

Calcimetry readings were negligible throughout the interval with a maximum of 5% CaCO₃. ROP values were extremely variable with drilling breaks up to 125m/hr through the interbedded coals, with average ROP values between 20 and 40m/hr. Total gas readings were highest during the interval 1825 - 1857m peaking at 33% at 1833m. A gas peak of 13.5% was observed at 1848m after which total gas values decreased to 0.2% at 1925m and remained low until 2143m. From here on to 2203m a series of gas peaks were recorded, with values of up to 1.9% corresponding to the large quantities of coal (up to 90%) and the interbedded sandstone layers of this part of the interval.

Interval 2203m - 2563m - Silty Shales & Sands, Coals and Thin Dolomites

A gradual decline of the sand content was evident in the samples over this interval, with a corresponding increase in shale (up to 100% at 2515m), siltstone, dolomite stringers and interbedded layers of coal (up to 80%).

The shales were dominantly dark brown to black, moderately firm, sub-fissile to fissile, earthy, very silty in places, with a high content of dark organic matter, micromicaceous, micropyrritic and slightly dolomitic. Occasionally the shales graded to lignite with apparent plant remains visible.

The boundary between the silty shale and siltstone was often difficult to determine, with the siltstone being generally a lighter brown to tan colour, very micromicaceous with carbonaceous inclusions and finely disseminated pyrite. Both the shale and siltstone, gave pale to bright yellow crush cut fluorescence with a very pale yellow dessication ring.

The thin dolomite stringers appeared light brown to dark tan in colour, occasionally reddish brown with some mottling. They were extremely hard, micritic to microcrystalline, brittle, blocky with very fine laminations and with a high silty and carbonaceous content. A dull yellow fluorescence was observed leaving a very pale and weak yellow dessication ring.

The amount of sandstone in the samples decreased rapidly, increasing only briefly between 2357m and 2378m (up to 100% at 2368m) and disappearing by 2515m. The sandstones were generally milky white to translucent to tan in colour, very fine grained, occasionally medium grained with occasional coarse grains of loose quartz being present. The sandstones displayed poor to moderate sorting, moderate sphericity, were of frosted appearance, sub-rounded and with a non-calcareous cement matrix, with possible feldspars and muscovite being present. In places a bright yellow pin-point fluorescence was observed with slow streaming cut fluorescence. All samples gave bright to moderately bright yellow crush cut fluorescence, with a pale yellow dessication ring remaining.

Calcimetry readings remained low throughout this interval with the highest reading of 15% CaMg (CO₃)₂ and 5% CaCO₃ obtained at 2550m. The dominant dolomitic readings coincided with the occurrence of the dolomite stringers during this section. Total gas readings continued at a generally high level of 0.5 - 1.5% with higher peaks corresponding to the faster drilling coals i.e. 2.8% at 2464m and 8.8% at 2522m with numerous other smaller peaks recorded.

Interval 2563m - 3018m - Igneous Intrusives & Sandstones

The top of this interval is marked by the appearance of volcanics in the cutting samples. From 2563m - 2568m a dark brown, black to metallic silver pumice was seen being vitreous, brittle, hard and highly vesicular, with large (2mm) vesicles displaying flow characteristics and grading to a black obsidian glass. From 2567m to 2583m appeared welded tuff with phylitic shales. The tuff was light grey to cream in colour with bands of light and dark grey in a pale green siliceous matrix, glossy, very hard and brittle. The shale was black with a glassy lustre, hard, blocky - sub fissile, brittle and non calcareous.

Below 2585m appeared a light, speckled black, basic igneous rock, making up almost 100% of the sample. The rock varied from cream to white, light green to light grey, brown to tan, dark green and also dark red brown. It had a fine cryptocrystalline groundmass with phenocrysts of feldspar and some quartz with abundant biotite. Also present were dark red brown euhedral crystals of hornblende, dark green augite and opaque dark brown garnet, the sample overall being slightly calcareous with abundant ferromagnesian minerals, magnetite and haematite. This rock has subsequently been identified as altered gabbroic dolerite. From this depth to 3018m the lithology seemed to be dominated by sandstone and siltstones with sections of igneous material. Frequent drilling breaks in association with total gas readings up to 28% (2753m) were noted and this section was later interpreted as a series of dolerite intrusions into a sandstone sequence.

Between 2715m and 3018m several relatively thick sandstone sections occur, interbedded with shales, siltstones and altered dolerites. The sandstones were commonly associated with significant increases in background gas levels, with numerous sharp gas peaks noted.

The sandstones are roughly divisible into three main sections, from 2715m to 2775m, from 2805m to 2875m, and from 2945m to 3018m.

From 2715m to 2775m, the sandstones were typically off white to light brown, translucent, fine to medium grained, moderately well sorted, moderately to well cemented with kaolinite cement in parts, and occasional glauconitic, pyritic and microcarbonaceous inclusions. Moderate to poor visible porosity was evident, and pale yellow fluorescence was seen with a variable yellow/white crush cut to slow streaming cut fluorescence. Total gas peaks coincided broadly with short drill breaks, with a maximum gas peak of 26% attained at 2753m.

Chromatographic analysis of the gas gave breakdowns to C4. Total gas levels throughout this interval were elevated well above the earlier background levels.

From 2805m to 2875m the sandstones appear less well-developed. Typically, these sandstones were off white to white, tan, very fine to fine grained, moderately sorted, subrounded to rounded with moderate sphericity, moderately well cemented, with some parts being clear to translucent, medium grained, moderately sorted, subangular to subrounded. Both types contain occasional recrystallised quartz grains which were often very coarse grained and angular. Porosity is moderate to poor.

Some dull yellow fluorescence was seen, with a slow streaming yellow white cut. Occasionally a light brown residual oil stain was noted. Again drill breaks correspond well with major gas peaks, with a maximum peak of 15.5% total gas at 2820m breaking down from C1 to C4. Shales and siltstones are the main lithologies interbedded with these sandstones.

From 2945m to 3018m the evidence suggests a sequence of thinly interbedded sandstones, shales and siltstones rather than the more massive units seen further up this sequence. This is deduced from the evidence of the frequent sharp gas peaks seen and the porosity/drill strength plots. These sandstones are typically more varied as might be expected if the above is true. Often they are clear to milky white, cream to light brown to brown, generally fine grained but varying between very fine and medium grain. Subangular to subrounded grains predominate, with moderate sorting cementation varies from poor to moderate, with some samples being particularly friable, and calcareous cement common. Occasional traces of pyrite and kaolinite were noted.

Hydrocarbon traces were also variable. Some brown oil stain was common, generally with dull yellow fluorescence and yellow crush to slow streaming cut fluorescence, and a blue/white dessication ring fluorescence.

The major gas peaks in this section correspond with the few sustained drill breaks, with a maximum peak of 14.5% containing C1 to C4 at 2969m.

This sequence of alternating dolerites and sands continued down to 3018m with occasional phylitic shales present. Calcimetry readings remained low, below 5%, and total gas peaks up to 26% were seen from the sandstone sections

with average readings of 0.5 - 1%. ROP averaged 5 - 7m/hr with drilling breaks of up to 30m/hr, again in the sandstone sections.

Interval 3018m - 3347m - Basaltic Extrusives

The upper boundary of this section was picked from a modified 'D' exponent plot since it is unclear from the cuttings samples which appeared to have been highly contaminated by cavings. The interval again represented an altered basic igneous rock of predominantly light grey to grey green colour, occasionally multi-coloured, green, brown, pinkish red, dark grey and black. The fine grained cryptocrystalline groundmass appeared to contain altered feldspar and pyroxene phenocrysts with abundant anhedral phenocrysts of chlorite and calcite. Unlike the previous interval, where intermittent sands were present, this section appeared to be uniformly igneous in nature with occasional fractured zones giving slight ROP changes and with a great deal of alteration visible in the samples.

Total gas readings were uniformly low, averaging less than 0.1%, with a maximum of 0.4% recorded at 3062m, and 0.2% at 3328m. Calcimetry readings increased only slightly over the previous sections, with values up to 10% CaCO₃.

A core was taken from 3344.7 to 3346.8m with 64% recovery. This proved to be of a highly altered amygdaloidal basalt showing abundant fractures and veining. Amygdales up to 2cm across, flattened and with flow characteristics, were present with quartz, calcitic and chloritic infillings. The groundmass appeared to consist of a matrix of altered feldspar, pyroxene and olivine. Overall colour was of a pale olive to olive grey with many lighter cream to off white infillings. Following this core, the decision to stop drilling was made, and Total Depth of Well Yolla #1 was announced at 3347m. The consequent wire line logging runs showed a total depth of 3350m. Total depth was reached on August 21st, 1985.

5. HYDROCARBON SUMMARY

HYDROCARBON SUMMARY

Depth (m)	Total Gas	Chromatographic Analysis	Hydrocarbon Indication	Lithology	Comments
1260-1275	Max peak 4.2%	C1 - C4	Traces dull brown oil stain, occasional traces of pinpoint pale yellow fluorescence, faint pale yellow crush cut fluorescence	Sandstone	Associated with gas peaks, first appearance of C4 and sandstone
1375-1380	Max peak 0.5%	C1 - C2	Trace yellow fluorescence, milky white to occasionally yellow crush cut	Sandstone/sand/claystone	Slight gas peak, slight drill break, C2
1430	Peak 1.25%	C1 - C2	Trace bright yellow fluorescence, slow streaming bright yellow white cut fluorescence, very bright yellow white crush cut fluorescence, very bright blue white dessication ring fluorescence	Sandstone	Slight gas peak, slight drill break, C2 followed later by C3 and C4
1830-1855	Peak 33% at 1833m	C1 - C5	Pale brown oil stain, pale to strong yellow fluorescence, bright yellow to white crush cut, thin yellow dessication ring	Sandstone	Very marked drill break associated with dramatic increase in gas levels, and sandstone with shows in cuttings and core
1855-2203	Peak 1.9%	C1 - C3 trace C4	Traces of residual oil with pinpoint white yellow fluorescence, dull yellow crush cut fluorescence, bright pale yellow dessication ring	Sandstone	Frequent drill breaks, little change in gas levels
	"	"	Pale yellow fluorescence, bright yellow crush cut fluorescence, white dessication ring	Shale	Occasional seen in shale at base of section
			Bright yellow crush cut, intense bright yellow dessication ring	Coal	

HYDROCARBON SUMMARY

Depth (m)	Total Gas	Chromatographic Analysis	Hydrocarbon Indication	Lithology	Comments
2203-2563	Max peak 5% at 2522m	C1 - C3 trace C4 with major peaks	Variable, pale to bright yellow fluorescence, pale to bright crush cut fluorescence, with generally pale yellow dessication ring, also brown and yellow white Variable, dull to bright yellow to pale yellow to brown/yellow fluorescence, generally pale yellow, crush cut fluorescence, dessication rings vary from dull to bright, yellow/white to light brown to blue/yellow, occasional traces of brown residual oil stain	Siltstone/shale	Gas peak and drill breaks generally associated, but not always corresponding with shows
2715-2775	Max peak 26% at 2753m	C1 - C4	Variable, pale yellow fluores- cence with variable yellow/white crush cut to slow streaming cut fluorescence	Sandstone	Associated with gas peaks and drill breaks
2805-2875	Max peak 15.5%	C1 - C4	Trace dull yellow fluorescence, slow streaming yellow/white cut, occasional light brown residual oil stain	Sandstone	Associated with gas peaks and drill breaks
2945-3018	Max peak 14.5%	C1 - C4	Common traces of brown oil stain, dull yellow fluorescence, yellow crush to slow streaming cut fluorescence, blue white dessication ring fluorescence	Sandstone	Associated with gas peaks and drill breaks

ANADRILL

Schlumberger

SHOW REPORT NUMBER 1

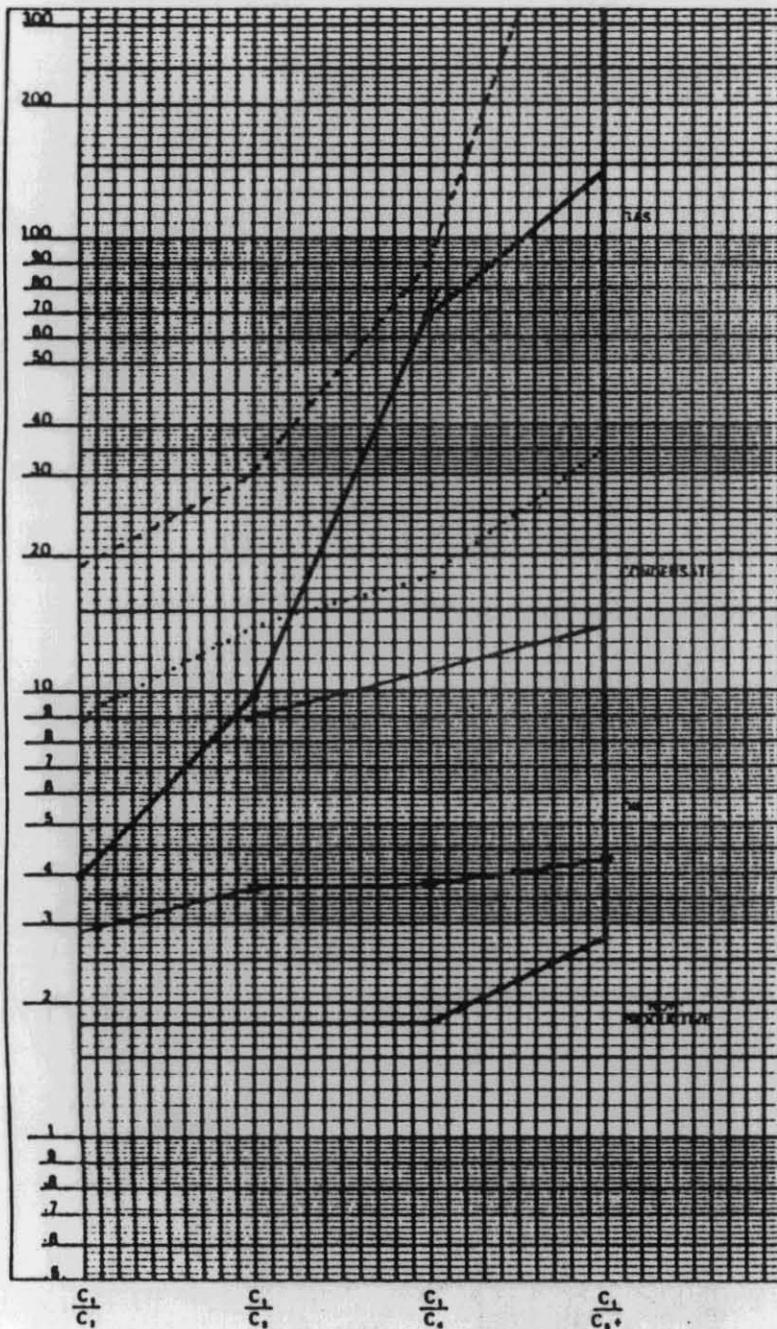
COMPANY AMQCO AUSTRALIA PETROLEUM COMPANY WELL NUMBER YOLLA NO. 1
LOCATION BASS STRAIT DATE 13 JULY 1985

- 1 SHOW INTERVAL 1831m TO 1838m
- 2 LITHOLOGY SANDSTONE: light grey, grey, very fine grained to fine grained angular to subangular, poorly sorted, occasionally argillaceous, dolomitic, traces of glauconite and mica, good intergranular porosity, firm to hard, friable.
- 3 PENETRATION RATE: BEFORE 18m/hr DURING 63m/hr AFTER 15m/hr
- 4 BACKGROUND GAS: BEFORE 7.1% max DURING 32.8% max AFTER 0.2% max
- 5 CHROMATOGRAPH ppm C1 137088 C2 33480 C3 13200 C4 2310 C5 816 (DURING)
- 6 D-P-L POROSITY 10 % 20 - 30 % 20 - 30 %
- 7 VISIBLE POROSITY Good, intergranular, 20-30%
- 8 MUD WT 9.0 ppg PORE PRESSURE 8.68 ppg ECD 9.25 ppg
- 9 FLUORESCENCE Pale to strong yellow % COLOR 100
- 10 CUT Crush, good, even COLOR Yellow INTENSITY Bright
- 11 WT. ON BIT 5 - 35 x 1000 LBS ROTARY SPEED 80 R-P-M
- 12 BIT: MAKE STC TYPE SDGH SIZE 12-1/4"
- 13 CHLORIDES: BEFORE _____ DURING _____ AFTER _____
- 14 REMARKS Very fine to fine grained friable sandstone with good visible intergranular porosity, high apparent permeability, thus flushed during coring, probably producible

UNIT OLU-FB-036 UNIT MANAGER C. CHAPMAN

22

312025



HYDROCARBON RATIO ANALYSIS

COMPANY AMOCO AUSTRALIA PETROLEUM COMPANY

WELL YOLLA #1

AREA BASS STRAIT COUNTRY AUSTRALIA

DEPTH 1833 m

MUD GAS

C₁ 137088 C₂ 33480 C₃ 13200 iC₄ 882 nC₄ 1428 C₅₊ 816

BACKGROUND GAS (AVE)

C₁ 21777 C₂ 4570 C₃ 1600 iC₄ 294 nC₄ 357 C₅₋

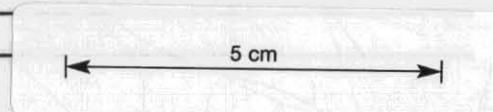
NET GAS

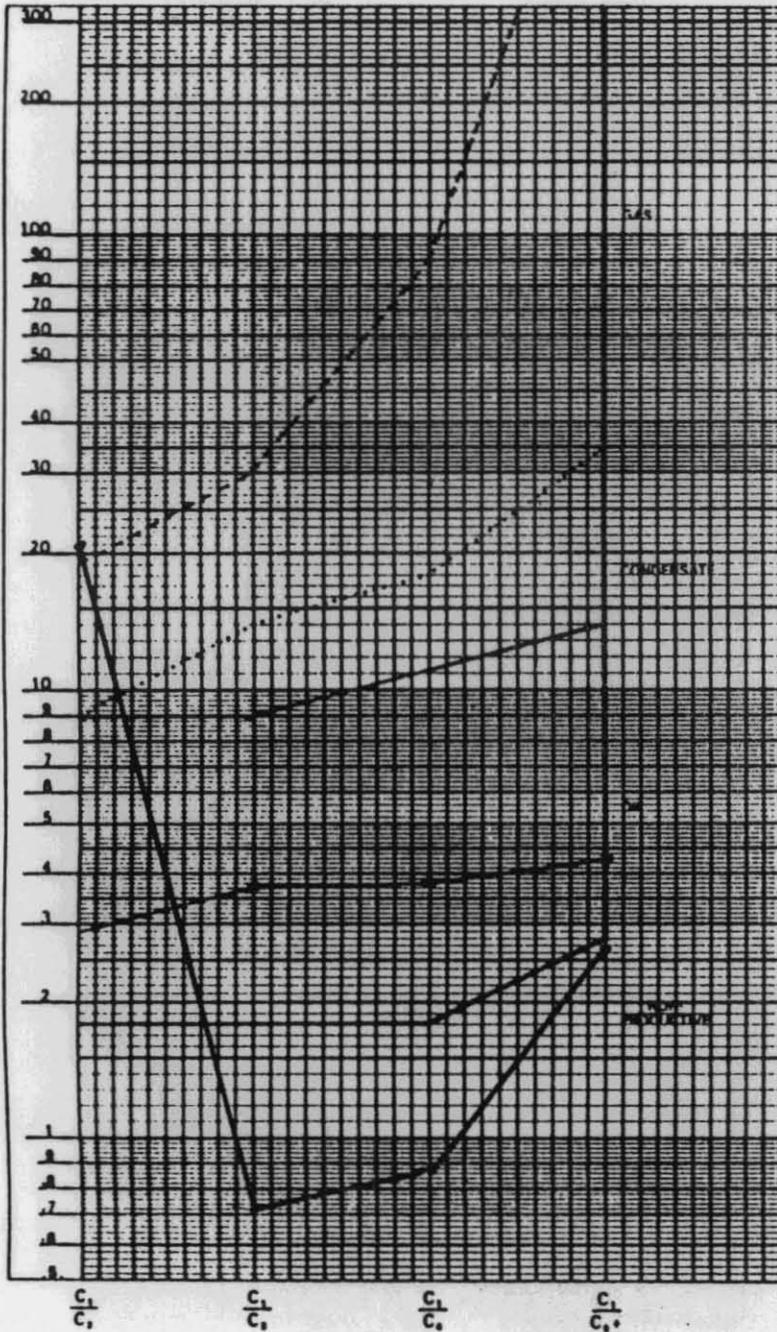
C₁ 115311 C₂ 28910 C₃ 11600 iC₄ 588 nC₄ 1071 C₅ 816

RATIO

C₁/C₂ 3.98 C₁/C₃ 9.9 C₁/C₄ 69.5 C₁/C₅ 141.0

TEST DATA TAKEN FROM MUD GAS @ 1833 m





HYDROCARBON RATIO ANALYSIS

COMPANY AMOCO AUSTRALIA PETROLEUM COMPANY

WELL YOLLA #1

AREA BASS STRAITS COUNTRY AUSTRALIA

DEPTH 1833 m

MUD GAS

C₁ 1499 C₂ 756 C₃ 3520 iC₄ 1180 nC₄ 1573 C₅ 816

BACKGROUND GAS

C₁ 3713 C₂ 648 C₃ 480 iC₄ 116 nC₄ 136 C₅ -

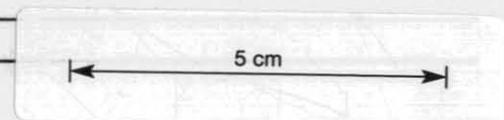
NET GAS

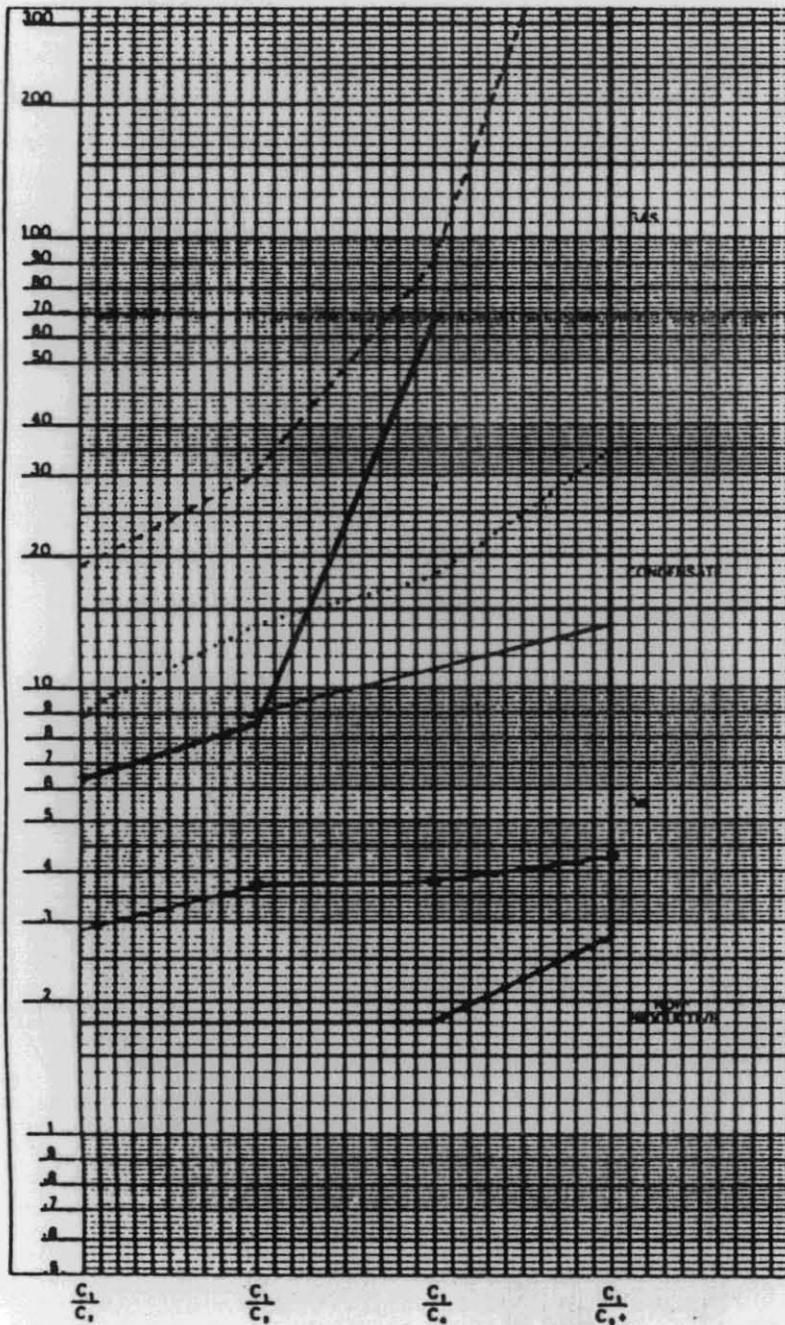
C₁ 2214 C₂ 108 C₃ 3040 iC₄ 1064 nC₄ 1437 C₅ -

RATIO

C₁/C₂ 20.5 C₂/C₃ 0.728 C₃/C₄ 0.89

TEST DATA BLENDER CUTTINGS GAS





HYDROCARBON RATIO ANALYSIS

COMPANY AMOCO AUSTRALIA PETROLEUM COMPANY

WELL YOLLA #1

AREA BASS STRAITS COUNTRY AUSTRALIA

DEPTH 1833 m

MUD GAS

C₁ 10853 C₂ 1728 C₃ 1200 iC₄ 118 nC₄ 143 C₅ -

BACKGROUND GAS

C₁ 2210 C₂ 380 C₃ 210 iC₄ 80 nC₄ 56 C₅ -

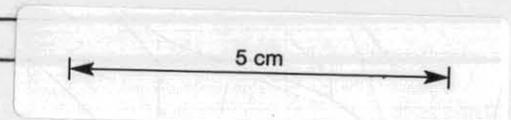
NET GAS

C₁ 8643 C₂ 1348 C₃ 990 iC₄ 38 nC₄ 87 C₅ -

RATIO

C₁/C₂ 6.4 C₂/C₃ 8.65 C₃/C₄ 69

TEST DATA BLENDER MUD GAS



6. PRESSURE EVALUATION

PRESSURE EVALUATION

(see enclosure 3, PEP LOG)

No evidence of overpressure was encountered during drilling of Yolla No. 1. At 2298m connection gas seemed to occur but this was later associated with ROP breaks and sand bodies.

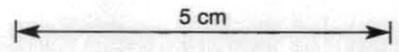
The Anadrill IDEL program gave a calculated pore pressure of between 8.7 - 8.9 ppg throughout the well and this normal trend was supported by other pressure indications such as D'Exp, shale density, true shale factor and mud temperature. (Refer to Advisor cross-plots and well completion log).

A 'd' exponent plot versus depth gives a normal compaction trend down to just below 2500m, at which point a slight reverse trend becomes apparent. This continues to approximately 3000m, where the normal trend is resumed.

However, the apparent reverse 'd' exponent trend seen is not thought to represent an increasing formation pore pressure trend for several reasons, the major one being the lithology in this interval is largely igneous (probably minimal porosity) and sandstone or siltstone. 'D' exponent is not of proven value in detecting pressure rises in igneous rocks, and is not regarded as a useful or meaningful pressure indicator in porous rocks such as sandstones, which make up the bulk of this section. The presence of igneous rocks, whether intrusive or basalt flows, and despite alteration, weathering and fracturing at a later stage, may have affected normal compaction and diagenetic processes and thus retarded the development of a normal gradient at this depth.

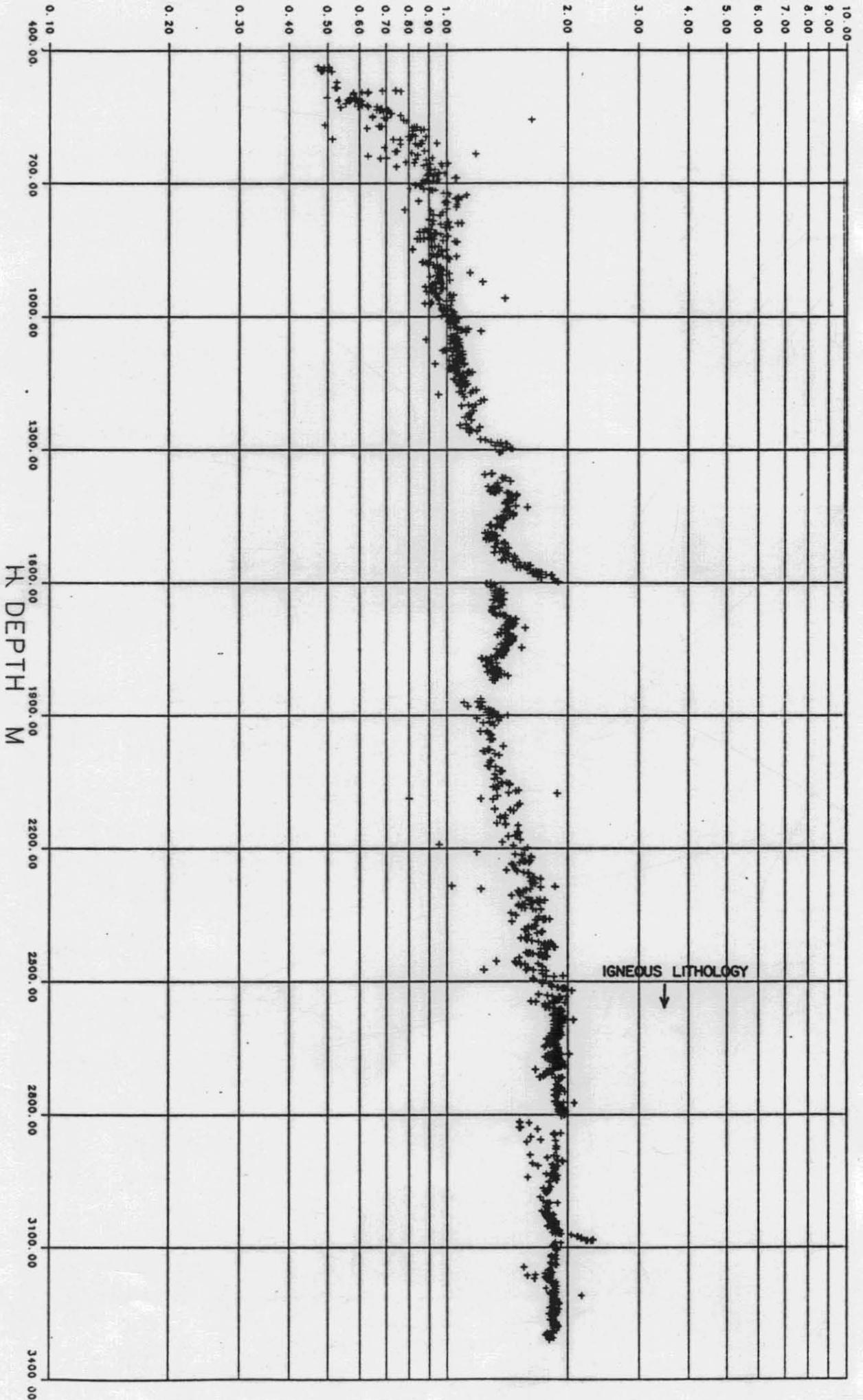
It should be noted that no other indications of abnormal pressures were seen.

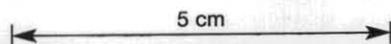
Mud temperature out against depth (Fig 2) shows no abnormal thermal gradients associated with overpressures and this is supported by plots of shale density and true shale factor on the well completion and mud log which again show only a normal compaction trend, conductivity trends shown no convincing evidence of formation pressure increases. Other possible indications, drill off trends etc were either not seen or unconvincing. On balance, therefore, it is felt that postulating an overpressure trend over this interval would be premature.



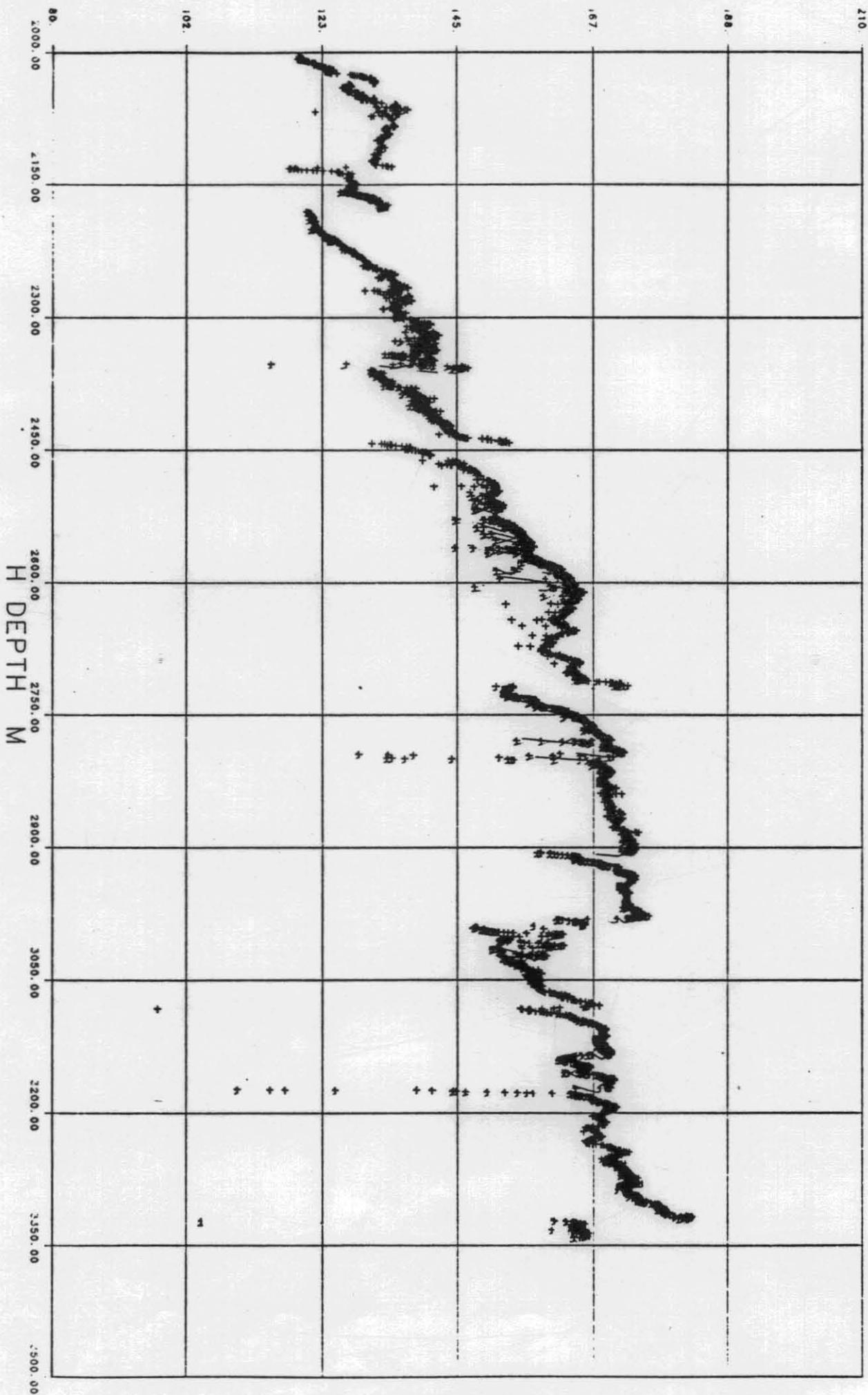
(Fig 1) D EXP

312031





TMP OUT DEG F (Fig 2)



312032

7. ENGINEERING REPORT

ADVISOR CROSS PLOT DISCUSSION

Plots of 'D' exp and temperature out against depth are largely self-explanatory and have been commented on in the previous section. A plot of Mud Conductivity in and out against depth (Fig 3) illustrates the change from a saltwater to freshwater based mud system after the 20" casing shoe was drilled out at 1309m. From this point there is an appreciable divergence of mud out conductivity with respect to mud in conductivity, with an overall decreasing conductivity trend. This can be explained by the bleeding in of saline formation fluid into the mud system giving the increase seen in conductivity out, coupled with the remedial action taken of constant dilution of the mud system with drillwater. Altogether nearly 32000 barrels of drillwater were used as dilution for the mud system. This explains the gradual decrease in conductivity with depth that is illustrated by the crossplot.

An interesting plot is the cost/interval against depth for succeeding bit runs (Fig 4). This illustrates the gradual levelling off of the cost/interval of each bit run as depth increases. In theory, as soon as the cost/interval of a bit starts to increase, thought should be given to pulling that bit, since it is becoming more uneconomic as it continues to drill. It is interesting to note that the steep increase in cost/interval seen at the end of bit run No. 14 (Depth in 2901m) shows that the bit should have been pulled, in theory, earlier than it was. At the time, large amounts of metal shavings were seen in the samples and it was subsequently found that half a cone had been lost downhole. This is also well illustrated by the extremely rapid increase in 'Drill Strengths' at the end of this bit run, seen on the plot of drill strength (k psi) against hole depth. (Fig 5)

The two bit 'failures' illustrated by the increasing cost/ intervals at 1600m and just before 3100m are also shown particularly well on the plot of 'D' Exp against depth (Fig 6) where at both these depths sharp increases in 'D' Exp are seen denoting inefficient drilling. 'D' Exp values return to the trend line at the commencement of the following bit runs in each case.

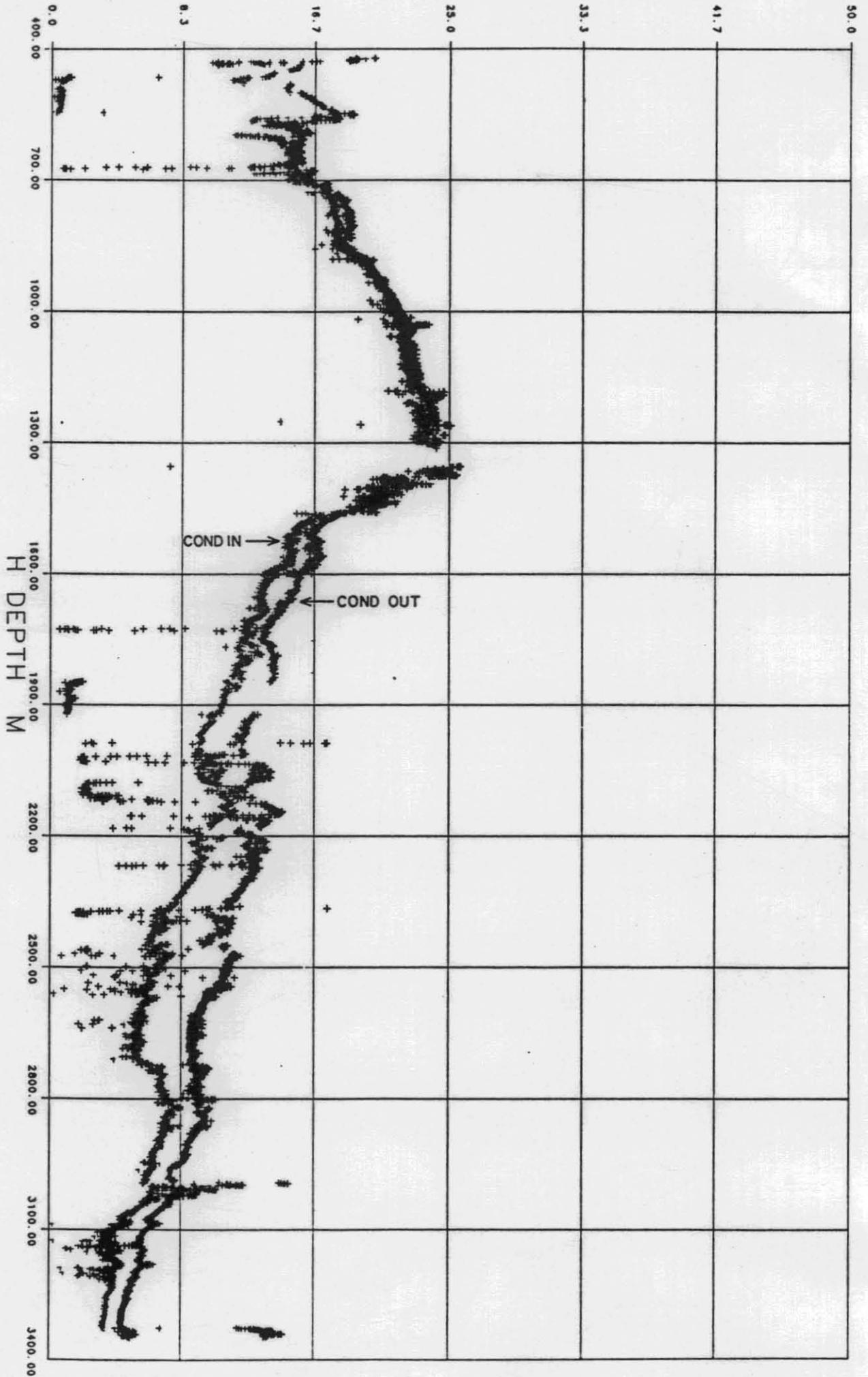
The plots of surface weight on bit (SWOB) and torque (drive amps) against depth (Figs 7 & 8) are included to show the general increasing trend of these parameters with depth, with the exception of the sands between approximately 1750m - 2100m, which required a much lower weight on bit to drill effectively. This is to some extent reflected in the lower torque values obtained over this interval.

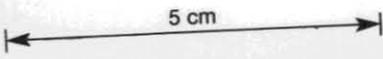
5 cm

CON IN MMHO/CM

(Fig 3)

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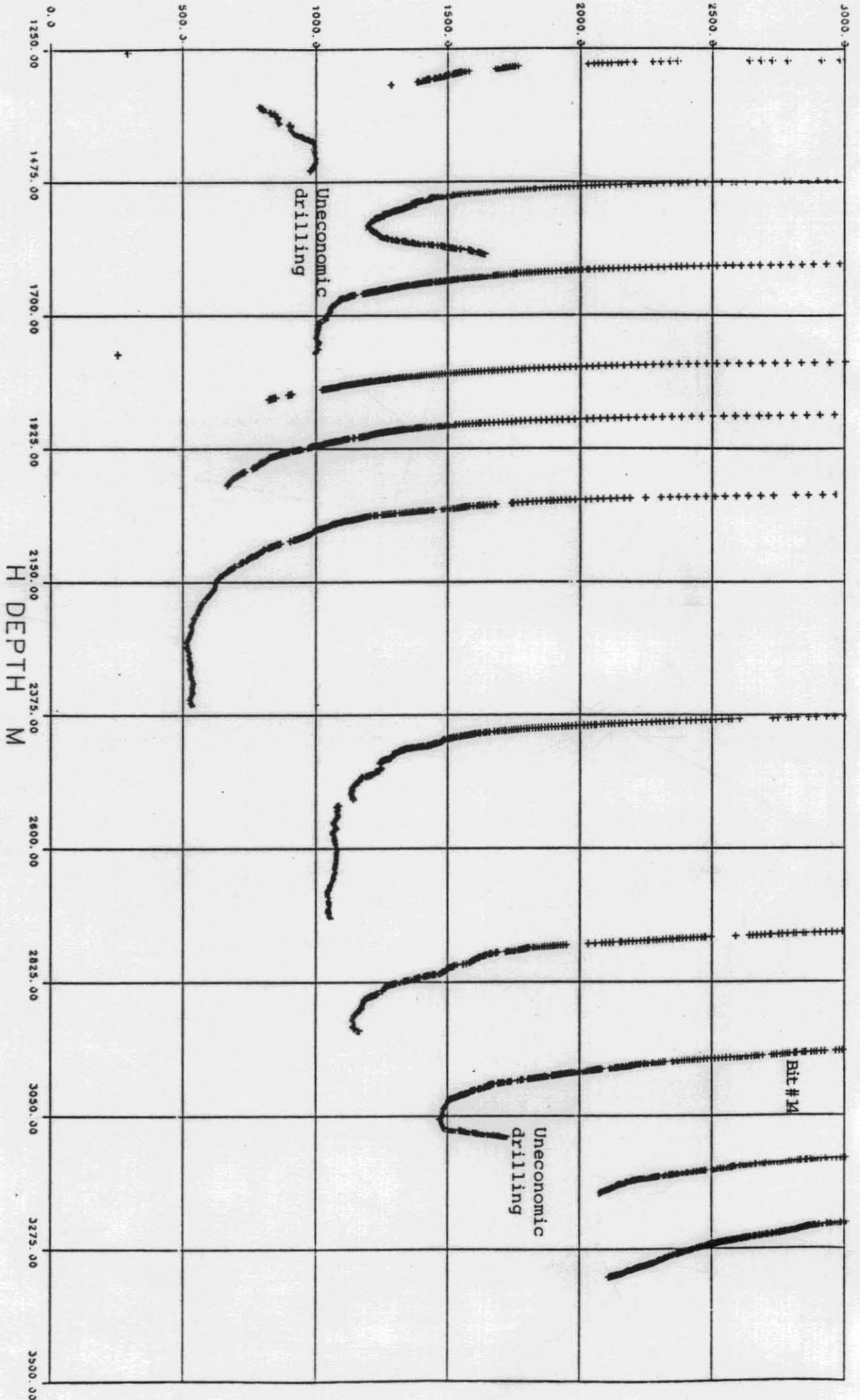




CST/INT COST/M

(Fig. 4)

312036

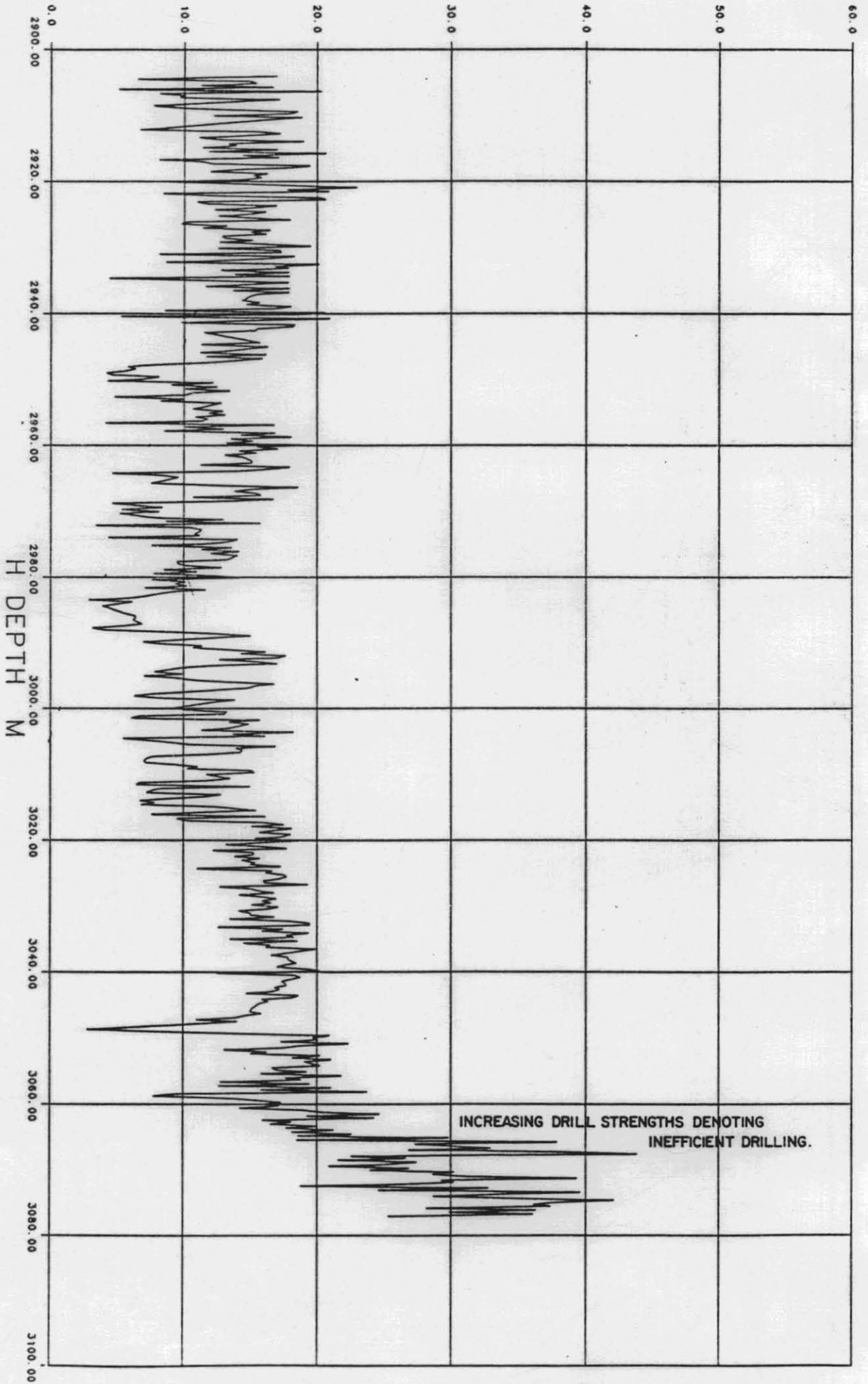


5 cm

(Fig 5)

DRILLS KPSI

312037

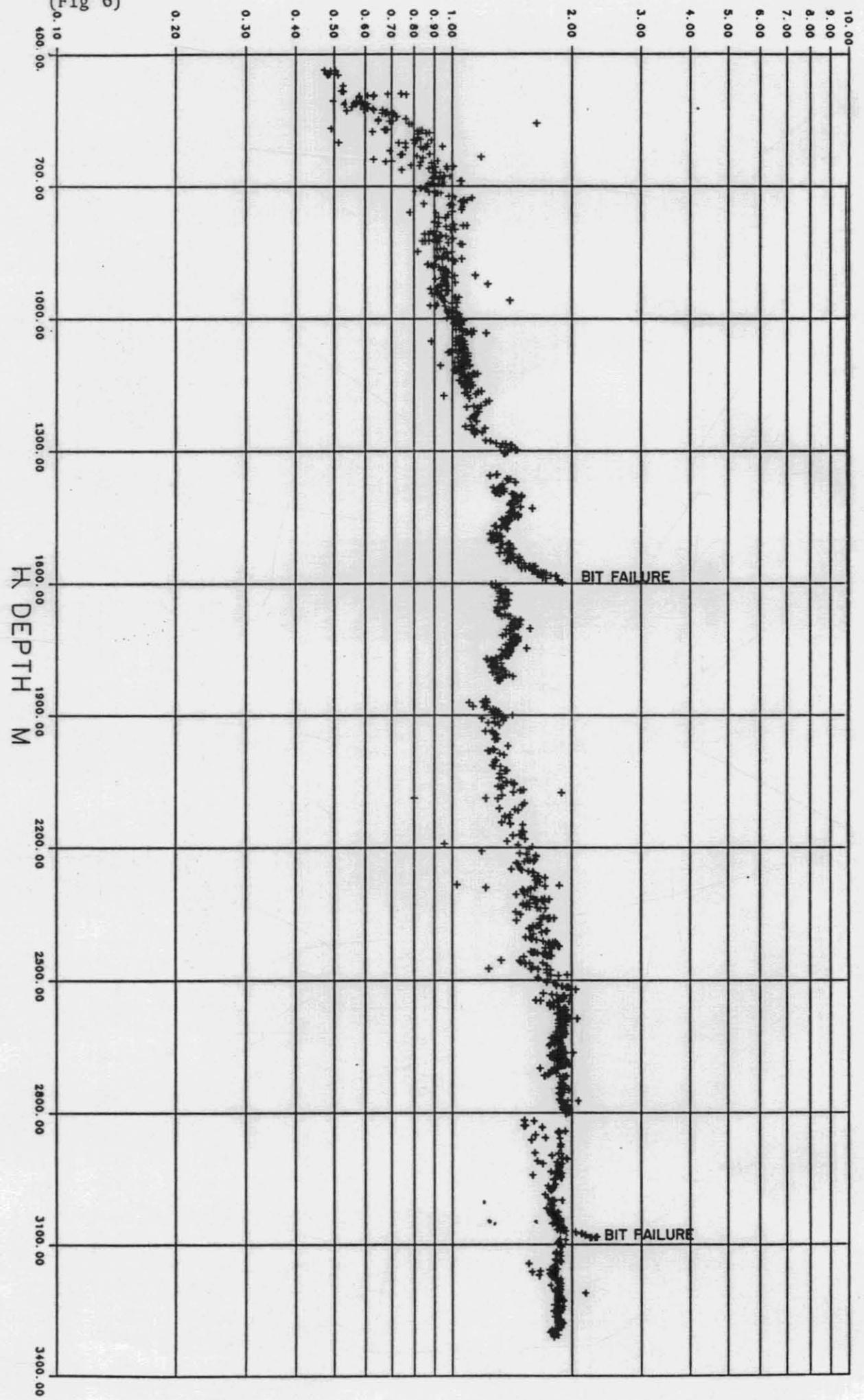


5 cm

35

D EXP

(Fig 6)



312038

H DEPTH M

BIT FAILURE

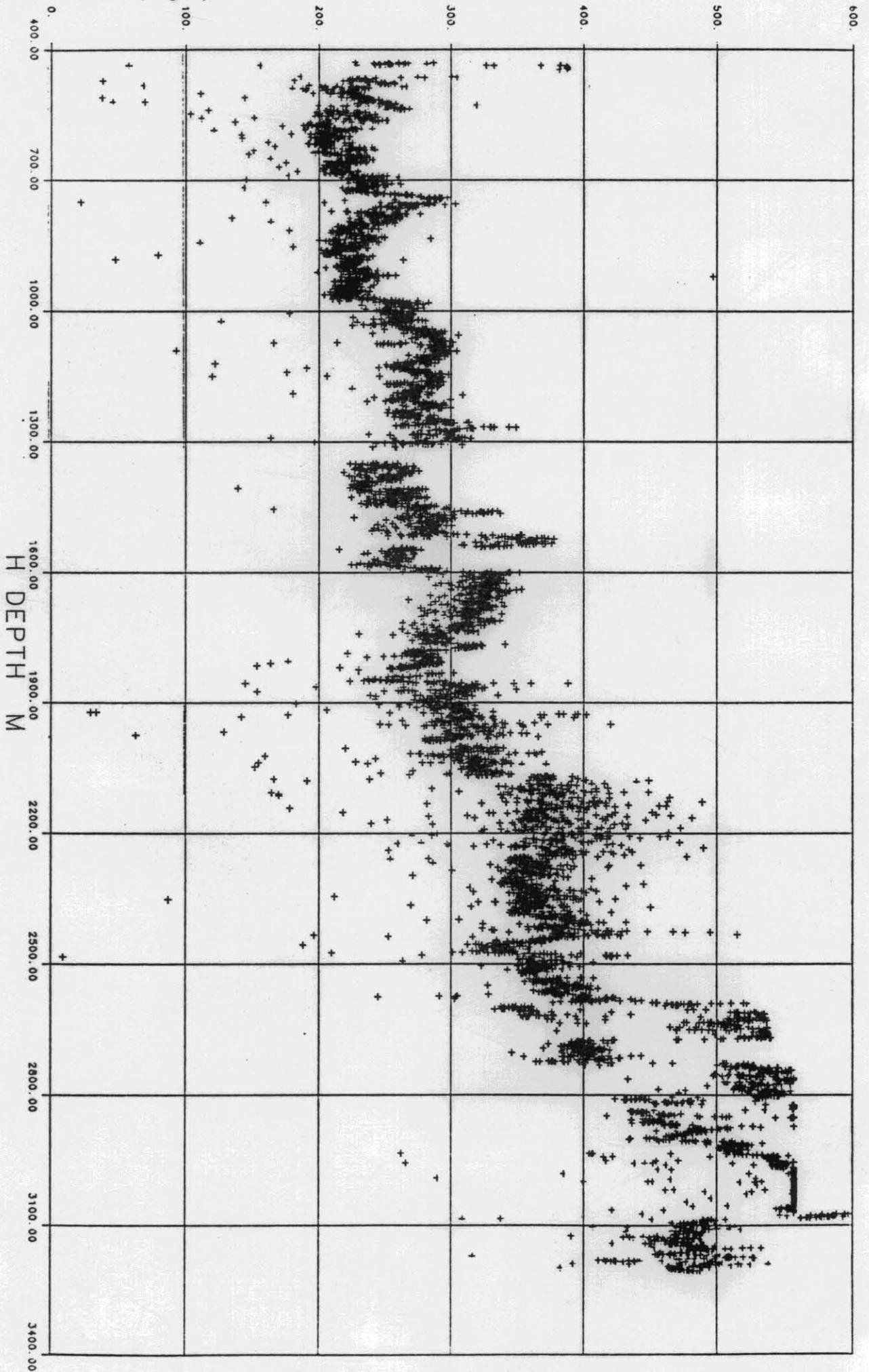
BIT FAILURE

5 cm

36

DRV AMP AMP

(Fig 7)



312039

5 cm

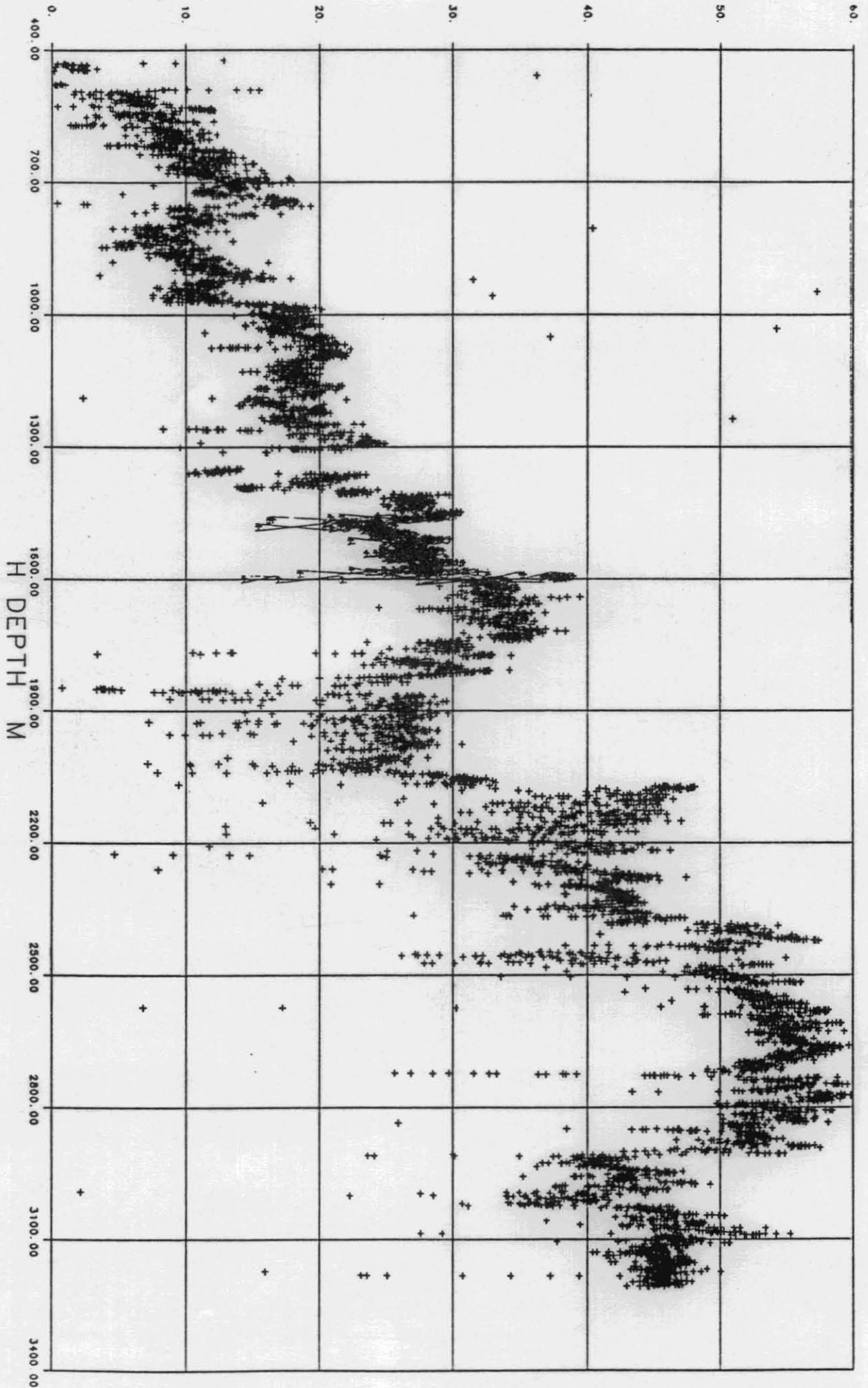
37

SWOB

KLBS

(Fig 8)

312040



8. HYDRAULICS

GENERAL HYDRAULICS

In general adequate hole cleaning was maintained throughout the drilling of Yolla 1, although during the latter stages of the well sample contamination by sloughing and cavings was a problem. Although at no stage during drilling were annular velocities high enough to cause a turbulent flow regime (refer to hydraulics analysis) hole enlargement was evident by the late return of carbide lag checks and by reference to the caliper logs. During the 17½" hole section an average hole size of 19½" was calculated using carbide gas returns.

Whilst drilling the upper part of the 13 3/8" hole where soft friable sands were encountered hole enlargement was again evident. Once the igneous section below 2500m was encountered however a much more in-gauge hole was produced, as shown by Schlumberger Caliper Log, with areas of enlargement corresponding to the softer sand sections found between the Dolerite intrusions.

Hydraulics analyses were run everyday whilst drilling (see Fig 11) and these showed good Bit Hydraulics optimisation. Average values for Bit Hydraulic Horsepower of 60% were calculated against an optimum of 50-65%. Average values for Hydraulic Horsepower per square inch (HHP/in²) of approximately 4.7 were obtained compared with the desired optimum of 2.5-5 HHP/in², and average nozzle velocities around 420 ft/see were calculated compared to the optimum of 350-400 ft/see. This excess of nozzle velocity over the desired optimum may have contributed to the hole enlargement seen whilst drilling.

Equivalent Circulating Density (ECD) values calculated whilst drilling at no stage approached calculated Fracture Gradient values, which had reached 15.8 ppg (equiv) by T.D. The calculated value of 12.7 ppg for fracture gradient at 413m (below the 20" casing show) corresponded well with the actual value of 12.5 ppg obtained from the Formation Integrity Test (FIT). Unfortunately the calculated value at the 13 3/8" casing shoe could not be checked in the same way since a value of 13.6 ppg was obtained at this depth (1760m) by a limit test only and so did not represent a true formation fracture value. The corresponding calculated value at the same depth was 14.4 ppg.

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*****
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***** THE ANALYSTS *****
***** SCHUMMEGER *****
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***** HYDRAULICS *****
9/19/85
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UNITS OPTION:(M=METRIC E=ENGLISH)= E

*** DRILLING ASSEMBLY PARAMETERS ***

(SURFACE EQUIPMENT)

CASE	STANDPIPE		HCSE		SWIVEL		KELLY	
	LENGTH(FT)	ID(IN)	LENGTH(FT)	ID(IN)	LENGTH(FT)	ID(IN)	LENGTH(FT)	ID(IN)
1	40	3	45	2	4	2	40	2.25
2	40	3.5	55	2.5	5	2.5	40	3.25
3	45	4	55	3	5	2.5	40	3.25
4	45	4	55	3	6	3	40	4

WHAT IS THE CASE FOR SURFACE EQUIPMENT? = 4

DRILL PIPE 1:

ID(IN) = 4.2700
 OD(IN) = 5.0000
 LENGTH(FT)= 9845.0000

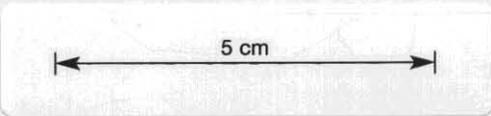
DRILL PIPE 2:

ID(IN) = 3.0000
 OD(IN) = 5.0000
 LENGTH(FT)= 422.0000

DRILL COLLAR 1:

ID(IN) = 3.0000
 OD(IN) = 5.0000
 LENGTH(FT)= 618.0000

TOTAL LENGTH (FT) = 10695.000



RISER ID(IN) = 19.0000
 DEPTH(FT)= 292.0000

312044

CASING 1 ID(IN) = 12.4510
 DEPTH(FT)= 5752.0000

CASING 2 ID(IN) = 0.0000

BORE HOLE 1 SIZE(IN) = 12.2500
 DEPTH(FT)= 10885.0000

TVD AT BOTTOM(FT) = 10885.0000
 KELLY LENGTH DRILLED(FT) = 0.0000

*** OPERATION PARAMETERS ***

MAX. HHP OF PUMP(HP) = 3200.0000
 STANDPIPE PRESSURE(PSI) = 2900.0000
 PUMP OUTPUT 5100Z(BEL/STK) = 0.1440
 PUMP EFFICIENCY(%) = 94.00
 MIN. ANN. VEL FOR CASING 1(FT/MIN)= 60.0000
 INTERVAL FOR ANN. VELOCITY(FT/MIN)= 5.0000
 MUD WEIGHT (LB/GAL) = 9.8000
 PLASTIC VISCOSITY(CP) = 14.00
 YIELD POINT(LB/100 SQ FT) = 19.0000

FLOW TEST? (OFFBOTTOM=C, DRILLING=D) = D

CUTTING WEIGHT (GM/CC) = 2.3000
 CUTTING SIZE (MM) = 3.0000

SELECT MODEL (POWER LAW=P,BINCHAM PLASTIC=B) FOR ANALYSIS = B

NEED OPTIMIZATION PROCESS (Y/N)? = Y

← 5 cm →

CIRC RATE GPM	ANN VEL FT/MIN	TOTAL PRESSURE LOSS, PSI	TOTAL HHP HP	HHP ACROSS BIT	% HHP AT BIT	NOZZ VEL FT/SEC	JET HP	NOZZLE			
								DIAM(32ND) IN	IN	AREA SQ IN	
318.3	60.0	2900.	538	437.	92.	508.5	3.7	9.	9.	10.	0.201
344.8	65.0	2900.	593	463.	79.	513.6	3.9	9.	10.	10.	0.215
371.4	70.0	2900.	628	465.	77.	518.1	4.1	10.	10.	10.	0.230
397.9	75.0	2900.	673	504.	75.	486.9	4.3	10.	11.	11.	0.262
424.4	80.0	2900.	718	520.	72.	519.4	4.4	10.	11.	11.	0.262
450.9	85.0	2900.	762	533.	70.	488.9	4.5	11.	11.	12.	0.295
477.5	90.0	2900.	807	542.	67.	488.6	4.6	11.	12.	12.	0.314
504.0	95.0	2900.	852	548.	64.	461.5	4.6	12.	12.	13.	0.351
530.5	100.0	2900.	897	550.	61.	460.6	4.7	12.	13.	13.	0.370
557.0	105.0	2900.	942	548.	58.	436.6	4.7	13.	13.	14.	0.410

SELECT NOZZLE SIZE(DIA=D, AREA=A) = D

NOZZLE 1 SIZE(32ND) = 14.00

NOZZLE 2 SIZE(32ND) = 14.00

NOZZLE 3 SIZE(32ND) = 14.00

CIRC. RATE FOR MIN. VEL (GPM) = 318.307

EFFECT. PUMP RATE(STK/MIN) = 55.99

EFFECT. PUMP OUTPUT(38L/STK) = 0.135

STARTING CIRC. RATE (GPM) = 575.00

INTERVAL FOR CIRC RATE(GPM) = 5.0000

STK/M	CIRC RATE GPM	ANN VEL FT/MIN	ECD PPG	HHP ACROSS BIT	IMPAC FORCE LB	TOT HHP HP	TOTAL PRESS PSI	% HHP AT BIT	NOZZ VEL FT/SEC	JET HP
102.	580.0	109.3	10.07	505.	1213.6	942	2786.	53.6	412.8	4.3
103.	585.0	110.3	10.07	518.	1234.6	965	2830.	53.7	416.4	4.4
104.	590.0	111.2	10.07	532.	1255.8	989	2874.	53.8	419.9	4.5
105.	595.0	112.2	10.07	545.	1277.2	1013	2918.	53.8	423.5	4.6
106.	600.0	113.1	10.07	559.	1298.8	1037	2963.	53.9	427.1	4.7
106.	605.0	114.0	10.07	573.	1320.5	1061	3008.	54.0	430.6	4.9
107.	610.0	115.0	10.07	588.	1342.4	1086	3053.	54.1	434.2	5.0
108.	615.0	115.9	10.07	602.	1364.5	1112	3099.	54.2	437.7	5.1
109.	620.0	116.9	10.07	617.	1386.8	1137	3145.	54.2	441.3	5.2

SELECT CIRC. RATE (GPM) FOR GENERAL HYDRAULIC ANALYSIS = 598.00

GENERAL HYDRAULIC ANALYSIS FOR SELECT-CIRCULATION RATE(GPM) = 598.000

DEPTH(FT) = 10885.000

TVD(FT) = 10885.000

HYDRAULIC PRESSURE(PSI) = 5544.863

E.C.D.(PPG) = 10.067

MUD PROPERTIES:

CONSISTANCY INDEX(K) = 1.37

POWER LAW INDEX(n) = 0.51

LAG INFORMATION:

UNITIME:

312046

HOLE(BBL) = 1672.883
 DRILL STRING:
 CAPACITY(BBL) = 183.952
 DISPLACEMENT(FBL) = 103.903
 CAPAC. + DISPL.(BBL) = 287.755
 ANNULUS(BBL) = 1395.127
 UPLAG INCREMENT(FBL/FT) = 0.121
 DOWNLAG INCREMENT(BBL/FT) = 0.018

MUD TRAVELING:
 TO BOTTOM:
 TIME(MIN) = 12.92
 STROKES = 1359.

	MUD FLOW	CUTTING FLOW
BOTTOM UP:		
TIME(MIN)	97.29	118.44
STROKES	1023E.	12458.
COMPLETE CYCLE:		
TIME(MIN)	110.21	131.36
STROKES	11592.	13817.

BINGHAM PLASTIC FRESSURE LOSS:
 SURFACE EQUIPMENT(PSI) = 34.063
 THROUGH DRILL STRING(PSI) = 1173.150
 ACROSS DRILL BIT(PSI) = 1596.980
 THROUGH ANNULUS(PSI) = 150.883
 TOTAL PRESSURE LOSS(PSI) = 2944.976
 % PRESSURE DROP AT BIT = 53.88

TOTAL HHP(HP) = 1027.477
 HHP ACROSS BIT(HF) = 553.649
 IMPACT FORCE(LB) = 1290.127

OPTIMIZATION PARAMETER	CALCULATED	CRITERIA
MAXIMUM BIT HORSEPOWER (%)	53.88	50-65
NOZZLE VELOCITY (FT/SEC)	425.64	350-400
JET HORSEPOWER (HP/IN ²)	4.70	2.5-5.0

DETAIL HYDRAULIC ANALYSIS FOR SELECT-CIRCULATION RATE(GPM) = 598.000

DEPTH(FT)					
FROM	0.	292.	5752.	9845.	10267.
TO	292.	5752.	9845.	10267.	10885.
LENGTH	292.	5460.	4093.	422.	618.

PIPE SIZE(IN)					
ID	4.276	4.276	4.276	3.000	3.000
OD	5.000	5.000	5.000	5.000	8.000
CAPACITY					
BBL/FT	0.018	0.018	0.018	0.009	0.009
BBL	5.196	56.977	72.597	3.689	5.403
DISPLACEMENT					
BBL/FT	0.507	0.307	0.007	0.016	0.053
BBL	1.705	35.650	25.702	6.559	33.018

HOLE SIZE(IN)					
ID	19.000	12.451	12.750	12.750	12.750

CAPACITY					
BBL/FT	0.326	0.126	0.121	0.121	0.084
BBL	95.306	689.646	497.242	51.267	51.666

312047

INTERNAL PIPE					
FLOW REGIME	TURB	TURB	TURB	TURB	TURB
FLOW VEL.					
FT/SEC	13.360	13.360	13.360	27.142	27.142
FT/MIN	901.615	901.615	901.615	1628.540	1628.540
FLOW TIME					
MIN	0.364	6.911	5.106	0.259	0.379
CRITICAL VEL.					
FT/SEC	5.647	5.647	5.647	5.813	5.813
FT/MIN	338.929	338.929	338.929	348.798	348.798
PRESSURE LOSS					
PSI	22.037	412.070	308.901	174.538	255.603

ANNULAR HOLE					
FLOW REGIME	LAMI	LAMI	LAMI	LAMI	LAMI
FLOW VEL.					
FT/SEC	0.727	1.979	1.953	1.953	2.838
FT/MIN	43.622	112.721	117.196	117.196	170.305
FLOW TIME					
MIN	6.694	48.438	34.924	3.601	3.629
CRITICAL VEL.					
FT/SEC	5.385	5.485	5.491	5.491	5.650
FT/MIN	323.121	329.106	329.466	329.466	338.970
PRESSURE LOSS					
PSI	1.997	72.202	55.762	5.749	15.174
SLIP VEL.					
FT/MIN	17.884	17.884	17.884	17.884	17.884
TRA. VEL.					
FT/MIN	25.737	94.937	99.312	99.312	152.421
TRA. TIME					
MIN	11.345	57.572	41.214	4.249	4.055

SELECT CIRC. RATE (GPM) FOR GENERAL HYDRAULIC ANALYSIS = 0.00

PUT (RERUN = R, EXIT = X) = X

9. CONCLUSION

A number of points can be raised from the Anadrill service during the drilling of Yolla No. 1.

Bit hydraulics and hole cleaning were adequate throughout the well though excessive hole enlargement was seen in places from carbide lag checks, probably due to the friable nature of the sandstone encountered.

The presence of CO₂ gas was inferred in the later stages of the well by the effect it was having on the mud system giving very high viscosities. Since the CO₂ was dissolving into the mud system and remaining in solution its presence could not be detected by the Anadrill CO₂ analyser. However, when the RFT samples were analysed, up to 7.5% CO₂ was observed in the gas samples. (Up to 16% CO₂ was seen from DST No. 1). With the large amount of volcanic material encountered in Yolla 1 the presence of fairly large amounts of CO₂ is not surprising and will be a factor to bear in mind when designing the mud program for any subsequent wells.

10. APPENDIX

BIT RECORD

MUD PROPERTIES RECORD

BIT HYDRAULICS DATA

SURVEY DATA

SHOW RECORD

RECORD CARBON TEMPERATURE

BIT RECORD

COMPANY AMOCO AUSTRALIA

WELL NO. YOLLA #1.

PAGE NO.

BIT RUN No.	DEPTH IN METER	SIZE	MAKE	TYPE	JETS 32 NDS.	METRE	HOURS	WT./ 1000	R.P.M	COND. T. B. G.			DEV.	REMARKS
1	91	26"	SMITH	DSJ	3 x 18	196	5.5	0-10	100	2	2	1	3/4°	26-36" HOLE OPENER
2	196	17 1/2"	SMITH	DSJ	3 x 18	215	6.5	5-8	140	1	1	1	3/4°	PILOT HOLE
3	196	26"	SMITH	DSJ	3 x 20	215	8.0	5-8	120	2	2	1	1 1/2°	OPEN PILOT HOLE
4	411	17 1/2"	SMITH	SDS-C	3x16,1x14	309	13.0	5-10	60-120	1	1	1	1/2°	HUNG OFF, W.O.W
5	720	17 1/2"	SMITH	SDS-C	3x16,1x14	530	40.0	15-20	120-125	3	6	1	1°	DRILLING AHEAD SLOWLY.
6	1250	17 1/2"	SMITH	SDT-C	3x15,1x13	202	43.0	25	120	6	4	1	1°	POOH, UNLATCH RISER, WOW
7	1452	17 1/2"	SMITH	SDG-H	3x15,1x12	139	34.8	20-38	120	7	5	1	1/2°	LOW ROP
8	1591	17 1/2"	SMITH	SDG-H	2x16,1x18	168	22.9	30-35	90-100	5	4	1	1/2°	POOH FOR 13 3/8" CASING.
9	1759	12 1/4"	SMITH	SDG-H	2x14,1x13	79	4.5	25-30	90	3	2	1/16	-	POOH FOR CORE No 1.
CB 1	1838	8 1/2"x4"	DB	CB303	—	10	1.11	4-12	80	/	/	/	-	CORE No.1
10	1847	12 1/4"	SMITH	STC-F2	2x14,1x13	135	8.6	15-20	90	1	2	1	3/4°	HANG OFF, POOH FOR E.LOGS
11	1982	12 1/4"	SMITH	STC-F2	2x14,1x13	373	27.1	35-45	95	1	4	1/16	1 1/2°	PULL TO SHOE, WOW.
12	2355	12 1/4"	SMITH	STC-F2	2x14,1x13	358	58.4	45-50	95	2	4	1/16	1/2°	STACK TEST.
13	2713	12 1/4"	SMITH	STC-F2	2x14,1x13	188	29.7	45-50	90-100	3	5	1/16	1°	POOH, LOW ROP
14	2901	12 1/4"	SMITH	STC-F2	2x14,1x13	177	44.8	40-50	95	8	8	8	3/4°	LOST HALF A CONE, AND MANY MISSING TEETH.
15	3078	12 1/4"	SMITH	STC-F3	3x14	95	24.8	40-50	70	2	6	1	1/2°	RUN IN W/ JUNK BASKET.
16	3173	12 1/4"	SMITH	STC-F3	3x14	144	42.5	40-50	75	1	5	1	1°	DRILL W/ JUNK BASKET.
17	3316	12 1/4"	SMITH	STC-F3	3x14	29	7.4	40-50	70	1	4	1/8	1°	POOH TO WOW, LOSE STRING, FISH FOR STRING
CB 2	3345	8 1/2"x4"	DB	CB303	—	2.1	0.7	20	90	/	/	/	1°	CORE No 2.

47

312050

DAILY MUD PROPERTIES

DATE	DEPTH	WT.	VISCOSITY		CORR. 115 °F		GELS		pH	FLUID LOSS		CL <input checked="" type="checkbox"/>	ALKALINITY			RETORT			ACTIVITY		# BW	REMARKS		
			SEC.	CPS.	PV	YP	0	10	BECK <input type="checkbox"/>	STRIP <input type="checkbox"/>	100 PSI API	500 PSI 200 °F HT-HP	CACL <input type="checkbox"/>	PF	PM	MF	CA ppm	% OIL	% SOL	% WATER	As		Am	METH BLUE
18/6		DRILL	WITH	SEAWATER	AND	HI-VIS	SWEEPS																	
19/6	1348	8.9	100		22	154	70	100	11.0															
20/6	1348	8.9	100		22	154	70	100	11.0															
21/6	1348	8.9	100		22	154	70	100	11.0															
22/6	1348	8.8	45		4	6	8	12	10.5		13000		0.8			400	0	2	98			13		
23/6	1348	9.0	100		14	73	38	46	12.0															
24/6	2364	9.3	67		10	43	23	35	9.8	38	15000		0.3		0.7	100	0	8	92			25	0.25	
25/6	2539	9.2	6.9		7	48	25	30	9.0	13.4	13000		0.1		0.25	360	0	6	94			22.5	0.25	
26/6	3528	9.2	63		7	40	26	31	9.4	21.1	17000		0.1		0.23	180	0	6	94			22.5	0.1	
27/6	4005	9.2	65		10	35	23	34	9.8	16.0	19000		0.2		0.5	400	0	6	94			22.5	TR	
28/6	4199	9.3	63		8	34	21	25	9.1	15.4	17000		0.1		0.25	760	0	7	93			25	TR	
29/6	4476	9.0	48		6	23	16	23	11.0	10.6	17500		1.0		1.8	100	0	5	95			25	TR	
30/6	4764	9.0	48		8	22	19	28	11.0	9.8	16500		1.4	3.1	2.9	100	0	6	94			25	TR	
1/7																								
2/7		WAIT ON WEATHER	NO MUD CHECKS RUN																					
3/7																								
4/7	4764	9.1	84		15	48	33	48	9.5	12.8	16500		0.35	—	1.65	160	0	6	94			25	TR	
5/7	4858	9.1	46		10	20	13	39	11.0	9.2	12000		1.3	2.1	2.7	100	0	7	93			27.5	TR	
6/7	5160	9.1	46		10	20	12	43	10.5	7.6	11000		1.6	1.83	3.5	100	TR	7	93			28	TR	
7/7	5295	9.2	43		10	18	11	37	10.5	6.9	9500		1.7	1.9	4.1	100	TR	7	93			27.5	TR	
8/7	5772	9.2	48		14	20	8	28	11.0	5.8	11000		1.7	3.1	2.9	80	0	7	93			27.5	TR	
9/7	5772	9.1	48		15	18	7	15	10.8	7.0	10000		1.0	1.2	2.7		0	7	93			27.5	TR	
10/7	5772	9.1	49		16	19	8	16	10.8	7.0	10000		1.0	1.2	2.7		0	7	93			27.5	TR	
11/7	5772	8.9	52		19	16	2	15	11.0	6.0	3500		1.7	2.6	3.1		0	4	96			20	0	
12/7	6030	8.9	45		17	15	2	12	11.0	5.8	4000		1.6	2.5	3.1		0	4	96			17.5	TR	
13/7	6062	8.9	48		17	16	2	13	11.0	5.6	4000		1.5	2.4	3.0	TR	0	4	96			17.5	TR	
14/7	6470	8.9	45		15	15	2	12	11.0	5.7	4000		1.2	2.3	2.5	TR	0	4	96			17.5	TR	
15/7	6504	8.9	48		17	17	2	12	11.0	5.8	4000		1.3	2.3	2.6	TR	0	4	96			17.5	TR	
16/7	6504	8.9	48		17	17	2	12	11.0	5.8	4000		1.3	2.3	2.6	TR	0	4	96			17.5	TR	
17/7	6504	8.9	48		17	17	2	12	11.0	5.8	4000		1.3	2.3	2.6	TR	0	4	96			17.5	TR	
18/8	6504	8.9	48		17	17	2	12	11.0	5.8	4000		1.3	2.3	2.6	TR	0	4	96			17.5	TR	

DATE SPUD:

DATE T.D.:

B.H.T.

DAILY MUD PROPERTIES

DATE	DEPTH	WT.	VISCOSITY		CORR. 115 °F		GELS		pH	FLUID LOSS		CL <input checked="" type="checkbox"/> CACL <input type="checkbox"/> NACL <input type="checkbox"/>	ALKALINITY			CA ppm	RETORT			ACTIVITY		# Bbl MBT	REMARKS SND
			SEC.	CPS.	PV	YP	0	10		100 PSI API	500 PSI 200 °F HT-HP		PF	PM	MF		% OIL	% SOL	% WATER	As	Am		
19/7	6504	8.9	49		17	18	2	12	11.0	6.0		4000	1.3	2.2	2.6	TR	0	4	96			19	TR
20/7	6722	8.9	50		19	15	4	22	10.8	6.0		4000	1.1	2.1	2.0	TR	0	4	96			20	TR
21/7	7142	9.0	51		23	19	4	21	11.5	6.0	22	4000	1.7	—	2.5	TR	0	3	97			20	TR
22/7	7142	9.0	51		23	19	4	21	11.5	6.0	22	4000	1.7	—	2.5	TR	0	3	97			20	TR
23/7	7142	9.0	51		23	19	4	21	11.5	6.0	22	4000	1.7	—	2.5	TR	0	3	97			20	TR
24/7	7179	8.9	45		15	13	3	15	11.0	6.3	20.8	5000	1.14	1.76	1.9	20	0	3	97			20	TR
25/7	7726	9.2	51		16	14	6	31	11.6	6.0	25	4200	1.37	1.8	2.34	TR	0	5	95			22.5	TR
26/7	7726	9.2	50		16	14	6	31	11.6	6.0	25	4200	1.37	1.8	2.34	TR	0	5	95			22.5	TR
27/7	7726	9.2	49		19	14	3	14	11.5	5.6	24	4300	0.98	1.24	1.85	TR	0	5	95			22.5	TR
28/7	8003	9.4+	56		20	20	5	29	10.9	5.8	19	3500	1.15	1.43	2.04	TR	0	7	93			26	TR
29/7	8003	9.4+	56		20	20	5	29	10.9	5.8	19	3500	1.15	1.43	2.04	TR	0	7	93			26	TR
30/7	8003	9.4+	56		20	20	5	29	10.9	5.8	19	3500	1.15	1.43	2.04	TR	0	7	93			26	TR
31/7	8003	9.4+	90		32	26	8	22	10.1	5.2	17.6	4200	0.81	0.95	1.81	32	0	7	93			26	TR
1/8	8050	9.6	57		22	21	9	31	10.4	5.3	17.8	4000	1.12	1.27	2.5	20	0	7	93			26	TR
2/8	8183	9.6	56		23	21	10	33	10.7	5.3	16.8	3600	1.37	1.55	2.8	TR	0	7	93			26	TR
3/8	8544	9.5+	59		25	21	9	32	10.5	5.6	19.0	2750	1.30	1.45	2.53	TR	0	7	93			26	0.4
4/8	8902	9.7+	53		23	16	8	25	10.8	5.2	18.4	2400	1.66	1.76	3.25	TR	0	8	92			27	0.25
5/8	8902	9.7+	53		23	16	8	25	10.8	5.2	18.4	2400	1.66	1.76	3.25	TR	0	8	92			27	0.25
6/8	8950	9.7+	56		24	26	13	35	10.1	5.6	19.2	2700	1.32	1.12	3.4	24	0	8	92			24	0.3
7/8	9298	9.6+	72		14	57	40	59	10.8	6.7	20.4	2700	2.24	2.52	4.99	TR	0	7	93			21	0.25
8/8	9515	9.6	50		14	32	22	33	11.0	7.7	19.8	2300	1.7	9.8	3.4	200	0	8	92			22	0.22
9/8	9777	9.5	47		15	10	5	18	11.4	8.6	28.0	2100	2.2	2.9	3.9	200	0	7	93			23	0.22
10/8	9978	9.6	42		22	16	8	24	11.1	5.7	21.6	1700	1.75	1.95	3.7	140	0	6	94			25	0.1
11/8	10138	9.5+	42		14	12	5	15	10.8	4.2	20.4	1300	1.65	1.90	3.2	20	0	6	94			25	0.1
12/8	10226	9.6	41		14	11	4	13	10.7	6.1	20.8	1200	1.45	1.72	3.0	100	0	6	94			23	0.2
13/8	10412	9.6+	44		20	19	7	25	10.8	5.3	20	1200	1.4	1.55	3.1	60	0	7	93			26	TR
14/8	10610	9.6	42		20	10	4	15	11.1	8.0	24	1200	1.2	1.55	2.4	10	0	6	94			27	0.2
15/8	10880	9.6	40		19	14	4	11	10.7	8.7	24.2	1200	0.9	1.2	1.9	40	0	7	93			25	0.1
16/8	10930	9.6	51		17	18	5	14	11.0	8.6	24.2	1400	1.08	1.8	2.3	40	0	7	93			26	TR
17/8	10972	9.6	44		16	16	4	16	11.0	8.6	24.2	1300	1.0	1.8	2.2	40	0	7	93			25	TR
18/8	10972	9.6	44		16	16	4	16	11.0	8.5	24.2	1300	1.0	1.8	2.2	40	0	7	93			25	TR

DATE SPUD: DATE T.D.: B.H.T.

DIRECTIONAL SURVEY DATA

<u>DEPTH</u>		<u>INCLINATION°</u>	<u>DIRECTION</u>
<u>FT</u>	<u>M</u>		
1862	567.5	0.75	115
2364	720.5	0.5	120
2867	873.8	0.25	113
3368	1026.5	0.5	82
3871	1179.8	0.75	189
4101	1249.9	1.0	351
4593	1399.8	1.0	319
4764	1451.9	1.0	317
5750.6	1752.7	0.75	95
5820	1773.8	1.25	75
6009	1831.4	1.0	88
6103	1860.1	0.5	78
6197	1888.7	0.5	63
6291	1917.4	0.25	63
6385	1946.0	Vert	-
6479	1974.7	Vert	-
6573	2003.3	Vert	-
6668	2032.3	0.25	253
6762	2060.9	0.5	28
6856	2098.6	0.5	32
6950	2118.2	0.5	94
7044	2146.9	0.75	104
7138	2175.5	0.75	93
7232	2204.2	1.0	95
7327	2233.1	1.0	87
7421	2261.8	1.25	74
7515	2390.4	1.5	62
7609	2319.1	1.5	59
7703	2347.7	2.25	59
7797	2376.4	1.75	62
7892	2405.3	1.25	59
8080	2462.6	1.0	60
8174	2411.3	0.75	69

DIRECTIONAL SURVEY DATA

<u>DEPTH</u>		<u>INCLINATION°</u>	<u>DIRECTION</u>
<u>FT</u>	<u>M</u>		
8268	2519.9	0.75	82
8362	2548.6	0.75	82
8455	2576.9	0.5	73
8551	2606.2	0.5	75
8645	2634.8	0.75	121
8739	2663.5	0.75	134
8833	2692.1	1.0	147
8927	2720.8	0.75	167
9021	2749.4	1.25	157
9116	2778.4	1.5	168
9210	2807.0	2.0	175
9304	2835.7	2.0	177
9398	2864.4	1.5	178
9492	2893.0	1.0	173
9586	2921.6	0.75	177
9680	2950.5	0.75	166
9775	2979.4	0.5	158
9869	3008.1	0.5	94
9963	3036.7	0.5	84
10057	3065.4	0.75	49
10151	3094.0	0.5	79
10245	3122.7	0.5	75
10433	3180.0	0.75	33
10527	3208.6	1.0	48
10622	3237.6	1.0	77
10810	3294.9	1.0	88
10904	3323.5	1.0	69
10967	3342.7	1.0	54