97-4088
VOL 1 of 6

415001

GREAT SOUTH LAND MINERALS PTY. LTD.

ACN 068 650 386

MICROFILMED
FICHE No. 014529-39

EL 1/88, VOL 10
See folio 38
EL 9/95
See folio 47
EL 21/95
See folio 45

1997 ANNUAL REPORT

FOR

MINERAL RESOURCES TASMANIA

EXPLORATION LICENCE Nos.

1/88, 9/95 & 21/95

Vol 1 of 6

97-4088

ANNUAL REPORT - 1997 VOL 1 of 6
EL'S 1.88, 9/95 & 21/95 - GREAT
SOUTHLAND MIN. BURRETT/TANNER

Dr. Clive Burrett – Chief Geologist

Mr. David Tanner – Exploration Manager

30th November, 1997.

AMG REFERENCE POINTS ADDED

415002

1997 ANNUAL REPORT

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GREAT SOUTH LAND MINERALS PTY LTD

ACN 068 650 386

415003

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65 Murray Street
HOBART 7000
Tel: (03) 6231 9339
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30 November, 1997

Director of Mines
Mineral Resources Tasmania
30 Gordons Hill Road
ROSNY PARK TAS 7018

Attention: Mr. A V Brown

Dear Tony,

1997 ANNUAL REPORT

I have much pleasure in forwarding our 1997 Annual Report covering work on Exploration Licences 1/88, 9/95 and 21/95. Please note that we have not attempted to duplicate information already provided to you in our Report on Drilling Operations dated June 1997, but rather see these two reports as companion volumes.

We have also not duplicated the large amount of routine reporting such as daily logs which were forwarded to you during the year, but have concentrated on summarising all this data in a concise and hopefully readable format. We would be pleased to have your reaction to this approach.

As you may be aware, the majority of our $1.1million expenditure on drilling operations this year was achieved through farm-in agreements approved by the Minister with Condor Oil Investments P/L and various other parties. Since the beginning of November, GSLM has been funding all exploration in its own right.

My board recently resolved to proceed with a public company float in order to help fund an expanded exploration program over the next three or more years. We look forward to your support in achieving a positive outcome from this program.

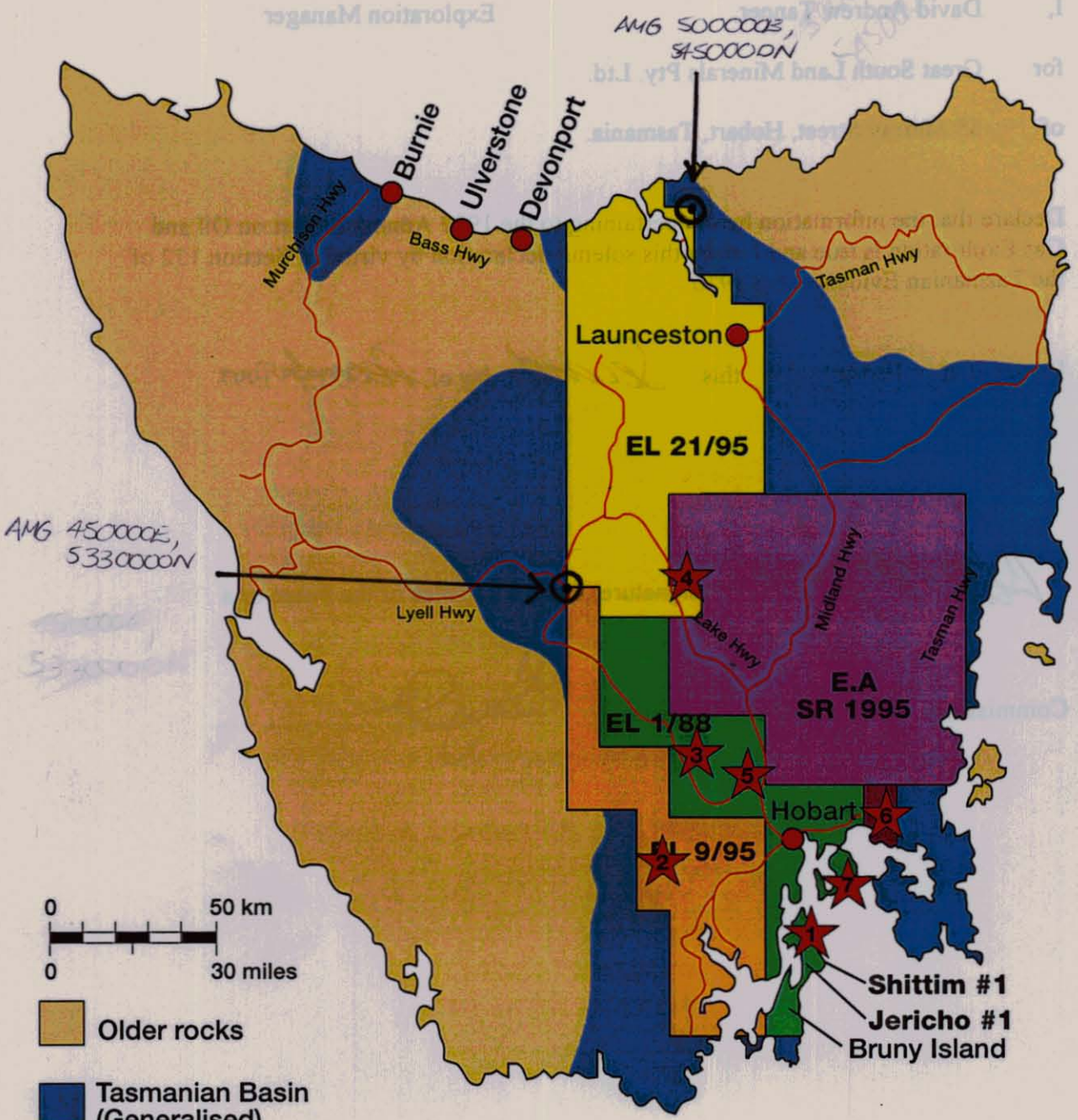
Should you require any further information to meet your specific requirements, please contact our Exploration Manager and CEO, Mr. David Tanner.

Yours faithfully,

Dr. Gordon Wise
CHAIRMAN

415004

Drill Holes and Exploration Licences in the Tasmanian Basin Owned by Great South Land Minerals P/L



AMG REFERENCE POINTS ADDED

Fig. 1

415005

STATUTORY DECLARATION

I, David Andrew Tanner, Exploration Manager

for Great South Land Minerals Pty. Ltd.

of 65 Murray Street, Hobart, Tasmania.

Declare that the information herein pertaining to the 1997 Annual Report on Oil and Gas Exploration is true and I make this solemn declaration by virtue of Section 132 of the Tasmanian Evidence Act 1910.

Declared at Hobart this Second day of December 1997.

.....(~~signature~~), before a Justice of the Peace or a

Commissioner of Declarations (signature) .....

2. EXECUTIVE SUMMARY

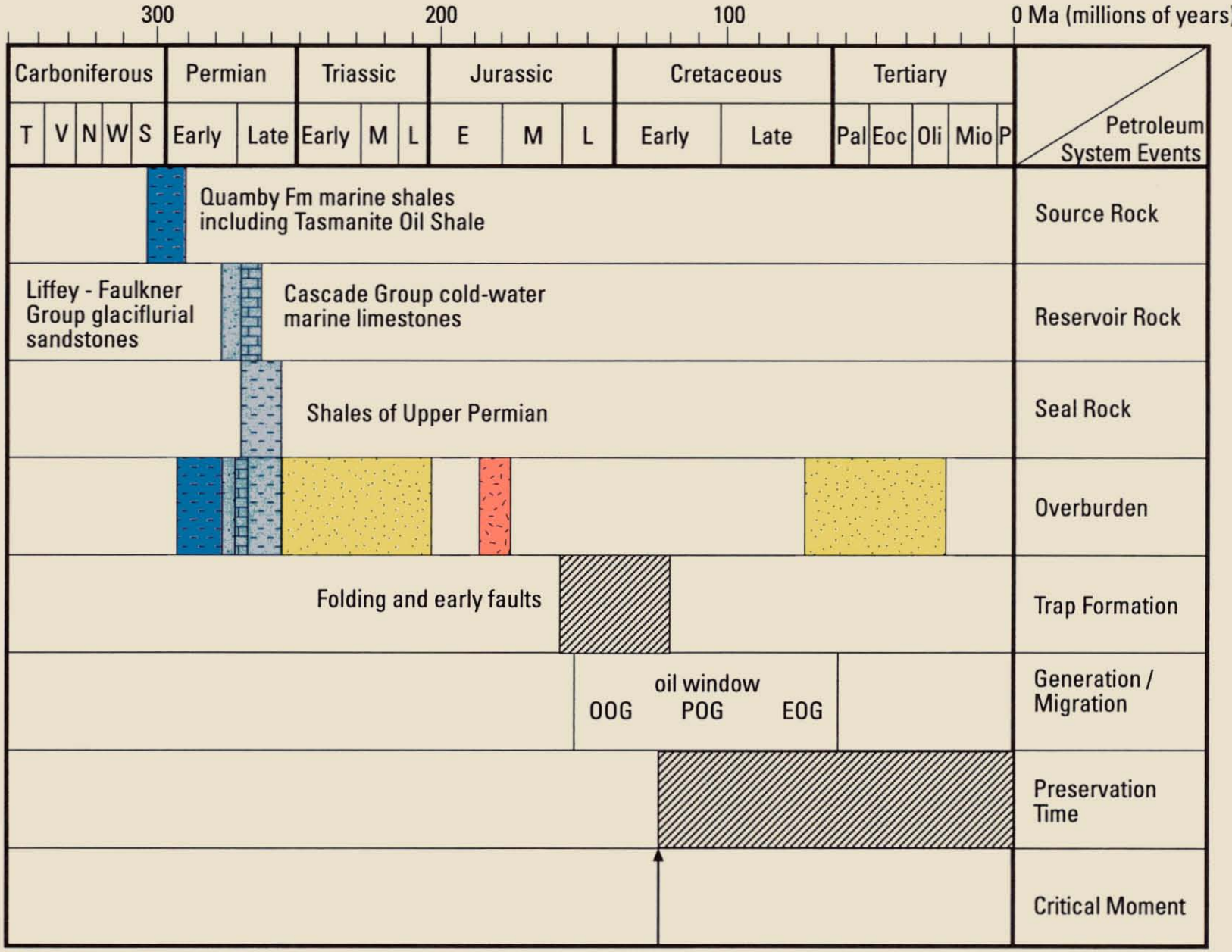
Great South Land Minerals Pty Ltd has carried out a major drilling program across all three of its leases, with a total of six holes having been drilled on during 1997. Direct expenditure on this drilling program amounted to over $1.1million, and 1997 also saw the company establish permanent offices in Hobart.

All wells drilled have shown encouraging levels of methane, wet gas and hydrogen in the mud returns, and the discovery of helium at both wells on Bruny Island adds a significant new dimension. We have shown that oil and gas have been generated in the Tasmanian Basin, and we now have all of the elements of a petroleum system in place. Final proof of the thermogenic origin of gas at Jericho #1 through carbon isotope testing was another positive result.

The company plans to further extend its efforts in 1998 across the whole of the Tasmanian Basin, and is looking forward to funding a major seismic program to complement a comprehensive stratigraphic drilling program during the coming year.

David A Tanner
Executive Director & Exploration Manager.

Elements of the Tasmanite Oil Shale Petroleum System
Timing Risk Chart



OOG = onset oil generation
POG = peak oil generation
EOG = end oil generation

Fig. 2

4150027

PETROLEUM SYSTEMS IN TASMANIA & EXPLORATION PHILOSOPHY

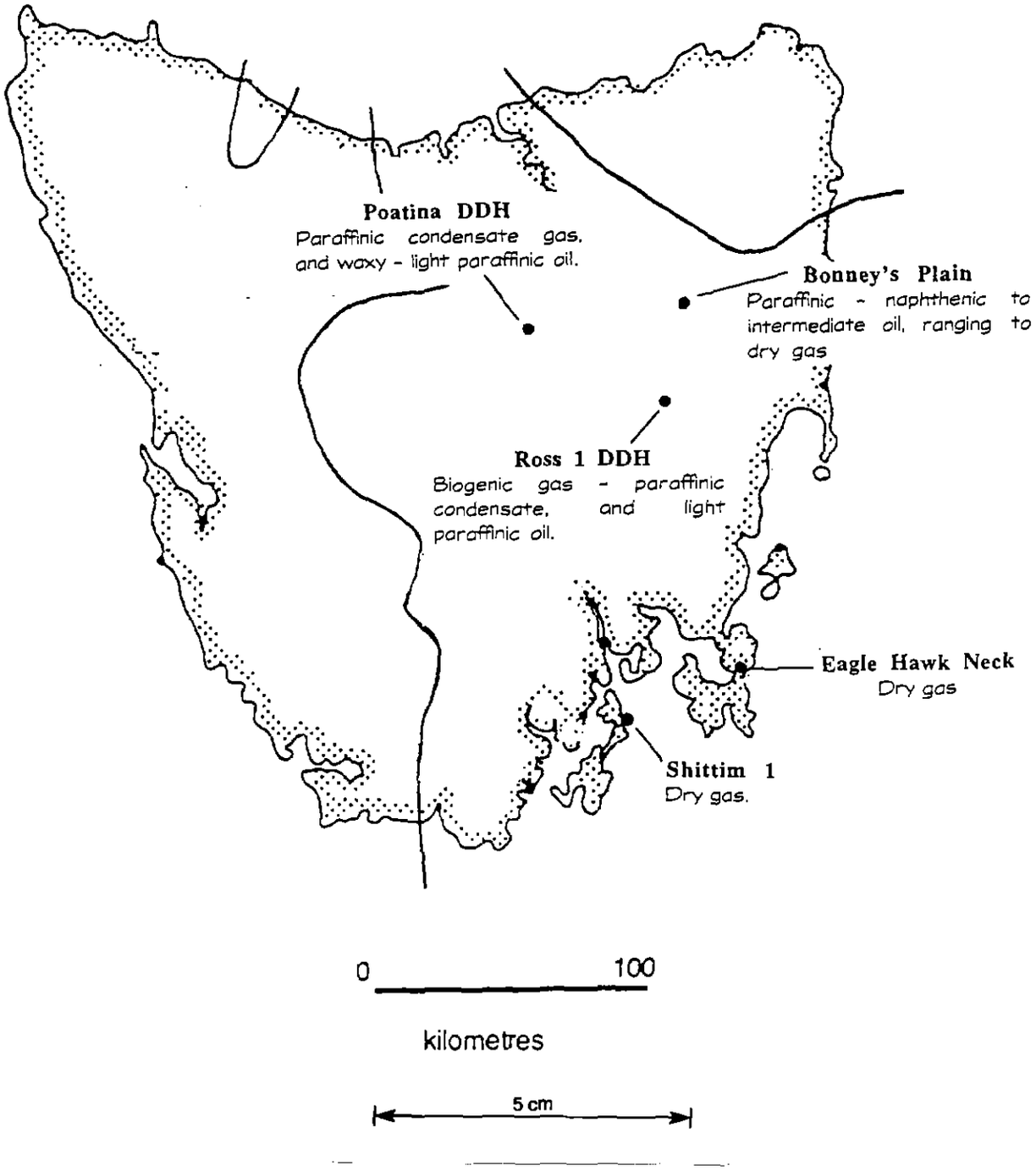
The Petroleum System

A petroleum system consists of five main elements (Magoon and Dow 1994). These are source, reservoir, seal, trap and petroleum generation/migration. Each of these elements is present in the Tasmanian Basin and these are presented on a timing risk chart for the Tasmanite Oil Shale petroleum system. If any of these elements are missing, dubious or if the timing is wrong (e.g. the petroleum is generated *before* the traps are formed) then petroleum is unlikely to be preserved (Otis and Schneidermann 1997). These elements have been discussed before (see Appendices 4 and 5) and only recent information is included here. From studies of seeps we know that petroleum has been generated in the Tasmanian Basin and that there are at least four seep types (see "Oil and Gas in Tasmania - a company profile of GSLM", June 1997 p. 9-14 Appendix 4). An oil seep was discovered in 1995 by Dr Ralph Bottrill of the Tasmanian Mines Department near Lonnavale and this was analysed independently by Drs S. Wythe and B. Watson of AMDEL (attached as Appendix 6) and Dr A. Revill of CSIRO who found the oil to be a migrated, lightly biodegraded, sweet (low sulphur) crude (Wythe and Watson 1996: Revill 1996). Tasmanite is used as the international geochemical standard model for Type II/I kerogens which source heavy crude oils.

GSLM's main exploration strategy for oil is to explore for traps charged from a Tasmanite Oil Shale source. Secondary aims are to define other oil source-seep distributions and to drill appropriate targets. A second major aim is to search for hydrocarbon gases produced from a variety of sources and thirdly to search for helium, sourced probably from the radioactive decay of Precambrian rocks below the Tasmanian Basin and which gas GSLM has found in encouraging quantities on Bruny Island. The methane found at Bruny Island (Jericho #1) has a carbon isotope value of -33.5 pp thousand which shows that the methane is definitely thermogenic and falls within the "gas associated with oil generation field" of Fuex (1983).

Cheryl-Lee Randell (1997) completed her studies on the palynology (fossil spores and pollen) and hydrocarbon potential of the Upper Carboniferous to Lower Permian shales of the Tasmanian Basin (see Appendix 3). She has found that the Thermal Alteration Index (TAI) of the palynomorphs all lie within the oil and gas windows and that the TOC (Total Organic Carbon), kerogen types and maturation indicators show that these rocks are prone mainly to gas production.

A recent study of apatite fission tracks (AFT) across the whole of Tasmania by O'Sullivan and Kohn (1997) confirms that most of the Tasmanian Basin rocks were in the oil window (more than 100 degrees Centigrade) prior to 100Ma (middle Cretaceous). This agrees with the earlier theoretical modelling of Carne (1992) and Woods (1995) though neither of these predicted the cooling and unroofing event subsequent to 100Ma indicated by the AFT results.



Potential hydrocarbon types generated from around the Tasmanian Basin , Randell (1997 see Appendix 3)



Shittim #1
Mudlogging Lab and Martin Purvins



Shittim #1
Driller Dale Roberts at controls of Longyear HD44

Drill Holes in the Tasmanian Basin

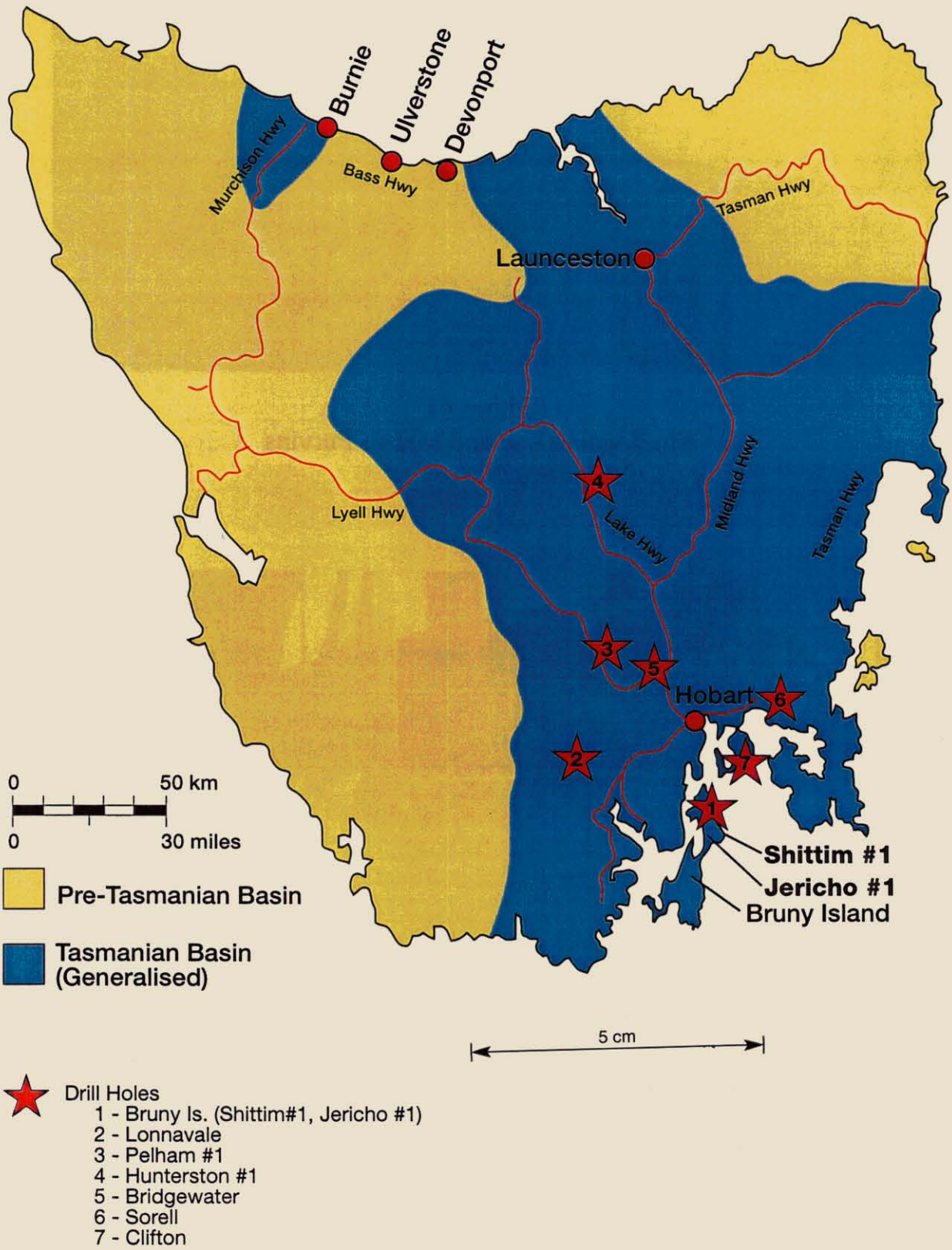


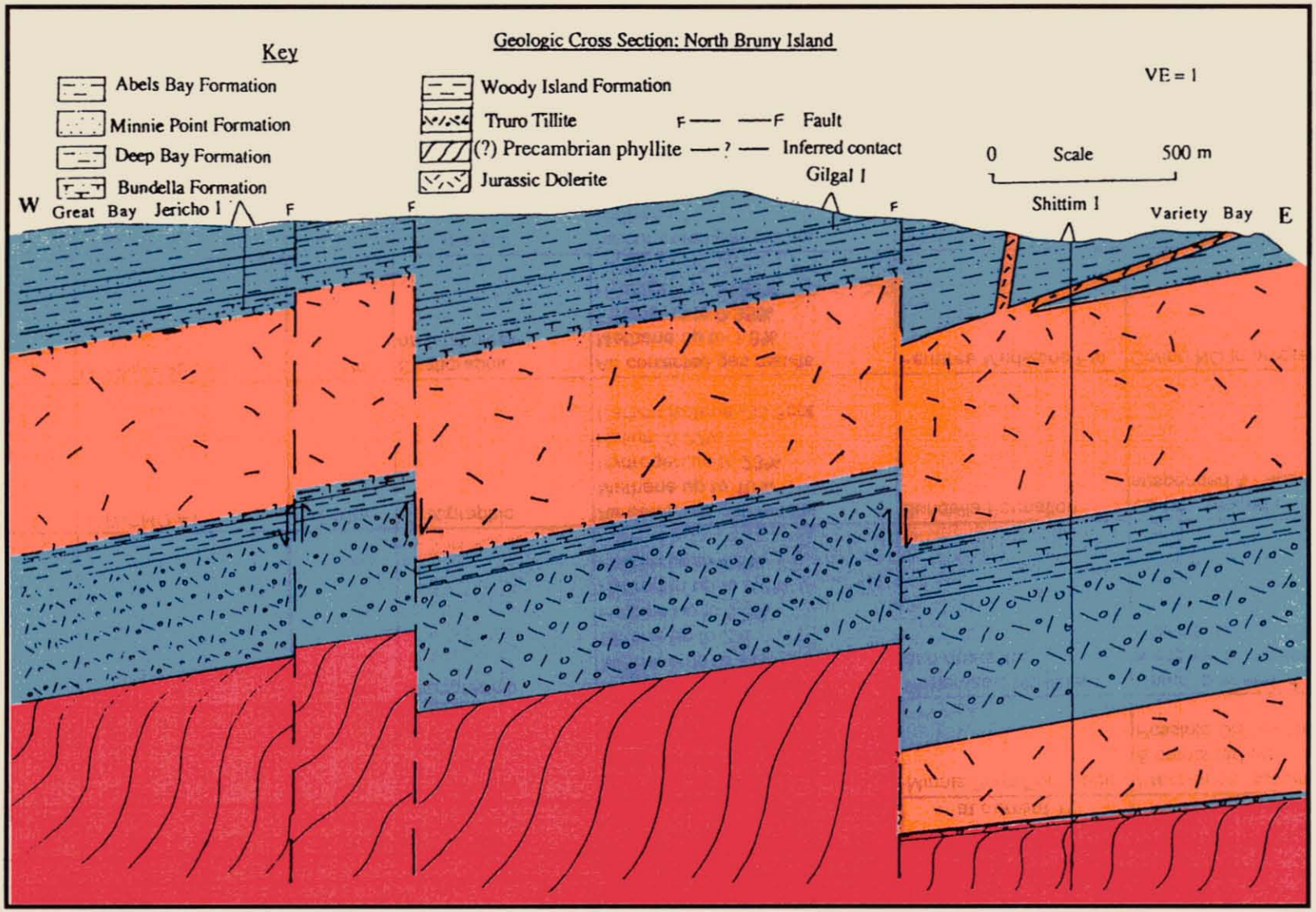
Fig. 4

DRILL HOLE SUMMARY

No. on map	WELL NAME	DEPTH DRILLED	PURPOSE	RESULTS	FORMATION at current TD	STATUS 30.Nov.97
1	GILGAL #1	50m	Stratigraphic	Gas flow reported - not sampled.	Minnie Point Formation	Precollared, suspended & cemented up. Possible DST in 1998.
1	SHITTIM #1	1751m	Stratigraphic	Air corrected gas results: Methane up to 31% Ethane up to 2% Hexane up to 0.5% Hydrogen up to 8.8% Helium up to 4.8%	Proterozoic phyllites and quartzites	Cored, suspended & capped at wellhead. Possible DST in 1998.
1	JERICHO #1	640m	Stratigraphic	Air corrected gas results: Methane up to 10% Hydrogen up to 23% Helium 0.22% Carbon isotope -33.5ppt	Bundella Formation	Cored, wedged off 6 times suspended & capped.
2	LONNAVALE #1	557m	Stratigraphic - on fault block	Air corrected gas results: Methane up to 1.8% Ethane up to 0.35% Hydrogen up to 85%	Ferntree Mudstone Fm	Coring NQ in progress.
3	PELHAM #1	370m	Stratigraphic - on fault block	Air corrected gas results: Methane 1% Hydrogen -awaiting result	Liffey Group correlate	Coring HQ in progress.
4	HUNTERSTON #1	336m	On dome - for petroleum		Jurassic dolerite	Pre-collared & cased. Coring HQ in 1998.
5	BRIDGEWATER #1	252m	On anticline - for petroleum		Ferntree Mudstone Fm	Pre-collared & cased 220m Coring HQ in 1998.
6	SORELL #1	--	On dome - for petroleum			Drillsite approved. Precollar in 1998.
7	CLIFTON #1	--	Stratigraphic to pre-Parmeener			Program submitted. Provisional approval given.

41501 2

Interpreted geological cross-section of north Bruny Island



From C. Randell, 1997.

4150 13

Fig. 5

4. OPERATIONS

Drilling operations have been carried out on a total of six separate sites during 1997. Refer to Table 1 for a summary of these drill holes.

4.1 Diamond Drilling

The year began with completion of Shittim #1 at Variety Bay on North Bruny Island to a depth of 1751 metres. In March, the Longyear HD44 drillrig was moved over to Great Bay on North Bruny Island to resume drilling on Jericho #1. Difficult drilling conditions through altered dolerite resulted in suspension of operations at Jericho #1 at a depth of 640 metres, and the drillrig was moved to Lonnavale #1 near Judbury at the beginning of July. A dolerite sill encountered at 195 metres again led to difficult drilling conditions, the base of the sill at 550 metres being reached at the end of September. Drilling at Lonnavale #1 was temporarily suspended during October due to unavailability of a BOP certified driller. Work recommenced late November to secure unstable areas of the hole before continuing to core into potential reservoir rocks.
Coring operations at Pelham #1 began in mid-November using a Mindrill rig under contract from Fred Ortner, reaching a depth of 370 metres by the end of November.

4.2 Precollar Program

Between late May and early October, an Atlas Copco TH60 hydraulic top drive rig with 6 inch down hole hammer under contract from Gerald Spaulding was used to drill and case precollars at Lonnavale #1, Hunterston #1, Bridgewater #1 and Pelham #1.

Details of drilling operations at each site, together with a summary of results is as follows.

4.3 Shittim #1 – Variety Bay, North Bruny Island – EL 1/88

This hole was drilled to a depth of 1686m BQ at the end of 1996 after having penetrated a second dolerite sill 250m thick, and was completed to a depth of 1751m in pre-Parmeener phyllites and quartzites on 12th February 1997. Thick sequences of both the Woody Island and Truro Tillite were cored. The basal phyllites and quartzites are similar to those of the Precambrian Oonah Formation.
Significant levels of hydrocarbon gases were encountered in association with hydrogen, and helium was recorded in analysis of samples from 1640-1751m. The highest air-corrected value of methane recorded was 31% at 1715m, and hydrogen occurred in all samples, ranging from 0.5% to 8.5% air-corrected. Helium was present in eight samples with concentrations up to 4.8% air-corrected, which is well above the economic cut-off value.
Details of lithology and gas readings are summarised in Fig 6. For complete results from Shittim #1, refer to Appendix 5: *Report on Drilling Operations June 1997.*

The hole has been capped with a blank flange at the wellhead to allow future access for possible wireline logging or drill stem testing.

415015 **SHITTIM #1**

Lithology and Gas

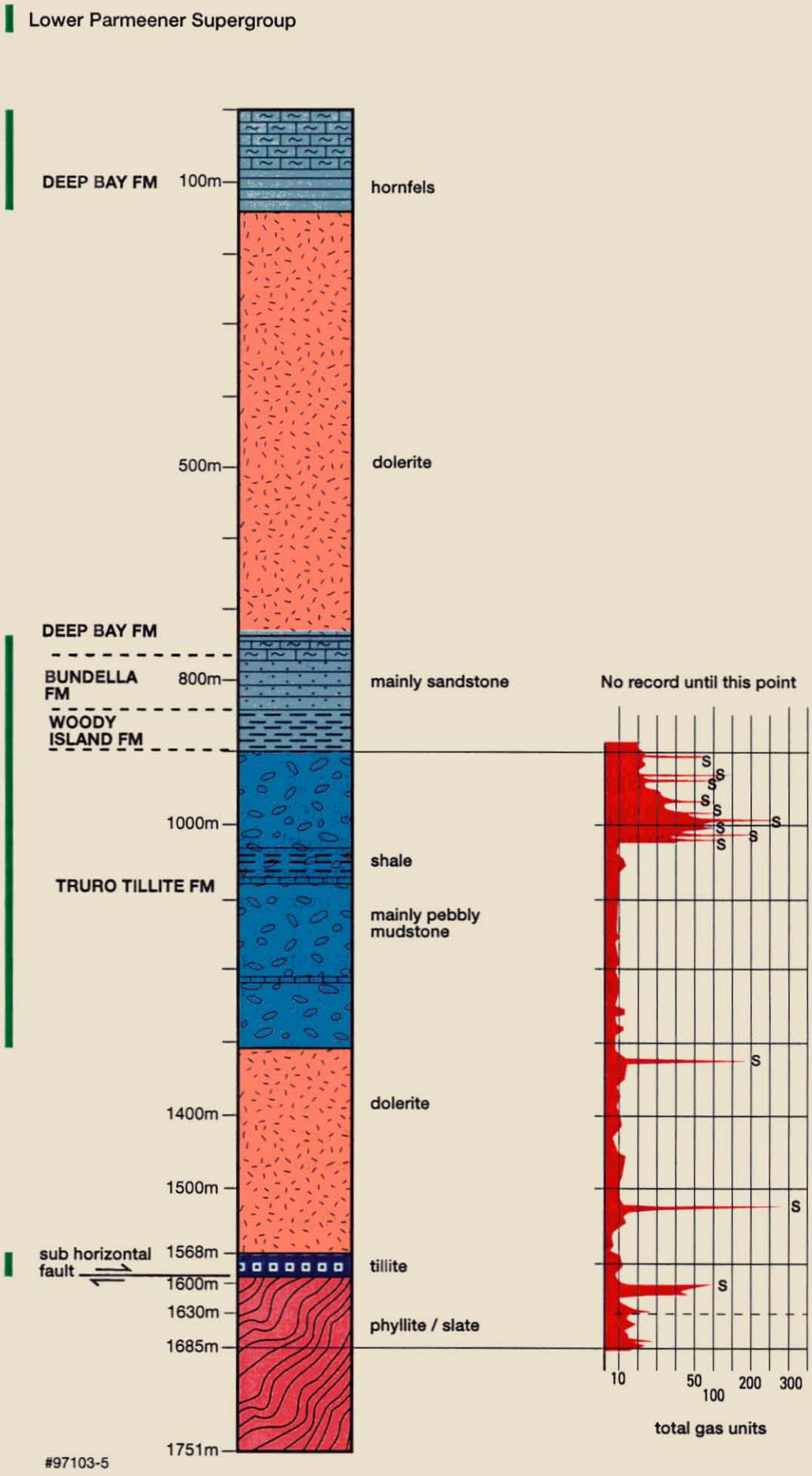
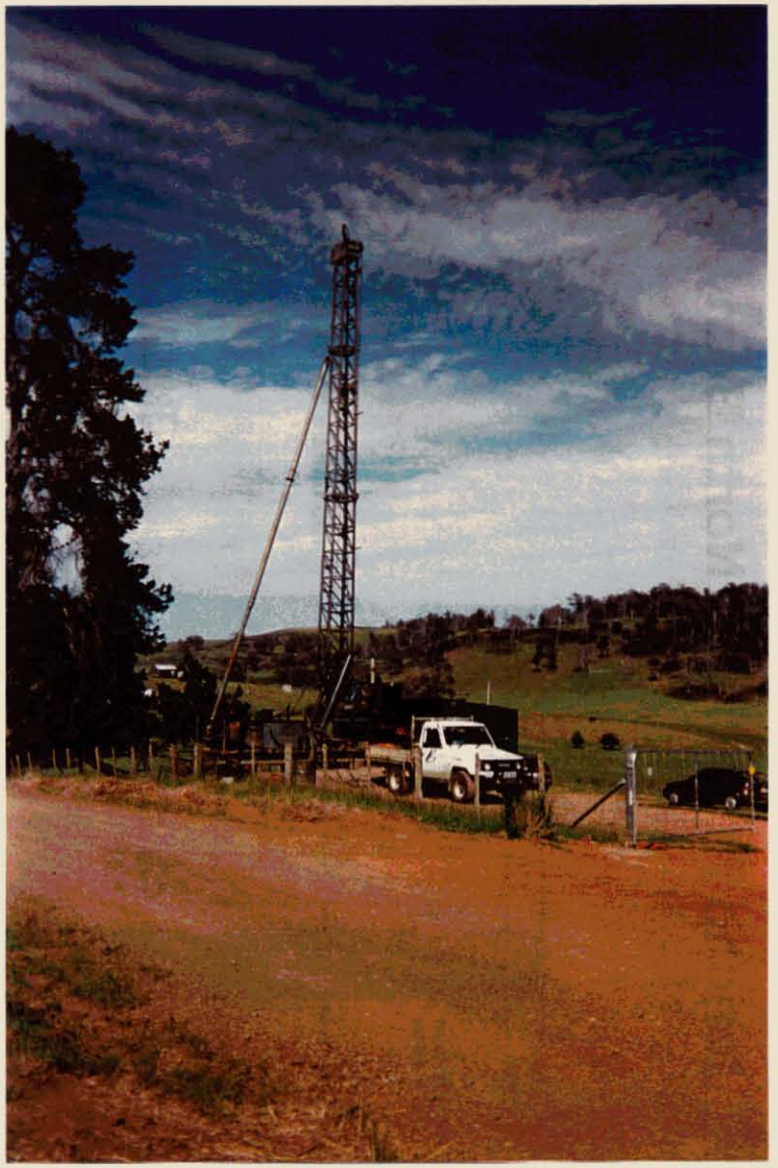


Fig. 6



Gerald Spaulding drilling Precollar at Lonnavale #1



Fred Ortner coring at Pelham #1

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415017

Jericho #1 well log, North Bruny Island

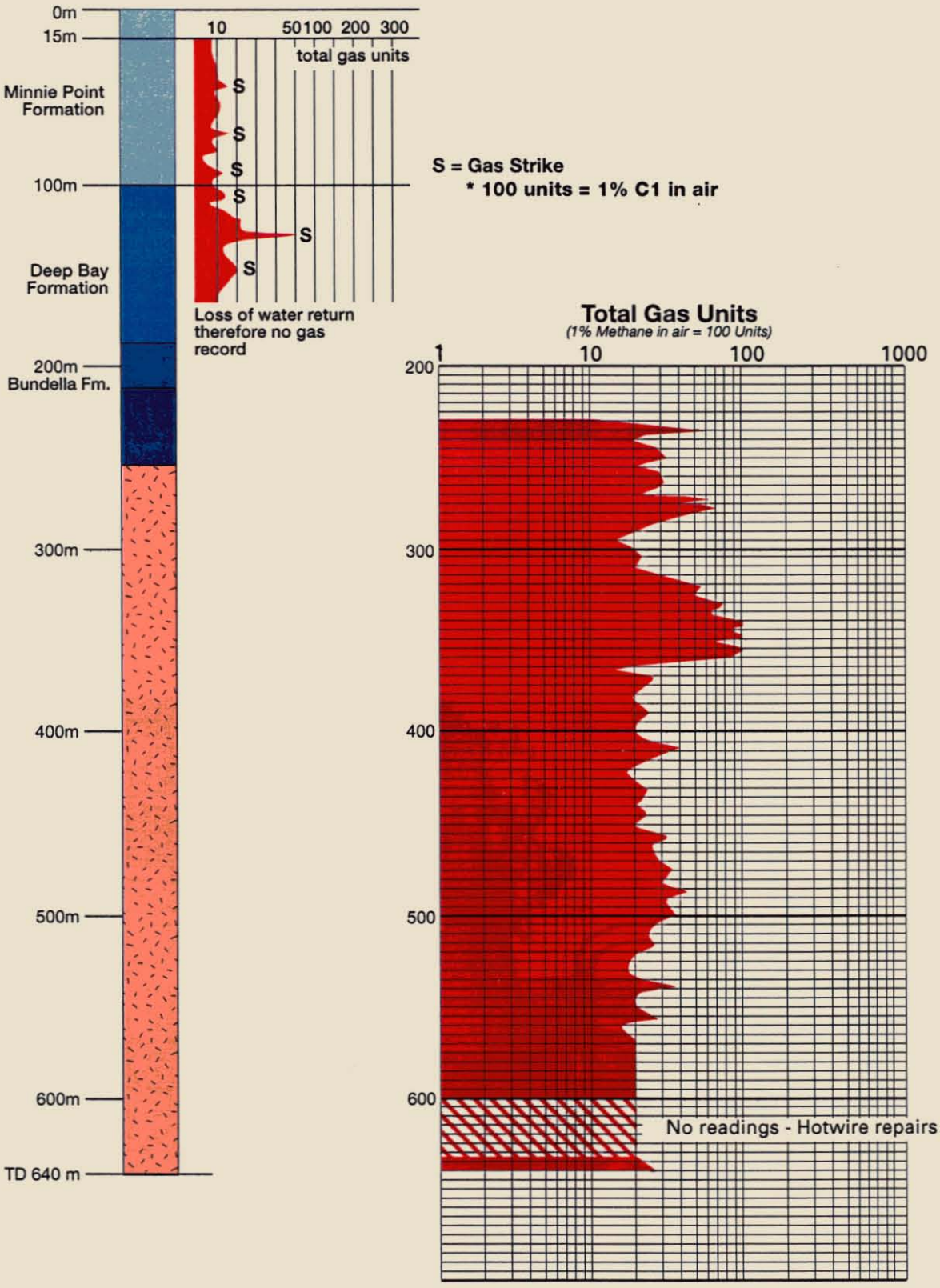


Fig. 7

4.4 Jericho #1 – Great Bay, North Bruny Island – EL 1/88

This hole was precollared HQ to 228m in October 1995, and was cased NW in early March 1997. Coring NQ from 228m in Permian metasediments began on 12th March, and a dolerite sill was encountered at a depth of 255m. A cross section through Jericho #1, Gilgal #1 and Shittim #1 can be seen in Fig. 5.

The dolerite below 620m was highly altered along a near vertical structure, and an analysis of core from 626.7m by R S Bottrill and R N Woolley of Mineral Resources Tasmania showed a high smectite content of around 30%. Hydration of this swelling clay caused squeezing of the drill string together with pressure locks which resulted in rods being stuck six times, despite the use of calcium inhibitors in the drilling mud.

The hole was wedged off four times to sidestep stuck core barrels, and in the final attempt to drill ahead BQ, diesel fuel was used as the drilling fluid in an attempt to prevent hydration of these clay minerals. This attempt was initially successful, but it is believed that invasion of formation fluids overnight caused the problem to re-occur. Drilling was finally suspended on 12th June, and the hole cemented for 10 metres at the casing shoe. The wellhead has been capped with a blank flange.

Significant levels of gas were recorded from cuttings and fractures within the dolerite, with hotwire readings of up to 100 units (1% methane in air). These readings, together with the core log, are presented graphically in Fig. 7. Analysis of gas samples showed hydrocarbons present in the range from C1 to C6, with methane at levels up to 10 % air-corrected and helium around 0.2%. Hydrogen results ranged up to 23% air-corrected. A spreadsheet summary of all Amdel reports can be found in Appendix 1A, and these results are presented in chart form as Fig. 8.

Carbon isotope analysis on a sample from 640m gave a value of –33.5ppt, which falls within the 'commercial and dry gas' fields of Fuex (1983) and indicates a definite thermogenic origin.

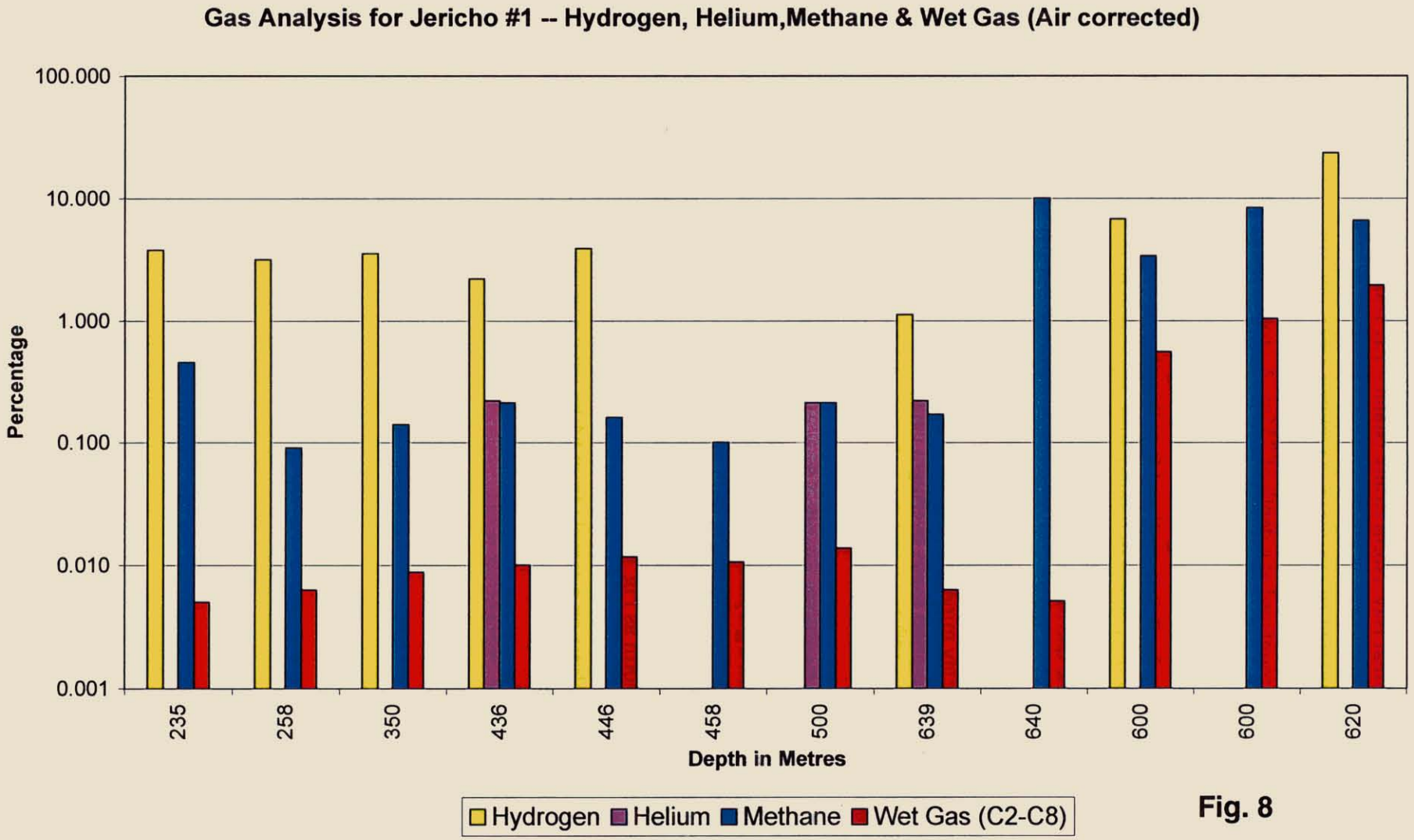


Fig. 8

4150119

415020

Petrological investigations: Jericho DDH, Bruny Island.

(DRAFT)

An unpublished report for Great South Land Minerals Pty Ltd.

R.S. Bottrill & R.N. Woolley, 2/06/97

Introduction

One sample of drill core, from Jericho DDH1D, 626.7m, drilled on EL##1/[illegible] was submitted for petrological analysis. This was conducted with a combination of Polarised Light Microscopy and X-Ray Diffraction (XRD). The report follows.

Results

Polarised Light Microscopy indicates that the sample contains dolerite, varying from very fresh and unaltered aggregates of primary pyroxenes and plagioclase, with trace quartz and opaque minerals, to almost unrecognisable aggregates of secondary minerals (clay minerals, zeolites and carbonates). Where partially altered the rock contains primary pyroxenes in a matrix of the secondary minerals (ie. plagioclase is preferentially altered). The altered zones are extensively fractured, mostly in the plane of the drill core axis. These were mostly clay-filled, but some contain calcite and zeolites.

The XRD results essentially confirm the microscope work, and are shown on the enclosed table.

Summary

The high smectite (probably montmorillonite) content (~30%) is the biggest problem, as this swelling clay is a notorious engineering problem. The zeolites are a lesser problem, as laumontite is also ~~also~~ unstable.

R. Bottrill
Mineralogist/Petrologist

R. Woolley
Technical Officer

TASMANIA DEVELOPMENT AND RESOURCES

Mineral Resources Tasmania

Client: M. Bendall
Sample Location: Bruny Island
Analysis: Approximate Mineralogy
Method: X-Ray Diffraction

Results (approx wt %)

Sample	*25%-40%*	*15%-25%*	*10%-15%*	*5%-10%*	*<5%*
Jericho, 626.7m	Smectite, Clinopyroxene	Calcite		Zeolites*, Plagioclase	Chlorite

* Laumontite and Stilbite/Stellerite

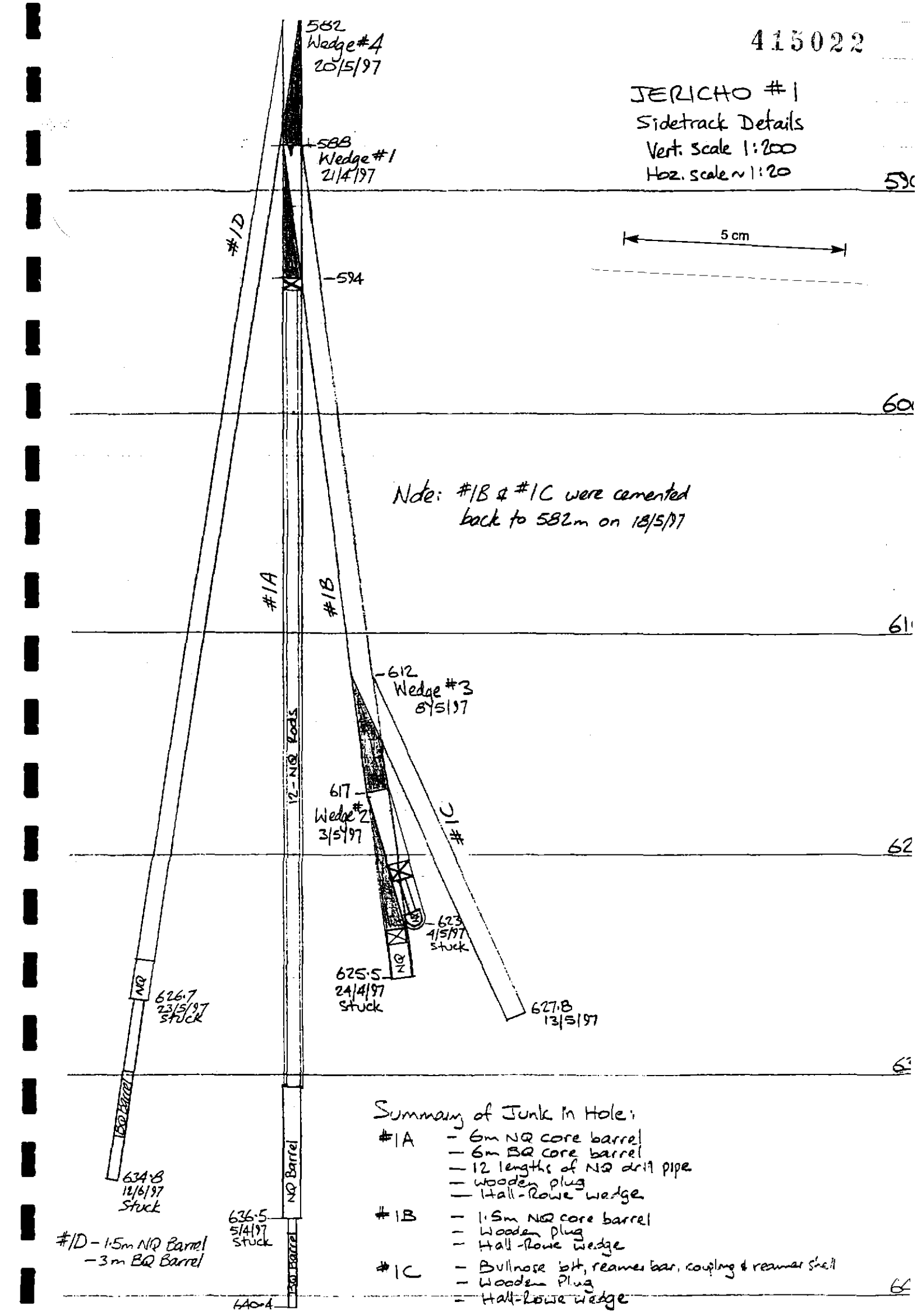
morphous minerals may not be detected
eak overlap may interfere with identification

R N Woolley

Analyst: R.N. Woolley
Date: 26 May 1997

415022

JERICHO #1
Sidetrack Details
Vert. scale 1:200
Hoz. scale ~ 1:20

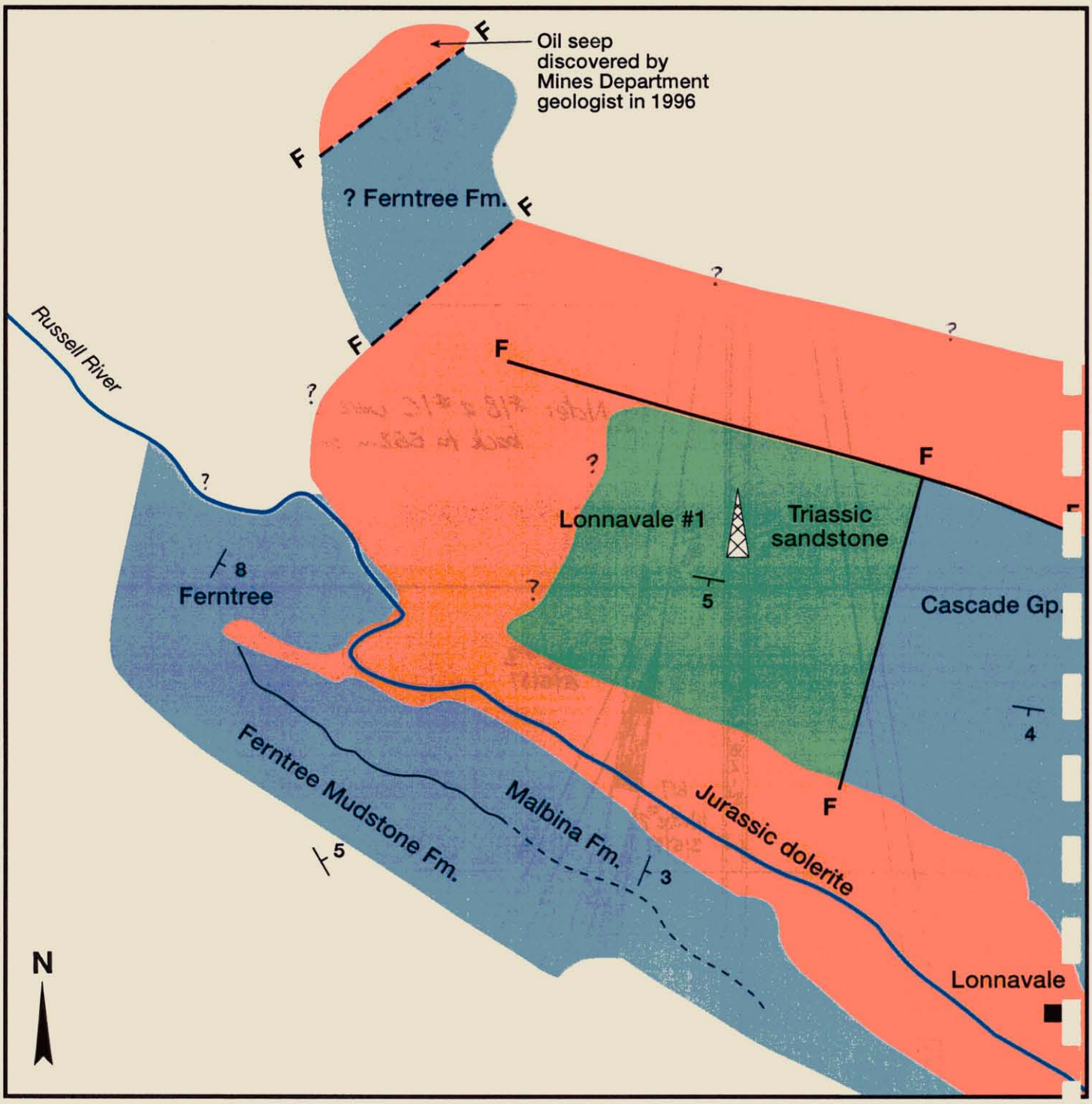


Summary of Junk in Hole:

- #1A
  - 6m NQ core barrel
  - 6m BQ core barrel
  - 12 lengths of NQ drill pipe
  - wooden plug
  - Hall-Rowe wedge
- #1B
  - 1·5m NQ core barrel
  - Wooden plug
  - Hall-Rowe wedge
- #1C
  - Bullnose bit, reamer bar, coupling & reamer shell
  - Wooden Plug
  - Hall-Rowe wedge

415023

Map of Lonnavale



N.B. geology based on reconaissance mapping only and should not be relied upon.

Fig. 9

4.5 Lonnavale #1 – Russell River above Judbury – EL 9/95

The Lonnavale site is located at the top end of river flats near Jollystone Creek, a northern tributary of the Russell River near Lonnavale, about 8km upstream of its junction with the Huon River.

Based on reconnaissance mapping in the area around the proposed drillsite, it is clear that dips of the Parmeener Supergroup in the immediate surrounding area are shallow and usually less than 5 degrees, and are dominantly to the east and southeast. See Fig. 9 for a map of this area.

An oil seep has recently been reported about 2.5km to the northwest in a quarry site. (Revill, A., 1996 and Wythe, S., & Watson, B., 1996)

The hole was precollared to 172m in May 1997 by Gerald Spaulding Drillers using an Atlas Copco TH60 hydraulic top drive drill rig and 6 inch down hole hammer. A succession of Triassic and Upper Permian sandstones overlying Permian siltstones with '*Fenestella*' was logged from chip samples. Heavy inflows of groundwater up to 10,000 gallons per hour required cementing up at a depth of about 120m. This water flow continued after drilling on, and the air hammer ceased to operate at a depth of 172m. Gas sampled during rod changes at 60m, 90m and 96m showed low levels of C1 to C7. Air, nitrogen and carbon dioxide corrected values from 96m gave methane 52%, butane 8%, pentane 7.5%, hexane 10.5% and heptane 17.5%.

This hole was cased with 100 NB API casing after establishing the Longyear HD44 drillrig on site in early July. The BOP equipment was then installed and tested. Coring HQ below 172m in Ferntree Mudstones commenced on 18th July. A dolerite sill was encountered at 195m, and the fractured nature of this dolerite resulted in fluid loss and required frequent cementing up and redrilling. The HQ drill string became stuck at 435m, and when drilling through a 3m fault intersection at 449m, the NQ drill string also became stuck. Drilling continued BQ to the end of the dolerite at 543m, where a 13m intersection of clay, breccia and fault infill material prevented any further advance beyond recovering 1.2m of Ferntree Mudstone. This zone is presently being over-reamed and cemented up to allow coring of the mudstone to continue. During this process, the NQ core barrel has become free, and an attempt is being made to recover it and ream ahead NQ.

Details of the cored and predicted stratigraphy can be seen in Fig.10. Cuttings gas readings through the fractured dolerite have been recorded in the range 20-50 units, with a high proportion of hydrogen. Gas strikes of around 300 units were recorded at 220m and 430m. Air-corrected results show methane at up to 1.8%, ethane up to 0.35% and hydrogen up to 85%. No helium has yet been recorded. Detailed gas results are summarised on the spreadsheet in Appendix 1A, and are charted in Fig. 11.

It is intended to drill on to basement at Lonnavale #1 as soon as the BOP is returned from Pelham #1.

415025

LONNAVALE #1

Lithology and Gas

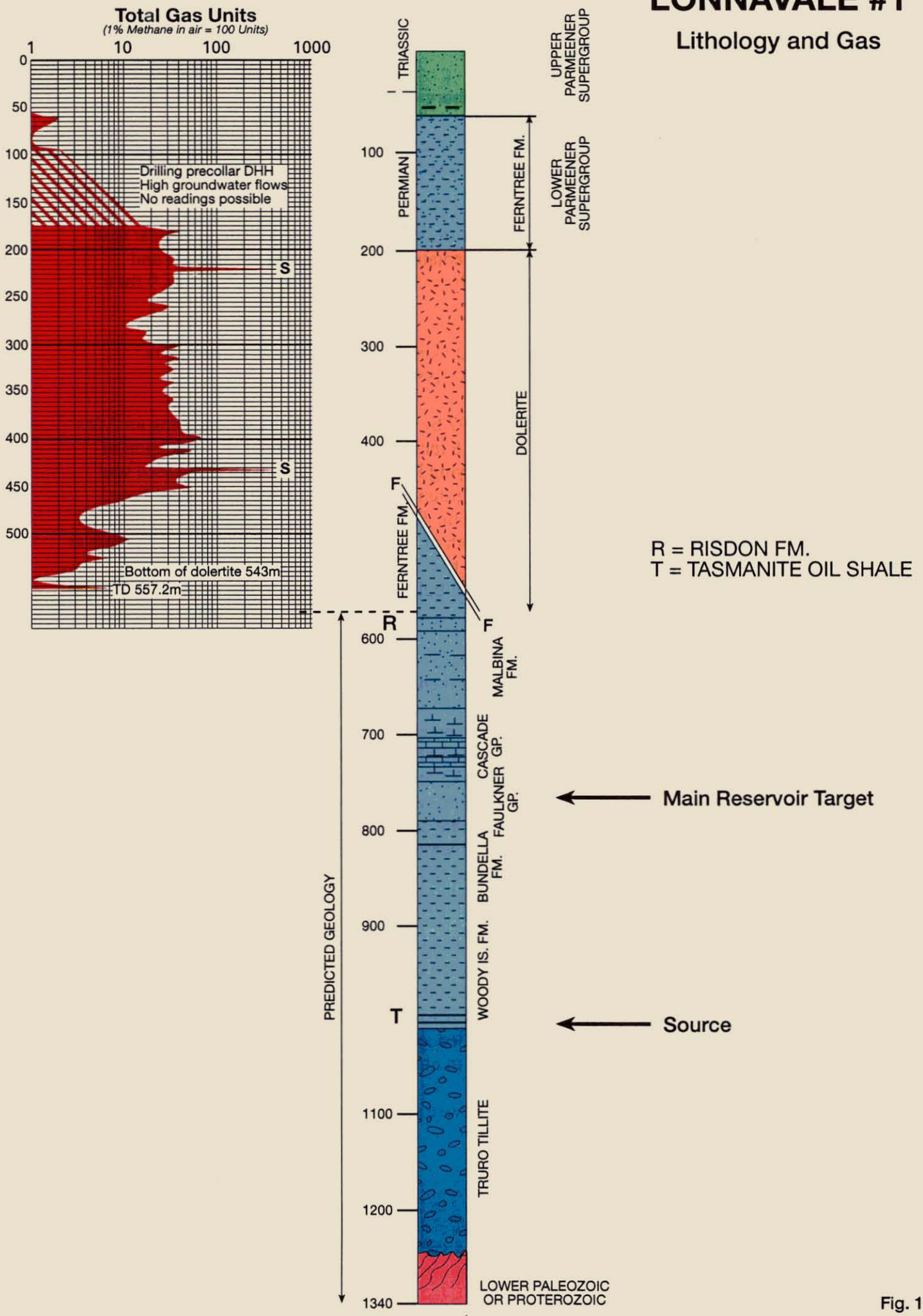


Fig. 10

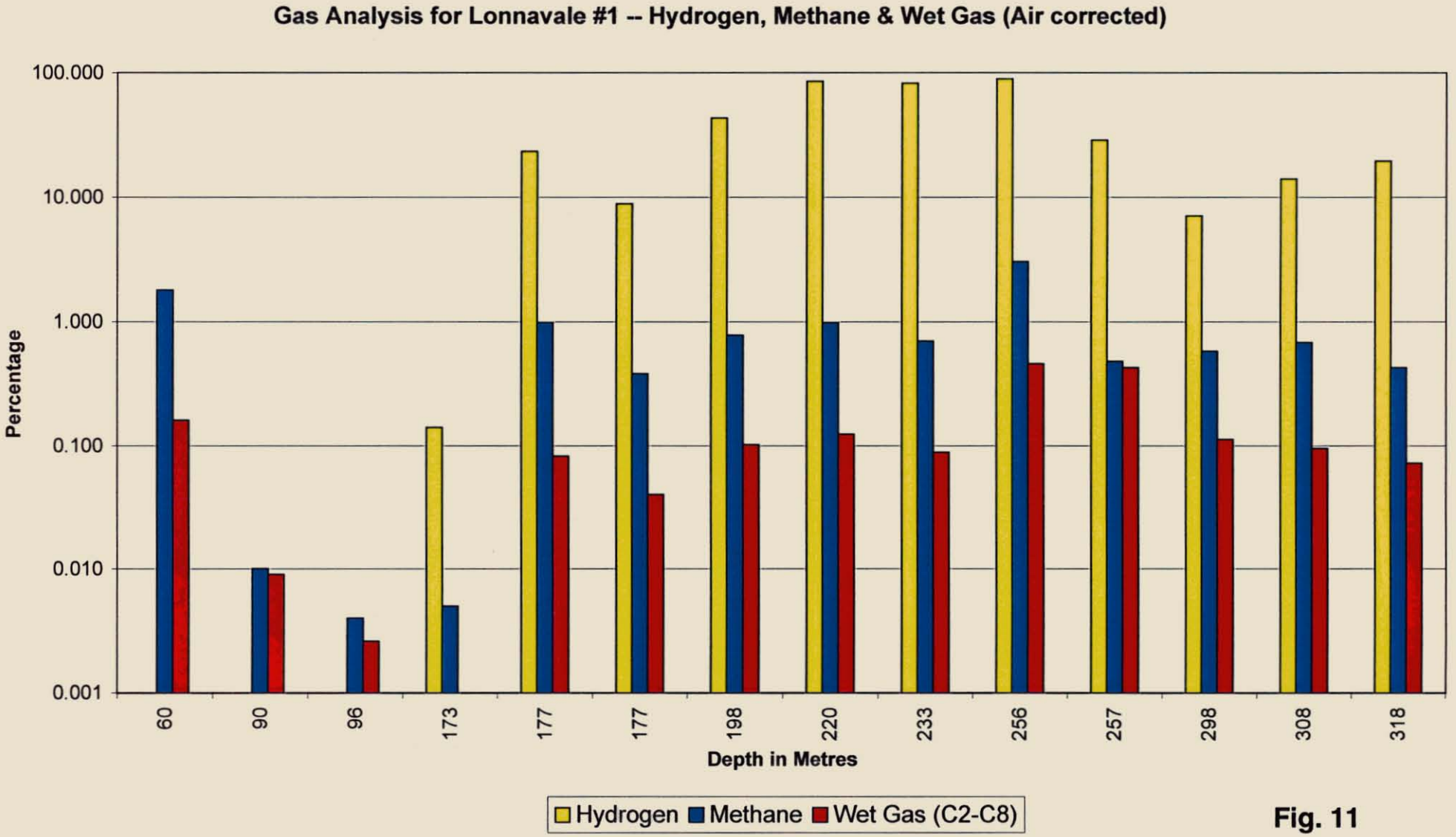


Fig. 11

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Map of Region Around Pelham#1

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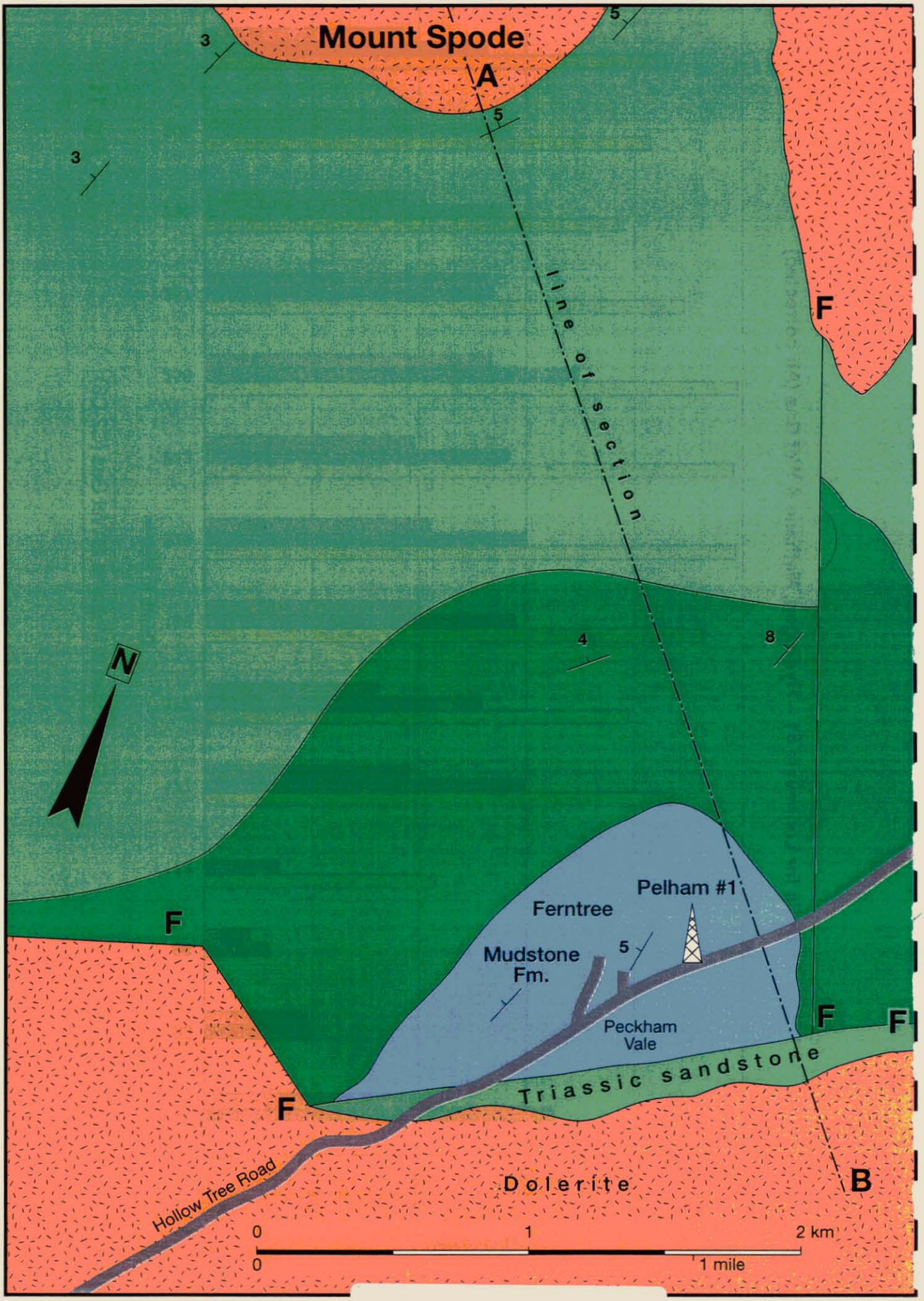


Fig. 12

4.6 Pelham #1 – Marked Tree Road 10km north of Gretna – EL 1/88

This hole is sited up dip on a triangular shaped fault block between Taylors Tier and Mount Spode at Peckham Vale, and is just to the west of a NE trending fault. Refer to Fig.12 and Fig.13 for details.

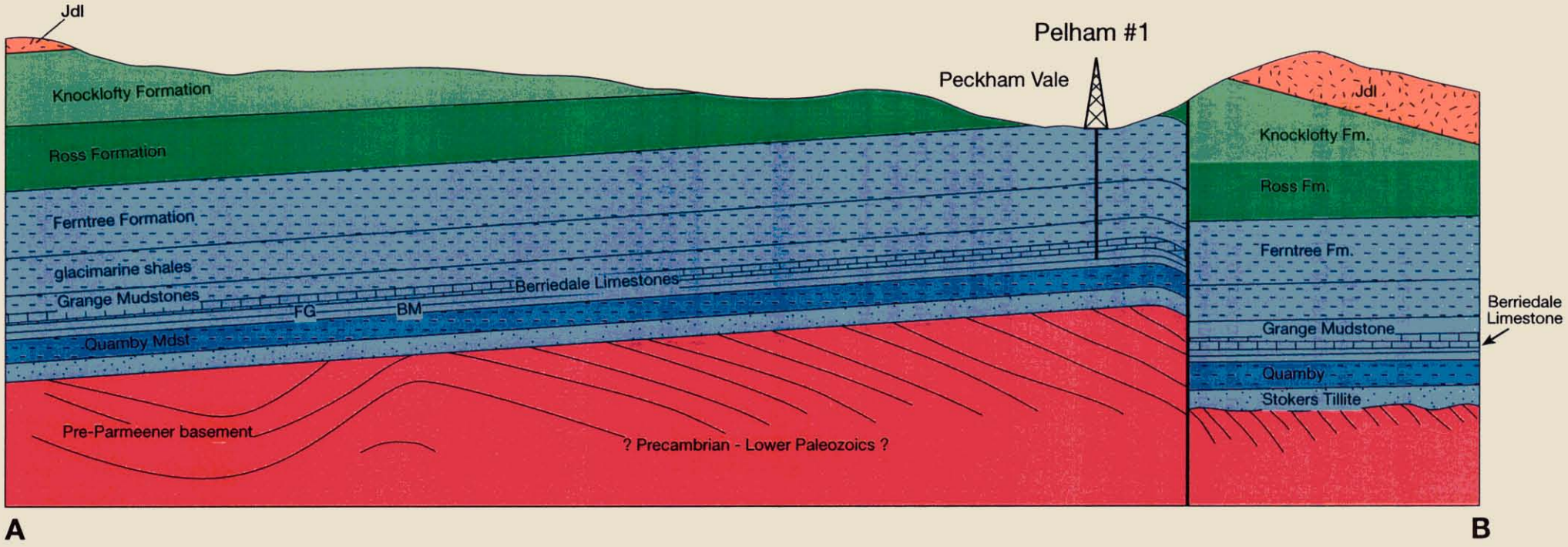
The precollar was drilled to 300m in late September 1997 by Gerald Spaulding Drillers using an Atlas Copco TH60 hydraulic top drive drill rig and 6 inch down hole hammer. Again, large groundwater inflows up to 20,000 gallons per hour required cementing up, and a high pressure booster was used in an attempt to drill on deeper with the air hammer. This approach was abandoned at 240m and the remainder of the hole was drilled with a TCI tricone rotary drill bit. HW steel casing was run in, welded and cemented in place on 7th October.

Chip samples indicate that the precollar terminates in Berriedale Limestone, and there is no indication of the presence of a dolerite sill. A decision was made to continue coring at Pelham #1 for a minimum of 100metres. A contract was let to Fred Ortner Drilling, and his Mindrill rig was established on site on 13th November. A 1.2m deep concrete cellar was constructed, and the BOP transferred from Lonnavale. After drilling out cement in the casing, coring HQ commenced on 20th November. The hole is presently at a depth of 370m in Liffey Group correlate sandstone.

Refer to Fig.14 for details of the drilled and predicted lithology, together with gas results to date.

Gas readings up to 80 units were recorded when coring commenced at 300m, but have now dropped back to about 10 units. Samples have been sent to AMDEL for analysis, but only one result has been advised to date, with an air-corrected value for methane of 1%.

Section A-B Near Pelham#1



Cross section based on field mapping
by M./A. Anandalwar (1957), C. Burrett(1977)
and regional arial photographic interpretation
by Geophoto Resources Consultants (1967)

$\frac{V}{H} = 1$

0 1 2 km

0 1 mile

5 cm

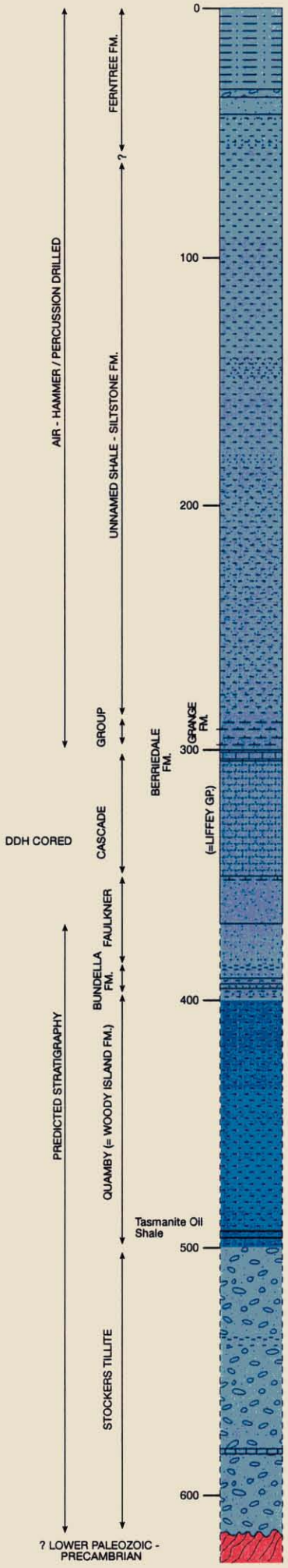
4150029

Fig. 13

415030

PELHAM #1

Lithology and Gas



Total Gas Units

(1% Methane in air = 100 Units)

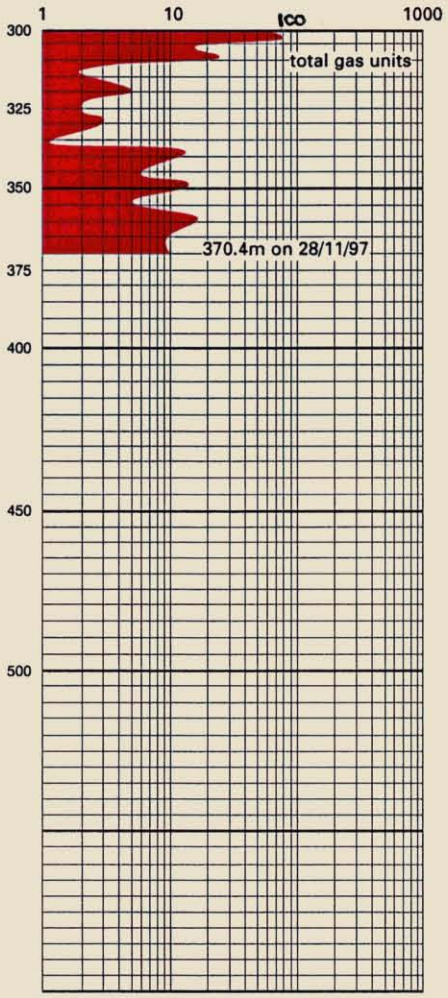
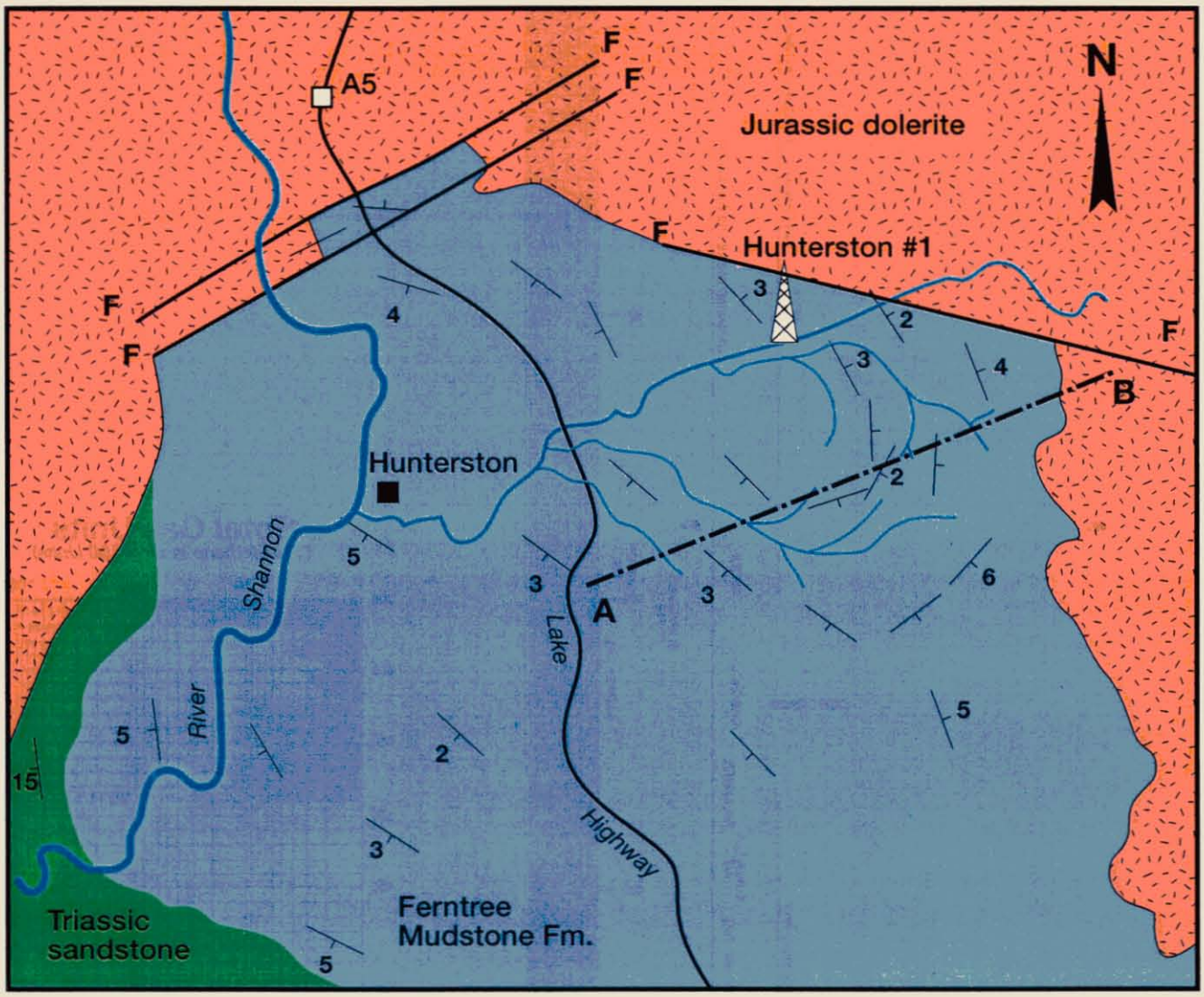


Fig. 14

415031

Map of Hunterston Dome



Based on Fairbridge 1948, aerial phototgraphy and field mapping by GSLM geologists 1997.

0 1 2 km

0 1 2 mile

5 cm

Fig. 15

4.7 Hunterston #1 – East of Lake Hwy 20km north of Bothwell – EL 21/95

This drillhole is situated near the centre of Hunterston dome, which was mapped by Fairbridge in 1949. Refer to Fig.15 and Fig.16 for details. Further discussion can be found in the prognosis which is part of Hunterston #1 Well Plan.

This hole was precollared to a depth of 336m in August 1997 by Gerald Spaulding Drillers using an Atlas Copco TH60 hydraulic top drive drill rig and 6 inch down hole hammer. Large water inflows were encountered at about 90m, and these were successfully cemented up. The DHH was still working well at 336m with only a small amount of water being lifted out of the hole. HW steel casing was run in, welded and cemented up on 21st August.

This hole will be cored to basement late in 1998.

4.8 Bridgewater #1 – Cobbs Hill 2km west of Bridgewater – EL 1/88

The anticlinal structure at Cobbs Hill is shown on the map in Fig.17 with a cross section presented in Fig.18.

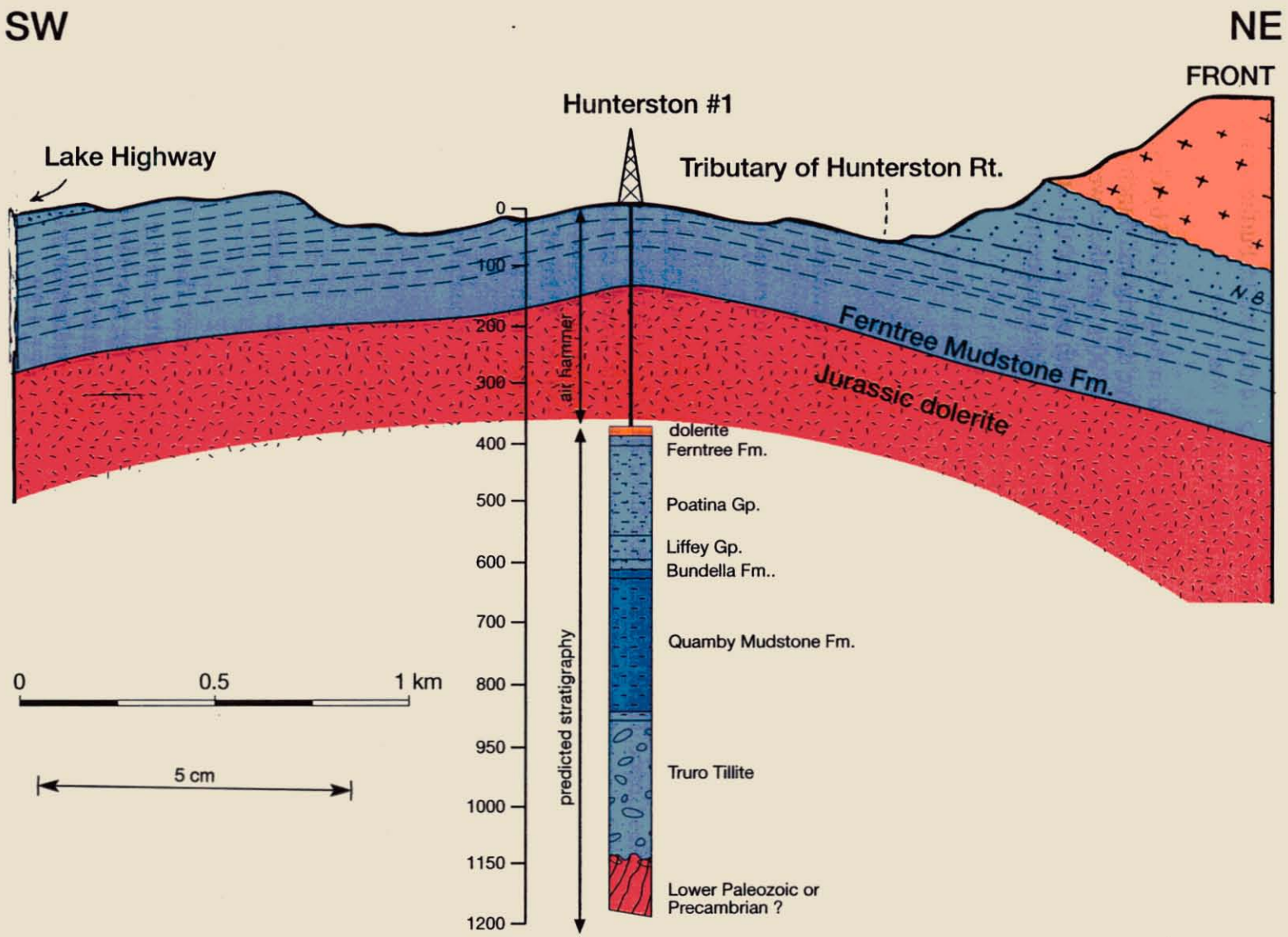
Precollaring of this hole began on 28th August 1997 by Gerald Spaulding Drillers using an Atlas Copco TH60 hydraulic top drive drill rig and 6 inch down hole hammer. Difficult drilling conditions and loss of returns in the soft Triassic sandstone required relocation of this hole after drilling about 180m and cementing up several times. The hole was finally terminated at 252m in Ferntree Mudstone and only 220m of HW casing could be run in before it became stuck. The casing was cemented in on 12th September.

Coring of this hole to basement will proceed after completion of Lonnavale #1 and Pelham #1.

4.9 Sorell #1 – Arthur Highway 3km east of Forcett – extension of EL 1/88

This drillhole is situated near the centre of the Forcett dome. The program for this hole has been approved by MRT, although no work has started on site. Agreement has been reached with Torenius Timber to drill on their land near the sawmill, in order to avoid any conflict with other residents. A meeting was held with residents on 9th October and chaired by the Registrar of Mines to answer questions on the exploration program. No objections were received by MRT in respect to the extension of EL 1/88.

Section Through East End of Hunterston Dome

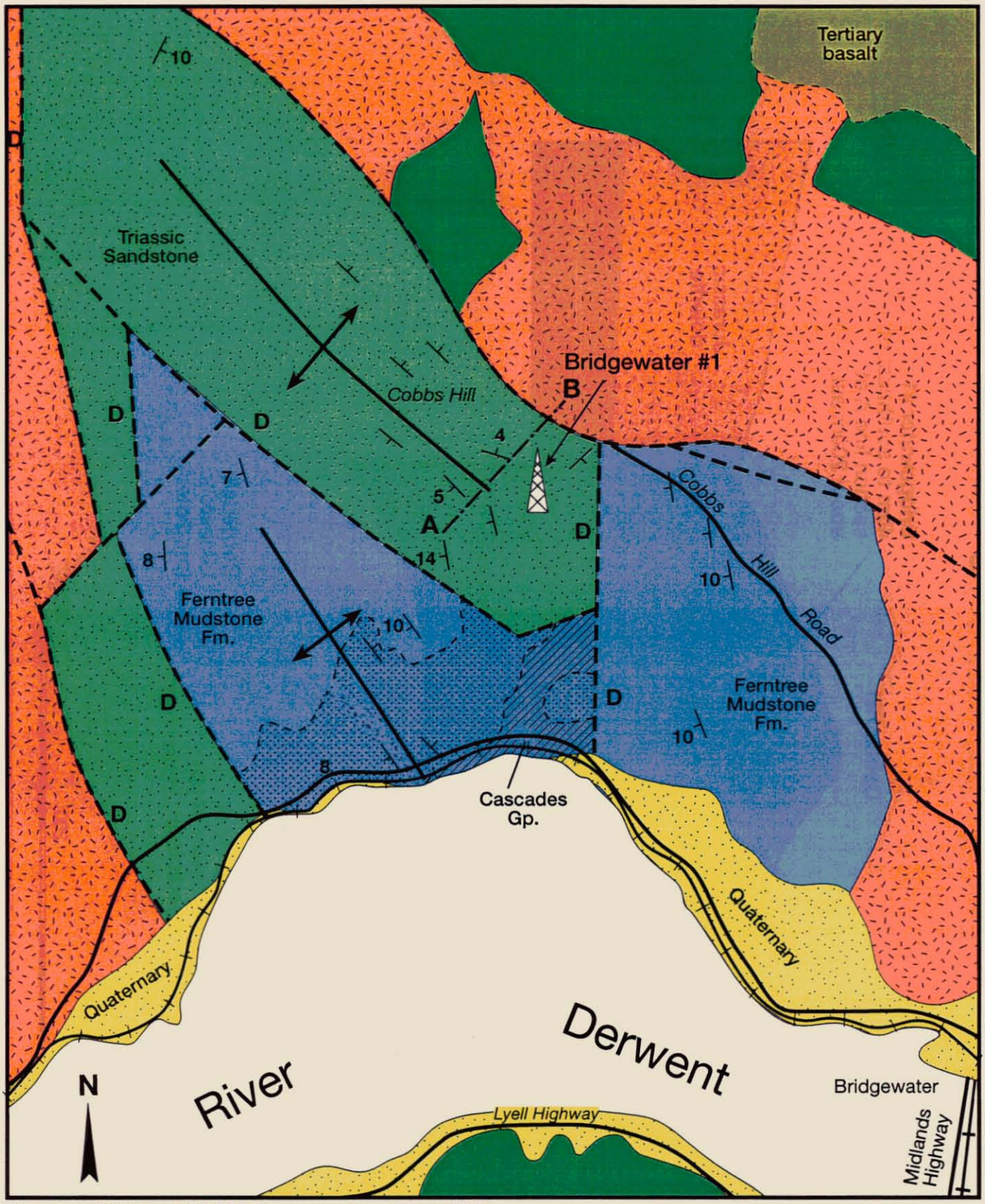


415033

Fig. 16

415034

Map of Bridgewater



Based on Brighton 1:50,000 Geological Map Sheet TDR
Aerial photograph interpretation and field mapping by GSLM geologists

0 1 2 km

0 1 mile

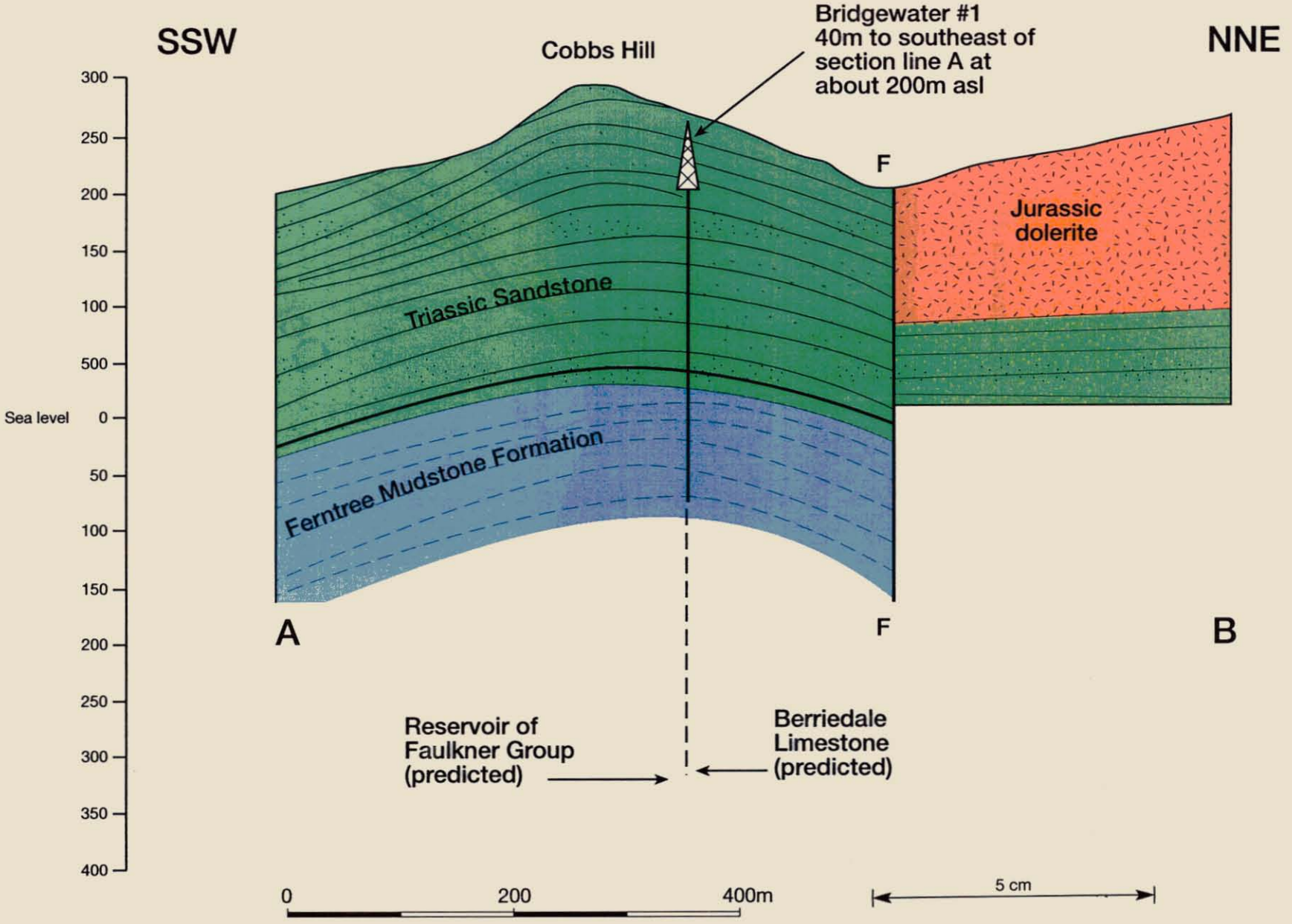
5 cm

Fault

Anticlinal axis

Fig. 17

Section A-B Near Bridgewater#1



41503 35

Fig. 18

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5. PLANNED OPERATIONS FOR 1998

The following program is planned for 1998 in general order of priority:

1. Complete Lonnavale #1
2. Complete Pelham #1
3. Precollar Sorell #1
4. Core Bridgewater #1 to completion
5. Core Hunterston #1 to completion
6. Seismic Program (as previously outlined)
7. Drill Stem Tests / Wireline logging

In addition, we plan to support two research projects. One of these may be an Honours project based on mapping of the Lonnavale area, and the other may be a PhD project based on the geochemistry of gas and oil.

6. EXPENDITURE STATEMENT

Twelve month period December 1996 to December 1997.

Costs of Drilling Program, including Mudlogging and Gas Analysis	$1,100,285
Administrative costs	$55,921
TOTAL EXPENDITURE:	**$1,156,206**

APPENDIX 1A: AMDEL GAS ANALYSIS RESULTS for SHITTIM #1, JERICHO #1, LONNAVALE #1, PELHAM #1

Report No.	Cylinder No.	Date Sampled	Depth Metres	Hotwire Units	Air Uncorrected			Air Corrected										Air, Nitrogen and Carbon Dioxide Corrected									
					H	C1	100(H+C1)	H	He	N	CO_2	C1	C2	C3	C4	C5	C6	C_2-C_6	H	He	C1	C2	C3	C4	C5	C6	C7	C8+	C_2-C_8+
SHITTIM 1B																												
LQ5351		22/11/96	1,630.0		0.61	0	61	6.49	0		1.76	0	0	0	0	0	0	0	3.03	0	0	0	0	0	0	0	0	0
LQ5368	Sample105				0.6	0.42	102	10.62		80.81	1.12	7.43	0.0053	0.0015	0.0051	0.0048	0.0005	0.017											0
LQ5368	Sample105				0.6	0.42	102	10.62		80.83	1.12	7.43	0	0	0	0	0	0											0
SHITTIM 1C																												
LQ5390	507	2/12/97			0.17	0.12	29	0.85	0.15	98.41	0	0.59	0.0014	0.0008	0.0019	0.0022	0.0008	0.0071	53.29	9.4	36.86	0.882	0.0476	0.1191	0.1348	0.0517	0.0088	0	1.224
LQ5390	180	3/12/96			0.18	8.9	908	0.45	0.22	77.31	0	22	0.0154	0.0008	0.0019	0.0024	0	0.0205	1.96	0.98	96.96	0.0679	0.0036	0.0084	0.0107	0	0.0068	0.0035	0.1009
LQ5390	122	5/12/96	1,640.0		0.15	0.04	19	1.23	0.41	97.92	0.11	0.33	0.00255	0.00079	0.00073	0.00033	0.00044	0.00484	82.34	20.78	16.62	0.12925	0.0399	0.03699	0.01662	0.02244	0.0104	0	0.2556
LQ5390	271	5/12/97	1,645.3		0.2	0.04	24	1.93	0.19	96.67	0.79	0.41	0.0058	0.0012	0.0011	0.0012	0.0026	0.0117	75.77	7.58	16.16	0.2209	0.0466	0.0432	0.0458	0.1027	0.017	0	0.4762
LQ5417		17/12/96	1,674.0	46	0.26	0.02	28	2.8	0	96.42	0.58	0.19	0.00874	0.00118	0.00168	0.00099	0.0001	0.01069	93.35	0	6.29	0.22512	0.03949	0.05801	0.03303	0.00323	0	0	0.3589
LQ5417	175	17/12/96	1,674.0	46	0.18	0.02	20	1.58	0	98.23	0.04	0.14	0.00535	0.00076	0.00089	0.0001	0	0.0071	81.6	0	7.99	0.31041	0.04427	0.0514	0.0056	0	0	0	0.4117
LQ5417	302	18/12/96	1,680.0	37	0.23	0.02	25	2.08	1.62	96.13	0.02	0.14	0.00615	0.00121	0.00123	0.00075	0.00023	0.00957	53.94	42.21	3.6	0.1597	0.03142	0.03189	0.01946	0.0061	0	0	0.2486
LQ5417	500	19/12/97	1,684.0	17	0.1	0.01	11	0.82	0.16	98.94	0	0.08	0.00165	0.00055	0.00067	0.00064	0.0002	0.00371	76.55	15.31	7.79	0.15387	0.05129	0.06201	0.05971	0.01837	0	0	0.3453
LQ5417	512	19/12/97	1,686.0	20	0.1	0.01	11	1.84	0.37	97.57	0	0.21	0.00545	0.00123	0.00059	0.00075	0.00031	0.00833	75.56	15.15	8.75	0.225	0.05091	0.02424	0.03106	0.01288	0	0	0.3441
SHITTIM 1D																												
LQ5525	403	28/01/97	1,686.0	30	0.13	0.12	25	2.96	0.92	93.28	0	2.75	0.0574	0.0044	0.003	0.0112	0.0008	0.0768	44.32	13.64	40.91	0.852	0.085	0.044	0.167	0.013	0	0	1.141
LQ5525	263	28/01/97	1,686.0	61	0.31	0.2	51	3.24	0.94	93.66	0.05	2.06	0.0177	0.0096	0.0079	0.0051	0.0004	0.0407	51.59	14.98	32.78	0.2829	0.1531	0.1265	0.0815	0.0082	0	0	0.6502
LQ5525	251	28/01/97	1,686.8	15	0.1	0.04	14	1.71	0.17	97.11	0.29	0.7	0.015	0.003	0.002	0.003	0.001	0.024	65.64	6.56	26.9	0.578	0.098	0.066	0.098	0.045	0	0	0.885
LQ5525	410	28/01/97	1,686.8	27	0.17	0.02	19	2.16	0.13	96.88	0.58	0.25	0.005	0.0008	0.0006	0.0006	0	0.007	84.77	4.99	9.97	0.194	0.03	0.025	0.024	0	0	0	0.273
LQ5537	513	29/01/97	1,692.8		0.09	0.004	9	1.03	0.11	98.67	0.14	0.05	0.0009	0.0003	0	0	0	0.0012	88.37	9.6	3.93	0.079	0.025	0	0	0	0	0	0.104
LQ5537	113	30/01/97	1,639.1	32	0.24	0.01	25	1.98	0.08	97.43	0.41	0.1	0.0019	0.0007	0.0005	0.0003	0	0.0034	91.62	3.82	4.41	0.09	0.03	0.02	0.01	0	0	0	0.15
LQ5537	109	30/01/97	1,693.5	10	0.06	0.004	6	1.12	0.19	98.28	0.33	0.08	0.0009	0	0	0	0	0.0009	80.81	13.47	5.66	0.063	0	0	0	0	0	0	0.063
LQ5537	225	30/01/97	1,693.8	17	0.12	0	12	1.77	0.15	97.85	0.18	0.05	0.0013	0.0003	0	0.0001	0	0.0017	89.94	7.5	2.46	0.067	0.016	0	0.007	0	0	0	0.09
LQ5537	201	30/01/97	1,693.8	60	0.45	0.01	46	8.77	0.19	89.89	0.92	0.23	0.0029	0.0009	0.0005	0.0004	0	0.0047	95.33	2.12	2.5	0.032	0.009	0.005	0.004	0	0	0	0.05
LQ5537	244	30/01/97	1,695.0	58	0.49	0.01	50	4.08	0.08	95.69	0.08	0.07	0.0016	0.0006	0.0003	0.0001	0	0.0026	98.4	1.97	1.57	0.039	0.014	0.008	0.003	0	0	0	0.064
LQ5537	216	31/01/97	1,695.7	42	0.3	0.02	32	3.39	0.01	96.17	0.14	0.19	0.0028	0.0008	0.0009	0.0006	0	0.0051	91.59	3.05	5.22	0.08	0.02	0.02	0.02	0	0	0	0.14
LQ5537	118	31/01/97	1,696.9	20	0.15	0.01	16	2.04	0.14	97.61	0.04	0.17	0.003	0.0005	0.0002	0.0003	0.0001	0.0041	86.81	5.79	7.23	0.127	0.023	0.007	0.013	0.004	0	0	0.174
LQ5537	161	31/01/97	1,698.3	28	0.22	0.07	29	2.41	0.11	96.45	0.22	0.81	0.00317	0.00131	0.00089	0.00024	0.00008	0.00569	72.15	3.28	24.39	0.095	0.039	0.027	0.007	0.002	0	0	0.17
LQ5548	200	1/02/97	1,700.0	39	0.22	0.01	23	4.18	2.28	93.17	0.2	0.16	0.007	0.001	0.001	0	0	0.009	630.6	34.4	2.4	0.11	0.02	0.01	0.003	0.003	0	0	0.146
LQ5548	206	1/02/97	1,703.1	60	0.4	0.02	42	3.33	0.25	96.1	0.18	0.13	0.006	0.001	0.001	0.0005	0.0001	0.0086	96.65	6.72	3.41	0.15	0.03	0.03	0.01	0.002	0	0	0.222
LQ5548	240		1,703.1		0.38	0.03	41	4.09	1.62	93.77	0.32	0.28	0.01	0.005	0.004	0.003	0.001	0.023	68.03	26.85	4.7	0.2	0.08	0.07	0.05	0.02	0	0	0.42
LQ5564	218	1/02/97	1,703.6	20	0.11	0.01	12	1.08	0.2	97.8	0.79	0.13	0.004	0.003	0.004	0.003	0.003	0.017	75.9	13.8	8.97	0.26	0.19	0.29	0.21	0.21	0.17	0	1.33
LQ5564	288	3/02/97	1,715.2	30	0.2	0.02	22	1.98	0.1	97.38	0.31	0.15	0.01	0.004	0.01	0.01	0.01	0.044	86.05	4.3	6.45	0.33	0.18	0.3	0.34	0.4	0.44	1.2	3.2
LQ5564	230	5/02/97	1,715.2	45	0	9.89	969	0	0.04	64.69	0.16	30.93	2.12	0.26	0.24	0.22	0.48	3.33	0	0.1	88.01	6.04	0.75	0.67	0.63	1.38	1.18	1.24	11.89
LQ5564	308	5/02/97	1,724.1	16	0.09	0.02	11	1.37	0.15	98.21	0	0.26	0.005	0.001	0.001	0.0002	0.0005	0.0077	76.59	8.51	14.46	0.28	0.06	0.06	0.01	0.03	0	0	0.44
LQ5573	117	6/02/97	1,727.1	23	0.17	0.02	19	1.21	0.07	98.28	0.3	0.14	0.004	0.0009	0.0003	0.0002	0.0001	0.0055	84.78	4.99	9.83	0.29	0.08	0.02	0.01	0.01	0.01	0	0.4
LQ5573	316	7/02/97	1,731.3	23	0.17	0.02	19	3.52	0.21	95.85	0	0.41	0.008	0.002	0.0003	0.0002	0.0006	0.0111	84.77	4.99	9.98	0.19	0.04	0.008	0.005	0.01	0.008	0	0.261
LQ5573	318	7/02/97	1,732.1	31	0.23	0.02	25	1.41	0.06	98.41	0	0.12	0.004	0.0004	0.0001	0.0001	0.0001	0.0047	88.2	3.83	7.68	0.25	0.02	0.009	0.007	0.004	0.003	0	0.293
LQ5573	323	7/02/97	1,732.8	17	0.11	0.01	12	6.64	4.83	87.79	0	0.64	0.03	0.006	0.005	0.008	0.01	0.059	54.41	39.57	5.24	0.21	0.15	0.04	0.07	0.09	0.12	0.2	0.88
LQ5573	313	8/02/97	1,733.0	52	0.32	0.03	35	2.34	0.07	97.35	0	0.23	0.008	0.002	0.001	0.0005	0.0009	0.0124	87.97	2.75	8.8	0.3	0.07	0.05	0.02	0.03	0.01	0	0.48
LQ5578	174	8/02/97	1,734.4	30	0.17	0.02	19	1.64	0.1	96.67	1.43	0.16	0.0039	0.0003	0.0004	0.0003	0.0002	0.0051	86.82	5.08	8.37	0.21	0.02	0.02	0.01	0.01	0	0	0.27
LQ5578	173	11/02/97	1,737.3	21	0.08	0.03	11	2.09	0.1	94.05	3.15	0.61	0	0	0	0	0	0	74.48	3.72	21.8	0	0	0	0	0	0	0	0
LQ5578	321	11/02/97	1,741.3	36	0.2	0.03	23	1.25	0.06	97.84	0.65	0.19	0.006	0.001	0.001	0.002	0.004	0.014	82	4.1	12.55	0.38	0.08	0.04	0.13	0.29	0.32	0.11	1.35
LQ5591	250	12/02/97	1,745.8	21	0.08	0.03	12	6.06	0.67	91	0.44	1.81	0.024	0.0042	0.0011	0.0007	0.0009	0.0309	70.67	7.85	21.12	0.28	0.049	0.013	0.008	0.01	0	0	0.36
LQ5639	132	26/02/97	1,568.0		0.57	4.4	497	0.74	0.04	94.05	0.03	5.14	0.0009	0.0005	0.0007	0.0008	0.0002	0.0031	12.55	0.66	86.75	0.014	0.0083	0.011	0.014	0.004	0.0011	0	0.0524
LQ5639	304	26/02/97	1,568.0		0.63	4.75	538	0.81	0.04	93.73	0.01	5.41	0.0008	0.0004	0.0006	0.0006	0.0002	0.0024	12.89	0.61	86.46	0.01	0.0059	0.01	0.01	0.0027	0.0012	0	0.0398
LQ5639	321	26/02/97	1,568.0		0.4	3.59	399	0.63	0.05	94.21	0.05	5.06	0.0008	0.0004	0.0007	0.0003	0.0003	0.0025	10.94	0.82	88.19	0.014	0.0071	0.012	0.0056	0.005	0.0021	0	0.0458
LQ5639	250	26/02/97	1,568.0		0.58	4.43	501	0.76	0.04	93.98	0.01	5.21	0.0001	0	0	0	0	0.0001	12.69	0.66	86.65	0.0012	0.0004	0	0	0	0	0	0.0016
LQ5639	341	26/02/97	1,568.0		0.38	4.34	472	0.55	0.04	93.78	0.01	5.62	0.0005	0.0003	0.0004	0.0004	0.0001	0.0017	8.83	0.7	90.44	0.0082	0.0043	0.0063	0.0062	0.0016	0.001	0	0.0276
LQ5639	136	26/02/97	1,568.0		0.58	4.7	528	0.75	0.04	93.77	0.04	5.4	0.0008	0.0004	0.0007	0.0007	0.0007	0.0033	12.09	0.63	87.19	0.012	0.0064	0.011	0.012	0.011	0.037	0	0.0894
LQ5639	343	26/02/97	1,568.0		0.64	4.58	522	0.82	0.04	93.92	0.07	4.15	0.0054	0.0004	0.0007	0.0007	0.0002	0.0074	13.61	0.64	85.63	0.09	0.0067	0.011	0.011	0.0027	0.0016	0	0.123
LQ5639	222	26/02/97	1,568.0		0	5.36	536	0	0.08	93.72	0.21	5.98	0.0054	0.0007	0.0008	0.0008	0.0003	0.008	0	1.26	98.62	0.089	0.012	0.012	0.014	0.0044	0.0017	0	0.1331
LQ5639	174	26/02/97	1,568.0		0.58	1.04	162	0.85	0.04	97.51	0.33	1.27	0.0013	0.0006	0.0009	0.0011	0.0015	0.0054	39.06	2.02	58.59	0.059	0.027	0.04	0.049	0.069	0.078	0	0.322
LQ5639	271	26/02/97	1,568.0		0.77	5.39	616	1.11	0.07	91.88	0.08	6.86	0.0005	0.0002	0.0004	0.0005	0.0001	0.0017	13.78	0.89	85.3	0.0062	0.003	0.0054	0.0056	0.0015	0.001	0	0.0227

413038

Report No.	Cylinder No.	Date Sampled	Depth Metres	Hotwire Units	Air Uncorrected			Air Corrected									Air, Nitrogen and Carbon Dioxide Corrected										
					H	C1	100(H+C1)	H	He	N	CO2	C1	C2	C3	C4	C5	C6	C_2-C_6	H	He	C1	C2	C3	C4	C5	C6	C7	C8+	C_2-C_8+
JERICHO 1A																												
LQ5699	334	12/03/97	235.3	50	0.35	0.04	39	3.79	0		0.21	0.45	0.0039	0.0001	0.0008	0.0001	0.0001	0.005	89.18	0	10.71	0.091	0.0033	0.018	0.0025	0.0023	0	0	0.1171
LQ5699	336	14/03/97	258.0	38	0.26	0.01	27	3.16	0		0.58	0.09	0.0041	0.0015	0.0004	0.0003	0	0.0063	97.16	0	2.63	0.13	0.046	0.011	0.009	0	0.013	0	0.209
LQ5699	335	16/03/97	350.0	70	0.48	0.02	50	3.54	0		0.04	0.14	0.0051	0.002	0.0011	0.0004	0.0002	0.0088	96.01	0	3.74	0.14	0.053	0.03	0.012	0.0058	0.0084	0	0.2492
LQ5765	249	22/03/97	436.0	14	0.1	0.01	11	2.19	0.22		0	0.21	0.01	0	0	0	0	0.01	83.16	8.32	7.99	0.26	0.11	0.1	0.03	0.03	0	0	0.53
LQ5765	350	22/03/97	446.0	25	0.16	0.01	17	3.89	0		0	0.16	0.0072	0.0025	0.002	0	0	0.0117	95.84	0	3.87	0.18	0.061	0.049	0	0	0	0	0.29
LQ5765	351	24/03/97	458.0	30	0	0.004	0.4	0	0		0.62	0.1	0.0055	0.0019	0.0017	0.001	0.0005	0.0108	0	0	90.08	5.2	1.61	1.58	0.9	0.45	0	0	9.94
LQ5765	352	25/03/97	500.0	28	0	0.01	1	0	0.21		0.22	0.21	0.0087	0.0027	0.0031	0.0008	0.0004	0.0137	0	48.38	48.42	1.58	0.26	0.35	0.02	0.01	0	0	2.22
LQ5767	349	9/04/97			0.05	0.01	6	1.12	0.22		0.84	0.17	0.0038	0.0009	0	0.001	0.0006	0.0063	73.94	14.73	11.22	0.25	0.06	0	0.06	0.04	0	0	0.41
LQ5820	*202*	*10/04/97*	*640.0*	*27*	*0*	*1.16*	*116*	*0*	*0*		*1.5*	*9.95*	*0.004*	*0.001*	*0.0001*	*0*	*0*	*0.0051*	*0*	*0*	*99.95*	*0.04*	*0.01*	*0.001*	*0*	*0*	*0*	*0*	*0.051*
JERICHO 1B																												
LQ5820	180	17/04/97		140	0.86	0.51	137	6.77	0		1.04	3.38	0.43	0.1	0.02	0	0	0.55	46.8	0	23.21	2.99	0.72	0.12	0.04	0	0	0	3.87
LQ5820	347	17/04/97	600			3.21	321			90.17	0.5	8.3	0.92	0.11	0	0	0	1.03			88.96	9.85	1.19	0	0	0	0	11.04
LQ5906	348	2/05/97	620	520	4.06	1.43	549	23.28	0	68	0.18	6.58	1.28	0.47	0.13	0.04	0.04	1.94	73.18	0	20.69	3.95	1.47	0.42	0.12	0.13	0.02	0.02	6.13
LONNAVALE #1																												
LQ5906	122	27/05/97	60.0	1	0	0.02	2	0	0	45	52.86	1.79	0.01	0.01	0.03	0.04	0.07	0.16	0	0	88.75	0.58	0.67	1.32	1.8	3.41	3.47	0	11.25
LQ5906	251	27/05/97	90.0	1	0	0.0006	0	0	0	74.27	25.72	0.01	0.002	0.002	0.002	0.001	0.002	0.009	0	0	44.88	9.41	8.89	10.54	7.91	11.45	6.93	0	55.13
LQ5906	287	27/05/97	96.0	2	0	0.0004	0	0	0	76.43	23.57	0.004	0.0002	0.0002	0.0007	0.0006	0.0009	0.0026	0	0	51.91	2.68	1.81	8.04	7.53	10.46	17.47	0	48.09
LQ6088	285	18/07/97	173.4	6	0.12	0.004	12	0.14	0	99.85	0.01	0.005	0.0004	0.0002	0	0	0	0.0006	96.15	0	3.4	0.28	0.15	0.01	0.01	0	0	0	0.45
LQ6088	137	18/07/97	176.7	38	0.34	0.01	35	23.19	0	75.75	0	0.98	0.05	0.02	0.01	0.002	0	0.082	95.6	0	4.02	0.21	0.1	0.06	0.01	0	0	0	0.38
LQ6088	162	18/07/97	176.7	41	0.32	0.01	33	8.81	0	90.77	0	0.38	0.02	0.01	0.006	0.002	0.002	0.04	95.4	0	4.13	0.26	0.11	0.07	0.02	0.02	0	0	0.48
LQ6130	360	23/07/97	198.0	24	0.22	0.004	22	42.9	0	54.99	1.23	0.78	0.07	0.02	0.007	0.004	0.001	0.102	97.97	0	1.78	0.17	0.05	0.02	0.008	0.003	0	0	0.251
LQ6130	257	30/07/97	220.0	310	2.77	0.03	280	85.35	0	12.43	1.12	0.88	0.07	0.03	0.02	0.004	0.0004	0.1244	98.73	0	1.13	0.08	0.03	0.02	0.004	0.0005	0	0	0.1345
LQ6130	200	31/07/97	233.0		0.37	0.003	37	82.05	0	9.91	7.25	0.7	0.08	0.02	0.006	0.002	0	0.088	99.05	0	0.84	0.07	0.02	0.008	0.002	0	0	0	0.1
LQ6216	103	20/08/97	256.0		0.17	0.006	18	88.81	0	0	7.71	3.02	0.05	0.2	0.14	0.05	0.02	0.46	96.23	0	3.27	0.06	0.22	0.15	0.06	0.02	0	0	0.51
LQ6216	*371*	*20/08/97*	*257.0*		*0.3*	*0.005*	*31*	*28.48*	*0*	*70.62*	*0*	*0.48*	*0.35*	*0.04*	*0.03*	*0.004*	*0.003*	*0.427*	*96.91*	*0*	*1.63*	*1.19*	*0.13*	*0.11*	*0.01*	*0.01*	*0*	*0*	*1.45*
LQ6216	246	25/08/97	298.4	20	0.13	0.01	14	7.08	0	76.17	16.04	0.58	0.07	0.02	0.01	0.008	0.008	0.112	91.02	0	7.4	0.87	0.3	0.19	0.07	0.08	0.07	0	1.58
LQ6216	329	25/08/97	308.4	24	0.17	0.008	18	13.96	0	81.08	4.19	0.68	0.07	0.01	0.009	0.004	0.002	0.095	94.72	0	4.59	0.49	0.1	0.06	0.03	0.02	0	0	0.7
LQ6216	338	26/08/97	317.9	30	0.2	0.004	20	19.39	0	79.78	0.33	0.43	0.05	0.01	0.01	0.002	0	0.072	97.47	0	2.17	0.24	0.07	0.03	0.01	0	0	0	0.35
PELHAM #1A																												
LQ6477	342	20/11/97	303.0	70			0	not done		98.95	0.07	0.98	0.003	0.002	0.0007	0.0002	0.0001	0.006										0

41393

SHITTIM #1 - COMPLETION

DRILLING CONTRACT SUMMARY

DATE	ACTIVITY	DEPTH	Footage Drilled		Drill Rig Hours			BOP	Labour Hours		CONSUMABLES
		metres	Total	Charged	Total	Charged		Days	Total	Charged	
						Working	Standby				
2/12/96	Operational responsibility transferred							1	9		
3/12/96	Gornick/McCormick to G M Wise	1635						1	13		
4/12/96	Ream from 1527m and drill BQ	1639.3	4.3		11			1	13		
5/12/96	Drill BQ	1647.3	8		11			1	13		
6/12/96	Drill BQ. Out of pipe.	1652.6	5.3		10			1	12		
7/12/96	No work								0		
8/12/96	No work								0		
9/12/96	Pick up rods - no site work								9		
10/12/96	Ream and drill BQ	1659.1	6.5		10			1	12.5		
11/12/96	Bean Pump governor failed							1	11.5		
12/12/96	Repairs							1	9		
13/12/96	Ream to TD & drill BQ	1660.6	1.5		12			1	13		
14/12/96	No work								0		
15/12/96	No work								0		
16/12/96	Drill BQ	1666.3	5.7		10.5			1	11.5		
17/12/96	Drill BQ	1676.1	9.8		13.5			1	14.5		
18/12/96	Drill BQ	1682.7	6.6		12.5			1	13.5		
19/12/96	Drill BQ & trip out to 1520m	1686	3.3		12.5			1	13.5		
20/12/96	Pack up gear from McCormick's								10		
21/12/96 -	} XMAS								0		
26/01/97	} BREAK								0		
27/01/97	Mark Oliver only on site								9.5		
28/01/97	Ream to TD & drill BQ	1688.6	2.8		11			1	13		
29/01/97	Drill BQ	1692.8	4		9.5			1	12.5		
30/01/97	Drill BQ	1695.1	2.3		10.5			1	13.5		
31/01/97	Drill BQ	1698.2	3.1		10.5			1	13.5		
1/02/97	Ream & drill BQ	1703.6	5.4		10.5			1	13.5		
2/02/97	Drill BQ	1706.1	2.5		6			1	10		
	Subtotals		**71.1**		**161**			**19**	**263.5**		
3/02/97	Repairs. Drill BQ	1712.8	6.7		8			1	12.5		
4/02/97	Drill BQ	1716.5	3.7		12			1	12		
5/02/97	Drill BQ	1725	8.5		12			1	12.5		
6/02/97	Drill BQ	1730.6	5.6		12.5			1	13.5		
7/02/97	Drill BQ	1733	2.4		9			1	12		
8/02/97	Drill BQ	1735.9	2.9		10.5			1	13.5		
9/02/97	POOH & check bit				10			1	13.5		
10/02/97	RIH & ream to TD				9			1	12		
11/02/97	Drill BQ	1741.3	5.4		12			1	13		
12/02/97	Drill BQ	1751	9.7		13			1	14		
13/02/97	POOH & pack up								10		
14/2/97 -	} BREAK										
23/02/97	} "										

JERICHO #1

DRILLING CONTRACT SUMMARY

DATE	ACTIVITY	DEPTH	Footage Drilled		Drill Rig Hours			BOP	Labour Hours		CONSUMABLES
		metres	Total	Charged	Total	Charged		Days	Total	Charged	
						Working	Standby				
24.2.97	Packing up at Shiltim				N/R				13.5		
25.2.97	Packing up at Shiltim				N/R				14		
26.2.97	Excavated & poured footings				N/R				13.5		
27.2.97	Move drill rig over from Shiltim				N/R				12.5		
28.2.97	Set up drill rig				N/R				12		
1.3.97	Complete setting up equipment				N/R				13		
2.3.97	Commence reaming HQ				N/R				12.5		
3.3.97	Complete reaming - lost core barrel	229	229		N/R				14		
4.3.97	Recover core tube & backend				N/R				13.5		
5.3.97	Fishing for barrel with tap & BQ rods				N/R				10		
6.3.97	Recover and POOH				12				12		
7.3.97	Run in 12m lengths casing & flush				12.5				13.5		Greg Daly on site
8.3.97	Cement casing - 120 bags				2				8		VSL on site - 120 bags
9.3.97	NO WORK										
	TOTAL SETUP HOURS								162		
10.3.97	Weld flange & fit BOP. RIH to ream	131.4	11.4		6				14		Greg Daly, Hazells crane
11.3.97	Drill out cement in casing.Test BOP	218.4	87		13			1	13		
12.3.97	RIH & drill NQ. Test casing shoe.	235.4	17	6	12			1	12.5		
13.3.97	Drill NQ	250.4	15	15	12.5			1	12.5		
14.3.97	Drill NQ	265.4	15	15	12.5			1	12.5		
15.3.97	Drill NQ. Pull rods & change bit.	277.4	12	12	12			1	12		
16.3.97	Drill NQ	295.4	18	18	13			1	13		
17.3.97	Drill NQ	321.3	26	26	13			1	13		
18.3.97	Drill NQ	347.4	26	26	13			1	13		
19.3.97	Drill NQ	370.4	23	23	13			1	13		
20.3.97	Drill NQ	402.4	32	32	12			1	12		
21.3.97	Drill NQ. Repairs to pump shaft.	415.4	13	13	12.5			1	12.5		Len Jackson on site
22.3.97	Drill NQ	445.4	30	30	9			1	10.5		
23.3.97	NIL										
24.3.97	Drill NQ	481.4	36	36	12.5			1	13.5		
25.3.97	Drill NQ	511.4	30	30	12			1	12		
26.3.97	Drill NQ	544.4	33	33	13			1	13		
27.3.97	Drill NQ. Pack up for Easter.	550.4	6	6	4			1	12		
28.3.97 to	EASTER BREAK - Fit Hydro Chuck										Len Jackson on site
1.4.97	Change seals and service drill rig										Len Jackson on site
2.4.97	Repairs to hydraulics. Drill NQ	556.4	6	6	3			1	13.5		
3.4.97	Drill NQ	586.4	30	30	12			1	13		
4.4.97	Drill NQ	616.4	30	30	12			1	12		
5.4.97	Drill NQ. Stuck & twisted off at 55.4	636.5	20.1	20.1	12	4		1	12		
6.4.97	Pull tube & 57m NQ. Set up BQ.	636.5	0		2	2	8	1	10		
7.4.97	RIH BQ & pump 2 bags cement.	636.5	0		8	8	4.5	1	12.5		
8.4.97	RIH BQ & drill out NQ barrel. Stuck.	638	1.5		8	8	1.5	1	9.5		
9.4.97	BQ parted 33m. Recover & free rods	639.6	1.6		8	8	3	1	11		
10.4.97	Run in new BQ bit & drill. Stuck.	640.4	0.8		9	9	2	1	11		
11.4.97	Run conc. hydrochloric acid	640.4	0		2	2	12	1	14		
12.4.97	NIL - Waiting on acid to work							1			
13.4.97	NIL - Waiting on acid to work							1			
14.4.97	Try cutting BQ barrel with Powergel				5	5	5	1	10		
15.4.97	Continue blasting				6	6	6.5	1	12.5		
16.4.97	Succeed & POOH BQ				8	8	3	1	11		
17.4.97	Weld up BQ & spear. Back off NQ				9	9	2.5	1	11.5		
18.4.97	Run in wooden plug & weld up wedge	594			4	4	6.5	1	10.5		
19.4.97	Run in wedge & cement.	588			8	8	3.5	1	12.5		
20.4.97	NIL - Waiting on cement to set							1			
21.4.97	Drill off wedge with bullnose bit	591.8	10		11	11	1	1	13		
22.4.97	Run in 1.5m core barrel & drill NQ	601.1	9.3		12	12	0.5	1	12.5		
23.4.97	Drill NQ	619.1	18		12.5	12.5	0.5	1	13		
24.4.97	Drill NQ. Stuck again!	625.55	6.45		10	10	1.5	1	12.5		
25.4.97 to	Anzac Day										
29.4.97	Break										
30.4.97	Cut off NQ barrel with Anzomex				6	6	4	1	11		
1.5.97	POOH and run in wooden plug	624			7	7	4	1	11		
2.5.97	Set and cement wedge	617			9	9		1	9		
3.5.97	Drill with Reaming Bar	623	12		11	11		1	11		
4.5.97	Reamed to 623 & lost reaming bar	623			7	7	2	1	9		
5.5.97	Fish - no luck. Run in wood plug.	621			8	8	3	1	11		
6.5.97	Run wedge and cement	612			10	10	4	1	14		
7.7.97	Re-cement and mix heavy mud				8	8	2	1	10		
8.5.97	Drill out wedge & POOH - lost bar	615.5	6		10	10		1	10		
9.5.97	Fish out reaming bar & survey hole				10	10	3	1	13		
10.5.97	Run in 1.5m barrel & drill NQ	617.3	1.8		10	10		1	10		
11.5.97	Drill NQ	623.4	6.1		10	10		1	10		
12.5.97	Drill NQ and ream	627	3.6		11	11		1	11		
13.5.97	Trip out and run in with reaming bar	627.8	0.8		11	11	0.5	1	11.5		
14.5.97	POOH reaming bar & RIH barrel. Cement job				11.5	11.5		1	11.5		1 x cement + plug
15.5.97	Drill out and re-cement	626.7			10	10		1	10		2 x cement + plug
16.5.97	Drill out & cement. Picked up wedge	626.9			10	10	3	1	13		2 x cement + plug
17.5.97	Pull apart & bring wedge back for repairs						8	1	8		
18.5.97	RIH, set wedge & cement	582.1			9	9	1	1	11		5 x cement + plug
19.5.97	POOH NQ & RIH reaming bar	578			6	6	3	1	9		1 x cement + plug
20.5.97	Drill off wedge. RIH & drill NQ	590.5	12.5		12.5	12.5	1	1	13.5		
21.5.97	Drill NQ	605.7	15.2		11	11		1	11		
22.5.97	Drill NQ	622.2	16.5		13	13		1	13		
23.5.97	Drill NQ. Stuck again!	626.7	4.5		10	10		1	10		
24.5.97	2 blasts at bit face. Still stuck.				7	7	3	1	10		
25.5.97 to	Break										
1.6.97	Break										
2.6.97	make up BQ string & RIH				8	8		1	10		
3.6.97	Cement NQ barrel, trip in BQ barrel				8	8		1	10		2 x cement + plug
4.6.97	No work - Office opening										
5.6.97	Drill BQ, cement & POOH-bit change				8	8	1	1	11		1 x cement + plug
6.6.97	RIH BQ, drill cement & run diesel	626.7			10	10		1	12		BQ bit - Series 2
7.6.97	Ream back to bottom & drill BQ	629.2	1.5		10	10		1	12		
10.6.97	Cleaning sludge out with detergent	629.2			11	11		1	13		
11.6.97	Trip out, clean barrel, RIH & drill BQ	630.8	1.8		11	11		1	13		
12.6.97	Drill BQ with diesel. Stuck again!	634.8	4		10	10		1	12		
13.6.97	Blast off BQ barrel & POOH				10	10		1	12		

LONNAVALE #1A

DRILLING CONTRACT SUMMARY

DATE	ACTIVITY	DEPTH	Footage Drilled		Drill Rig Hours			BOP	Labour Hours		CONSUMABLES	COST
		metres	Total	Charged	Total	Charged		Days	Total	Charged		
						Working	Standby					
1.7.97	Transport Drilrig to Lonnavale				N/R				10.5			
2.7.97	Jack up rig and excavate foundations				N/R				10.5			
3.7.97	Pour footings & set up equipment				N/R				11			
4.7.97	Install support frame				N/R				10.5			
5.7.97	No work				N/R				0			
6.7.97	No work				N/R				0			
7.7.97	Pick up rods & tanks from Bruny				N/R				11.5			
8.7.97	Setting up equipment				N/R				8.5			
9.7.97	Setting up equipment				N/R				6			
10.7.97	No work				N/R				0			
	Subtotal								68.5			
11.7.97	Run & weld casing - Greg Daly				N/R		8.5		10.5			
12.7.97	Cement casing - VSL on site				N/R		7		9			
13.7.97	No work				N/R				0			
14.7.97	Weld flange, service & mount BOP				N/R		8.5		10.5			
15.7.97	Pressure test to 3000 psi				N/R		9	1	11			
16.7.97	Drill out cement - bearing failure				N/R		7	1	10.5			
17.7.97	Repair bearing & drill out cement	172.3			7	7		1	11		1x Liquid Polymer	135.00
18.7.97	Core HQ - lost circ. - cement up	179	6.7		10	10	4	1	16		16x Bags Cement+1xPlug	131.20
19.7.97	No work								0			15.00
20.7.97	No work								0			
21.7.97	Drill out cement & run in new rods	179	0		10	10		1	11			
22.7.97	Core HQ	183	4		10.5	10.5		1	10.5		1x Liquid Polymer	135.00
23.7.97	Core HQ - lost circ. - cement up	188	5		10.5	10.5		1	10.5		1x LP+ 6xCement+1xPlug	199.20
24.7.97	Drill cement - core HQ - cement up	197	9		11.5	11.5		1	11.5		10x Cement + 1x Plug	97.00
25.7.97	Drill cement - core HQ - change bit	199	2		11	11		1	12		1x HQ series 6 Impreg bit	900.00
26.7.97	No Work								0			
27.7.97	No Work								0			
28.7.97	Core HQ - lost circ. - cement up	205	6		10.5	10.5		1	11.5		1x LP+ 10xCement+1xPlug	232.00
29.7.97	Drill cement - core HQ - cement up	220	15		13.5	13.5		1	13.5		2x LP+ 15xCement+1xPlug	408.00
30.7.97	Drill cement - core HQ - gas sample	230	10		12.5	12.5		1	12.5		1x LP+ 2x Buckets Hysaal	150.00
31.7.97	Core HQ - lost returns at 233m	243	13		12.5	12.5		1	12.5		1x LP	135.00
1.8.97	Core HQ	254.8	11.8		10.5	10.5		1	11.5		1x LP	135.00
2.8.97	No Work - awaiting cementing packers											
3.8.97	No Work											
4.8.97	No Work											
5.8.97	Pull HQ - run in HSSGP packer BQ - Presaure grout 172m-255m				4	4	5	1	11		1x HSSGP Packer	369.00
6.8.97	POOH BQ & RIH HQ				4	4	2	1	8		50x Bags Cement	410.00
7.8.97 to	No Work. Bean Pump re-engine											
17.8.97	No Work											
18.8.97	Drill out Van Ruth packer & cement	191.7			9.5	9.5		1	11.5		1 x LP	135.00
19.8.97	Drill out cement	230.7			12	12		1	12		1 x LP	135.00
20.8.97	Drill out cement & core HQ	263.7	8.9		13	13		1	13.5		1 x LP	135.00
21.8.97	Trip out & replace reamers. Drill HQ	284.7	21		11.5	11.5		1	12		2 x LP	270.00
22.8.97	Drill HQ. Shut down & pack up	289.7	5		3	3		1	8		Back & Front Reamers	775.00
23-24.8.97	No Work											
25.8.97	Drill HQ. Partial returns.	314.7	25		11.5	11.5		1	13		2 x LP	270.00
26.8.97	Drill HQ. Partial returns.	340.7	26		11.5	11.5		1	12		1 x LP	135.00
27.8.97	Drill HQ. Partial returns.	368.7	28		12	12		1	12.5		1 x LP	135.00
28.8.97	Drill HQ. Partial returns.	391.7	23		11	11		1	11.5		1 x LP	135.00
29.8.97	Drill HQ. Partial returns. Press.Lock	407.7	16		10	10		1	11		1 x LP	135.00
30-31.8.97	No Work											
1.9.97	Drill HQ. Partial returns. Short runs	422.7	15		12.5	12.5		1	14			
2.9.97	Drill HQ. Soft clay minerals.	427.7	5		12	12		1	12.5			
3.9.97	Change bit. Flush hole with detergent		0		9.5	9.5		1	10		HQ drill bit	900.00
4.9.97	Condition hole. Drill HQ. High gas	433.7	6		12.5	12.5		1	13			
5.9.97	Drill HQ. Cement hole - stuck string	434.9	1.2		18	18		1	19		75 bags cement. HQ plug	630.00
6-7.9.97	No work											
8.9.97	Cement to 415 with BQ. Make up NQ		0		5	5	4	1	11		12 bags cement, BQ plug	108.40
9.9.97	Run in NQ and drill to 407		0		9	9	2	1	12.5		1xLP, NQ bit+reamers	1415.00
10.9.97	Drill out HQ barrel and drill NQ	437.4	2.5		13	13		1	13.5		1xLP	135.00
11.9.97	Change bit. Drill NQ. Stuck at 449.1	453.8	16.4		13.5	13.5		1	14		NQ bit	650.00
12.9.97	RIH BQ and cement NQ barrel		0		5	5	4	1	10		4 bags cement. BQ plug	42.80
13-14.9.97	No work											
15.9.97	Change BOP packing, clean chicksan lines, service rig				0				12		BQ bit+reamers.	1071.00
16.9.97	RIH and drill out NQ barrel		0		12	12		1	12		BQ bit	455.00
17.9.97	Change bit. Drill BQ. Cement job	460.4	6.6		12.5	12.5		1	13		1xLP. 1bag cement, BQ plug	153.20
18.9.97	Drill out cement. Rod trip. Drill BQ	469.8	9.4		13	13		1	13.5		1xLP	135.00
19.9.97	Drill BQ. Rod trip. Cement job	478.4	8.6		11	11		1	12		3 bags cement, BQ plug	34.60
20-21.9.97	No work											
22.9.97	Drill out cement. Drill BQ	483.9	5.5		11.5	11.5		1	13.5			
23.9.97	Drill BQ	501.9	18		12	12		1	12.5		1xLP	135.00
24.9.97	Drill BQ. Cement job back to 477	514.1	12.2		11.5	11.5		1	12		4 bags cement, BQ plug	42.80
25.9.97	Drill out cement. Drill BQ	517.8	3.7		13	13		1	13.5			
26.9.97	Drill BQ	539.8	22		12	12		1	12.5			

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APPENDIX 1
(Part 1)

MICROFILMED
FICHE No. 014529-39

Vol 2 of 6

Great South Land Minerals Pty Ltd

A.C.N. 068 650 386

MINERAL RESOURCES
EL1/96 VOL 10
-2 DEC 1997
See folio 35

Amdel Limited Petroleum Services
Gas and Water Analysis

Report Number	Date
LQ5351	Dec 96
LQ5368	Dec 96
LQ5390	Dec 96
LQ5417	Mar 97
LQ5525	Mar 97
LQ5537	Mar 97
LQ5548	Mar 97
LQ5564	Mar 97
LQ5573	Mar 97
LQ5578	Mar 97
LQ5591	Mar 97
LQ5693	Mar 97
LQ5639	Apr 97

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ANNUAL REPORT - 1997 VOL 2 of 6
EL'S 1.88, 9/95 & 21/95 - GREAT
SOUTHLAND MIN. BURRETT/TANNER

amdel

415044

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5351

Sample: SHITTIM-1B
1630 m
22/11/96

GAS	MOL %
Oxygen plus Argon	20.32
Nitrogen	78.92
Helium	0.00
Carbon Dioxide	0.15
Hydrogen	0.61
Methane	0.00
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'os	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.69
Lower Flammability limit	654.42
Upper Flammability limit	12139.41
Ratio of upper to lower	18.55
Wobbe Index	0.07
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.991
Real gas Density (Rel to air = 1)	0.990
Ideal Nett Calorific Value MJ/m^3	0.06
Ideal Gross Calorific Value MJ/m^3	0.07
Real Nett Calorific Value MJ/m^3	0.06
Real Gross Calorific Value MJ/m^3	0.07
Gross calorific value of water-saturated gas MJ/m^3	0.04

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valente

Date : 02-12-96

amdel

415045

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd — Report # LQ5351

Sample: SHITTIM-1B
1630 m
22/11/96
AIR CORRECTED

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	89.75
Helium	0.00
Carbon Dioxide	1.76
Hydrogen	8.49
Methane	0.00
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.09
Lower Flammability limit	47.10
Upper Flammability limit	873.74
Ratio of upper to lower	18.55
Wobbe Index	1.08
Compressibility Factor	1.0006
Ideal Gas Density (Rel to air = 1)	0.901
Real gas Density (Rel to air = 1)	0.900
Ideal Nett Calorific Value MJ/m^3	0.87
Ideal Gross Calorific Value MJ/m^3	1.03
Real Nett Calorific Value MJ/m^3	0.87
Real Gross Calorific Value MJ/m^3	1.03
Gross calorific value of water-saturated gas MJ/m^3	0.98

This report relates specifically to the sample submitted for analysis.

Signed Lasmelin Valents

Date : 02-12-96

amdel

415046

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5351

Sample: SHITTIM-1B
1631 m
22/11/96

GAS	MOL %
Oxygen plus Argon	16.03
Nitrogen	83.02
Helium	0.00
Carbon Dioxide	0.14
Hydrogen	0.81
Methane	0.00
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.46
Lower Flammability limit	492.72
Upper Flammability limit	9139.90
Ratio of upper to lower	18.55
Wobbe Index	0.10
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.983
Real gas Density (Rel to air = 1)	0.983
Ideal Nett Calorific Value MJ/m^3	0.08
Ideal Gross Calorific Value MJ/m^3	0.10
Real Nett Calorific Value MJ/m^3	0.08
Real Gross Calorific Value MJ/m^3	0.10
Gross calorific value of water-saturated gas MJ/m^3	0.07

This report relates specifically to the sample submitted for analysis.

Signed Carmelia Valenti

Date : 02-12-96

amdel

415047

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5351

Sample: SHITTIM-1B
1631 m
22/11/96

AIR CORRECTED

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.51
Helium	0.00
Carbon Dioxide	0.46
Hydrogen	3.03
Methane	0.00
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.30
Lower Flammability limit	132.00
Upper Flammability limit	2448.53
Ratio of upper to lower	18.55
Wobbe Index	0.38
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.943
Real gas Density (Rel to air = 1)	0.942
Ideal Nett Calorific Value MJ/m^3	0.31
Ideal Gross Calorific Value MJ/m^3	0.37
Real Nett Calorific Value MJ/m^3	0.31
Real Gross Calorific Value MJ/m^3	0.37
Gross calorific value of water-saturated gas MJ/m^3	0.33

This report relates specifically to the sample submitted for analysis.

Signed Lucrecia Valenzuela

Date : 02-12-96

amdel

415048

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105
Air Corrected and Nitrogen Corrected

GAS	MOL. %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	5.86
Hydrogen	55.33
Methane	38.72
Ethane	0.028
Propane	0.0077
I-Butane	0.000
N-Butane	0.027
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.024
Hexanes	0.0027
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	9.95
Lower Flammability limit	4.62
Upper Flammability limit	29.97
Ratio of upper to lower	6.48
Wobbe Index	36.48
Compressibility Factor	1.0051
Ideal Gas Density (Rel to air = 1)	0.344
Real gas Density (Rel to air = 1)	0.342
Ideal Nett Calorific Value MJ/m^3	18.89
Ideal Gross Calorific Value MJ/m^3	21.39
Real Nett Calorific Value MJ/m^3	18.80
Real Gross Calorific Value MJ/m^3	21.28
Gross calorific value of water-saturated gas MJ/m^3	21.00

This report relates specifically to the sample submitted for analysis.

Signed

Date : 06-12-96

amdel

415049

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.36
Nitrogen	78.51
Carbon Dioxide	0.11
Hydrogen	0.60
Methane	0.42
Ethane	0.0003
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0003
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.64
Lower Flammability limit	426.41
Upper Flammability limit	2763.37
Ratio of upper to lower	6.48
Wobbe Index	0.23
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.989
Real gas Density (Rel to air = 1)	0.989
Ideal Nett Calorific Value MJ/m^3	0.20
Ideal Gross Calorific Value MJ/m^3	0.23
Real Nett Calorific Value MJ/m^3	0.20
Real Gross Calorific Value MJ/m^3	0.23
Gross calorific value of water-saturated gas MJ/m^3	0.20

This report relates specifically to the sample submitted for analysis.

Signed

Date : 06-12-96

amdel

415050

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105
Air Corrected

GAS	MOL. %
Oxygen plus Argon	0.00
Nitrogen	80.81
Carbon Dioxide	1.12
Hydrogen	10.62
Methane	7.43
Ethane	0.0053
Propane	0.0015
I-Butane	0.0000
N-Butane	0.0051
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0046
Hexanes	0.0005
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	24.55
Lower Flammability limit	24.09
Upper Flammability limit	156.15
Ratio of upper to lower	6.48
Wobbe Index	4.46
Compressibility Factor	1.0007
Ideal Gas Density (Rel to air = 1)	0.848
Real gas Density (Rel to air = 1)	0.847
Ideal Nett Calorific Value MJ/m^3	3.63
Ideal Gross Calorific Value MJ/m^3	4.10
Real Nett Calorific Value MJ/m^3	3.62
Real Gross Calorific Value MJ/m^3	4.10
Gross calorific value of water-saturated gas MJ/m^3	4.00

This report relates specifically to the sample submitted for analysis.

Signed

Date : 06-12-96

amdel

415051

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.62
Carbon Dioxide	1.36
Hydrogen	0.60
Methane	0.42
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.02
Lower Flammability limit	427.35
Upper Flammability limit	2771.14
Ratio of upper to lower	6.48
Wobbe Index	0.23
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.968
Real gas Density (Rel to air = 1)	0.967
Ideal Nett Calorific Value MJ/m³	0.20
Ideal Gross Calorific Value MJ/m³	0.23
Real Nett Calorific Value MJ/m³	0.20
Real Gross Calorific Value MJ/m³	0.23
Gross calorific value of water-saturated gas MJ/m³	0.20

This report relates specifically to the sample submitted for analysis.

Signed Carmelin Valenti

Date : 06-12-96

amdel

415052

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.36
Nitrogen	78.51
Carbon Dioxide	0.11
Hydrogen	0.60
Methane	0.42
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.64
Lower Flammability limit	427.35
Upper Flammability limit	2771.14
Ratio of upper to lower	6.48
Wobbe Index	0.23
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.989
Real gas Density (Rel to air = 1)	0.989
Ideal Nett Calorific Value MJ/m^3	0.20
Ideal Gross Calorific Value MJ/m^3	0.23
Real Nett Calorific Value MJ/m^3	0.20
Real Gross Calorific Value MJ/m^3	0.23
Gross calorific value of water-saturated gas MJ/m^3	0.20

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 06-12-96

amdel

413053

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.62
Carbon Dioxide	1.36
Hydrogen	0.60
Methane	0.42
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.02
Lower Flammability limit	427.35
Upper Flammability limit	2771.14
Ratio of upper to lower	6.48
Wobbe Index	0.23
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.968
Real gas Density (Rel to air = 1)	0.967
Ideal Nett Calorific Value MJ/m^3	0.20
Ideal Gross Calorific Value MJ/m^3	0.23
Real Nett Calorific Value MJ/m^3	0.20
Real Gross Calorific Value MJ/m^3	0.23
Gross calorific value of water-saturated gas MJ/m^3	0.20

This report relates specifically to the sample submitted for analysis.

Signed Pamela Valenti

Date : 06-12-96

amdel

415054

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.36
Nitrogen	78.51
Carbon Dioxide	0.11
Hydrogen	0.60
Methane	0.42
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.64
Lower Flammability limit	427.35
Upper Flammability limit	2771.14
Ratio of upper to lower	6.48
Wobbe Index	0.23
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.989
Real gas Density (Rel to air = 1)	0.989
Ideal Nett Calorific Value MJ/m^3	0.20
Ideal Gross Calorific Value MJ/m^3	0.23
Real Nett Calorific Value MJ/m^3	0.20
Real Gross Calorific Value MJ/m^3	0.23
Gross calorific value of water-saturated gas MJ/m^3	0.20

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 06-12-96

amdel

415055

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105
Air Corrected and Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	5.86
Hydrogen	55.37
Methane	38.77
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	9.92
Lower Flammability limit	4.63
Upper Flammability limit	30.03
Ratio of upper to lower	6.48
Wobbe Index	36.42
Compressibility Factor	1.0051
Ideal Gas Density (Rel to air = 1)	0.342
Real gas Density (Rel to air = 1)	0.340
Ideal Nett Calorific Value MJ/m^3	18.82
Ideal Gross Calorific Value MJ/m^3	21.31
Real Nett Calorific Value MJ/m^3	18.72
Real Gross Calorific Value MJ/m^3	21.20
Gross calorific value of water-saturated gas MJ/m^3	20.92

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 06-12-96

amdel

415056

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.36
Nitrogen	78.51
Carbon Dioxide	0.11
Hydrogen	0.60
Methane	0.42
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.64
Lower Flammability limit	427.35
Upper Flammability limit	2771.14
Ratio of upper to lower	6.48
Wobbe Index	0.23
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.989
Real gas Density (Rel to air = 1)	0.989
Ideal Nett Calorific Value MJ/m^3	0.20
Ideal Gross Calorific Value MJ/m^3	0.23
Real Nett Calorific Value MJ/m^3	0.20
Real Gross Calorific Value MJ/m^3	0.23
Gross calorific value of water-saturated gas MJ/m^3	0.20

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 06-12-96

amdel

415057

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5368

Sample: Sample 105
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	80.83
Carbon Dioxide	1.12
Hydrogen	10.62
Methane	7.43
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	24.54
Lower Flammability limit	24.14
Upper Flammability limit	156.56
Ratio of upper to lower	6.48
Wobbe Index	4.44
Compressibility Factor	1.0007
Ideal Gas Density (Rel to air = 1)	0.847
Real gas Density (Rel to air = 1)	0.846
Ideal Nett Calorific Value MJ/m^3	3.61
Ideal Gross Calorific Value MJ/m^3	4.09
Real Nett Calorific Value MJ/m^3	3.61
Real Gross Calorific Value MJ/m^3	4.08
Gross calorific value of water-saturated gas MJ/m^3	3.99

This report relates specifically to the sample submitted for analysis.

Signed Carmelin Valente

Date : 06-12-96

amdel

415058

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: FLOW LINE - SHITTIM # 1C
37 Units, 1psig, 1645.3m
05/12/96, 3:20h, Cyl# 271
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.67
Carbon Dioxide	0.79
Helium	0.19
Hydrogen	1.93
Methane	0.4125
Ethane	0.0056
Propane	0.0012
I-Butane	0.0000
N-Butane	0.0011
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0012
Hexanes	0.0026
Heptanes	0.0004
Octanes and higher h'cs	0.0000
Total	100.00

$C_2 = 56$ / $\Sigma HC = 65$ = 0.86

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.54
Lower Flammability limit	174.78
Upper Flammability limit	1825.61
Ratio of upper to lower	10.45
Wobbe Index	0.41
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.951
Real gas Density (Rel to air = 1)	0.951
Ideal Nett Calorific Value MJ/m^3	0.35
Ideal Gross Calorific Value MJ/m^3	0.40
Real Nett Calorific Value MJ/m^3	0.35
Real Gross Calorific Value MJ/m^3	0.40
Gross calorific value of water-saturated gas MJ/m^3	0.36

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415059

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: FLOW LINE – SHITTIM #1C
37 Units, 1psig, 1645.3m
05/12/96, 3:20h, Cyl# 271
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.01
Nitrogen	80.60
Carbon Dioxide	0.13
Helium	0.02
Hydrogen	0.20
Methane	0.0427
Ethane	0.0006
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0003
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.73
Lower Flammability limit	1688.61
Upper Flammability limit	17637.77
Ratio of upper to lower	10.45
Wobbe Index	0.04
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.04
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.04
Gross calorific value of water-saturated gas MJ/m^3	0.01

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415060

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: FLOW LINE – SHITTIM #1C
37 Units, 1psig, 1645.3m
05/12/96, 3:20h, Cyl# 271
Air, Nitrogen and Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	0.00
Helium	7.58
Hydrogen	75.77
Methane	16.1769
Ethane	0.2209
Propane	0.0466
I-Butane	0.0000
N-Butane	0.0432
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0458
Hexanes	0.1027
Heptanes	0.0170
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.68
Lower Flammability limit	4.46
Upper Flammability limit	46.56
Ratio of upper to lower	10.45
Wobbe Index	39.29
Compressibility Factor	1.0076
Ideal Gas Density (Rel to air = 1)	0.161
Real gas Density (Rel to air = 1)	0.160
Ideal Nett Calorific Value MJ/m^3	13.73
Ideal Gross Calorific Value MJ/m^3	15.79
Real Nett Calorific Value MJ/m^3	13.62
Real Gross Calorific Value MJ/m^3	15.67
Gross calorific value of water-saturated gas MJ/m^3	15.49

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415061

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: FLOW LINE - SHITTIM #1C
37 Units, 1psig, 1645.3m
05/12/96, 3:20h, Cyl# 271
Air and Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	23.70
Helium	5.78
Hydrogen	57.82
Methane	12.3444
Ethane	0.1685
Propane	0.0356
I-Butane	0.0000
N-Butane	0.0330
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0350
Hexanes	0.0783
Heptanes	0.0130
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	13.99
Lower Flammability limit	5.84
Upper Flammability limit	61.01
Ratio of upper to lower	10.45
Wobbe Index	17.33
Compressibility Factor	1.0053
Ideal Gas Density (Rel to air = 1)	0.483
Real gas Density (Rel to air = 1)	0.480
Ideal Nett Calorific Value MJ/m^3	10.48
Ideal Gross Calorific Value MJ/m^3	12.05
Real Nett Calorific Value MJ/m^3	10.42
Real Gross Calorific Value MJ/m^3	11.98
Gross calorific value of water-saturated gas MJ/m^3	11.81

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415062

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: SAMPLE NO.4 - SHITTim #1C
Cuttinga Gas
HW 37, 1643.2m
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.84
Nitrogen	80.94
Carbon Dioxide	0.06
Helium	0.00
Hydrogen	0.11
Methane	0.05
Ethane	0.0005
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0002
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0002
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.74
Lower Flammability limit	2572.67
Upper Flammability limit	19257.80
Ratio of upper to lower	7.49
Wobbe Index	0.03
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m^3	0.03
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.03
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415063

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: SAMPLE NO.4 – SHITTIM #1C
Cuttings Gas
HW 37, 1643.2m
Air, Nitrogen and Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	0.00
Helium	0.00
Hydrogen	66.64
Methane	32.66
Ethane	0.3041
Propane	0.1012
I-Butane	0.0000
N-Butane	0.1200
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.1103
Hexanes	0.0709
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	6.93
Lower Flammability limit	4.25
Upper Flammability limit	31.79
Ratio of upper to lower	7.49
Wobbe Index	43.14
Compressibility Factor	1.0065
Ideal Gas Density (Rel to air = 1)	0.239
Real gas Density (Rel to air = 1)	0.238
Ideal Nett Calorific Value MJ/m^3	18.57
Ideal Gross Calorific Value MJ/m^3	21.10
Real Nett Calorific Value MJ/m^3	18.45
Real Gross Calorific Value MJ/m^3	20.96
Gross calorific value of water-saturated gas MJ/m^3	20.71

This report relates specifically to the sample submitted for analysis.

Signed _____

Date 16-12-96

amdel

415064

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: SAMPLE NO.4 — SHITTIM # 1C
Cuttings Gas
HW 37, 1643.2m
Air and Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	13.50
Helium	0.00
Hydrogen	57.64
Methane	28.25
Ethane	0.2631
Propane	0.0875
I-Butane	0.0000
N-Butane	0.1038
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0954
Hexanes	0.0613
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	11.93
Lower Flammability limit	4.91
Upper Flammability limit	36.75
Ratio of upper to lower	7.49
Wobbe Index	28.43
Compressibility Factor	1.0052
Ideal Gas Density (Rel to air = 1)	0.412
Real gas Density (Rel to air = 1)	0.410
Ideal Nett Calorific Value MJ/m^3	16.07
Ideal Gross Calorific Value MJ/m^3	18.25
Real Nett Calorific Value MJ/m^3	15.98
Real Gross Calorific Value MJ/m^3	18.16
Gross calorific value of water-saturated gas MJ/m^3	17.91

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415065

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: SAMPLE NO.4 — SHITTim #1C
Cuttings Gas
HW 37, 1643.2m
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	98.29
Carbon Dioxide	0.23
Helium	0.00
Hydrogen	0.99
Methane	0.49
Ethane	0.0045
Propane	0.0015
I-Butane	0.0000
N-Butane	0.0018
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0016
Hexanes	0.0011
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

✓

$C_2 = 45$ / $\Sigma C_3 - C_8$ 60 = 0.75

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.74
Lower Flammability limit	285.21
Upper Flammability limit	2134.99
Ratio of upper to lower	7.49
Wobbe Index	0.32
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.958
Real gas Density (Rel to air = 1)	0.957
Ideal Nett Calorific Value MJ/m^3	0.28
Ideal Gross Calorific Value MJ/m^3	0.31
Real Nett Calorific Value MJ/m^3	0.28
Real Gross Calorific Value MJ/m^3	0.31
Gross calorific value of water-saturated gas MJ/m^3	0.28

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415066

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: HOT BY SUCTION - SHITTIM #1C
37 psig, 1640m
05/12/96, Cyl# 122
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.92
Carbon Dioxide	0.11
Helium	0.41
Hydrogen	1.23
Methane	0.33
Ethane	0.00255
Propane	0.00079
I-Butane	0.00000
N-Butane	0.00073
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00033
Hexanes	0.00044
Heptanes	0.00020
Octanes and higher h'cs	0.00000
Total	100.01

3.2

$C_2 = \frac{0.255}{249} = 1.024$

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.57
Lower Flammability limit	266.43
Upper Flammability limit	2569.90
Ratio of upper to lower	9.65
Wobbe Index	0.28
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.952
Real gas Density (Rel to air = 1)	0.952
Ideal Nett Calorific Value MJ/m^3	0.24
Ideal Gross Calorific Value MJ/m^3	0.28
Real Nett Calorific Value MJ/m^3	0.24
Real Gross Calorific Value MJ/m^3	0.28
Gross calorific value of water-saturated gas MJ/m^3	0.24

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415067

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: HOT WIRE BY SUCTION – SHITTim · #1C
37 Units, 0 psig, 1640m
05/12/96, Cyl# 122
Air, Nitrogen and Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	0.00
Helium	20.78
Hydrogen	62.34
Methane	16.62
Ethane	0.12925
Propane	0.03990
I-Butane	0.00000
N-Butane	0.03699
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.01662
Hexanes	0.02244
Heptanes	0.01039
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.88
Lower Flammability limit	5.25
Upper Flammability limit	50.67
Ratio of upper to lower	9.65
Wobbe Index	34.26
Compressibility Factor	1.0062
Ideal Gas Density (Rel to air = 1)	0.168
Real gas Density (Rel to air = 1)	0.167
Ideal Nett Calorific Value MJ/m^3	12.25
Ideal Gross Calorific Value MJ/m^3	14.06
Real Nett Calorific Value MJ/m^3	12.18
Real Gross Calorific Value MJ/m^3	13.97
Gross calorific value of water-saturated gas MJ/m^3	13.79

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415068

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5390

Sample: HOT WIRE BY SUCTION - Shirrim #1C
37 Units, 0 psig, 1640m
05/12/96, Cyl# 122
Air and Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	5.13
Helium	19.71
Hydrogen	59.14
Methane	15.77
Ethane	0.12262
Propane	0.03785
I-Butane	0.00000
N-Butane	0.03509
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.01577
Hexanes	0.02129
Heptanes	0.00986
Octanes and higher h'cs	0.00000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	6.88
Lower Flammability limit	5.54
Upper Flammability limit	53.42
Ratio of upper to lower	9.65
Wobbe Index	27.35
Compressibility Factor	1.0059
Ideal Gas Density (Rel to air = 1)	0.238
Real gas Density (Rel to air = 1)	0.236
Ideal Nett Calorific Value MJ/m^3	11.62
Ideal Gross Calorific Value MJ/m^3	13.34
Real Nett Calorific Value MJ/m^3	11.56
Real Gross Calorific Value MJ/m^3	13.26
Gross calorific value of water-saturated gas MJ/m^3	13.08

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 16-12-96

amdel

415069

Amdel Limited
A.C.N. 008 127 802

Petroleum Services
PO Box 338
Torrensville Plaza SA 5031

Telephone: (08) 8416 5240
Facsimile: (08) 8234 2933

21 March, 1997

Condor Oil Investments
84 Well Parade
BLACKMANS BAY
HOBART TAS 7052

Attention: Malcolm Bendall

REPORT LQ5417

CLIENT REFERENCE:

WELL NAME/RE: Shittim-1C

MATERIAL: Gas

WORK REQUIRED: Gas Chromatography & Geochemistry

Please direct technical enquiries regarding this work to the signatory below under whose supervision the work was carried out.

Brian L. Watson
Manager
Petroleum Services

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1. INTRODUCTION

Five (5) samples were received for gas compositions, three (3) samples for extraction of organic matter and two (2) core sample on 20 December 1996.

2. ANALYTICAL PROCEDURES

Headspace analysis was determined by injection onto a Perkin Elmer Sigma 2 gas chromatograph equipped with a packed alumina column.

Nitrogen and carbon dioxide were determined by injection onto a Varian 6000 gas chromatograph equipped with a porapak column, thermal conductivity detector and helium carrier gas.

Hydrogen and helium were determined by injection onto a Varian 6000 gas chromatograph equipped with a molecular sieve column, thermal conductivity detector and argon carrier.

Concentrations were calculated from peak areas measured with an integrator and compared with peak areas taken from standard gas mixtures of known concentrations injected onto the same chromatograph using the same conditions.

The water samples were extracted with dichloromethane in a separating funnel. The core samples were extracted in a soxhlet apparatus with dichloromethane for eight hours. Removal of solvent by careful rotary evaporation from both the core and water samples gave the extracts. These were subsequently analysed by gas chromatography. The gas chromatograph was setup with a capillary column, a flame ionisation detector and nitrogen carrier gas.

The saturated and aromatic hydrocarbons were separated by liquid chromatography on activated silica gel and activated alumina. The saturated hydrocarbons were eluted with petroleum ether, the aromatic hydrocarbons with petroleum ether/dichloromethane and the polars and resins were eluted with methanol/dichloromethane.

The saturated hydrocarbons (alkanes) were examined by gas chromatography.

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

3. RESULTS

Gas composition results are presented on the following pages. The water and core extract yields were determined to be:

1664 m	<0.5 mg/L
1674 m	2 mg/L
1676 m	<0.5 mg/L
1676 m (a)	<0.5 mg/kg
(b)	9.7 mg/kg

Total organic carbon results for the two Shittim-1C 1676 m core samples was 0.12% for both samples. Compositional data and alkane ratios for the core extract from Shittim-1C 1676 m are given in the table below.

Compositional Data (%)			Alkane Ratios		
Sats	**Arom**	**P&R**	**Pr/Ph**	**Pr/17**	**Ph/18**
25.8	9.7	22.6	1.11	0.45	0.25

Sats - Saturated Hydrocarbons
Arom - Aromatic Hydrocarbons
P&R - Polars & Resins
Pr - Pristane
Ph - Phytane
17 - nC_{17}
18 - nC_{18}

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415072

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: SHITTIM 1C (7)
Hot Wire @ 46 Units
17/12/96, 1674 m
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.67
Nitrogen	80.94
Helium	0.00
Carbon Dioxide	0.11
Hydrogen	0.26
Methane	0.02
Ethane	0.00063
Propane	0.00011
I-Butane	0.00000
N-Butane	0.00016
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00009
Hexanes	0.00001
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.71
Lower Flammability limit	1450.68
Upper Flammability limit	20995.26
Ratio of upper to lower	14.47
Wobbe Index	0.04
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.991
Real gas Density (Rel to air = 1)	0.991
Ideal Nett Calorific Value MJ/m^3	0.03
Ideal Gross Calorific Value MJ/m^3	0.04
Real Nett Calorific Value MJ/m^3	0.03
Real Gross Calorific Value MJ/m^3	0.04
Gross calorific value of water-saturated gas MJ/m^3	0.01

This report relates specifically to the sample submitted for analysis.

Signed Pamela Valente

Date : 24-12-96

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415073

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: SHITTIM 1C (7)
Hot Wire @ 46 Units
17/12/96, 1674 m
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.42
Helium	0.00
Carbon Dioxide	0.58
Hydrogen	2.80
Methane	0.19
Ethane	0.00674
Propane	0.00118
I-Butane	0.00000
N-Butane	0.00168
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00099
Hexanes	0.00010
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.36
Lower Flammability limit	134.88
Upper Flammability limit	1952.08
Ratio of upper to lower	14.47
Wobbe Index	0.43
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.945
Real gas Density (Rel to air = 1)	0.944
Ideal Nett Calorific Value MJ/m^3	0.36
Ideal Gross Calorific Value MJ/m^3	0.42
Real Nett Calorific Value MJ/m^3	0.36
Real Gross Calorific Value MJ/m^3	0.42
Gross calorific value of water-saturated gas MJ/m^3	0.38

This report relates specifically to the sample submitted for analysis.

Signed Pamela Valenti

Date : 24-12-96

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415074

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: SHITTIM 1C (7)
Hot Wire @ 46 Units
17/12/96, 1674 m
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	16.34
Hydrogen	78.10
Methane	5.26
Ethane	0.18835
Propane	0.03304
I-Butane	0.00000
N-Butane	0.04686
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.02764
Hexanes	0.00270
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	9.73
Lower Flammability limit	4.83
Upper Flammability limit	69.89
Ratio of upper to lower	14.47
Wobbe Index	20.16
Compressibility Factor	1.0076
Ideal Gas Density (Rel to air = 1)	0.336
Real gas Density (Rel to air = 1)	0.333
Ideal Nett Calorific Value MJ/m^3	10.01
Ideal Gross Calorific Value MJ/m^3	11.69
Real Nett Calorific Value MJ/m^3	9.94
Real Gross Calorific Value MJ/m^3	11.60
Gross calorific value of water-saturated gas MJ/m^3	11.46

This report relates specifically to the sample submitted for analysis.

Signed Carmelita Valente

Date : 24-12-96

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415075

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: SHITTIM 1C (7)
Hot Wire @ 46 Units
17/12/96, 1674 m
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	93.35
Methane	6.29
Ethane	0.22512
Propane	0.03949
I-Butane	0.00000
N-Butane	0.05601
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.03303
Hexanes	0.00323
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.04
Lower Flammability limit	4.04
Upper Flammability limit	58.48
Ratio of upper to lower	14.47
Wobbe Index	43.15
Compressibility Factor	1.0094
Ideal Gas Density (Rel to air = 1)	0.105
Real gas Density (Rel to air = 1)	0.104
Ideal Nett Calorific Value MJ/m^3	11.97
Ideal Gross Calorific Value MJ/m^3	13.97
Real Nett Calorific Value MJ/m^3	11.86
Real Gross Calorific Value MJ/m^3	13.84
Gross calorific value of water-saturated gas MJ/m^3	13.70

This report relates specifically to the sample submitted for analysis.

Signed Pamela Valente

Date : 24-12-96

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415076

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE
46 Units, 1674 m
17/12/96, 1823 h, Cyl# 175
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.00
Nitrogen	80.77
Helium	0.00
Carbon Dioxide	0.03
Hydrogen	0.18
Methane	0.02
Ethane	0.00061
Propane	0.00009
I-Butane	0.00000
N-Butane	0.00010
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00001
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.73
Lower Flammability limit	2063.67
Upper Flammability limit	28228.60
Ratio of upper to lower	13.68
Wobbe Index	0.03
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed Pamela Valente

Date : 24-12-96

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PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE
46 Units, 1674 m
17/12/96, 1823 h, Cyl# 175
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	98.23
Helium	0.00
Carbon Dioxide	0.04
Hydrogen	1.58
Methane	0.14
Ethane	0.00535
Propane	0.00076
I-Butane	0.00000
N-Butane	0.00089
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00010
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.59
Lower Flammability limit	235.23
Upper Flammability limit	3217.71
Ratio of upper to lower	13.68
Wobbe Index	0.25
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.953
Real gas Density (Rel to air = 1)	0.952
Ideal Nett Calorific Value MJ/m^3	0.21
Ideal Gross Calorific Value MJ/m^3	0.25
Real Nett Calorific Value MJ/m^3	0.21
Real Gross Calorific Value MJ/m^3	0.25
Gross calorific value of water-saturated gas MJ/m^3	0.21

This report relates specifically to the sample submitted for analysis.

Signed Pimentel-Valente

Date : 24-12-96

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415078

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE
46 Units, 1674 m
17/12/96, 1823 h, Cyl# 175
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	2.39
Hydrogen	89.40
Methane	7.80
Ethane	0.30298
Propane	0.04321
I-Butane	0.00000
N-Butane	0.05017
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00546
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.25
Lower Flammability limit	4.15
Upper Flammability limit	56.83
Ratio of upper to lower	13.68
Wobbe Index	36.71
Compressibility Factor	1.0090
Ideal Gas Density (Rel to air = 1)	0.147
Real gas Density (Rel to air = 1)	0.145
Ideal Nett Calorific Value MJ/m^3	12.08
Ideal Gross Calorific Value MJ/m^3	14.06
Real Nett Calorific Value MJ/m^3	11.97
Real Gross Calorific Value MJ/m^3	13.94
Gross calorific value of water-saturated gas MJ/m^3	13.79

This report relates specifically to the sample submitted for analysis.

Signed Pamela Valente

Date : 24-12-96

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415079

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE
46 Units, 1674 m
17/12/96, 1823 h, Cyl# 175
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	91.60
Methane	7.99
Ethane	0.31041
Propane	0.04427
I-Butane	0.00000
N-Butane	0.05140
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00560
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.28
Lower Flammability limit	4.06
Upper Flammability limit	55.47
Ratio of upper to lower	13.68
Wobbe Index	42.84
Compressibility Factor	1.0092
Ideal Gas Density (Rel to air = 1)	0.113
Real gas Density (Rel to air = 1)	0.112
Ideal Nett Calorific Value MJ/m^3	12.37
Ideal Gross Calorific Value MJ/m^3	14.41
Real Nett Calorific Value MJ/m^3	12.26
Real Gross Calorific Value MJ/m^3	14.27
Gross calorific value of water-saturated gas MJ/m^3	14.13

This report relates specifically to the sample submitted for analysis.

Signed Pamela Vabre

Date : 24-12-96

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415080

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE
37 Units, 1680 m
18/12/96, 1130 h, Cyl# 302
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.07
Nitrogen	80.47
Helium	0.18
Carbon Dioxide	0.03
Hydrogen	0.23
Methane	0.02
Ethane	0.00068
Propane	0.00013
I-Butane	0.00000
N-Butane	0.00014
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00008
Hexanes	0.00003
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.67
Lower Flammability limit	1638.60
Upper Flammability limit	23696.75
Ratio of upper to lower	14.46
Wobbe Index	0.03
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.990
Real gas Density (Rel to air = 1)	0.990
Ideal Nett Calorific Value MJ/m^3	0.03
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.03
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed Carmelin Valenti

Date : 24-12-96

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415081

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE
37 Units, 1680 m
18/12/96, 1130 h, Cyl# 302
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.13
Helium	1.62
Carbon Dioxide	0.02
Hydrogen	2.08
Methane	0.14
Ethane	0.00615
Propane	0.00121
I-Butane	0.00000
N-Butane	0.00123
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00075
Hexanes	0.00023
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.07
Lower Flammability limit	181.55
Upper Flammability limit	2625.48
Ratio of upper to lower	14.46
Wobbe Index	0.32
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.935
Real gas Density (Rel to air = 1)	0.934
Ideal Nett Calorific Value MJ/m^3	0.27
Ideal Gross Calorific Value MJ/m^3	0.31
Real Nett Calorific Value MJ/m^3	0.27
Real Gross Calorific Value MJ/m^3	0.31
Gross calorific value of water-saturated gas MJ/m^3	0.27

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 24-12-96

amdel

415082

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE
37 Units, 1680 m
18/12/96, 1130 h, Cyl# 302
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	42.02
Carbon Dioxide	0.46
Hydrogen	53.69
Methane	3.59
Ethane	0.15897
Propane	0.03128
I-Butane	0.00000
N-Butane	0.03175
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.01937
Hexanes	0.00607
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.64
Lower Flammability limit	7.02
Upper Flammability limit	101.52
Ratio of upper to lower	14.46
Wobbe Index	22.72
Compressibility Factor	1.0054
Ideal Gas Density (Rel to air = 1)	0.126
Real gas Density (Rel to air = 1)	0.125
Ideal Nett Calorific Value MJ/m^3	6.90
Ideal Gross Calorific Value MJ/m^3	8.06
Real Nett Calorific Value MJ/m^3	6.87
Real Gross Calorific Value MJ/m^3	8.01
Gross calorific value of water-saturated gas MJ/m^3	7.89

This report relates specifically to the sample submitted for analysis.

Signed Cinnelin Valente

Date : 24-12-96

amdel

415083

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE
37 Units, 1680 m
18/12/96, 1130 h, Cyl# 302
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	42.21
Carbon Dioxide	0.00
Hydrogen	53.94
Methane	3.60
Ethane	0.15970
Propane	0.03142
I-Butane	0.00000
N-Butane	0.03189
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.01946
Hexanes	0.00610
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.45
Lower Flammability limit	6.99
Upper Flammability limit	101.05
Ratio of upper to lower	14.46
Wobbe Index	23.43
Compressibility Factor	1.0054
Ideal Gas Density (Rel to air = 1)	0.119
Real gas Density (Rel to air = 1)	0.119
Ideal Nett Calorific Value MJ/m^3	6.94
Ideal Gross Calorific Value MJ/m^3	8.09
Real Nett Calorific Value MJ/m^3	6.90
Real Gross Calorific Value MJ/m^3	8.05
Gross calorific value of water-saturated gas MJ/m^3	7.93

This report relates specifically to the sample submitted for analysis.

Signed Pierrette Valenti

Date : 24-12-96

amdel

415084

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE (Frothing P.B)
17 Units, 1684 m
19/12/96, 1150 h, Cyl# 500
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.78
Nitrogen	81.08
Helium	0.02
Carbon Dioxide	0.01
Hydrogen	0.10
Methane	0.01
Ethane	0.00020
Propane	0.00007
I-Butane	0.00000
N-Butane	0.00008
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00008
Hexanes	0.00002
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.73
Lower Flammability limit	3668.79
Upper Flammability limit	48292.53
Ratio of upper to lower	13.16
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.02

This report relates specifically to the sample submitted for analysis.

Signed Pirmalin Valente

Date : 24-12-96

amdel

415085

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE (Frothing P.B)
17 Units, 1684 m
19/12/96, 1150 h, Cyl# 500
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	98.94
Helium	0.16
Carbon Dioxide	0.00
Hydrogen	0.82
Methane	0.08
Ethane	0.00165
Propane	0.00055
I-Butane	0.00000
N-Butane	0.00067
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00064
Hexanes	0.00020
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.75
Lower Flammability limit	445.73
Upper Flammability limit	5867.15
Ratio of upper to lower	13.16
Wobbe Index	0.14
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.958
Real gas Density (Rel to air = 1)	0.958
Ideal Nett Calorific Value MJ/m^3	0.12
Ideal Gross Calorific Value MJ/m^3	0.13
Real Nett Calorific Value MJ/m^3	0.12
Real Gross Calorific Value MJ/m^3	0.13
Gross calorific value of water-saturated gas MJ/m^3	0.10

This report relates specifically to the sample submitted for analysis.

Signed Pannelin Valenti

Date : 24-12-96

amdel

415086

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE (Frothing P.B)
17 Units, 1684 m
19/12/96, 1150 h, Cyl# 500
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	15.31
Carbon Dioxide	0.00
Hydrogen	76.55
Methane	7.79
Ethane	0.15387
Propane	0.05129
I-Butane	0.00000
N-Butane	0.06201
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.05971
Hexanes	0.01837
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.57
Lower Flammability limit	4.79
Upper Flammability limit	63.08
Ratio of upper to lower	13.16
Wobbe Index	35.72
Compressibility Factor	1.0077
Ideal Gas Density (Rel to air = 1)	0.123
Real gas Density (Rel to air = 1)	0.122
Ideal Nett Calorific Value MJ/m^3	10.79
Ideal Gross Calorific Value MJ/m^3	12.54
Real Nett Calorific Value MJ/m^3	10.71
Real Gross Calorific Value MJ/m^3	12.44
Gross calorific value of water-saturated gas MJ/m^3	12.30

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 24-12-96

amdel

415087

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE (Frothing P.B)
17 Units, 1684 m
19/12/96, 1150 h, Cyl# 500
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	15.31
Carbon Dioxide	0.00
Hydrogen	76.55
Methane	7.79
Ethane	0.15387
Propane	0.05129
I-Butane	0.00000
N-Butane	0.06201
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.05971
Hexanes	0.01837
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.57
Lower Flammability limit	4.79
Upper Flammability limit	63.08
Ratio of upper to lower	13.16
Wobbe Index	35.72
Compressibility Factor	1.0077
Ideal Gas Density (Rel to air = 1)	0.123
Real gas Density (Rel to air = 1)	0.122
Ideal Nett Calorific Value MJ/m^3	10.79
Ideal Gross Calorific Value MJ/m^3	12.54
Real Nett Calorific Value MJ/m^3	10.71
Real Gross Calorific Value MJ/m^3	12.44
Gross calorific value of water-saturated gas MJ/m^3	12.30

This report relates specifically to the sample submitted for analysis.

Signed Pierrelin Valenti

Date : 24-12-96

amdel

415088

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE (Frothing)
20 Units, 1686 m
19/12/96, 1445 h, Cyl# 512
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.50
Nitrogen	79.35
Helium	0.02
Carbon Dioxide	0.02
Hydrogen	0.10
Methane	0.01
Ethane	0.00030
Propane	0.00007
I-Butane	0.00000
N-Butane	0.00003
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00004
Hexanes	0.00002
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.80
Lower Flammability limit	3635.67
Upper Flammability limit	46329.49
Ratio of upper to lower	12.74
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.994
Real gas Density (Rel to air = 1)	0.994
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Lavrentin Valenta

Date : 24-12-96

amdel

415089

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE (Frothing)
20 Units, 1686 m
19/12/96, 1445 h, Cyl# 512
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.57
Helium	0.37
Carbon Dioxide	0.00
Hydrogen	1.84
Methane	0.21
Ethane	0.00545
Propane	0.00123
I-Butane	0.00000
N-Butane	0.00059
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00075
Hexanes	0.00031
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.42
Lower Flammability limit	198.05
Upper Flammability limit	2523.70
Ratio of upper to lower	12.74
Wobbe Index	0.32
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.947
Real gas Density (Rel to air = 1)	0.947
Ideal Nett Calorific Value MJ/m^3	0.27
Ideal Gross Calorific Value MJ/m^3	0.31
Real Nett Calorific Value MJ/m^3	0.27
Real Gross Calorific Value MJ/m^3	0.31
Gross calorific value of water-saturated gas MJ/m^3	0.27

This report relates specifically to the sample submitted for analysis.

Signed Pavnelin Valente

Date : 24-12-96

amdel

415090

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE (Frothing)
20 Units, 1686 m
19/12/96, 1445 h, Cyl# 512
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	15.15
Carbon Dioxide	0.00
Hydrogen	75.76
Methane	8.75
Ethane	0.22500
Propane	0.05091
I-Butane	0.00000
N-Butane	0.02424
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.03106
Hexanes	0.01288
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.67
Lower Flammability limit	4.80
Upper Flammability limit	61.16
Ratio of upper to lower	12.74
Wobbe Index	35.80
Compressibility Factor	1.0076
Ideal Gas Density (Rel to air = 1)	0.127
Real gas Density (Rel to air = 1)	0.126
Ideal Nett Calorific Value MJ/m^3	10.99
Ideal Gross Calorific Value MJ/m^3	12.75
Real Nett Calorific Value MJ/m^3	10.91
Real Gross Calorific Value MJ/m^3	12.66
Gross calorific value of water-saturated gas MJ/m^3	12.51

This report relates specifically to the sample submitted for analysis.

Signed Pamela Valenti

Date : 24-12-96

amdel

415091

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT Pty Ltd Report # LQ5417

Sample: HOT WIRE (Frothing)
20 Units, 1686 m
19/12/96, 1445 h, Cyl# 512
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	15.15
Carbon Dioxide	0.00
Hydrogen	75.76
Methane	8.75
Ethane	0.22500
Propane	0.05091
I-Butane	0.00000
N-Butane	0.02424
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.03106
Hexanes	0.01288
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

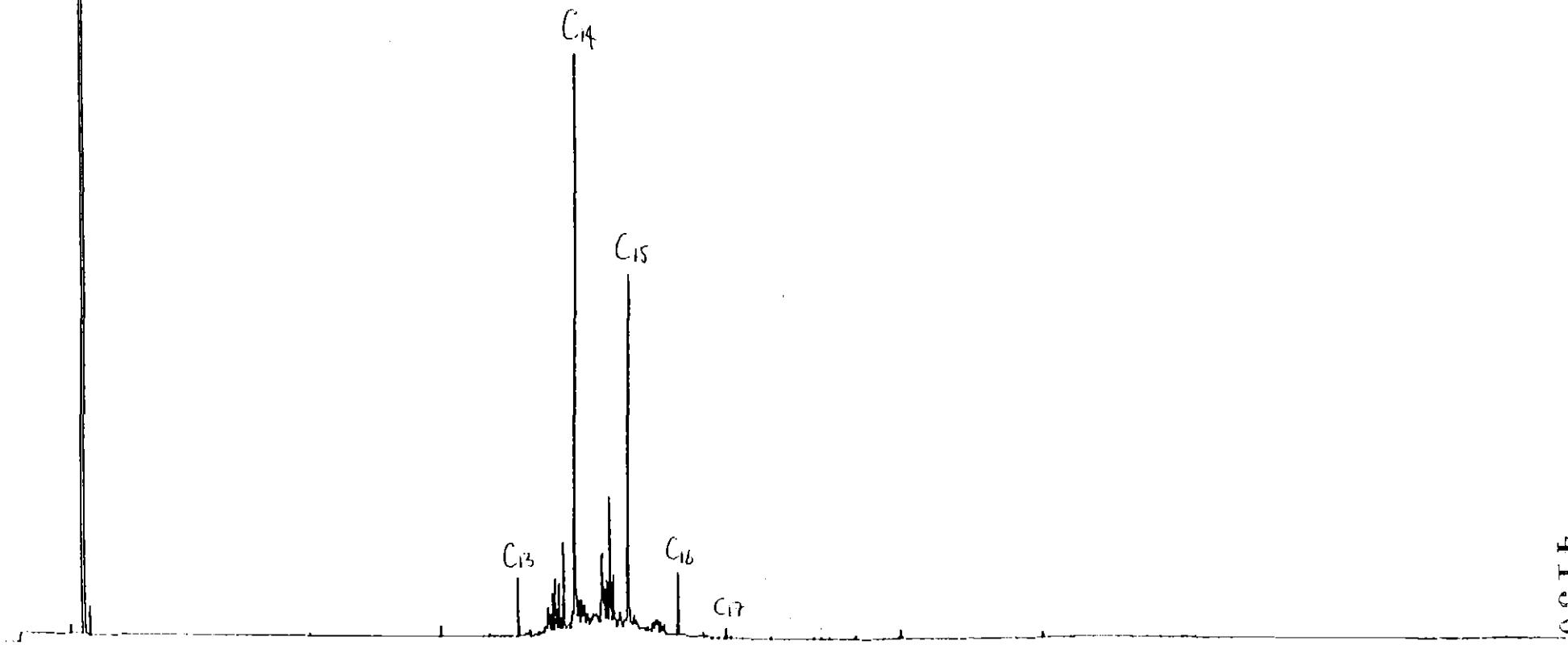
Average Molecular Weight	3.67
Lower Flammability limit	4.80
Upper Flammability limit	61.16
Ratio of upper to lower	12.74
Wobbe Index	35.80
Compressibility Factor	1.0076
Ideal Gas Density (Rel to air = 1)	0.127
Real gas Density (Rel to air = 1)	0.126
Ideal Nett Calorific Value MJ/m^3	10.99
Ideal Gross Calorific Value MJ/m^3	12.75
Real Nett Calorific Value MJ/m^3	10.91
Real Gross Calorific Value MJ/m^3	12.66
Gross calorific value of water-saturated gas MJ/m^3	12.51

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valente

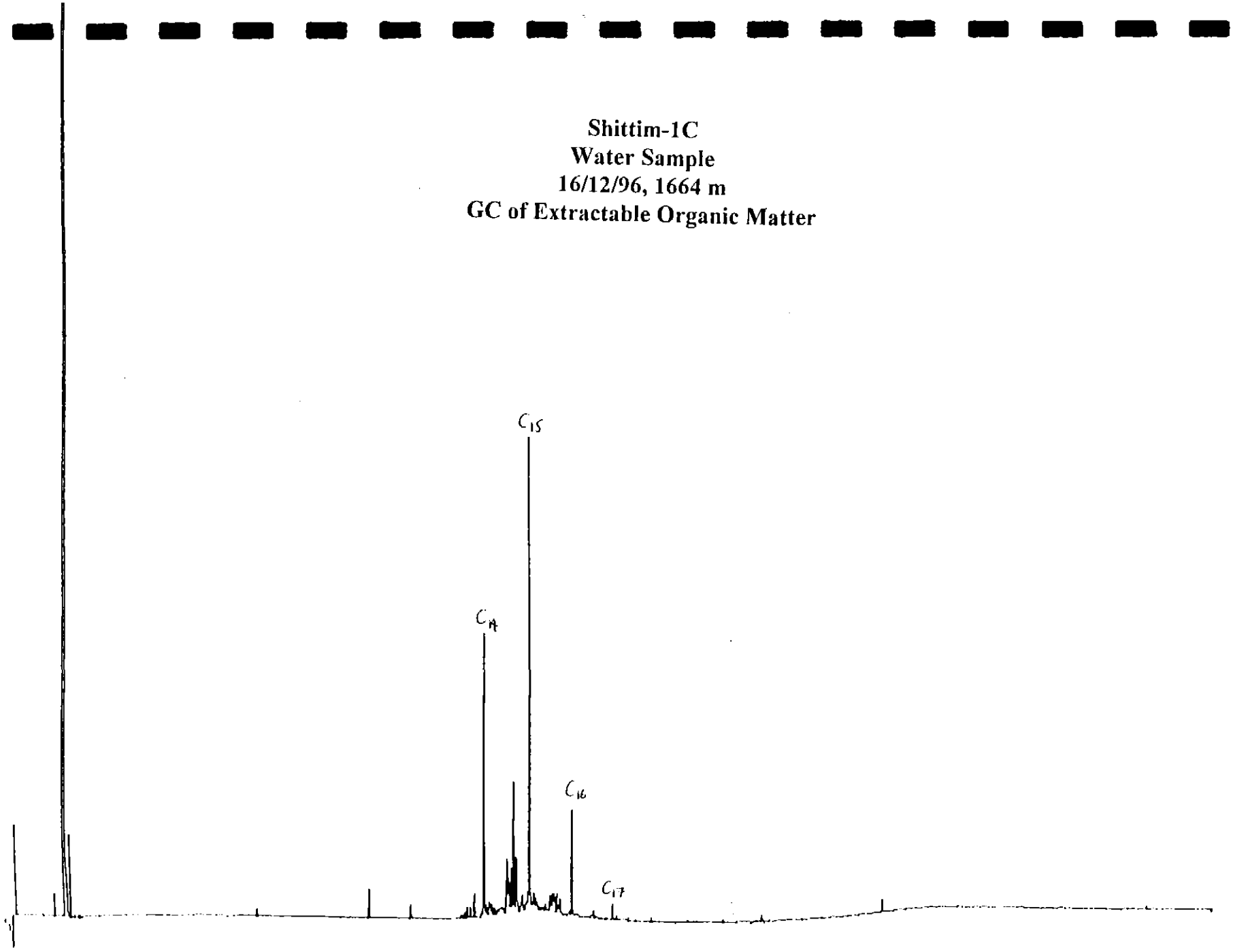
Date : 24-12-96

Shittim-1C
Water Sample
17/12/96, 1674 m
GC of Extractable Organic Matter

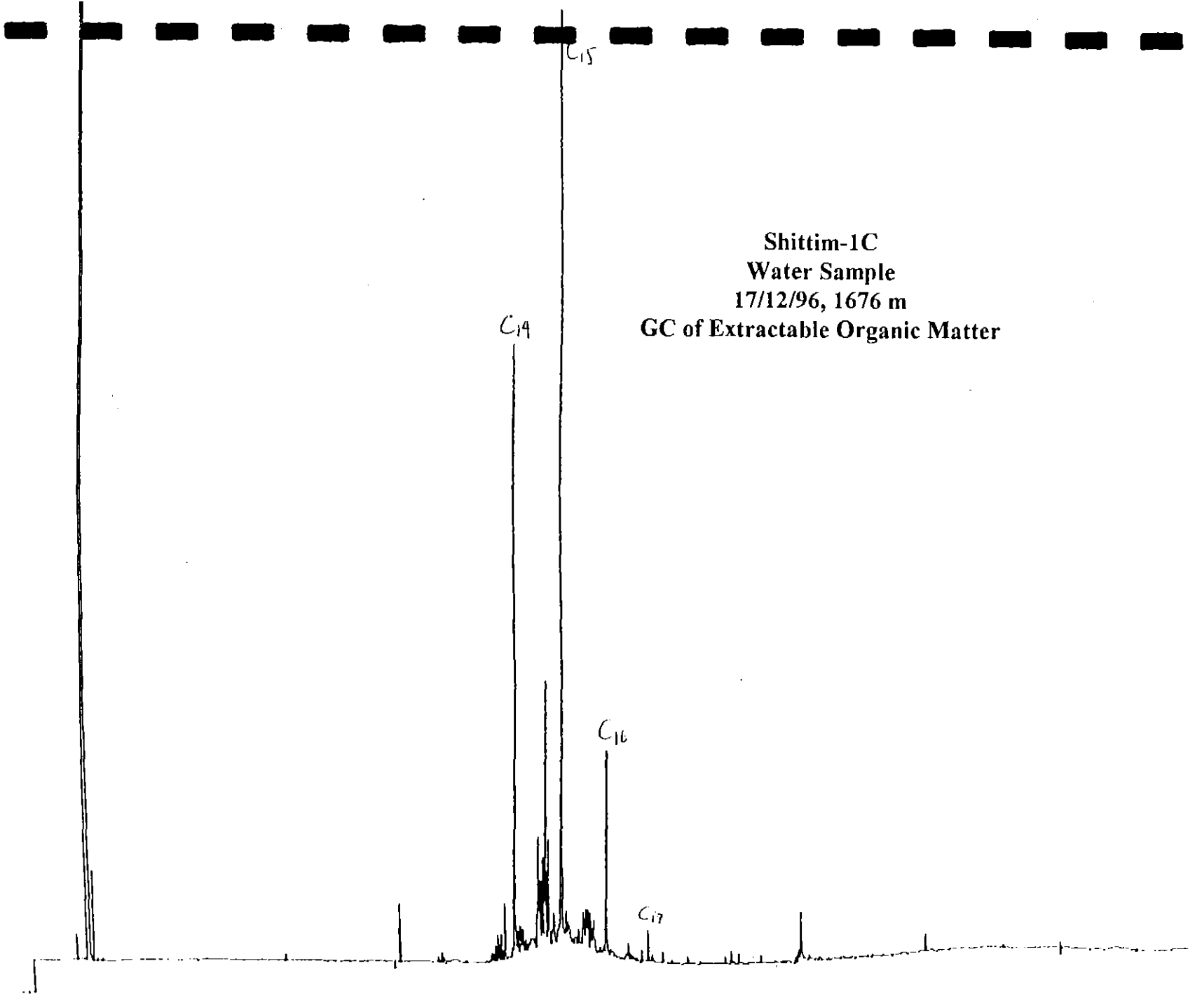


41302

Shittim-1C
Water Sample
16/12/96, 1664 m
GC of Extractable Organic Matter



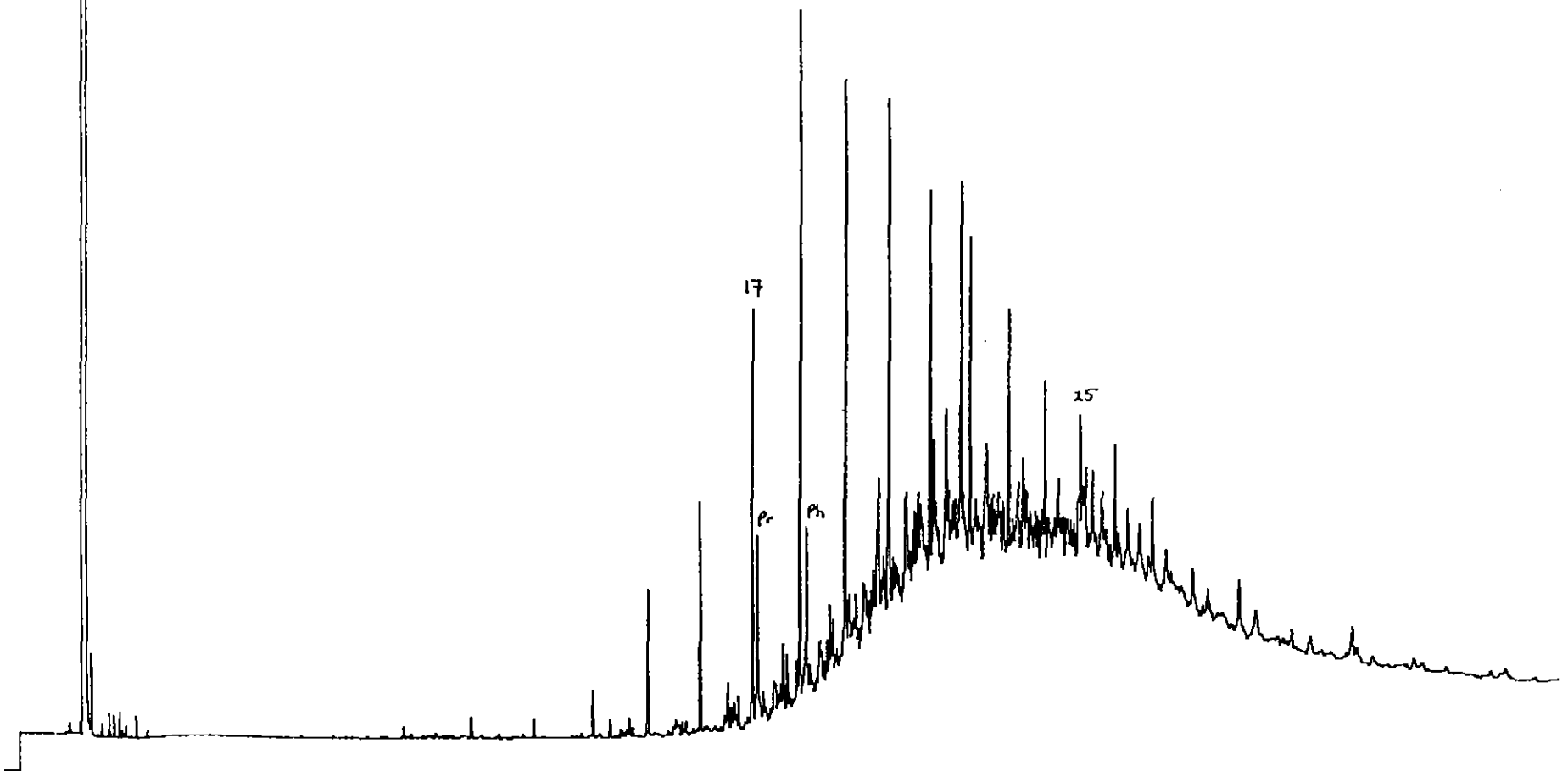
41509



Shittim-1C
Water Sample
17/12/96, 1676 m
GC of Extractable Organic Matter

41809

Shittim-1C
Core Sample, 1676 m
GC of Saturates Fraction



41509S

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD — Report # LQ5525

Sample: *SHITTIM I-D, HOT WIRE SUCTION*
Gas, 1686 m, 30 units
1 kPag @ 15°C, 28/01/97, 1400h, Cyl# 403
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.82
Nitrogen	78.89
Helium	0.04
Carbon Dioxide	0.00
Hydrogen	0.13
Methane	0.12
Ethane	0.00250
Propane	0.00019
I-Butane	0.00000
N-Butane	0.00013
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00049
Hexanes	0.00004
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.79
Lower Flammability limit	1726.95
Upper Flammability limit	9956.54
Ratio of upper to lower	5.77
Wobbe Index	0.06
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.994
Real gas Density (Rel to air = 1)	0.994
Ideal Nett Calorific Value MJ/m^3	0.06
Ideal Gross Calorific Value MJ/m^3	0.06
Real Nett Calorific Value MJ/m^3	0.06
Real Gross Calorific Value MJ/m^3	0.06
Gross calorific value of water-saturated gas MJ/m^3	0.03

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415097

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Gas, 1686 m, 30 units
1 kPag @ 15°C, 28/01/97, 1400h, Cyl# 403
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.28
Helium	0.92
Carbon Dioxide	0.00
Hydrogen	2.98
Methane	2.75
Ethane	0.0574
Propane	0.0044
I-Butane	0.0000
N-Butane	0.0030
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0112
Hexanes	0.0008
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.70
Lower Flammability limit	75.27
Upper Flammability limit	433.99
Ratio of upper to lower	5.77
Wobbe Index	1.52
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.922
Real gas Density (Rel to air = 1)	0.921
Ideal Nett Calorific Value MJ/m^3	1.30
Ideal Gross Calorific Value MJ/m^3	1.46
Real Nett Calorific Value MJ/m^3	1.30
Real Gross Calorific Value MJ/m^3	1.46
Gross calorific value of water-saturated gas MJ/m^3	1.41

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415098

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Gas, 1686 m, 30 units
1 kPag @ 15°C, 28/01/97, 1400h, Cyl# 403
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	13.64
Carbon Dioxide	0.00
Hydrogen	44.32
Methane	40.91
Ethane	0.852
Propane	0.065
I-Butane	0.000
N-Butane	0.044
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.167
Hexanes	0.013
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	8.44
Lower Flammability limit	5.07
Upper Flammability limit	29.21
Ratio of upper to lower	5.77
Wobbe Index	40.24
Compressibility Factor	1.0042
Ideal Gas Density (Rel to air = 1)	0.292
Real gas Density (Rel to air = 1)	0.290
Ideal Nett Calorific Value MJ/m^3	19.29
Ideal Gross Calorific Value MJ/m^3	21.73
Real Nett Calorific Value MJ/m^3	19.21
Real Gross Calorific Value MJ/m^3	21.64
Gross calorific value of water-saturated gas MJ/m^3	21.33

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415099

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Gas, 1686 m, 30 units
1 kPag @ 15°C, 28/01/97, 1400h, Cyl# 403
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	13.64
Carbon Dioxide	0.00
Hydrogen	44.32
Methane	40.91
Ethane	0.852
Propane	0.065
I-Butane	0.000
N-Butane	0.044
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.167
Hexanes	0.013
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	8.44
Lower Flammability limit	5.07
Upper Flammability limit	29.21
Ratio of upper to lower	5.77
Wobbe Index	40.24
Compressibility Factor	1.0042
Ideal Gas Density (Rel to air = 1)	0.292
Real gas Density (Rel to air = 1)	0.290
Ideal Nett Calorific Value MJ/m^3	19.29
Ideal Gross Calorific Value MJ/m^3	21.73
Real Nett Calorific Value MJ/m^3	19.21
Real Gross Calorific Value MJ/m^3	21.64
Gross calorific value of water-saturated gas MJ/m^3	21.33

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415100

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Gas, 1686 m, 61 units
1 kPag @ 15°C, 28/01/97, 1040h, Cyl# 263
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.52
Nitrogen	79.85
Helium	0.09
Carbon Dioxide	0.03
Hydrogen	0.31
Methane	0.20
Ethane	0.00170
Propane	0.00092
I-Butane	0.00000
N-Butane	0.00076
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00049
Hexanes	0.00004
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.67
Lower Flammability limit	842.27
Upper Flammability limit	5651.90
Ratio of upper to lower	6.71
Wobbe Index	0.12
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.990
Real gas Density (Rel to air = 1)	0.990
Ideal Nett Calorific Value MJ/m^3	0.10
Ideal Gross Calorific Value MJ/m^3	0.12
Real Nett Calorific Value MJ/m^3	0.10
Real Gross Calorific Value MJ/m^3	0.12
Gross calorific value of water-saturated gas MJ/m^3	0.08

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Gas, 1686 m, 61 units
1 kPag @ 15°C, 28/01/97, 1040h, Cyl# 263
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.66
Helium	0.94
Carbon Dioxide	0.05
Hydrogen	3.24
Methane	2.06
Ethane	0.0177
Propane	0.0096
I-Butane	0.0000
N-Butane	0.0079
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0051
Hexanes	0.0004
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.71
Lower Flammability limit	80.67
Upper Flammability limit	541.31
Ratio of upper to lower	6.71
Wobbe Index	1.26
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.922
Real gas Density (Rel to air = 1)	0.922
Ideal Nett Calorific Value MJ/m^3	1.06
Ideal Gross Calorific Value MJ/m^3	1.21
Real Nett Calorific Value MJ/m^3	1.06
Real Gross Calorific Value MJ/m^3	1.21
Gross calorific value of water-saturated gas MJ/m^3	1.15

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

lgamdel

415102

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Gas, 1686 m, 61 units
1 kPag @ 15°C, 28/01/97, 1040h, Cyl# 263
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	14.86
Carbon Dioxide	0.76
Hydrogen	51.20
Methane	32.53
Ethane	0.2808
Propane	0.1519
I-Butane	0.0000
N-Butane	0.1255
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0809
Hexanes	0.0061
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	7.47
Lower Flammability limit	5.10
Upper Flammability limit	34.22
Ratio of upper to lower	6.71
Wobbe Index	37.54
Compressibility Factor	1.0050
Ideal Gas Density (Rel to air = 1)	0.258
Real gas Density (Rel to air = 1)	0.257
Ideal Nett Calorific Value MJ/m^3	16.84
Ideal Gross Calorific Value MJ/m^3	19.07
Real Nett Calorific Value MJ/m^3	16.76
Real Gross Calorific Value MJ/m^3	18.97
Gross calorific value of water-saturated gas MJ/m^3	18.71

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415103

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Gas, 1686 m, 61 units
1 kPag @ 15°C, 28/01/97, 1040h, Cyl# 263
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	14.98
Carbon Dioxide	0.00
Hydrogen	51.59
Methane	32.78
Ethane	0.2829
Propane	0.1531
I-Butane	0.0000
N-Butane	0.1265
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0815
Hexanes	0.0062
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	7.19
Lower Flammability limit	5.06
Upper Flammability limit	33.96
Ratio of upper to lower	6.71
Wobbe Index	38.56
Compressibility Factor	1.0050
Ideal Gas Density (Rel to air = 1)	0.248
Real gas Density (Rel to air = 1)	0.247
Ideal Nett Calorific Value MJ/m^3	16.97
Ideal Gross Calorific Value MJ/m^3	19.21
Real Nett Calorific Value MJ/m^3	16.89
Real Gross Calorific Value MJ/m^3	19.12
Gross calorific value of water-saturated gas MJ/m^3	18.86

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415104

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: *SHITTIM 1-D, HOT WIRE SUCTION*
Cuttings Gas, 1686.8 m, 15 units
1 kPag @ 15°C, 28/01/97, 1530h, Cyl# 251
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.43
Nitrogen	79.38
Helium	0.01
Carbon Dioxide	0.04
Hydrogen	0.10
Methane	0.04
Ethane	0.0009
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0002
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.80
Lower Flammability limit	2958.96
Upper Flammability limit	23789.24
Ratio of upper to lower	8.04
Wobbe Index	0.03
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.994
Real gas Density (Rel to air = 1)	0.994
Ideal Nett Calorific Value MJ/m^3	0.03
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.03
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415105

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Cuttings Gas, 1686.8 m, 15 units
1 kPag @ 15°C, 28/01/97, 1530h, Cyl# 251
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.11
Helium	0.17
Carbon Dioxide	0.29
Hydrogen	1.71
Methane	0.70
Ethane	0.015
Propane	0.003
I-Butane	0.000
N-Butane	0.002
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.003
Hexanes	0.001
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.49
Lower Flammability limit	173.31
Upper Flammability limit	1393.34
Ratio of upper to lower	8.04
Wobbe Index	0.50
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.949
Real gas Density (Rel to air = 1)	0.949
Ideal Nett Calorific Value MJ/m^3	0.43
Ideal Gross Calorific Value MJ/m^3	0.49
Real Nett Calorific Value MJ/m^3	0.43
Real Gross Calorific Value MJ/m^3	0.49
Gross calorific value of water-saturated gas MJ/m^3	0.45

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

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415106

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: *SHITTIM 1-D, HOT WIRE SUCTION*
Cuttings Gas, 1686.8 m, 15 units
1 kPag @ 15°C, 28/01/97, 1530h, Cyl# 251
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	5.91
Carbon Dioxide	9.90
Hydrogen	59.14
Methane	24.25
Ethane	0.520
Propane	0.089
I-Butane	0.000
N-Butane	0.060
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.089
Hexanes	0.041
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	10.01
Lower Flammability limit	5.00
Upper Flammability limit	40.23
Ratio of upper to lower	8.04
Wobbe Index	28.91
Compressibility Factor	1.0056
Ideal Gas Density (Rel to air = 1)	0.345
Real gas Density (Rel to air = 1)	0.343
Ideal Nett Calorific Value MJ/m^3	14.93
Ideal Gross Calorific Value MJ/m^3	17.00
Real Nett Calorific Value MJ/m^3	14.84
Real Gross Calorific Value MJ/m^3	16.90
Gross calorific value of water-saturated gas MJ/m^3	16.68

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415107

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Cuttings Gas, 1686.8 m, 15 units
1 kPag @ 15°C, 28/01/97, 1530h, Cyl# 251
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	6.56
Carbon Dioxide	0.00
Hydrogen	65.64
Methane	26.90
Ethane	0.578
Propane	0.098
I-Butane	0.000
N-Butane	0.066
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.098
Hexanes	0.045
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	6.27
Lower Flammability limit	4.51
Upper Flammability limit	36.24
Ratio of upper to lower	8.04
Wobbe Index	40.54
Compressibility Factor	1.0065
Ideal Gas Density (Rel to air = 1)	0.216
Real gas Density (Rel to air = 1)	0.215
Ideal Nett Calorific Value MJ/m^3	16.57
Ideal Gross Calorific Value MJ/m^3	18.86
Real Nett Calorific Value MJ/m^3	16.46
Real Gross Calorific Value MJ/m^3	18.74
Gross calorific value of water-saturated gas MJ/m^3	18.51

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

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415108

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Cuttings Gas, 1686.8 m, 27 units
1 kPag @ 15°C, 28/01/97, 1638h, Cyl# 410
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.95
Nitrogen	79.77
Helium	0.01
Carbon Dioxide	0.08
Hydrogen	0.17
Methane	0.02
Ethane	0.00039
Propane	0.00006
I-Butane	0.00000
N-Butane	0.00005
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00005
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.77
Lower Flammability limit	2140.16
Upper Flammability limit	27228.97
Ratio of upper to lower	12.72
Wobbe Index	0.03
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.993
Real gas Density (Rel to air = 1)	0.993
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

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415109

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Cuttings Gas, 1686.8 m, 27 units
1 kPag @ 15°C, 28/01/97, 1638h, Cyl# 410
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.88
Helium	0.13
Carbon Dioxide	0.58
Hydrogen	2.16
Methane	0.25
Ethane	0.0050
Propane	0.0008
I-Butane	0.0000
N-Butane	0.0006
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0006
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.48
Lower Flammability limit	*168.51*
Upper Flammability limit	2143.95
Ratio of upper to lower	12.72
Wobbe Index	0.37
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.949
Real gas Density (Rel to air = 1)	0.949
Ideal Nett Calorific Value MJ/m^3	0.31
Ideal Gross Calorific Value MJ/m^3	0.36
Real Nett Calorific Value MJ/m^3	0.31
Real Gross Calorific Value MJ/m^3	0.36
Gross calorific value of water-saturated gas MJ/m^3	0.32

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

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415110

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Cuttings Gas, 1686.8 m, 27 units
1 kPag @ 15°C, 28/01/97, 1638h, Cyl# 410
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	4.06
Carbon Dioxide	18.51
Hydrogen	69.08
Methane	8.13
Ethane	0.158
Propane	0.025
I-Butane	0.000
N-Butane	0.020
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.020
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	11.09
Lower Flammability limit	5.27
Upper Flammability limit	67.01
Ratio of upper to lower	12.72
Wobbe Index	18.74
Compressibility Factor	1.0066
Ideal Gas Density (Rel to air = 1)	0.383
Real gas Density (Rel to air = 1)	0.380
Ideal Nett Calorific Value MJ/m^3	9.99
Ideal Gross Calorific Value MJ/m^3	11.60
Real Nett Calorific Value MJ/m^3	9.93
Real Gross Calorific Value MJ/m^3	11.52
Gross calorific value of water-saturated gas MJ/m^3	11.37

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415111

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5525

Sample: SHITTIM 1-D, HOT WIRE SUCTION
Cuttings Gas, 1686.8 m, 27 units
1 kPag @ 15°C, 28/01/97, 1638h, Cyl# 410
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	4.99
Carbon Dioxide	0.00
Hydrogen	84.77
Methane	9.97
Ethane	0.194
Propane	0.030
I-Butane	0.000
N-Butane	0.025
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.024
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.61
Lower Flammability limit	4.29
Upper Flammability limit	54.61
Ratio of upper to lower	12.72
Wobbe Index	40.30
Compressibility Factor	1.0085
Ideal Gas Density (Rel to air = 1)	0.125
Real gas Density (Rel to air = 1)	0.124
Ideal Nett Calorific Value MJ/m^3	12.26
Ideal Gross Calorific Value MJ/m^3	14.23
Real Nett Calorific Value MJ/m^3	12.16
Real Gross Calorific Value MJ/m^3	14.11
Gross calorific value of water-saturated gas MJ/m^3	13.96

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 05-02-97

amdel

415112

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD — Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Gas, 1692.8m
0 kPag, 29/01/97, Cyl# 513
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.67
Nitrogen	80.19
Helium	0.01
Carbon Dioxide	0.04
Hydrogen	0.09
Methane	0.004
Ethane	0.00008
Propane	0.00003
I-Butane	0.00000
N-Butane	0.00000
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00000
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.78
Lower Flammability limit	4280.70
Upper Flammability limit	66875.50
Ratio of upper to lower	15.62
Wobbe Index	0.01
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.994
Real gas Density (Rel to air = 1)	0.994
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.01
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.01
Gross calorific value of water-saturated gas MJ/m^3	-0.02

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Gas, 1692.8m
0 kPag, 29/01/97, Cyl# 513
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	98.67
Helium	0.11
Carbon Dioxide	0.14
Hydrogen	1.03
Methane	0.05
Ethane	0.0009
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.74
Lower Flammability limit	375.60
Upper Flammability limit	5867.85
Ratio of upper to lower	15.62
Wobbe Index	0.15
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.958
Real gas Density (Rel to air = 1)	0.957
Ideal Nett Calorific Value MJ/m^3	0.12
Ideal Gross Calorific Value MJ/m^3	0.14
Real Nett Calorific Value MJ/m^3	0.12
Real Gross Calorific Value MJ/m^3	0.14
Gross calorific value of water-saturated gas MJ/m^3	0.11

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

amdel

415114

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Gas, 1692.8m
0 kPag, 29/01/97, Cyl# 513
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	8.58
Carbon Dioxide	10.59
Hydrogen	77.22
Methane	3.52
Ethane	0.070
Propane	0.022
I-Butane	0.000
N-Butane	0.000
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.000
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	7.16
Lower Flammability limit	4.99
Upper Flammability limit	77.95
Ratio of upper to lower	15.62
Wobbe Index	21.58
Compressibility Factor	1.0077
Ideal Gas Density (Rel to air = 1)	0.247
Real gas Density (Rel to air = 1)	0.245
Ideal Nett Calorific Value MJ/m^3	9.15
Ideal Gross Calorific Value MJ/m^3	10.73
Real Nett Calorific Value MJ/m^3	9.08
Real Gross Calorific Value MJ/m^3	10.65
Gross calorific value of water-saturated gas MJ/m^3	10.52

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

amdel

415115

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Gas, 1692.8m
0 kPag, 29/01/97, Cyl# 513
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	9.60
Carbon Dioxide	0.00
Hydrogen	86.37
Methane	3.93
Ethane	0.079
Propane	0.025
I-Butane	0.000
N-Butane	0.000
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.000
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.79
Lower Flammability limit	4.46
Upper Flammability limit	69.69
Ratio of upper to lower	15.62
Wobbe Index	38.66
Compressibility Factor	1.0087
Ideal Gas Density (Rel to air = 1)	0.096
Real gas Density (Rel to air = 1)	0.095
Ideal Nett Calorific Value MJ/m^3	10.24
Ideal Gross Calorific Value MJ/m^3	12.00
Real Nett Calorific Value MJ/m^3	10.15
Real Gross Calorific Value MJ/m^3	11.90
Gross calorific value of water-saturated gas MJ/m^3	11.77

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415116

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.1m, 32units
1 kPag @ 15°C, 30/01/97, 1022h, Cyl# 113
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.85
Nitrogen	80.81
Helium	0.01
Carbon Dioxide	0.08
Hydrogen	0.24
Methane	0.01
Ethane	0.00023
Propane	0.00008
I-Butane	0.00000
N-Butane	0.00005
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00004
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.71
Lower Flammability limit	1600.37
Upper Flammability limit	24741.63
Ratio of upper to lower	15.46
Wobbe Index	0.03
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.991
Real gas Density (Rel to air = 1)	0.991
Ideal Nett Calorific Value MJ/m^3	0.03
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.03
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

amdel

415117

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1695.1m, 52units
1 kPag @ 15°C, 30/01/97, 1022h, Cyl# 113
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.43
Helium	0.08
Carbon Dioxide	0.41
Hydrogen	1.98
Methane	0.10
Ethane	0.0019
Propane	0.0007
I-Butane	0.0000
N-Butane	0.0005
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.53
Lower Flammability limit	194.01
Upper Flammability limit	2999.33
Ratio of upper to lower	15.46
Wobbe Index	0.29
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.951
Real gas Density (Rel to air = 1)	0.950
Ideal Nett Calorific Value MJ/m^3	0.24
Ideal Gross Calorific Value MJ/m^3	0.28
Real Nett Calorific Value MJ/m^3	0.24
Real Gross Calorific Value MJ/m^3	0.28
Gross calorific value of water-saturated gas MJ/m^3	0.24

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

amdel

415118

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.1m, 32units
1 kPag @ 15°C, 30/01/97, 1022h, Cyl# 113
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	3.21
Carbon Dioxide	15.88
Hydrogen	77.07
Methane	3.71
Ethane	0.074
Propane	0.026
I-Butane	0.000
N-Butane	0.018
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.013
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	9.32
Lower Flammability limit	4.98
Upper Flammability limit	77.04
Ratio of upper to lower	15.46
Wobbe Index	19.09
Compressibility Factor	1.0076
Ideal Gas Density (Rel to air = 1)	0.322
Real gas Density (Rel to air = 1)	0.319
Ideal Nett Calorific Value MJ/m^3	9.25
Ideal Gross Calorific Value MJ/m^3	10.83
Real Nett Calorific Value MJ/m^3	9.18
Real Gross Calorific Value MJ/m^3	10.75
Gross calorific value of water-saturated gas MJ/m^3	10.62

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415119

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD *Report # LQ5537*

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.1m, 32units
1 kPag @ 15°C, 30/01/97, 1022h, Cyl# 113
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	3.82
Carbon Dioxide	0.00
Hydrogen	91.62
Methane	4.41
Ethane	0.09
Propane	0.03
I-Butane	0.00
N-Butane	0.02
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.01
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.77
Lower Flammability limit	4.19
Upper Flammability limit	64.81
Ratio of upper to lower	15.46
Wobbe Index	41.63
Compressibility Factor	1.0092
Ideal Gas Density (Rel to air = 1)	0.096
Real gas Density (Rel to air = 1)	0.095
Ideal Nett Calorific Value MJ/m^3	10.99
Ideal Gross Calorific Value MJ/m^3	12.87
Real Nett Calorific Value MJ/m^3	10.89
Real Gross Calorific Value MJ/m^3	12.76
Gross calorific value of water-saturated gas MJ/m^3	12.63

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415120

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.5m, 10units
1 kPag @ 15°C, 30/01/97, 1140h, Cyl# 109
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.54
Nitrogen	79.34
Helium	0.01
Carbon Dioxide	0.05
Hydrogen	0.06
Methane	0.004
Ethane	0.00005
Propane	0.00000
I-Butane	0.00000
N-Butane	0.00000
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00000
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.82
Lower Flammability limit	6306.68
Upper Flammability limit	91554.91
Ratio of upper to lower	14.52
Wobbe Index	0.01
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.995
Real gas Density (Rel to air = 1)	0.995
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.01
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.01
Gross calorific value of water-saturated gas MJ/m^3	-0.02

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415121

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.5m, 10units
1 kPag @ 15°C, 30/01/97, 1140h, Cyl# 109
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	98.28
Helium	0.19
Carbon Dioxide	0.33
Hydrogen	1.12
Methane	0.08
Ethane	0.0009
Propane	0.0000
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.72
Lower Flammability limit	337.44
Upper Flammability limit	4898.60
Ratio of upper to lower	14.52
Wobbe Index	0.17
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.957
Real gas Density (Rel to air = 1)	0.957
Ideal Nett Calorific Value MJ/m^3	0.14
Ideal Gross Calorific Value MJ/m^3	0.17
Real Nett Calorific Value MJ/m^3	0.14
Real Gross Calorific Value MJ/m^3	0.17
Gross calorific value of water-saturated gas MJ/m^3	0.13

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415122

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.5m, 10units
1 kPag @ 15°C, 30/01/97, 1140h, Cyl# 109
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	10.86
Carbon Dioxide	19.39
Hydrogen	65.14
Methane	4.56
Ethane	0.051
Propane	0.000
I-Butane	0.000
N-Butane	0.000
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.000
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	11.03
Lower Flammability limit	5.81
Upper Flammability limit	84.33
Ratio of upper to lower	14.52
Wobbe Index	15.60
Compressibility Factor	1.0063
Ideal Gas Density (Rel to air = 1)	0.381
Real gas Density (Rel to air = 1)	0.378
Ideal Nett Calorific Value MJ/m^3	8.24
Ideal Gross Calorific Value MJ/m^3	9.63
Real Nett Calorific Value MJ/m^3	8.19
Real Gross Calorific Value MJ/m^3	9.57
Gross calorific value of water-saturated gas MJ/m^3	9.44

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415123

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.5m, 10units
1 kPag @ 15°C, 30/01/97, 1140h, Cyl# 109
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	13.47
Carbon Dioxide	0.00
Hydrogen	80.81
Methane	5.66
Ethane	0.063
Propane	0.000
I-Butane	0.000
N-Butane	0.000
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.000
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'os	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.09
Lower Flammability limit	4.68
Upper Flammability limit	67.98
Ratio of upper to lower	14.52
Wobbe Index	36.54
Compressibility Factor	1.0081
Ideal Gas Density (Rel to air = 1)	0.107
Real gas Density (Rel to air = 1)	0.106
Ideal Nett Calorific Value MJ/m^3	10.22
Ideal Gross Calorific Value MJ/m^3	11.94
Real Nett Calorific Value MJ/m^3	10.14
Real Gross Calorific Value MJ/m^3	11.85
Gross calorific value of water-saturated gas MJ/m^3	11.71

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415124

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.8m, 17units
1 kPag @ 15°C, 30/01/97, 1253h, Cyl# 225
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.20
Nitrogen	79.63
Helium	0.01
Carbon Dioxide	0.04
Hydrogen	0.12
Methane	0.00
Ethane	0.00009
Propane	0.00002
I-Butane	0.00000
N-Butane	0.00000
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00001
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher hcs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.79
Lower Flammability limit	3256.45
Upper Flammability limit	54123.76
Ratio of upper to lower	16.62
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.994
Real gas Density (Rel to air = 1)	0.994
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.02

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

amdel

415125

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.8m, 17units
1 kPag @ 15°C, 30/01/97, 1253h, Cyl# 225
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.85
Helium	0.15
Carbon Dioxide	0.18
Hydrogen	1.77
Methane	0.05
Ethane	0.0013
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'os	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.54
Lower Flammability limit	221.11
Upper Flammability limit	3674.95
Ratio of upper to lower	16.62
Wobbe Index	0.24
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.951
Real gas Density (Rel to air = 1)	0.951
Ideal Nett Calorific Value MJ/m^3	0.20
Ideal Gross Calorific Value MJ/m^3	0.23
Real Nett Calorific Value MJ/m^3	0.20
Real Gross Calorific Value MJ/m^3	0.23
Gross calorific value of water-saturated gas MJ/m^3	0.20

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415126

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.8m, 17units
1 kPag @ 15°C, 30/01/97, 1253h, Cyl# 225
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	6.87
Carbon Dioxide	8.34
Hydrogen	82.44
Methane	2.27
Ethane	0.061
Propane	0.015
I-Butane	0.000
N-Butane	0.000
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.007
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	6.00
Lower Flammability limit	4.74
Upper Flammability limit	78.78
Ratio of upper to lower	16.62
Wobbe Index	23.92
Compressibility Factor	1.0082
Ideal Gas Density (Rel to air = 1)	0.207
Real gas Density (Rel to air = 1)	0.205
Ideal Nett Calorific Value MJ/m^3	9.26
Ideal Gross Calorific Value MJ/m^3	10.89
Real Nett Calorific Value MJ/m^3	9.19
Real Gross Calorific Value MJ/m^3	10.80
Gross calorific value of water-saturated gas MJ/m^3	10.67

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415127

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1693.8m, 17units
1 kPag @ 15°C, 30/01/97, 1253h, Cyl# 225
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	7.50
Carbon Dioxide	0.00
Hydrogen	89.94
Methane	2.46
Ethane	0.067
Propane	0.016
I-Butane	0.000
N-Butane	0.000
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.007
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.54
Lower Flammability limit	4.34
Upper Flammability limit	72.21
Ratio of upper to lower	16.62
Wobbe Index	40.09
Compressibility Factor	1.0090
Ideal Gas Density (Rel to air = 1)	0.088
Real gas Density (Rel to air = 1)	0.087
Ideal Nett Calorific Value MJ/m^3	10.11
Ideal Gross Calorific Value MJ/m^3	11.88
Real Nett Calorific Value MJ/m^3	10.01
Real Gross Calorific Value MJ/m^3	11.77
Gross calorific value of water-saturated gas MJ/m^3	11.65

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415128

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Background Gas, 1693.8m, 60units
1 kPag @ 15°C, 30/01/97, 1610h, Cyl# 201
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.62
Nitrogen	78.83
Helium	0.01
Carbon Dioxide	0.08
Hydrogen	0.45
Methane	0.01
Ethane	0.00015
Propane	0.00004
I-Butane	0.00000
N-Butane	0.00002
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00002
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.73
Lower Flammability limit	869.87
Upper Flammability limit	14550.38
Ratio of upper to lower	16.73
Wobbe Index	0.06
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m^3	0.05
Ideal Gross Calorific Value MJ/m^3	0.06
Real Nett Calorific Value MJ/m^3	0.05
Real Gross Calorific Value MJ/m^3	0.06
Gross calorific value of water-saturated gas MJ/m^3	0.03

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415129

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Background Gas, 1693.8m, 60units
1 kPag @ 15°C, 30/01/97, 1610h, Cyl# 201
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	89.89
Helium	0.19
Carbon Dioxide	0.92
Hydrogen	8.77
Methane	0.23
Ethane	0.0029
Propane	0.0009
I-Butane	0.0000
N-Butane	0.0005
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0004
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	25.81
Lower Flammability limit	44.64
Upper Flammability limit	746.67
Ratio of upper to lower	16.73
Wobbe Index	1.22
Compressibility Factor	1.0006
Ideal Gas Density (Rel to air = 1)	0.891
Real gas Density (Rel to air = 1)	0.890
Ideal Nett Calorific Value MJ/m^3	0.98
Ideal Gross Calorific Value MJ/m^3	1.15
Real Nett Calorific Value MJ/m^3	0.98
Real Gross Calorific Value MJ/m^3	1.15
Gross calorific value of water-saturated gas MJ/m^3	1.10

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415130

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Background Gas, 1693.8m, 60units
1 kPag @ 15°C, 30/01/97, 1610h, Cyl# 201
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	1.93
Carbon Dioxide	9.13
Hydrogen	86.63
Methane	2.27
Ethane	0.029
Propane	0.008
I-Butane	0.000
N-Butane	0.005
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.004
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	6.22
Lower Flammability limit	4.52
Upper Flammability limit	75.58
Ratio of upper to lower	16.73
Wobbe Index	24.53
Compressibility Factor	1.0086
Ideal Gas Density (Rel to air = 1)	0.215
Real gas Density (Rel to air = 1)	0.213
Ideal Nett Calorific Value MJ/m^3	9.67
Ideal Gross Calorific Value MJ/m^3	11.37
Real Nett Calorific Value MJ/m^3	9.59
Real Gross Calorific Value MJ/m^3	11.27
Gross calorific value of water-saturated gas MJ/m^3	11.15

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415131

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Background Gas, 1693.8m, 60units
1 kPag @ 15°C, 30/01/97, 1610h, Cyl# 201
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	2.12
Carbon Dioxide	0.00
Hydrogen	95.33
Methane	2.50
Ethane	0.032
Propane	0.009
I-Butane	0.000
N-Butane	0.005
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.004
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.43
Lower Flammability limit	4.11
Upper Flammability limit	68.68
Ratio of upper to lower	16.73
Wobbe Index	43.22
Compressibility Factor	1.0096
Ideal Gas Density (Rel to air = 1)	0.084
Real gas Density (Rel to air = 1)	0.083
Ideal Nett Calorific Value MJ/m^3	10.64
Ideal Gross Calorific Value MJ/m^3	12.51
Real Nett Calorific Value MJ/m^3	10.54
Real Gross Calorific Value MJ/m^3	12.39
Gross calorific value of water-saturated gas MJ/m^3	12.27

This report relates specifically to the sample submitted for analysis.

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Date : 06-02-97

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415132

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: *CONDOR OIL INVESTMENT PTY LTD* Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1695m, 58units
1 kPag @ 15°C, 30/01/97, 1710h, Cyl# 244
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.89
Nitrogen	80.57
Helium	0.01
Carbon Dioxide	0.03
Hydrogen	0.49
Methane	0.01
Ethane	0.00020
Propane	0.00007
I-Butane	0.00000
N-Butane	0.00004
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00002
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.64
Lower Flammability limit	804.92
Upper Flammability limit	13953.88
Ratio of upper to lower	17.34
Wobbe Index	0.06
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.989
Real gas Density (Rel to air = 1)	0.989
Ideal Nett Calorific Value MJ/m^3	0.05
Ideal Gross Calorific Value MJ/m^3	0.06
Real Nett Calorific Value MJ/m^3	0.05
Real Gross Calorific Value MJ/m^3	0.06
Gross calorific value of water-saturated gas MJ/m^3	0.03

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415133

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1695m, 58units
1 kPag @ 15°C, 30/01/97, 1710h, Cyl# 244
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	95.69
Helium	0.08
Carbon Dioxide	0.08
Hydrogen	4.08
Methane	0.07
Ethane	0.0016
Propane	0.0006
I-Butane	0.0000
N-Butane	0.0003
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.94
Lower Flammability limit	96.78
Upper Flammability limit	1677.82
Ratio of upper to lower	17.34
Wobbe Index	0.54
Compressibility Factor	1.0001
Ideal Gas Density (Rel to air = 1)	0.930
Real gas Density (Rel to air = 1)	0.930
Ideal Nett Calorific Value MJ/m^3	0.44
Ideal Gross Calorific Value MJ/m^3	0.52
Real Nett Calorific Value MJ/m^3	0.44
Real Gross Calorific Value MJ/m^3	0.52
Gross calorific value of water-saturated gas MJ/m^3	0.48

This report relates specifically to the sample submitted for analysis.

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Date : 06-02-97

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415134

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1695m, 58units
1 kPag @ 15°C, 30/01/97, 1710h, Cyl# 244
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	1.93
Carbon Dioxide	1.77
Hydrogen	94.69
Methane	1.55
Ethane	0.038
Propane	0.014
I-Butane	0.000
N-Butane	0.008
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.003
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.04
Lower Flammability limit	4.17
Upper Flammability limit	72.21
Ratio of upper to lower	17.34
Wobbe Index	37.32
Compressibility Factor	1.0095
Ideal Gas Density (Rel to air = 1)	0.105
Real gas Density (Rel to air = 1)	0.104
Ideal Nett Calorific Value MJ/m^3	10.26
Ideal Gross Calorific Value MJ/m^3	12.08
Real Nett Calorific Value MJ/m^3	10.16
Real Gross Calorific Value MJ/m^3	11.97
Gross calorific value of water-saturated gas MJ/m^3	11.85

This report relates specifically to the sample submitted for analysis.

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Date : 06-02-97

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415135

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1695m, 58units
1 kPag @ 15°C, 30/01/97, 1710h, Cyl# 244
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	1.97
Carbon Dioxide	0.00
Hydrogen	96.40
Methane	1.57
Ethane	0.039
Propane	0.014
I-Butane	0.000
N-Butane	0.008
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.003
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.30
Lower Flammability limit	4.09
Upper Flammability limit	70.93
Ratio of upper to lower	17.34
Wobbe Index	43.66
Compressibility Factor	1.0097
Ideal Gas Density (Rel to air = 1)	0.079
Real gas Density (Rel to air = 1)	0.079
Ideal Nett Calorific Value MJ/m^3	10.44
Ideal Gross Calorific Value MJ/m^3	12.30
Real Nett Calorific Value MJ/m^3	10.34
Real Gross Calorific Value MJ/m^3	12.18
Gross calorific value of water-saturated gas MJ/m^3	12.06

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Background Gas, 1695.7m, 42units
1 kPag @ 15°C, 31/01/97, 1020h, Cyl# 216
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.69
Nitrogen	79.94
Helium	0.01
Carbon Dioxide	0.04
Hydrogen	0.30
Methane	0.02
Ethane	0.00025
Propane	0.00007
I-Butane	0.00000
N-Butane	0.00008
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00005
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.72
Lower Flammability limit	1271.91
Upper Flammability limit	19136.38
Ratio of upper to lower	15.05
Wobbe Index	0.04
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.04
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.04
Gross calorific value of water-saturated gas MJ/m^3	0.01

This report relates specifically to the sample submitted for analysis.

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Date : 06-02-97

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PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Background Gas, 1695.7m, 42units
1 kPag @ 15°C, 31/01/97, 1020h, Cyl# 216
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.17
Helium	0.11
Carbon Dioxide	0.14
Hydrogen	3.39
Methane	0.19
Ethane	0.0028
Propane	0.0008
I-Butane	0.0000
N-Butane	0.0009
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0006
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.10
Lower Flammability limit	112.63
Upper Flammability limit	1694.49
Ratio of upper to lower	15.05
Wobbe Index	0.50
Compressibility Factor	1.0001
Ideal Gas Density (Rel to air = 1)	0.936
Real gas Density (Rel to air = 1)	0.935
Ideal Nett Calorific Value MJ/m³	0.42
Ideal Gross Calorific Value MJ/m³	0.49
Real Nett Calorific Value MJ/m³	0.42
Real Gross Calorific Value MJ/m³	0.49
Gross calorific value of water-saturated gas MJ/m³	0.45

This report relates specifically to the sample submitted for analysis.

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Date : 06-02-97

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415138

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD *Report # LQ5537*

Sample: SHITTIM-1D, HOT WIRE
Background Gas, 1695.7m, 42units
1 kPag @ 15°C, 31/01/97, 1020h, Cyl# 216
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	2.94
Carbon Dioxide	3.54
Hydrogen	88.35
Methane	5.04
Ethane	0.074
Propane	0.020
I-Butane	0.000
N-Butane	0.024
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.016
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.32
Lower Flammability limit	4.32
Upper Flammability limit	64.98
Ratio of upper to lower	15.05
Wobbe Index	32.88
Compressibility Factor	1.0089
Ideal Gas Density (Rel to air = 1)	0.149
Real gas Density (Rel to air = 1)	0.148
Ideal Nett Calorific Value MJ/m^3	10.86
Ideal Gross Calorific Value MJ/m^3	12.70
Real Nett Calorific Value MJ/m^3	10.76
Real Gross Calorific Value MJ/m^3	12.59
Gross calorific value of water-saturated gas MJ/m^3	12.46

This report relates specifically to the sample submitted for analysis.

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Date : 06-02-97

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415139

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Background Gas, 1695.7m, 42units
1 kPag @ 15°C, 31/01/97, 1020h, Cyl# 216
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	3.05
Carbon Dioxide	0.00
Hydrogen	91.59
Methane	5.22
Ethane	0.08
Propane	0.02
I-Butane	0.00
N-Butane	0.02
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.02
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.86
Lower Flammability limit	4.17
Upper Flammability limit	62.68
Ratio of upper to lower	15.05
Wobbe Index	41.87
Compressibility Factor	1.0092
Ideal Gas Density (Rel to air = 1)	0.099
Real gas Density (Rel to air = 1)	0.098
Ideal Nett Calorific Value MJ/m^3	11.26
Ideal Gross Calorific Value MJ/m^3	13.17
Real Nett Calorific Value MJ/m^3	11.15
Real Gross Calorific Value MJ/m^3	13.05
Gross calorific value of water-saturated gas MJ/m^3	12.91

This report relates specifically to the sample submitted for analysis.

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Date : 06-02-97

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PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1696.9m, 20units
31/01/97, 1345h, Cyl# 118
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.04
Nitrogen	79.76
Helium	0.01
Carbon Dioxide	0.03
Hydrogen	0.15
Methane	0.01
Ethane	0.00022
Propane	0.00004
I-Butane	0.00000
N-Butane	0.00001
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00002
Hexanes	0.00001
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.77
Lower Flammability limit	2492.33
Upper Flammability limit	34710.28
Ratio of upper to lower	13.93
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.993
Real gas Density (Rel to air = 1)	0.993
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1696.9m, 20units
31/01/97, 1345h, Cyl# 118
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.61
Helium	0.14
Carbon Dioxide	0.04
Hydrogen	2.04
Methane	0.17
Ethane	0.0030
Propane	0.0005
I-Butane	0.0000
N-Butane	0.0002
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.44
Lower Flammability limit	183.70
Upper Flammability limit	2558.32
Ratio of upper to lower	13.93
Wobbe Index	0.32
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.947
Real gas Density (Rel to air = 1)	0.947
Ideal Nett Calorific Value MJ/m^3	0.27
Ideal Gross Calorific Value MJ/m^3	0.31
Real Nett Calorific Value MJ/m^3	0.27
Real Gross Calorific Value MJ/m^3	0.31
Gross calorific value of water-saturated gas MJ/m^3	0.28

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1696.9m, 20units
31/01/97, 1345h, Cyl# 118
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	5.70
Carbon Dioxide	1.47
Hydrogen	85.53
Methane	7.13
Ethane	0.125
Propane	0.022
I-Butane	0.000
N-Butane	0.007
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.013
Hexanes	0.004
Heptanes	0.000
Octanes and higher hcs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.81
Lower Flammability limit	4.37
Upper Flammability limit	60.88
Ratio of upper to lower	13.93
Wobbe Index	36.31
Compressibility Factor	1.0086
Ideal Gas Density (Rel to air = 1)	0.131
Real gas Density (Rel to air = 1)	0.130
Ideal Nett Calorific Value MJ/m^3	11.30
Ideal Gross Calorific Value MJ/m^3	13.17
Real Nett Calorific Value MJ/m^3	11.20
Real Gross Calorific Value MJ/m^3	13.05
Gross calorific value of water-saturated gas MJ/m^3	12.91

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

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415143

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1696.9m, 20units
31/01/97, 1345h, Cyl# 118
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	5.79
Carbon Dioxide	0.00
Hydrogen	86.81
Methane	7.23
Ethane	0.127
Propane	0.023
I-Butane	0.000
N-Butane	0.007
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.013
Hexanes	0.004
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.21
Lower Flammability limit	4.31
Upper Flammability limit	59.98
Ratio of upper to lower	13.93
Wobbe Index	40.16
Compressibility Factor	1.0087
Ideal Gas Density (Rel to air = 1)	0.111
Real gas Density (Rel to air = 1)	0.110
Ideal Nett Calorific Value MJ/m^3	11.46
Ideal Gross Calorific Value MJ/m^3	13.36
Real Nett Calorific Value MJ/m^3	11.37
Real Gross Calorific Value MJ/m^3	13.25
Gross calorific value of water-saturated gas MJ/m^3	13.11

This report relates specifically to the sample submitted for analysis.

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Date : 06-02-97

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415144

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1698.3m, 28units
31/01/97, 1600h, Cyl# 161
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.63
Nitrogen	80.02
Helium	0.01
Carbon Dioxide	0.05
Hydrogen	0.22
Methane	0.07
Ethane	0.00029
Propane	0.00012
I-Butane	0.00000
N-Butane	0.00008
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00002
Hexanes	0.00001
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.73
Lower Flammability limit	1426.45
Upper Flammability limit	12542.09
Ratio of upper to lower	8.79
Wobbe Index	0.06
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m^3	0.05
Ideal Gross Calorific Value MJ/m^3	0.06
Real Nett Calorific Value MJ/m^3	0.05
Real Gross Calorific Value MJ/m^3	0.06
Gross calorific value of water-saturated gas MJ/m^3	0.02

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

amdel

415145

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1698.3m, 28units
31/01/97, 1600h, Cyl# 161
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.45
Helium	0.11
Carbon Dioxide	0.22
Hydrogen	2.41
Methane	0.81
Ethane	0.00317
Propane	0.00131
I-Butane	0.00000
N-Butane	0.00089
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00024
Hexanes	0.00008
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.30
Lower Flammability limit	130.40
Upper Flammability limit	1146.50
Ratio of upper to lower	8.79
Wobbe Index	0.62
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.943
Real gas Density (Rel to air = 1)	0.942
Ideal Nett Calorific Value MJ/m^3	0.53
Ideal Gross Calorific Value MJ/m^3	0.60
Real Nett Calorific Value MJ/m^3	0.53
Real Gross Calorific Value MJ/m^3	0.60
Gross calorific value of water-saturated gas MJ/m^3	0.56

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

amdel

415146

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1698.3m, 28units
31/01/97, 1600h, Cyl# 161
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	3.08
Carbon Dioxide	6.17
Hydrogen	67.70
Methane	22.89
Ethane	0.089
Propane	0.037
I-Butane	0.000
N-Butane	0.025
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.007
Hexanes	0.002
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	7.94
Lower Flammability limit	4.64
Upper Flammability limit	40.76
Ratio of uppor to lower	8.79
Wobbe Index	32.38
Compressibility Factor	1.0066
Ideal Gas Density (Rel to air = 1)	0.274
Real gas Density (Rel to air = 1)	0.272
Ideal Nett Calorific Value MJ/m^3	14.82
Ideal Gross Calorific Value MJ/m^3	16.95
Real Nett Calorific Value MJ/m^3	14.73
Real Gross Calorific Value MJ/m^3	16.84
Gross calorific value of water-saturated gas MJ/m^3	16.64

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

amdel

415147

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENT PTY LTD — Report # LQ5537

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1698.3m, 2Bunits
31/01/97, 1600h, Cyl# 161
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	3.28
Carbon Dioxide	0.00
Hydrogen	72.15
Methane	24.39
Ethane	0.095
Propane	0.039
I-Butane	0.000
N-Butane	0.027
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.007
Hexanes	0.002
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.57
Lower Flammability limit	4.35
Upper Flammability limit	38.24
Ratio of upper to lower	8.79
Wobbe Index	41.21
Compressibility Factor	1.0071
Ideal Gas Density (Rel to air = 1)	0.192
Real gas Density (Rel to air = 1)	0.191
Ideal Nett Calorific Value MJ/m^3	15.80
Ideal Gross Calorific Value MJ/m^3	18.07
Real Nett Calorific Value MJ/m^3	15.68
Real Gross Calorific Value MJ/m^3	17.94
Gross calorific value of water-saturated gas MJ/m^3	17.73

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 06-02-97

amdel

415148

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHETTUM-1D
Cuttings Gas, 1700.1m, 39units
01/02/97, 1018h, Cyl# 200
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.57
Nitrogen	79.04
Helium	0.12
Carbon Dioxide	0.04
Hydrogen	0.22
Methane	0.01
Ethane	0.0004
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.75
Lower Flammability limit	1758.37
Upper Flammability limit	28052.07
Ratio of upper to lower	15.95
Wobbe Index	0.03
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.993
Real gas Density (Rel to air = 1)	0.993
Ideal Nett Calorific Value MJ/m^3	0.03
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.03
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 12-02-97

amdel

415149

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHITTIM-1D
Cuttings Gas, 1700.1m, 39units
01/02/97, 1016h, Cyl# 200
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.17
Helium	2.28
Carbon Dioxide	0.20
Hydrogen	4.18
Methane	0.16
Ethane	0.007
Propane	0.001
I-Butane	0.000
N-Butane	0.001
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.000
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.39
Lower Flammability limit	92.50
Upper Flammability limit	1475.76
Ratio of upper to lower	15.95
Wobbe Index	0.60
Compressibility Factor	1.0002
Ideal Gas Density (Rel to air = 1)	0.911
Real gas Density (Rel to air = 1)	0.911
Ideal Nett Calorific Value MJ/m^3	0.49
Ideal Gross Calorific Value MJ/m^3	0.57
Real Nett Calorific Value MJ/m^3	0.49
Real Gross Calorific Value MJ/m^3	0.57
Gross calorific value of water-saturated gas MJ/m^3	0.53

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 12-02-97

amdel

415150

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHITTIM-1D
Cuttings Gas, 1700.1m, 39units
01/02/97, 1018h, Cyl# 200
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	33.39
Carbon Dioxide	2.93
Hydrogen	61.22
Methane	2.32
Ethane	0.11
Propane	0.02
I-Butane	0.00
N-Butane	0.01
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.003
Hexanes	0.003
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.28
Lower Flammability limit	6.32
Upper Flammability limit	100.80
Ratio of upper to lower	15.95
Wobbe Index	21.82
Compressibility Factor	1.0061
Ideal Gas Density (Rel to air = 1)	0.148
Real gas Density (Rel to air = 1)	0.147
Ideal Nett Calorific Value MJ/m^3	7.15
Ideal Gross Calorific Value MJ/m^3	8.39
Real Nett Calorific Value MJ/m^3	7.11
Real Gross Calorific Value MJ/m^3	8.34
Gross calorific value of water-saturated gas MJ/m^3	8.22

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 12-02-97

amdel

415151

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHITTIM-1D
Cuttings Gas, 1700.1m, 39units
01/02/97, 1018h, Cyl# 200
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	34.40
Carbon Dioxide	0.00
Hydrogen	63.06
Methane	2.40
Ethane	0.11
Propane	0.02
I-Butane	0.00
N-Butane	0.01
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.003
Hexanes	0.003
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.08
Lower Flammability limit	6.13
Upper Flammability limit	97.86
Ratio of upper to lower	15.95
Wobbe Index	26.48
Compressibility Factor	1.0063
Ideal Gas Density (Rel to air = 1)	0.107
Real gas Density (Rel to air = 1)	0.106
Ideal Nett Calorific Value MJ/m^3	7.37
Ideal Gross Calorific Value MJ/m^3	8.64
Real Nett Calorific Value MJ/m^3	7.32
Real Gross Calorific Value MJ/m^3	8.59
Gross calorific value of water-saturated gas MJ/m^3	8.46

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 12-02-97

amdel

415152

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHITTIM-1D
Cuttings Gas, 1703.1m, 60units
01/02/97, 1428h, Cyl# 206
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.10
Helium	0.25
Carbon Dioxide	0.18
Hydrogen	3.33
Methane	0.13
Ethane	0.006
Propane	0.001
I-Butane	0.000
N-Butane	0.001
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.0005
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.10
Lower Flammability limit	116.00
Upper Flammability limit	1848.89
Ratio of upper to lower	15.94
Wobbe Index	0.47
Compressibility Factor	1.0001
Ideal Gas Density (Rel to air = 1)	0.936
Real gas Density (Rel to air = 1)	0.935
Ideal Nett Calorific Value MJ/m^3	0.39
Ideal Gross Calorific Value MJ/m^3	0.46
Real Nett Calorific Value MJ/m^3	0.39
Real Gross Calorific Value MJ/m^3	0.46
Gross calorific value of water-saturated gas MJ/m^3	0.42

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 12-02-97

amdel

415153

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHITTIM-1D
Cuttings Gas, 1703.1m, 60units
01/02/97, 1428h, Cyl# 206
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.88
Nitrogen	80.62
Helium	0.03
Carbon Dioxide	0.05
Hydrogen	0.40
Methane	0.02
Ethane	0.0007
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.66
Lower Flammability limit	966.71
Upper Flammability limit	15408.32
Ratio of upper to lower	15.94
Wobbe Index	0.06
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.990
Real gas Density (Rel to air = 1)	0.989
Ideal Nett Calorific Value MJ/m^3	0.05
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.05
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.02

This report relates specifically to the sample submitted for analysis.

Signed

Date : 12-02-97

amdel

415154

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # I.Q5548

Sample: SHITTIM-1D
Cuttings Gas, 1703.1m, 60units
01/02/97, 1428h, Cyl# 206
Air & Nitrogen Corrected

GAS	MOL. %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	6.42
Carbon Dioxide	4.60
Hydrogen	85.54
Methane	3.24
Ethane	0.14
Propane	0.03
I-Butane	0.00
N-Butane	0.02
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.01
Hexanes	0.002
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.60
Lower Flammability limit	4.52
Upper Flammability limit	72.05
Ratio of upper to lower	15.94
Wobbe Index	29.45
Compressibility Factor	1.0086
Ideal Gas Density (Rel to air = 1)	0.159
Real gas Density (Rel to air = 1)	0.158
Ideal Nett Calorific Value MJ/m^3	10.01
Ideal Gross Calorific Value MJ/m^3	11.74
Real Nett Calorific Value MJ/m^3	9.93
Real Gross Calorific Value MJ/m^3	11.64
Gross calorific value of water-saturated gas MJ/m^3	11.51

This report relates specifically to the sample submitted for analysis.

Signed

Date : 12-02-97

amdel

415155

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHITTIM-1D
Cuttings Gas, 1703.1m, 60units
01/02/97, 1428h, Cyl# 206
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	6.72
Carbon Dioxide	0.00
Hydrogen	89.65
Methane	3.41
Ethane	0.15
Propane	0.03
I-Butane	0.00
N-Butane	0.03
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.01
Hexanes	0.002
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.71
Lower Flammability limit	4.31
Upper Flammability limit	68.75
Ratio of upper to lower	15.94
Wobbe Index	40.25
Compressibility Factor	1.0090
Ideal Gas Density (Rel to air = 1)	0.093
Real gas Density (Rel to air = 1)	0.093
Ideal Nett Calorific Value MJ/m^3	10.49
Ideal Gross Calorific Value MJ/m^3	12.30
Real Nett Calorific Value MJ/m^3	10.40
Real Gross Calorific Value MJ/m^3	12.19
Gross calorific value of water-saturated gas MJ/m^3	12.07

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 12-02-97

amdel

415156

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHITTIM-1D
Cuttings Gas, 1703.1m
1442h, Cyl# 240
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.59
Nitrogen	79.80
Helium	0.15
Carbon Dioxide	0.05
Hydrogen	0.38
Methane	0.03
Ethane	0.001
Propane	0.0004
I-Butane	0.0000
N-Butane	0.0004
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.66
Lower Flammability limit	986.72
Upper Flammability limit	14090.70
Ratio of upper to lower	14.28
Wobbe Index	0.06
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.990
Real gas Density (Rel to air = 1)	0.990
Ideal Nett Calorific Value MJ/m^3	0.05
Ideal Gross Calorific Value MJ/m^3	0.06
Real Nett Calorific Value MJ/m^3	0.05
Real Gross Calorific Value MJ/m^3	0.06
Gross calorific value of water-saturated gas MJ/m^3	0.03

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 12-02-97

amdel

415157

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # I.Q5548

Sample: SHITTIM-1D
Cuttings Gas, 1703.1m
1442h, Cyl# 240
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.77
Helium	1.62
Carbon Dioxide	0.23
Hydrogen	4.09
Methane	0.28
Ethane	0.01
Propane	0.005
I-Butane	0.000
N-Butane	0.004
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.003
Hexanes	0.001
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.02

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.57
Lower Flammability limit	91.62
Upper Flammability limit	1308.33
Ratio of upper to lower	14.28
Wobbe Index	0.65
Compressibility Factor	1.0001
Ideal Gas Density (Rel to air = 1)	0.917
Real gas Density (Rel to air = 1)	0.917
Ideal Nett Calorific Value MJ/m^3	0.54
Ideal Gross Calorific Value MJ/m^3	0.63
Real Nett Calorific Value MJ/m^3	0.54
Real Gross Calorific Value MJ/m^3	0.63
Gross calorific value of water-saturated gas MJ/m^3	0.58

This report relates specifically to the sample submitted for analysis.

Signed Dave Cass

Date : 12-02-97

amdel

415158

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHITTIM-1D
Cuttings Gas, 1703.1m
1442h, Cyl# 240
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	25.88
Carbon Dioxide	3.63
Hydrogen	65.56
Methane	4.52
Ethane	0.19
Propane	0.08
I-Butane	0.00
N-Butane	0.07
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.05
Hexanes	0.02
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.86
Lower Flammability limit	5.72
Upper Flammability limit	81.67
Ratio of upper to lower	14.28
Wobbe Index	24.45
Compressibility Factor	1.0066
Ideal Gas Density (Rel to air = 1)	0.168
Real gas Density (Rel to air = 1)	0.167
Ideal Nett Calorific Value MJ/m^3	8.60
Ideal Gross Calorific Value MJ/m^3	10.02
Real Nett Calorific Value MJ/m^3	8.54
Real Gross Calorific Value MJ/m^3	9.95
Gross calorific value of water-saturated gas MJ/m^3	9.82

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 12-02-97

amdel

415159

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5548

Sample: SHITTIM-1D
Cuttings Gas, 1703.1m
1442h, Cyl# 240
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	26.85
Carbon Dioxide	0.00
Hydrogen	68.03
Methane	4.70
Ethane	0.20
Propane	0.08
I-Butane	0.00
N-Butane	0.07
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.05
Hexanes	0.02
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.39
Lower Flammability limit	5.51
Upper Flammability limit	78.71
Ratio of upper to lower	14.28
Wobbe Index	30.40
Compressibility Factor	1.0068
Ideal Gas Density (Rel to air = 1)	0.117
Real gas Density (Rel to air = 1)	0.116
Ideal Nett Calorific Value MJ/m^3	8.92
Ideal Gross Calorific Value MJ/m^3	10.40
Real Nett Calorific Value MJ/m^3	8.86
Real Gross Calorific Value MJ/m^3	10.32
Gross calorific value of water-saturated gas MJ/m^3	10.19

This report relates specifically to the sample submitted for analysis.

Signed Dave Cass

Date : 12-02-97

amdel

A.C.N. 008 127 802

415160 FAXED

FAXED

FACSIMILE TRANSMISSION FROM:

AMDEL LIMITED PETROLEUM SERVICES
35-37 STIRLING STREET, THEBARTON SA 5031
FACSIMILE NO: (08) 234 2933 or (08) 234 2760
TELEPHONE NO: (08) 416 5240

TO:	Dr Clive Burrett		
COMPANY:	Geology Dept - University of Tasmania		
FAX NO:	002 ~~202 476~~ 232 547	DATE:	15 January, 1996
COPY TO:	Malcolm Bendall - 002 292 153		
FROM:	Scott Wythe	TOTAL PAGES:	13

Clive/Malcolm,

Please find following geochemical data for the Lonnavale seep sample. Brief interpretative notes are given below.

- the oil appears to be early mature-mature with an equivalent vitrinite reflectance value of approximately 0.8%.
- the tricyclic signature associated with *Tasmanites* is present and dominates the 191 mass fragmentogram.
- no evidence of *botryococcane* was detected (m/z 183).
- pristane/phytane as an indicator of the oxicity of the environment of deposition is probably unreliable due to likely loss of a proportion of these lighter compounds.
- source information is difficult to assess. Hopane signatures are unreliable due to the dominance of tricyclic compounds in m/z 191 but the C_{29} norhopane appears to be more abundent than the C_{30} hopane. This suggests a carbonate source however the presence of significant amounts of diasteranes usually associated with clay-rich environments suggests otherwise. The 27:28:29 steranes are equally abundent implying a dominence of neither C_{27} marine or C_{29} land plant organic matter in the source material.

Best regards,

Scott Wythe
Petroleum Geochemist

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amdel

A.C.N. 008 127 802

415161

FACSIMILE TRANSMISSION FROM:

AMDEL LIMITED PETROLEUM SERVICES
35-37 STIRLING STREET, THEBARTON SA 5031
FACSIMILE NO: (08) 8234 2933 or (08) 8234 2760
TELEPHONE NO: (08) 8416 5240

TO:	Malcolm Bendall		
COMPANY:	Condor Oil Investments Pty Ltd		
FAX NO:	03 6229 2153	DATE:	11 February, 1997
COPY TO:	Gerry Carne - 8332 7730		
FROM:	Scott Wythe	TOTAL PAGES:	3

Malcolm/Gerry,

Please find following gas chromatograms of two core extracts from 1689.2m and 1700.1m depths. Extract yields for the samples are:

1689.2m	4.27mg/kg
1700.1m	11.2mg/kg

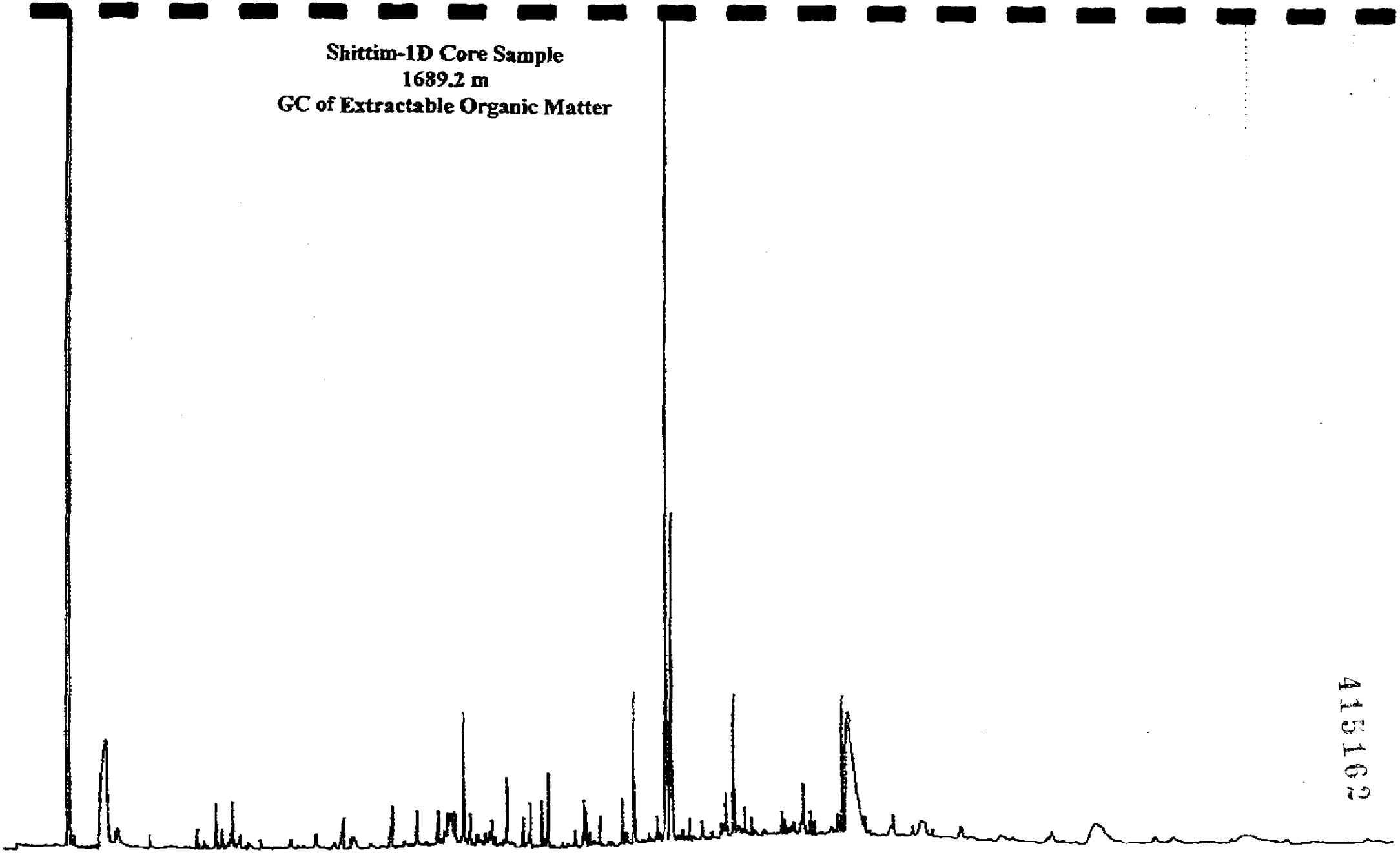
Note that again only small amounts of extract were obtained and as discussed with Malcolm this afternoon we recommend waiting for all of the core samples provided to be extracted before deciding whether to perform further analysis.

Best Regards,

Scott Wythe
Petroleum Geochemist
Petroleum Services

This document and any following pages are confidential and intended solely for the named addressee. The copying or distribution of them or of any information they contain, by anyone other than the addressee, is prohibited. If you have received this document in error, please let us know by telephone and then return it by mail to the address above. We shall refund in full your costs in so doing.

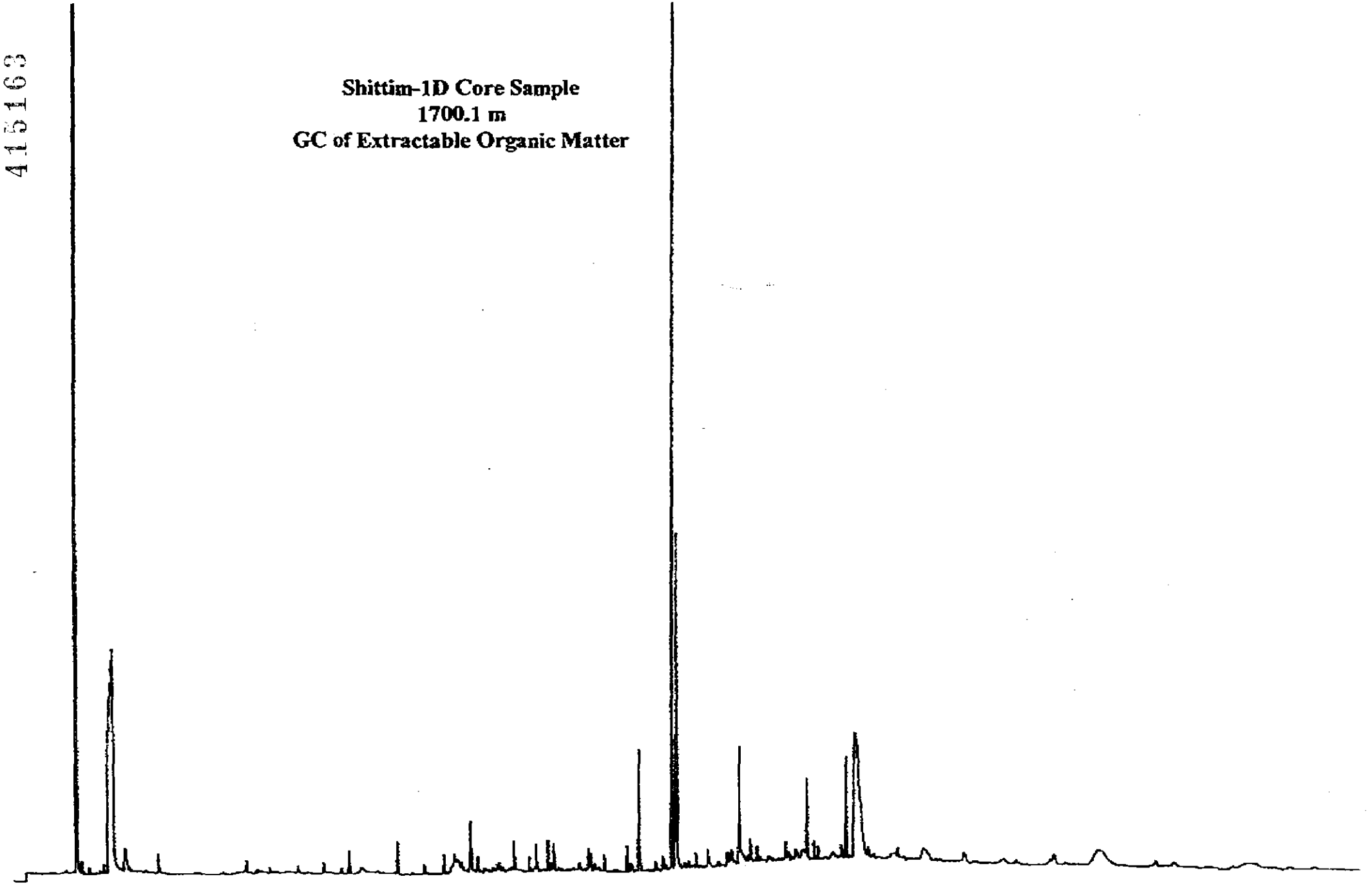
Shittim-1D Core Sample
1689.2 m
GC of Extractable Organic Matter



415162

415163

Shittim-1D Core Sample
1700.1 m
GC of Extractable Organic Matter



Fax Sent By : 61 8 6243755 HOWELL LTD PALMERSTON 04-JAN 11/07/97 10:48 Pg: 5/5

amdel

415164

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1703.6m, 20 Units
01/02/97, 1750 h, Cyl# 218
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.33
Nitrogen	80.41
Helium	0.02
Carbon Dioxide	0.12
Hydrogen	0.11
Methane	0.01
Ethane	0.0004
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0004
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0003
Heptanes	0.0002
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.77
Lower Flammability limit	3194.19
Upper Flammability limit	38944.27
Ratio of upper to lower	12.19
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.993
Real gas Density (Rel to air = 1)	0.993
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 13-02-97

amdel

415165

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: *CONDOR OIL INVESTMENTS PTY LTD* *Report # LQ5564*

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1703.6m, 20 Units
01/02/97, 1750 h, Cyl# 218
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.80
Helium	0.20
Carbon Dioxide	0.79
Hydrogen	1.08
Methane	0.13
Ethane	0.004
Propane	0.003
I-Butane	0.000
N-Butane	0.004
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.003
Hexanes	0.003
Heptanes	0.002
Octanes and higher h'cs	0.000
Total	100.02

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.80
Lower Flammability limit	325.68
Upper Flammability limit	3970.82
Ratio of upper to lower	12.19
Wobbe Index	0.21
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.960
Real gas Density (Rel to air = 1)	0.960
Ideal Nett Calorific Value MJ/m^3	0.18
Ideal Gross Calorific Value MJ/m^3	0.20
Real Nett Calorific Value MJ/m^3	0.18
Real Gross Calorific Value MJ/m^3	0.20
Gross calorific value of water-saturated gas MJ/m^3	0.17

This report relates specifically to the sample submitted for analysis.

Signed Pamela Valents

Date : 13-02-97

amdel

415166

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1703.6m, 20 Units
01/02/97, 1750 h, Cyl# 218
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	8.87
Carbon Dioxide	35.73
Hydrogen	48.78
Methane	5.77
Ethane	0.16
Propane	0.12
I-Butane	0.00
N-Butane	0.19
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.13
Hexanes	0.14
Heptanes	0.11
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	18.52
Lower Flammability limit	7.20
Upper Flammability limit	87.81
Ratio of upper to lower	12.19
Wobbe Index	11.49
Compressibility Factor	1.0040
Ideal Gas Density (Rel to air = 1)	0.639
Real gas Density (Rel to air = 1)	0.637
Ideal Nett Calorific Value MJ/m^3	7.98
Ideal Gross Calorific Value MJ/m^3	9.19
Real Nett Calorific Value MJ/m^3	7.94
Real Gross Calorific Value MJ/m^3	9.15
Gross calorific value of water-saturated gas MJ/m^3	9.00

This report relates specifically to the sample submitted for analysis.

Signed Lorraine Valenta

Date : 13-02-97

amdel

415167

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1703.6m, 20 Units
01/02/97, 1750 h, Cyl# 218
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	13.80
Carbon Dioxide	0.00
Hydrogen	75.90
Methane	8.97
Ethane	0.26
Propane	0.19
I-Butane	0.00
N-Butane	0.29
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.21
Hexanes	0.21
Heptanes	0.17
Octanes and higher h'cs	0.00
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.35
Lower Flammability limit	4.63
Upper Flammability limit	56.44
Ratio of upper to lower	12.19
Wobbe Index	36.87
Compressibility Factor	1.0076
Ideal Gas Density (Rel to air = 1)	0.150
Real gas Density (Rel to air = 1)	0.149
Ideal Nett Calorific Value MJ/m^3	12.41
Ideal Gross Calorific Value MJ/m^3	14.29
Real Nett Calorific Value MJ/m^3	12.32
Real Gross Calorific Value MJ/m^3	14.18
Gross calorific value of water-saturated gas MJ/m^3	14.02

This report relates specifically to the sample submitted for analysis.

Signed Lucinda Valentine

Date : 13-02-97

amdel

415168

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: *SHITTIM-1D, HOT WIRE*
Cutting Gas, 1715.2m, 30 Units
03/02/97, 1215 h, Cyl# 288
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.38
Nitrogen	80.33
Helium	0.01
Carbon Dioxide	0.06
Hydrogen	0.20
Methane	0.02
Ethane	0.0008
Propane	0.0004
I-Butane	0.0000
N-Butane	0.0007
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0008
Hexanes	0.0009
Heptanes	0.0010
Octanes and higher h'cs	0.0028
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.74
Lower Flammability limit	*1690.24*
Upper Flammability limit	21228.63
Ratio of upper to lower	12.56
Wobbe Index	0.04
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m³	0.04
Ideal Gross Calorific Value MJ/m³	0.04
Real Nett Calorific Value MJ/m³	0.04
Real Gross Calorific Value MJ/m³	0.04
Gross calorific value of water-saturated gas MJ/m³	0.01

This report relates specifically to the sample submitted for analysis.

Signed Cunthia Valenta

Date : 13-02-97

amdel

415169

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: *SHITTIM-1D, HOT WIRE*
Cutting Gas, 1715.2m, 30 Units
03/02/97, 1215 h, Cyl# 288
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.38
Helium	0.10
Carbon Dioxide	0.31
Hydrogen	1.98
Methane	0.15
Ethane	0.01
Propane	0.004
I-Butane	0.00
N-Butane	0.01
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.01
Hexanes	0.01
Heptanes	0.01
Octanes and higher h'cs	0.03
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.55
Lower Flammability limit	170.61
Upper Flammability limit	2142.76
Ratio of upper to lower	12.56
Wobbe Index	0.44
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.951
Real gas Density (Rel to air = 1)	0.951
Ideal Nett Calorific Value MJ/m^3	0.37
Ideal Gross Calorific Value MJ/m^3	0.43
Real Nett Calorific Value MJ/m^3	0.37
Real Gross Calorific Value MJ/m^3	0.43
Gross calorific value of water-saturated gas MJ/m^3	0.39

This report relates specifically to the sample submitted for analysis.

Signed Lavinia Valente

Date : 13-02-97

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD — Report # I-Q5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1715.2m, 30 Units
03/02/97, 1215 h, Cyl# 288
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	3.80
Carbon Dioxide	11.76
Hydrogen	75.93
Methane	5.70
Ethane	0.29
Propane	0.16
I-Butane	0.00
N-Butane	0.26
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.30
Hexanes	0.35
Heptanes	0.39
Octanes and higher h'cs	1.06
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	10.21
Lower Flammability limit	4.45
Upper Flammability limit	55.91
Ratio of upper to lower	12.56
Wobbe Index	27.54
Compressibility Factor	1.0072
Ideal Gas Density (Rel to air = 1)	0.352
Real gas Density (Rel to air = 1)	0.350
Ideal Nett Calorific Value MJ/m^3	14.35
Ideal Gross Calorific Value MJ/m^3	16.35
Real Nett Calorific Value MJ/m^3	14.24
Real Gross Calorific Value MJ/m^3	16.23
Gross calorific value of water-saturated gas MJ/m^3	16.04

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valentis

Date : 13-02-97

amdel

415171

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1715.2m, 30 Units
03/02/97, 1215 h, Cyl# 288
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	4.30
Carbon Dioxide	0.00
Hydrogen	86.05
Methane	6.45
Ethane	0.33
Propane	0.19
I-Butane	0.00
N-Butane	0.30
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.34
Hexanes	0.40
Heptanes	0.44
Octanes and higher h'cs	1.20
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.70
Lower Flammability limit	3.93
Upper Flammability limit	49.34
Ratio of upper to lower	12.56
Wobbe Index	41.75
Compressibility Factor	1.0085
Ideal Gas Density (Rel to air = 1)	0.197
Real gas Density (Rel to air = 1)	0.195
Ideal Nett Calorific Value MJ/m^3	16.26
Ideal Gross Calorific Value MJ/m^3	18.52
Real Nett Calorific Value MJ/m^3	16.12
Real Gross Calorific Value MJ/m^3	18.37
Gross calorific value of water-saturated gas MJ/m^3	18.18

This report relates specifically to the sample submitted for analysis.

Signed

Date : 13-02-97

amdel

415172

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 45 Units, 1715.2m
05/02/97, 1250 h, Cyl# 230
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	15.03
Nitrogen	73.89
Helium	0.01
Carbon Dioxide	0.07
Hydrogen	0.00
Methane	9.69
Ethane	0.67
Propane	0.08
I-Butane	0.00
N-Butane	0.07
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.07
Hexanes	0.15
Heptanes	0.13
Octanes and higher h'cs	0.14
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.84
Lower Flammability limit	37.07
Upper Flammability limit	127.53
Ratio of upper to lower	3.44
Wobbe Index	5.32
Compressibility Factor	0.9994
Ideal Gas Density (Rel to air = 1)	0.961
Real gas Density (Rel to air = 1)	0.961
Ideal Nett Calorific Value MJ/m^3	4.73
Ideal Gross Calorific Value MJ/m^3	5.22
Real Nett Calorific Value MJ/m^3	4.74
Real Gross Calorific Value MJ/m^3	5.22
Gross calorific value of water-saturated gas MJ/m^3	5.10

This report relates specifically to the sample submitted for analysis.

Signed

Date : 13-02-97

amdel

415173

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 45 Units, 1715.2m
05/02/97, 1250 h, Cyl# 230
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	64.69
Helium	0.04
Carbon Dioxide	0.16
Hydrogen	0.00
Methane	30.93
Ethane	2.12
Propane	0.26
I-Butane	0.00
N-Butane	0.24
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.22
Hexanes	0.49
Heptanes	0.41
Octanes and higher h'cs	0.44
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	25.54
Lower Flammability limit	11.61
Upper Flammability limit	39.95
Ratio of upper to lower	3.44
Wobbe Index	17.74
Compressibility Factor	0.9989
Ideal Gas Density (Rel to air = 1)	0.882
Real gas Density (Rel to air = 1)	0.882
Ideal Nett Calorific Value MJ/m^3	15.11
Ideal Gross Calorific Value MJ/m^3	16.66
Real Nett Calorific Value MJ/m^3	15.13
Real Gross Calorific Value MJ/m^3	16.68
Gross calorific value of water-saturated gas MJ/m^3	16.35

This report relates specifically to the sample submitted for analysis.

Signed Lavrentin Valentin

Date : 13-02-97

amdel

415174

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 45 Units, 1715.2m
05/02/97, 1250 h, Cyl# 230
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.10
Carbon Dioxide	0.45
Hydrogen	0.00
Methane	87.60
Ethane	6.01
Propane	0.75
I-Butane	0.00
N-Butane	0.67
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.63
Hexanes	1.38
Heptanes	1.17
Octanes and higher h'cs	1.24
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	21.01
Lower Flammability limit	4.10
Upper Flammability limit	14.11
Ratio of upper to lower	3.44
Wobbe Index	55.40
Compressibility Factor	0.9961
Ideal Gas Density (Rel to air = 1)	0.725
Real gas Density (Rel to air = 1)	0.728
Ideal Nett Calorific Value MJ/m^3	42.79
Ideal Gross Calorific Value MJ/m^3	47.18
Real Nett Calorific Value MJ/m^3	42.96
Real Gross Calorific Value MJ/m^3	47.36
Gross calorific value of water-saturated gas MJ/m^3	46.36

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 13-02-97

amdel

415175

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: *SHITTIM-1D, HOT WIRE*
Cutting Gas, 45 Units, 1715.2m
05/02/97, 1250 h, Cyl# 230
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.10
Carbon Dioxide	0.00
Hydrogen	0.00
Methane	88.01
Ethane	6.04
Propane	0.75
I-Butane	0.00
N-Butane	0.67
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.63
Hexanes	1.38
Heptanes	1.18
Octanes and higher h'cs	1.24
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	20.90
Lower Flammability limit	*4.08*
Upper Flammability limit	14.04
Ratio of upper to lower	3.44
Wobbe Index	55.79
Compressibility Factor	0.9961
Ideal Gas Density (Rel to air = 1)	0.722
Real gas Density (Rel to air = 1)	0.724
Ideal Nett Calorific Value MJ/m^3	42.99
Ideal Gross Calorific Value MJ/m^3	47.39
Real Nett Calorific Value MJ/m^3	43.15
Real Gross Calorific Value MJ/m^3	47.58
Gross calorific value of water-saturated gas MJ/m^3	46.57

This report relates specifically to the sample submitted for analysis.

Signed Lucretia Valenta

Date : 13-02-97

amdel

415176

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1724.1m, 16 Units
05/02/97, 1540 h, Cyl# 308
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.26
Nitrogen	79.62
Helium	0.01
Carbon Dioxide	0.00
Hydrogen	0.09
Methane	0.02
Ethane	0.0003
Propane	0.00007
I-Butane	0.00000
N-Butane	0.00008
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00001
Hexanes	0.00003
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.79
Lower Flammability limit	3828.54
Upper Flammability limit	41792.88
Ratio of upper to lower	10.92
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.994
Real gas Density (Rel to air = 1)	0.994
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis

Signed Lorraine Valenti

Date : 13-02-97

amdel

415177

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1724.1m, 16 Units
05/02/97, 1540 h, Cyl# 308
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	98.21
Helium	0.15
Carbon Dioxide	0.00
Hydrogen	1.37
Methane	0.26
Ethane	0.005
Propane	0.001
I-Butane	0.000
N-Butane	0.001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0002
Hexanes	0.0005
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.59
Lower Flammability limit	250.62
Upper Flammability limit	2735.79
Ratio of upper to lower	10.92
Wobbe Index	0.28
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.953
Real gas Density (Rel to air = 1)	0.952
Ideal Nett Calorific Value MJ/m^3	0.23
Ideal Gross Calorific Value MJ/m^3	0.27
Real Nett Calorific Value MJ/m^3	0.24
Real Gross Calorific Value MJ/m^3	0.27
Gross calorific value of water-saturated gas MJ/m^3	0.23

This report relates specifically to the sample submitted for analysis.

Signed Carmelita Valenta

Date : 13-02-97

amdel

415178

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1724.1m, 16 Units
05/02/97, 1540 h, Cyl# 308
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	8.51
Carbon Dioxide	0.00
Hydrogen	76.59
Methane	14.46
Ethane	0.28
Propane	0.06
I-Butane	0.00
N-Butane	0.06
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.01
Hexanes	0.03
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.38
Lower Flammability limit	4.50
Upper Flammability limit	49.11
Ratio of upper to lower	10.92
Wobbe Index	38.80
Compressibility Factor	1.0077
Ideal Gas Density (Rel to air = 1)	0.151
Real gas Density (Rel to air = 1)	0.150
Ideal Nett Calorific Value MJ/m^3	13.09
Ideal Gross Calorific Value MJ/m^3	15.09
Real Nett Calorific Value MJ/m^3	12.99
Real Gross Calorific Value MJ/m^3	14.97
Gross calorific value of water-saturated gas MJ/m^3	14.80

This report relates specifically to the sample submitted for analysis.

Signed Cumulin Valenti

Date : 13-02-97

amdel

415179

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5564

Sample: SHITTIM-1D, HOT WIRE
Cutting Gas, 1724.1m, 16 Units
05/02/97, 1540 h, Cyl# 308
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	8.51
Carbon Dioxide	0.00
Hydrogen	76.59
Methane	14.46
Ethane	0.28
Propane	0.06
I-Butane	0.00
N-Butane	0.06
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.01
Hexanes	0.03
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.38
Lower Flammability limit	4.50
Upper Flammability limit	49.11
Ratio of upper to lower	10.92
Wobbe Index	38.80
Compressibility Factor	1.0077
Ideal Gas Density (Rel to air = 1)	0.151
Real gas Density (Rel to air = 1)	0.150
Ideal Nett Calorific Value MJ/m^3	13.09
Ideal Gross Calorific Value MJ/m^3	15.09
Real Nett Calorific Value MJ/m^3	12.99
Real Gross Calorific Value MJ/m^3	14.97
Gross calorific value of water-saturated gas MJ/m^3	14.80

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valentino

Date : 13-02-97

amdel

415180

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1727.1m, 23 Units
06/02/97, 1137h, Cyl# 117
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.39
Nitrogen	81.34
Helium	0.01
Carbon Dioxide	0.07
Hydrogen	0.17
Methane	0.02
Ethane	0.0006
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.71
Lower Flammability limit	2137.81
Upper Flammability limit	27207.95
Ratio of upper to lower	12.73
Wobbe Index	0.03
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.991
Real gas Density (Rel to air = 1)	0.991
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed Debbie Cass

Date : 14-02-97

amdel

415181

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1727.1m, 23 Units
06/02/97, 1137h, Cyl# 117
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	98.28
Helium	0.07
Carbon Dioxide	0.30
Hydrogen	1.21
Methane	0.14
Ethane	0.004
Propane	0.0009
I-Butane	0.0000
N-Butane	0.0003
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0002
Hexanes	0.0001
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.71
Lower Flammability limit	300.98
Upper Flammability limit	3830.55
Ratio of upper to lower	12.73
Wobbe Index	0.21
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.957
Real gas Density (Rel to air = 1)	0.957
Ideal Nett Calorific Value MJ/m^3	0.18
Ideal Gross Calorific Value MJ/m^3	0.20
Real Nett Calorific Value MJ/m^3	0.18
Real Gross Calorific Value MJ/m^3	0.20
Gross calorific value of water-saturated gas MJ/m^3	0.17

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 14-02-97

amdel

415182

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1727.1m, 23 Units
06/02/97, 1137h, Cyl# 117
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	4.12
Carbon Dioxide	17.43
Hydrogen	70.00
Methane	8.11
Ethane	0.24
Propane	0.05
I-Butane	0.00
N-Butane	0.02
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.01
Hexanes	0.01
Heptanes	0.01
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	10.68
Lower Flammability limit	5.19
Upper Flammability limit	66.07
Ratio of upper to lower	12.73
Wobbe Index	19.43
Compressibility Factor	1.0068
Ideal Gas Density (Rel to air = 1)	0.369
Real gas Density (Rel to air = 1)	0.366
Ideal Nett Calorific Value MJ/m^3	10.17
Ideal Gross Calorific Value MJ/m^3	11.80
Real Nett Calorific Value MJ/m^3	10.10
Real Gross Calorific Value MJ/m^3	11.72
Gross calorific value of water-saturated gas MJ/m^3	11.57

This report relates specifically to the sample submitted for analysis.

Signed Qiane Cass

Date : 14-02-97

amdel

415183

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1727.1m, 23 Units
06/02/97, 1137h, Cyl# 117
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	4.99
Carbon Dioxide	0.00
Hydrogen	84.78
Methane	9.83
Ethane	0.29
Propane	0.06
I-Butane	0.00
N-Butane	0.02
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.01
Hexanes	0.01
Heptanes	0.01
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.64
Lower Flammability limit	4.29
Upper Flammability limit	54.55
Ratio of upper to lower	12.73
Wobbe Index	40.30
Compressibility Factor	1.0085
Ideal Gas Density (Rel to air = 1)	0.126
Real gas Density (Rel to air = 1)	0.125
Ideal Nett Calorific Value MJ/m^3	12.31
Ideal Gross Calorific Value MJ/m^3	14.29
Real Nett Calorific Value MJ/m^3	12.21
Real Gross Calorific Value MJ/m^3	14.17
Gross calorific value of water-saturated gas MJ/m^3	14.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 14-02-97

amdel

415184

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1731.3m, 23 Units
07/02/97, 1002h, Cyl# 316
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.69
Nitrogen	79.09
Helium	0.01
Carbon Dioxide	0.02
Hydrogen	0.17
Methane	0.02
Ethane	0.0004
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.79
Lower Flammability limit	2139.93
Upper Flammability limit	27229.92
Ratio of upper to lower	12.72
Wobbe Index	0.03
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.994
Real gas Density (Rel to air = 1)	0.994
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 14-02-97

amdel

415185

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # I.Q5573

Sample: SHITTIM-1D
Cuttings Gas, 1731.3m, 23 Units
07/02/97, 1002h, Cyl# 316
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	95.85
Helium	0.21
Carbon Dioxide	0.00
Hydrogen	3.52
Methane	0.41
Ethane	0.008
Propane	0.002
I-Butane	0.000
N-Butane	0.0003
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0002
Hexanes	0.0006
Heptanes	0.0004
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.00
Lower Flammability limit	103.32
Upper Flammability limit	1314.68
Ratio of upper to lower	12.72
Wobbe Index	0.61
Compressibility Factor	1.0001
Ideal Gas Density (Rel to air = 1)	0.932
Real gas Density (Rel to air = 1)	0.932
Ideal Nett Calorific Value MJ/m^3	0.51
Ideal Gross Calorific Value MJ/m^3	0.59
Real Nett Calorific Value MJ/m^3	0.51
Real Gross Calorific Value MJ/m^3	0.59
Gross calorific value of water-saturated gas MJ/m^3	0.55

This report relates specifically to the sample submitted for analysis.

Signed

Date : 14-02-97

amdel

415186

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1731.3m, 23 Units
07/02/97, 1002h, Cyl# 316
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	4.99
Carbon Dioxide	0.00
Hydrogen	84.77
Methane	9.98
Ethane	0.19
Propane	0.04
I-Butane	0.000
N-Butane	0.008
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.005
Hexanes	0.013
Heptanes	0.008
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.61
Lower Flammability limit	4.29
Upper Flammability limit	54.61
Ratio of upper to lower	12.72
Wobbe Index	40.30
Compressibility Factor	1.0085
Ideal Gas Density (Rel to air = 1)	0.125
Real gas Density (Rel to air = 1)	0.124
Ideal Nett Calorific Value MJ/m^3	12.26
Ideal Gross Calorific Value MJ/m^3	14.24
Real Nett Calorific Value MJ/m^3	12.16
Real Gross Calorific Value MJ/m^3	14.12
Gross calorific value of water-saturated gas MJ/m^3	13.96

This report relates specifically to the sample submitted for analysis.

Signed Diane Casi

Date : 14-02-97

amdel

415187

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1731.3m, 23 Units
07/02/97, 1002h, Cyl# 316
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	4.99
Carbon Dioxide	0.00
Hydrogen	84.77
Methane	9.98
Ethane	0.19
Propane	0.04
I-Butane	0.000
N-Butane	0.008
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.005
Hexanes	0.01
Heptanes	0.008
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.61
Lower Flammability limit	4.29
Upper Flammability limit	54.61
Ratio of upper to lower	12.72
Wobbe Index	40.30
Compressibility Factor	1.0085
Ideal Gas Density (Rel to air = 1)	0.125
Real gas Density (Rel to air = 1)	0.124
Ideal Nett Calorific Value MJ/m^3	12.26
Ideal Gross Calorific Value MJ/m^3	14.24
Real Nett Calorific Value MJ/m^3	12.16
Real Gross Calorific Value MJ/m^3	14.12
Gross calorific value of water-saturated gas MJ/m^3	13.96

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 14-02-97

amdel

415188

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # 1.Q5573

Sample: SHITTIM-1D
Cuttings Gas, 1732.1m, 31 Units
07/02/97, 1135h, Cyl# 318
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	17.81
Nitrogen	81.91
Helium	0.01
Carbon Dioxide	0.02
Hydrogen	0.23
Methane	0.02
Ethane	0.0007
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.66
Lower Flammability limit	1618.21
Upper Flammability limit	22236.26
Ratio of upper to lower	13.74
Wobbe Index	0.04
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.990
Real gas Density (Rel to air = 1)	0.990
Ideal Nett Calorific Value MJ/m^3	0.03
Ideal Gross Calorific Value MJ/m^3	0.04
Real Nett Calorific Value MJ/m^3	0.03
Real Gross Calorific Value MJ/m^3	0.04
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed

Date : 14-02-97

amdel

415189

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SIITTIM-1D
Cuttings Gas, 1732.1m, 31 Units
07/02/97, 1135h, Cyl# 318
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	98.41
Helium	0.06
Carbon Dioxide	0.00
Hydrogen	1.41
Methane	0.12
Ethane	0.004
Propane	0.0004
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kl'a (abs)

Average Molecular Weight	27.62
Lower Flammability limit	264.28
Upper Flammability limit	3631.54
Ratio of upper to lower	13.74
Wobbe Index	0.23
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.954
Real gas Density (Rel to air = 1)	0.953
Ideal Nett Calorific Value MJ/m^3	0.19
Ideal Gross Calorific Value MJ/m^3	0.22
Real Nett Calorific Value MJ/m^3	0.19
Real Gross Calorific Value MJ/m^3	0.22
Gross calorific value of water-saturated gas MJ/m^3	0.18

This report relates specifically to the sample submitted for analysis

Signed

Date : 14-02-97

lq amdel

415190

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1732.1m, 31 Units
07/02/97, 1135h, Cyl# 318
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	3.83
Carbon Dioxide	0.00
Hydrogen	88.20
Methane	7.68
Ethane	0.25
Propane	0.02
I-Butane	0.000
N-Butane	0.009
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.007
Hexanes	0.004
Heptanes	0.003
Octanes and higher hcs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.26
Lower Flammability limit	4.22
Upper Flammability limit	57.99
Ratio of upper to lower	13.74
Wobbe Index	41.04
Compressibility Factor	1.0089
Ideal Gas Density (Rel to air = 1)	0.113
Real gas Density (Rel to air = 1)	0.112
Ideal Nett Calorific Value MJ/m^3	11.83
Ideal Gross Calorific Value MJ/m^3	13.78
Real Nett Calorific Value MJ/m^3	11.73
Real Gross Calorific Value MJ/m^3	13.66
Gross calorific value of water-saturated gas MJ/m^3	13.51

This report relates specifically to the sample submitted for analysis.

Signed Alan Cass

Date : 14-02-97

amdel

415191

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1732.1m, 31 Units
07/02/97, 1135h, Cyl# 318
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	3.83
Carbon Dioxide	0.00
Hydrogen	88.20
Methane	7.68
Ethane	0.25
Propane	0.02
I-Butane	0.000
N-Butane	0.009
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.007
Hexanes	0.004
Heptanes	0.003
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.26
Lower Flammability limit	4.22
Upper Flammability limit	57.99
Ratio of upper to lower	13.74
Wobbe Index	41.04
Compressibility Factor	1.0089
Ideal Gas Density (Rel to air = 1)	0.113
Real gas Density (Rel to air = 1)	0.112
Ideal Nett Calorific Value MJ/m^3	11.83
Ideal Gross Calorific Value MJ/m^3	13.78
Real Nett Calorific Value MJ/m^3	11.73
Real Gross Calorific Value MJ/m^3	13.66
Gross calorific value of water-saturated gas MJ/m^3	13.51

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 14-02-97

amdel

415192

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1732.8m, 17 Units
07/02/97, 1432h, Cyl# 323
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.49
Nitrogen	78.29
Helium	0.08
Carbon Dioxide	0.02
Hydrogen	0.11
Methane	0.01
Ethane	0.0004
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0002
Heptanes	0.0002
Octanes and higher h'cs	0.0004
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.82
Lower Flammability limit	3250.78
Upper Flammability limit	41980.70
Ratio of upper to lower	12.91
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.995
Real gas Density (Rel to air = 1)	0.995
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed

Date : 14-02-97

amdel

415193

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD — Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1732.8m, 17 Units
07/02/97, 1432h, Cyl# 323
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	87.79
Helium	4.83
Carbon Dioxide	0.00
Hydrogen	6.64
Methane	0.64
Ethane	0.03
Propane	0.006
I-Butane	0.000
N-Butane	0.005
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.008
Hexanes	0.01
Heptanes	0.01
Octanes and higher h'cs	0.02
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	25.10
Lower Flammability limit	53.88
Upper Flammability limit	695.77
Ratio of upper to lower	12.91
Wobbe Index	1.28
Compressibility Factor	1.0004
Ideal Gas Density (Rel to air = 1)	0.866
Real gas Density (Rel to air = 1)	0.866
Ideal Nett Calorific Value MJ/m^3	1.03
Ideal Gross Calorific Value MJ/m^3	1.19
Real Nett Calorific Value MJ/m^3	1.03
Real Gross Calorific Value MJ/m^3	1.19
Gross calorific value of water-saturated gas MJ/m^3	1.14

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 14-02-97

amdel

415194

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: *SHITTIM-1D*
Cuttings Gas, 1732.8m, 17 Units
07/02/97, 1432h, Cyl# 323
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	39.57
Carbon Dioxide	0.00
Hydrogen	54.41
Methane	5.24
Ethane	0.21
Propane	0.05
I-Butane	0.00
N-Butane	0.04
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.07
Hexanes	0.09
Heptanes	0.12
Octanes and higher h'cs	0.20
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.10
Lower Flammability limit	6.57
Upper Flammability limit	84.87
Ratio of upper to lower	12.91
Wobbe Index	25.92
Compressibility Factor	1.0055
Ideal Gas Density (Rel to air = 1)	0.141
Real gas Density (Rel to air = 1)	0.141
Ideal Nett Calorific Value MJ/m^3	8.45
Ideal Gross Calorific Value MJ/m^3	9.75
Real Nett Calorific Value MJ/m^3	8.40
Real Gross Calorific Value MJ/m^3	9.70
Gross calorific value of water-saturated gas MJ/m^3	9.55

This report relates specifically to the sample submitted for analysis.

Signed Dave Cass

Date : 14-02-97

amdel

415195

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1732.8m, 17 Units
07/02/97, 1432h, Cyl# 323
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	39.57
Carbon Dioxide	0.00
Hydrogen	54.41
Methane	5.24
Ethane	0.21
Propane	0.05
I-Butane	0.00
N-Butane	0.04
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.07
Hexanes	0.09
Heptanes	0.12
Octanes and higher h'cs	0.20
Total	99.99

(0.00 = less than 0.01%)

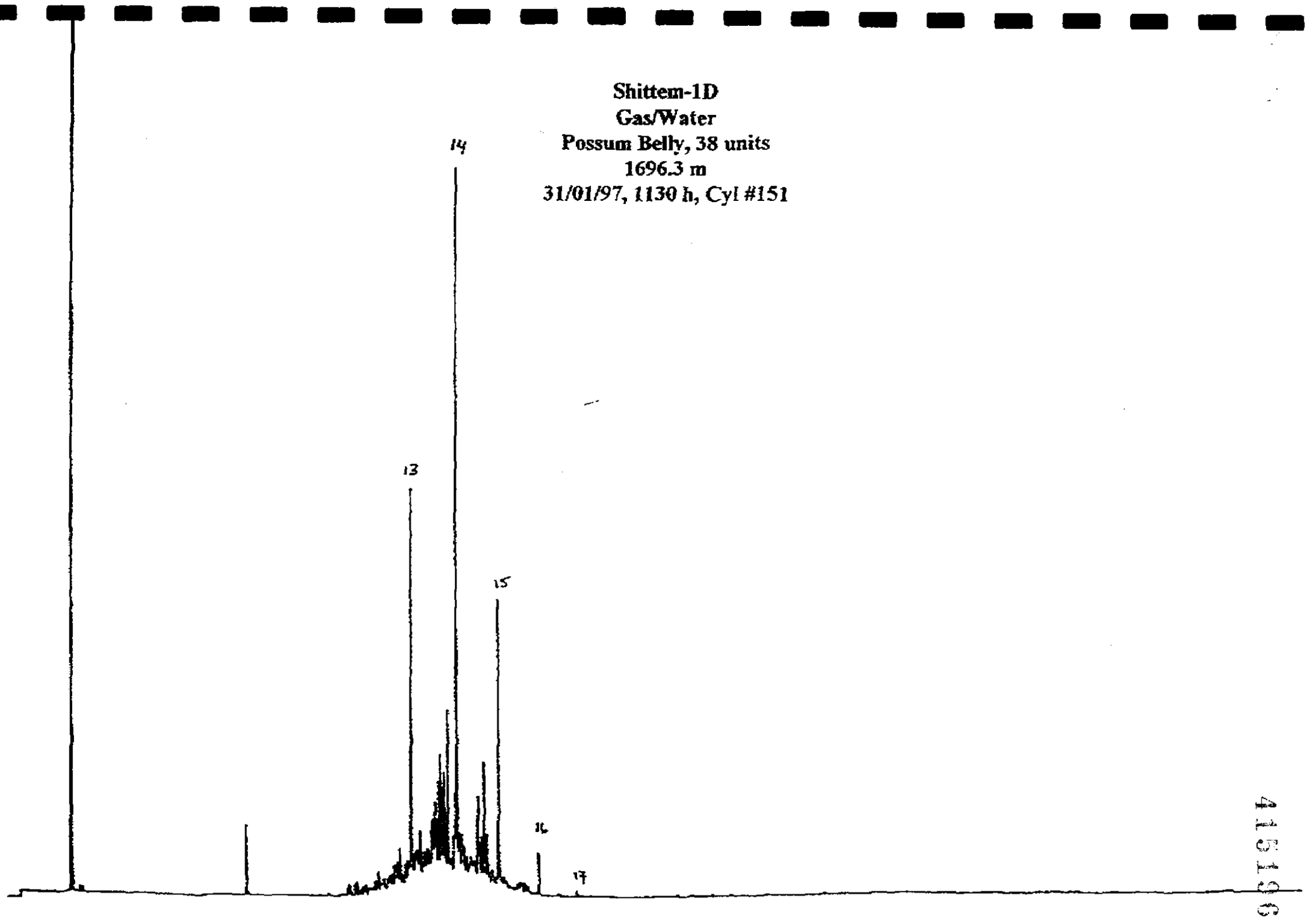
The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

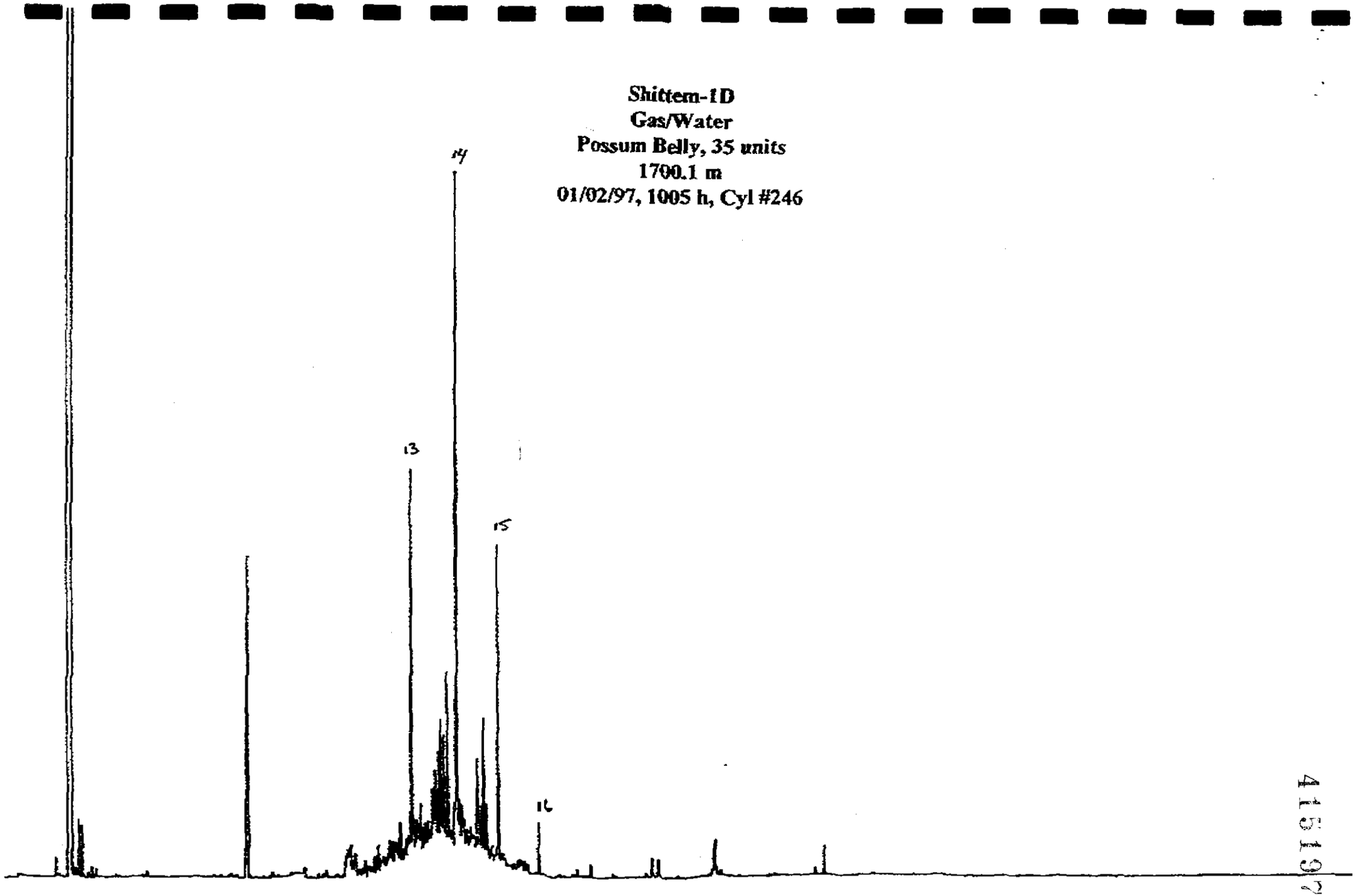
Average Molecular Weight	4.10
Lower Flammability limit	6.57
Upper Flammability limit	84.87
Ratio of upper to lower	12.91
Wobbe Index	25.92
Compressibility Factor	1.0055
Ideal Gas Density (Rel to air = 1)	0.141
Real gas Density (Rel to air = 1)	0.141
Ideal Nett Calorific Value MJ/m^3	8.45
Ideal Gross Calorific Value MJ/m^3	9.75
Real Nett Calorific Value MJ/m^3	8.40
Real Gross Calorific Value MJ/m^3	9.70
Gross calorific value of water-saturated gas MJ/m^3	9.55

This report relates specifically to the sample submitted for analysis.

Signed Steve Cass

Date : 14-02-97


Shittem-1D
Gas/Water
Possum Belly, 38 units
1696.3 m
31/01/97, 1130 h, Cyl #151
13
14
15
16
17


Shittem-1D
Gas/Water
Possum Belly, 35 units
1700.1 m
01/02/97, 1005 h, Cyl #246
13
14
15
16

415197

amdel

415198

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1733m, 52 Units
08/02/97, 0910h, Cyl# 313
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.49
Nitrogen	81.13
Helium	0.01
Carbon Dioxide	0.02
Hydrogen	0.32
Methane	0.03
Ethane	0.001
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0002
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.66
Lower Flammability limit	1147.12
Upper Flammability limit	15138.31
Ratio of upper to lower	13.20
Wobbe Index	0.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.990
Real gas Density (Rel to air = 1)	0.990
Ideal Nett Calorific Value MJ/m^3	0.05
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.05
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.02

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 14-02-97

amdel

415199

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1733m, 52 Units
08/02/97, 0910h, Cyl# 313
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.35
Helium	0.07
Carbon Dioxide	0.00
Hydrogen	2.34
Methane	0.23
Ethane	0.008
Propane	0.002
I-Butane	0.000
N-Butane	0.001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0005
Hexanes	0.0009
Heptanes	0.0002
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.36
Lower Flammability limit	156.78
Upper Flammability limit	2069.00
Ratio of upper to lower	13.20
Wobbe Index	0.39
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.945
Real gas Density (Rel to air = 1)	0.944
Ideal Nett Calorific Value MJ/m^3	0.33
Ideal Gross Calorific Value MJ/m^3	0.38
Real Nett Calorific Value MJ/m^3	0.33
Real Gross Calorific Value MJ/m^3	0.38
Gross calorific value of water-saturated gas MJ/m^3	0.34

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 14-02-97

amdel

415200

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1733m, 52 Units
08/02/97, 0910h, Cyl# 313
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	2.75
Carbon Dioxide	0.00
Hydrogen	87.97
Methane	8.80
Ethane	0.30
Propane	0.07
I-Butane	0.00
N-Butane	0.05
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.02
Hexanes	0.03
Heptanes	0.01
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.49
Lower Flammability limit	4.17
Upper Flammability limit	55.06
Ratio of upper to lower	13.20
Wobbe Index	41.40
Compressibility Factor	1.0088
Ideal Gas Density (Rel to air = 1)	0.121
Real gas Density (Rel to air = 1)	0.120
Ideal Nett Calorific Value MJ/m^3	12.38
Ideal Gross Calorific Value MJ/m^3	14.38
Real Nett Calorific Value MJ/m^3	12.27
Real Gross Calorific Value MJ/m^3	14.25
Gross calorific value of water-saturated gas MJ/m^3	14.11

This report relates specifically to the sample submitted for analysis.

Signed Debbie Cass

Date : 14-02-97

amdel

415201

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5573

Sample: SHITTIM-1D
Cuttings Gas, 1733m, 52 Units
08/02/97, 0910h, Cyl# 313
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	2.75
Carbon Dioxide	0.00
Hydrogen	87.97
Methane	8.80
Ethane	0.30
Propane	0.07
I-Butane	0.00
N-Butane	0.05
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.02
Hexanes	0.03
Heptanes	0.01
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

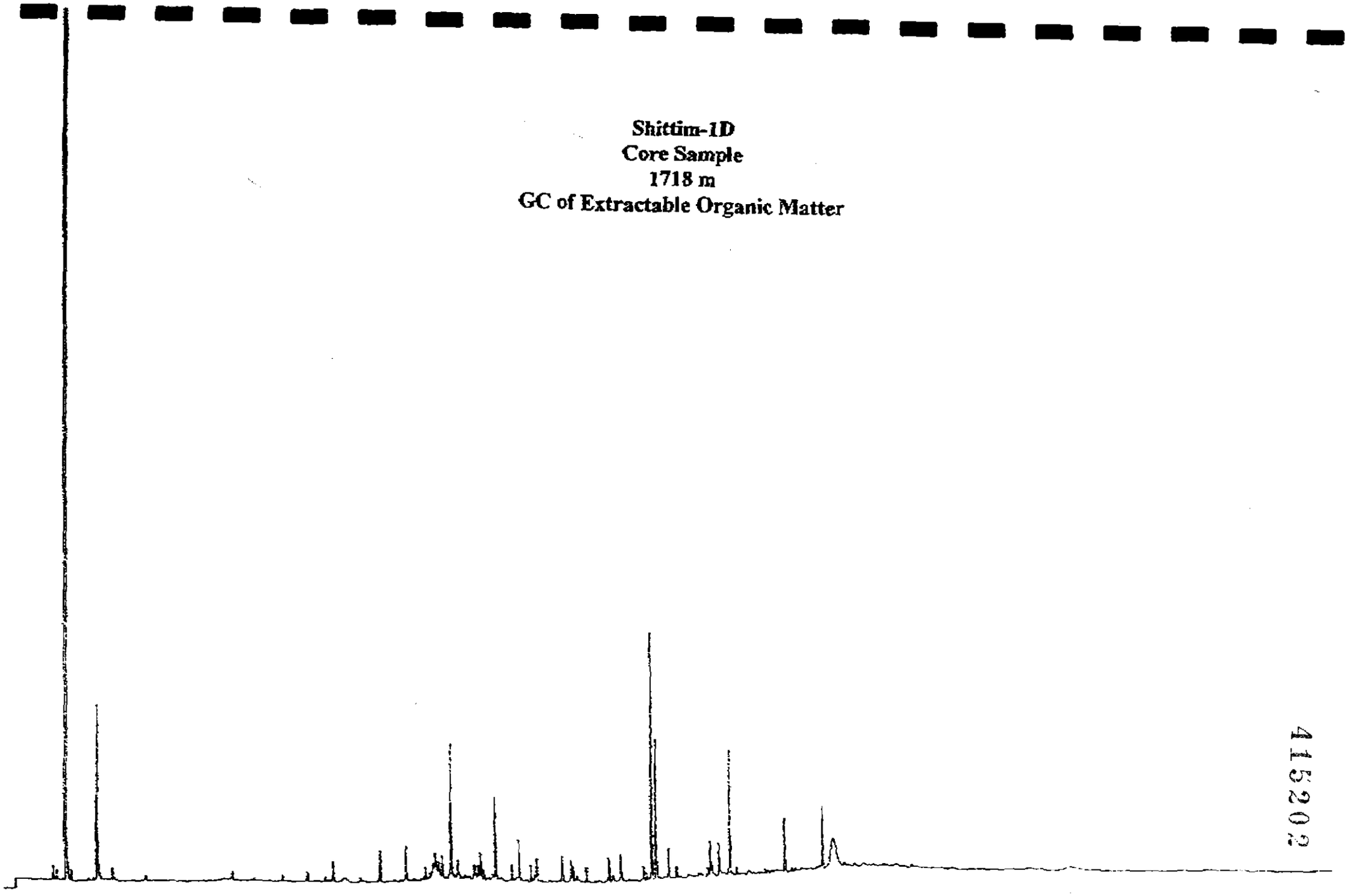
Average Molecular Weight	3.49
Lower Flammability limit	4.17
Upper Flammability limit	55.06
Ratio of upper to lower	13.20
Wobbe Index	41.40
Compressibility Factor	1.0088
Ideal Gas Density (Rel to air = 1)	0.121
Real gas Density (Rel to air = 1)	0.120
Ideal Nett Calorific Value MJ/m^3	12.38
Ideal Gross Calorific Value MJ/m^3	14.38
Real Nett Calorific Value MJ/m^3	12.27
Real Gross Calorific Value MJ/m^3	14.25
Gross calorific value of water-saturated gas MJ/m^3	14.11

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

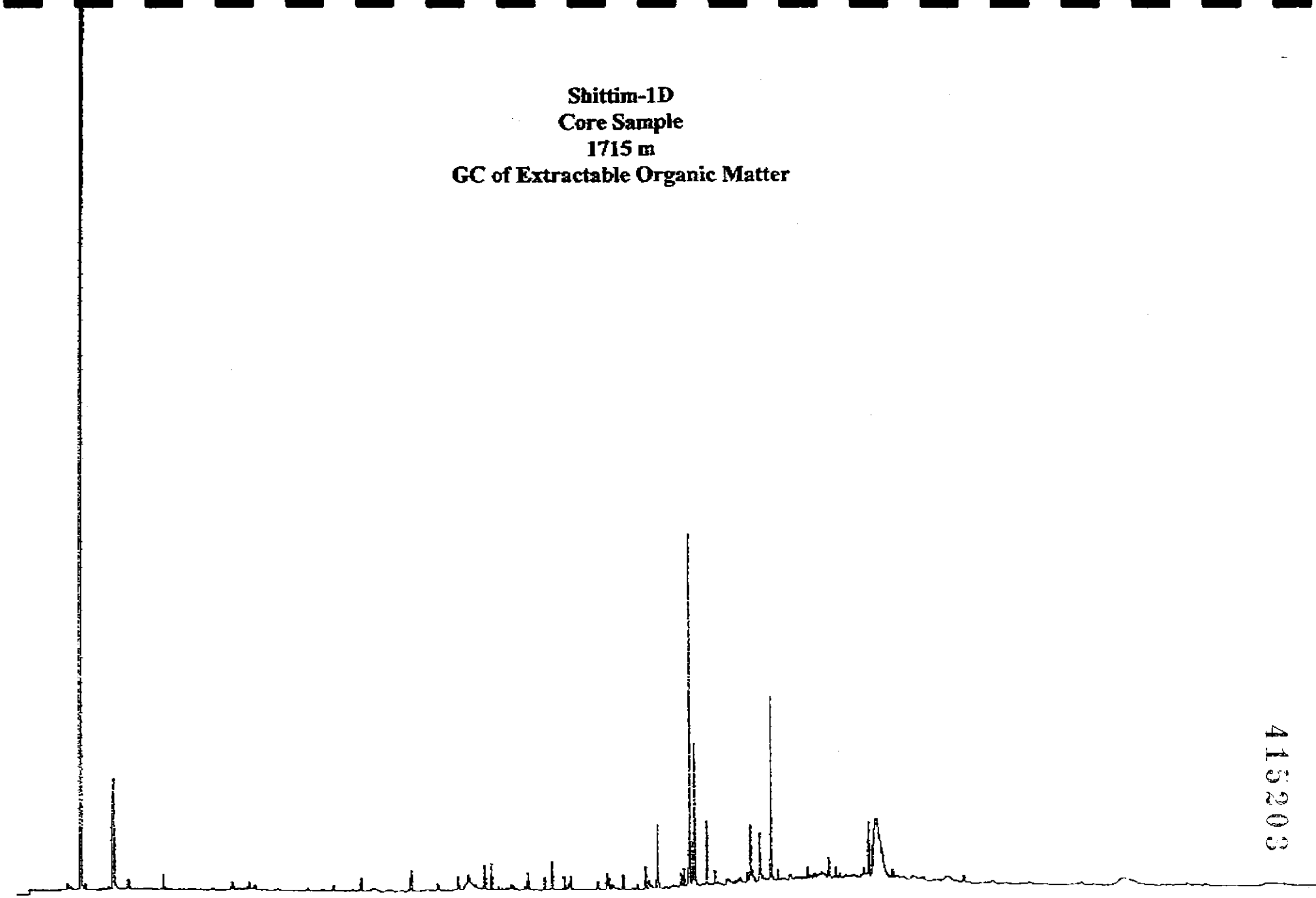
Date : 14-02-97

Shittim-1D
Core Sample
1718 m
GC of Extractable Organic Matter



415202

Shittim-1D
Core Sample
1715 m
GC of Extractable Organic Matter



415203

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415204

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD — Report # LQ5578

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas,1734.4m, 30units
08/02/97, 1405 h, Cyl# 174
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.31
Nitrogen	80.30
Helium	0.01
Carbon Dioxide	0.19
Hydrogen	0.17
Methane	0.02
Ethane	0.00041
Propane	0.00003
I-Butane	0.00000
N-Butane	0.00004
Neo Pentane	0.00000
I-Pentane	0.00000
N-Pentane	0.00003
Hexanes	0.00002
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.77
Lower Flammability limit	2173.22
Upper Flammability limit	29098.52
Ratio of upper to lower	13.39
Wobbe Index	0.03
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.993
Real gas Density (Rel to air = 1)	0.993
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed Lornelia Valenta

Date : 18-02-97

amdel

415205

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas,1734.4m, 30units
08/02/97, 1405 h, Cyl# 174
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.67
Helium	0.10
Carbon Dioxide	1.43
Hydrogen	1.64
Methane	0.16
Ethane	0.0039
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0004
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0002
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.78
Lower Flammability limit	225.95
Upper Flammability limit	3025.40
Ratio of upper to lower	13.39
Wobbe Index	0.27
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.959
Real gas Density (Rel to air = 1)	0.959
Ideal Nett Calorific Value MJ/m^3	0.22
Ideal Gross Calorific Value MJ/m^3	0.26
Real Nett Calorific Value MJ/m^3	0.22
Real Gross Calorific Value MJ/m^3	0.26
Gross calorific value of water-saturated gas MJ/m^3	0.23

This report relates specifically to the sample submitted for analysis.

Signed Carmelo Valenti

Date : 18-02-97

amdel

415206

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas,1734.4m, 30units
08/02/97, 1405 h, Cyl# 174
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	2.89
Carbon Dioxide	42.96
Hydrogen	49.21
Methane	4.78
Ethane	0.12
Propane	0.01
I-Butane	0.00
N-Butane	0.01
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.008
Hexanes	0.005
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	20.84
Lower Flammability limit	7.51
Upper Flammability limit	100.52
Ratio of upper to lower	13.39
Wobbe Index	9.28
Compressibility Factor	1.0038
Ideal Gas Density (Rel to air = 1)	0.720
Real gas Density (Rel to air = 1)	0.717
Ideal Nett Calorific Value MJ/m^3	6.77
Ideal Gross Calorific Value MJ/m^3	7.87
Real Nett Calorific Value MJ/m^3	6.74
Real Gross Calorific Value MJ/m^3	7.84
Gross calorific value of water-saturated gas MJ/m^3	7.71

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valente

Date : 18-02-97

415207

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modifie

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas,1734.4m, 30units
08/02/97, 1405 h, Cyl# 174
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	5.08
Carbon Dioxide	0.00
Hydrogen	86.28
Methane	8.37
Ethane	0.21
Propane	0.02
I-Butane	0.00
N-Butane	0.02
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.01
Hexanes	0.01
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water-free basis ~~assuming only the measured constituents are present~~
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.39
Lower Flammability limit	4.28
Upper Flammability limit	57.33
Ratio of upper to lower	13.39
Wobbe Index	40.37
Compressibility Factor	1.0087
Ideal Gas Density (Rel to air = 1)	0.117
Real gas Density (Rel to air = 1)	0.116
Ideal Nett Calorific Value MJ/m^3	11.87
Ideal Gross Calorific Value MJ/m^3	13.80
Real Nett Calorific Value MJ/m^3	11.76
Real Gross Calorific Value MJ/m^3	13.69
Gross calorific value of water saturated gas MJ/m^3	13.54

This report relates specifically to the sample submitted for analysis.

Signed Carmelo Valente

Date : 18-02-97

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas,1737.3m, 21units
11/02/97, 1030 h, Cyl# 173
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.93
Nitrogen	78.80
Helium	0.004
Carbon Dioxide	0.16
Hydrogen	0.08
Methane	0.03
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.85
Lower Flammability limit	3938.24
Upper Flammability limit	34776.27
Ratio of upper to lower	8.83
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.996
Real gas Density (Rel to air = 1)	0.996
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valentis

Date : 18-02-97

amdel

415209

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas,1737.3m, 21units
11/02/97, 1030 h, Cyl# 173
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	94.05
Helium	0.10
Carbon Dioxide	3.15
Hydrogen	2.09
Methane	0.61
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.88
Lower Flammability limit	154.95
Upper Flammability limit	1449.25
Ratio of upper to lower	9.35
Wobbe Index	0.49
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.962
Real gas Density (Rel to air = 1)	0.962
Ideal Nett Calorific Value MJ/m^3	0.42
Ideal Gross Calorific Value MJ/m^3	0.48
Real Nett Calorific Value MJ/m^3	0.42
Real Gross Calorific Value MJ/m^3	0.48
Gross calorific value of water-saturated gas MJ/m^3	0.44

This report relates specifically to the sample submitted for analysis.

Signed Lucretia Valenta

Date : 18-02-97

amdel

415210

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: *SHITTIM-1D, HOT WIRE*
Cuttings Gas,1737.3m, 21units
11/02/97, 1030 h, Cyl# 173
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	1.75
Carbon Dioxide	52.88
Hydrogen	35.10
Methane	10.27
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	25.70
Lower Flammability limit	9.23
Upper Flammability limit	86.37
Ratio of upper to lower	9.35
Wobbe Index	8.62
Compressibility Factor	1.0016
Ideal Gas Density (Rel to air = 1)	0.887
Real gas Density (Rel to air = 1)	0.885
Ideal Nett Calorific Value MJ/m^3	7.08
Ideal Gross Calorific Value MJ/m^3	8.12
Real Nett Calorific Value MJ/m^3	7.07
Real Gross Calorific Value MJ/m^3	8.10
Gross calorific value of water-saturated gas MJ/m^3	7.95

This report relates specifically to the sample submitted for analysis.

Signed Carmelia Valente

Date : 18-02-97

amdel

415211

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas,1737.3m, 21units
11/02/97, 1030 h, Cyl# 173
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	3.72
Carbon Dioxide	0.00
Hydrogen	74.48
Methane	21.80
Ethane	0.00
Propane	0.00
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.15
Lower Flammability limit	4.35
Upper Flammability limit	40.70
Ratio of upper to lower	9.35
Wobbe Index	40.85
Compressibility Factor	1.0074
Ideal Gas Density (Rel to air = 1)	0.178
Real gas Density (Rel to air = 1)	0.176
Ideal Nett Calorific Value MJ/m^3	15.02
Ideal Gross Calorific Value MJ/m^3	17.22
Real Nett Calorific Value MJ/m^3	14.91
Real Gross Calorific Value MJ/m^3	17.09
Gross calorific value of water-saturated gas MJ/m^3	16.90

This report relates specifically to the sample submitted for analysis.

Signed Laurencia Valente

Date : 18-02-97

amdel

415212

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SHTTTM-1D, HOT WIRE
Cuttings Gas,1741.3m, 36units
11/02/97, 1814 h, Cyl# 321
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	17.91
Nitrogen	81.71
Helium	0.01
Carbon Dioxide	0.14
Hydrogen	0.20
Methane	0.03
Ethane	0.0009
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0007
Heptanes	0.0008
Octanes and higher h'cs	0.0003
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.69
Lower Flammability limit	1710.42
Upper Flammability limit	19511.77
Ratio of upper to lower	11.41
Wobbe Index	0.04
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.991
Real gas Density (Rel to air = 1)	0.991
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.04
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.04
Gross calorific value of water-saturated gas MJ/m^3	0.01

This report relates specifically to the sample submitted for analysis.

Signed Carmelia Valenta

Date : 18-02-97

amdel

415213

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas,1741.3m, 36units
11/02/97, 1814 h, Cyl# 321
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.84
Helium	0.06
Carbon Dioxide	0.65
Hydrogen	1.25
Methane	0.19
Ethane	0.006
Propane	0.001
I-Butane	0.000
N-Butane	0.001
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.002
Hexanes	0.004
Heptanes	0.005
Octanes and higher h'cs	0.002
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.76
Lower Flammability limit	273.08
Upper Flammability limit	3115.22
Ratio of upper to lower	11.41
Wobbe Index	0.26
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.959
Real gas Density (Rel to air = 1)	0.958
Ideal Nett Calorific Value MJ/m^3	0.22
Ideal Gross Calorific Value MJ/m^3	0.25
Real Nett Calorific Value MJ/m^3	0.22
Real Gross Calorific Value MJ/m^3	0.25
Gross calorific value of water-saturated gas MJ/m^3	0.22

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 18-02-97

PETROLEUM SERVICES GAS ANALYSIS

415214

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas,1741.3m, 36units
11/02/97, 1814 h, Cyl# 321
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	2.88
Carbon Dioxide	29.75
Hydrogen	57.61
Methane	8.81
Ethane	0.26
Propane	0.06
I-Butane	0.00
N-Butane	0.03
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.09
Hexanes	0.20
Heptanes	0.23
Octanes and higher hcs	0.08
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	16.46
Lower Flammability limit	5.94
Upper Flammability limit	67.74
Ratio of upper to lower	11.41
Wobbe Index	15.51
Compressibility Factor	1.0050
Ideal Gas Density (Rel to air = 1)	0.568
Real gas Density (Rel to air = 1)	0.565
Ideal Nett Calorific Value MJ/m³	10.18
Ideal Gross Calorific Value MJ/m³	11.69
Real Nett Calorific Value MJ/m³	10.13
Real Gross Calorific Value MJ/m³	11.63
Gross calorific value of water-saturated gas MJ/m³	11.46

This report relates specifically to the sample submitted for analysis.

Signed Carmelo Valenti

Date : 18-02-97

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415215

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5578

Sample: SIITTIM-1D, HOT WIRE
Cuttings Gas,1741.3m, 36units
11/02/97, 1814 h, Cyl# 321
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	4.10
Carbon Dioxide	0.00
Hydrogen	82.00
Methane	12.55
Ethane	0.38
Propane	0.08
I-Butane	0.00
N-Butane	0.04
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.13
Hexanes	0.29
Heptanes	0.32
Octanes and higher hcs	0.11
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.79
Lower Flammability limit	4.17
Upper Flammability limit	47.59
Ratio of upper to lower	11.41
Wobbe Index	40.91
Compressibility Factor	1.0082
Ideal Gas Density (Rel to air = 1)	0.165
Real gas Density (Rel to air = 1)	0.164
Ideal Nett Calorific Value MJ/m³	14.49
Ideal Gross Calorific Value MJ/m³	16.64
Real Nett Calorific Value MJ/m³	14.38
Real Gross Calorific Value MJ/m³	16.51
Gross calorific value of water-saturated gas MJ/m³	16.33

This report relates specifically to the sample submitted for analysis.

Signed Carmelia Valenta

Date : 18-02-97

amdel

415216

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1745.8m, 21 units
12/02/97, 1215 h, Cyl# 250
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.53
Nitrogen	78.31
Helium	0.01
Carbon Dioxide	0.03
Hydrogen	0.09
Methane	0.03
Ethane	0.0004
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.85
Lower Flammability limit	3563.81
Upper Flammability limit	32839.39
Ratio of upper to lower	9.21
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.996
Real gas Density (Rel to air = 1)	0.996
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Lucinda Valentis

Date : 21-02-97

amdel

415217

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1745.8m, 21units
12/02/97, 1215 h, Cyl# 250
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	91.00
Helium	0.67
Carbon Dioxide	0.44
Hydrogen	6.06
Methane	1.81
Ethane	0.024
Propane	0.0042
I-Butane	0.0000
N-Butane	0.0011
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0007
Hexanes	0.0009
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.13
Lower Flammability limit	52.89
Upper Flammability limit	487.38
Ratio of upper to lower	9.21
Wobbe Index	1.52
Compressibility Factor	1.0003
Ideal Gas Density (Rel to air = 1)	0.902
Real gas Density (Rel to air = 1)	0.902
Ideal Nett Calorific Value MJ/m^3	1.26
Ideal Gross Calorific Value MJ/m^3	1.44
Real Nett Calorific Value MJ/m^3	1.26
Real Gross Calorific Value MJ/m^3	1.44
Gross calorific value of water-saturated gas MJ/m^3	1.38

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 21-02-97

amdel

415218

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1745.8m, 21units
12/02/97, 1215 h, Cyl# 250
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	7.47
Carbon Dioxide	4.91
Hydrogen	67.20
Methane	20.07
Ethane	0.27
Propane	0.046
I-Butane	0.000
N-Butane	0.013
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.0076
Hexanes	0.0097
Heptanes	0.0060
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	7.16
Lower Flammability limit	4.77
Upper Flammability limit	43.98
Ratio of upper to lower	9.21
Wobbe Index	32.11
Compressibility Factor	1.0066
Ideal Gas Density (Rel to air = 1)	0.247
Real gas Density (Rel to air = 1)	0.245
Ideal Nett Calorific Value MJ/m^3	13.93
Ideal Gross Calorific Value MJ/m^3	15.96
Real Nett Calorific Value MJ/m^3	13.84
Real Gross Calorific Value MJ/m^3	15.85
Gross calorific value of water-saturated gas MJ/m^3	15.66

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenta

Date : 21-02-97

amdel

415219

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1745.8m, 21units
12/02/97, 1215 h, Cyl# 250
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	7.85
Carbon Dioxide	0.00
Hydrogen	70.67
Methane	21.12
Ethane	0.28
Propane	0.049
I-Butane	0.000
N-Butane	0.013
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.0080
Hexanes	0.010
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.26
Lower Flammability limit	4.54
Upper Flammability limit	41.82
Ratio of upper to lower	9.21
Wobbe Index	39.40
Compressibility Factor	1.0070
Ideal Gas Density (Rel to air = 1)	0.181
Real gas Density (Rel to air = 1)	0.180
Ideal Nett Calorific Value MJ/m^3	14.65
Ideal Gross Calorific Value MJ/m^3	16.78
Real Nett Calorific Value MJ/m^3	14.55
Real Gross Calorific Value MJ/m^3	16.67
Gross calorific value of water-saturated gas MJ/m^3	16.47

This report relates specifically to the sample submitted for analysis.

Signed Lawrence Valente

Date : 21-02-97

amdel

415220

PETROLEUM SERVICES GAS ANALYSIS

Method OL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 33units
12/02/97, 1522 h, Cyl# 304
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	17.59
Nitrogen	82.00
Helium	0.04
Carbon Dioxide	0.02
Hydrogen	0.32
Methane	0.03
Ethane	0.0011
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'os	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.62
Lower Flammability limit	1158.40
Upper Flammability limit	15717.09
Ratio of upper to lower	13.57
Wobbe Index	0.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.988
Real gas Density (Rel to air = 1)	0.988
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.02

This report relates specifically to the sample submitted for analysis.

Signed Carmelin Valenta

Date : 21-02-97

amdel

415221

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 33units
12/02/97, 1522 h, Cyl# 304
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.72
Helium	0.23
Carbon Dioxide	0.00
Hydrogen	1.87
Methane	0.17
Ethane	0.0064
Propane	0.0012
I-Butane	0.0000
N-Butane	0.0005
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'os	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.45
Lower Flammability limit	198.28
Upper Flammability limit	2690.27
Ratio of upper to lower	13.57
Wobbe Index	0.30
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.948
Real gas Density (Rel to air = 1)	0.948
Ideal Nett Calorific Value MJ/m^3	0.25
Ideal Gross Calorific Value MJ/m^3	0.30
Real Nett Calorific Value MJ/m^3	0.25
Real Gross Calorific Value MJ/m^3	0.30
Gross calorific value of water-saturated gas MJ/m^3	0.26

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valente

Date : 21-02-97

amdel

415222

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 33units
12/02/97, 1522 h, Cyl# 304
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	10.25
Carbon Dioxide	0.00
Hydrogen	81.97
Methane	7.43
Ethane	0.28
Propane	0.051
I-Butane	0.000
N-Butane	0.021
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.002
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.38
Lower Flammability limit	4.52
Upper Flammability limit	61.36
Ratio of upper to lower	13.57
Wobbe Index	38.00
Compressibility Factor	1.0082
Ideal Gas Density (Rel to air = 1)	0.117
Real gas Density (Rel to air = 1)	0.116
Ideal Nett Calorific Value MJ/m^3	11.15
Ideal Gross Calorific Value MJ/m^3	12.97
Real Nett Calorific Value MJ/m^3	11.06
Real Gross Calorific Value MJ/m^3	12.87
Gross calorific value of water-saturated gas MJ/m^3	12.72

This report relates specifically to the sample submitted for analysis.

Signed Lucinda Valenta

Date : 21-02-97

amdel

415223

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 33units
12/02/97, 1522 h, Cyl# 304
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	10.25
Carbon Dioxide	0.00
Hydrogen	81.97
Methane	7.43
Ethane	0.28
Propane	0.051
I-Butane	0.000
N-Butane	0.021
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.002
Hexanes	0.000
Heptanes	0.000
Octanes and higher hcs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.38
Lower Flammability limit	4.52
Upper Flammability limit	61.36
Ratio of upper to lower	13.57
Wobbe Index	38.00
Compressibility Factor	1.0082
Ideal Gas Density (Rel to air = 1)	0.117
Real gas Density (Rel to air = 1)	0.116
Ideal Nett Calorific Value MJ/m^3	11.15
Ideal Gross Calorific Value MJ/m^3	12.97
Real Nett Calorific Value MJ/m^3	11.06
Real Gross Calorific Value MJ/m^3	12.87
Gross calorific value of water-saturated gas MJ/m^3	12.72

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valentis

Date : 21-02-97

amdel

415224

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 43units
12/02/97, 1505 h, Cyl# 136
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	17.08
Nitrogen	82.46
Helium	0.06
Carbon Dioxide	0.04
Hydrogen	0.33
Methane	0.03
Ethane	0.0009
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.60
Lower Flammability limit	1136.57
Upper Flammability limit	16079.66
Ratio of upper to lower	14.15
Wobbe Index	0.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.987
Real gas Density (Rel to air = 1)	0.987
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.02

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenta

Date : 21-02-97

amdel

415225

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHTTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 43units
12/02/97, 1505 h, Cyl# 136
Air Corrected

GAS	MOL. %
Oxygen plus Argon	0.00
Nitrogen	97.74
Helium	0.31
Carbon Dioxide	0.10
Hydrogen	1.72
Methane	0.13
Ethane	0.004
Propane	0.0008
I-Butane	0.0000
N-Butane	0.0007
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.49
Lower Flammability limit	218.49
Upper Flammability limit	3091.11
Ratio of upper to lower	14.15
Wobbe Index	0.27
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.949
Real gas Density (Rel to air = 1)	0.949
Ideal Nett Calorific Value MJ/m^3	0.22
Ideal Gross Calorific Value MJ/m^3	0.26
Real Nett Calorific Value MJ/m^3	0.22
Real Gross Calorific Value MJ/m^3	0.26
Gross calorific value of water-saturated gas MJ/m^3	0.23

This report relates specifically to the sample submitted for analysis.

Signed Carmelin Valenta

Date : 21-02-97

amdel

415226

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 43units
12/02/97, 1505 h, Cyl# 136
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	13.77
Carbon Dioxide	4.47
Hydrogen	75.74
Methane	5.74
Ethane	0.20
Propane	0.037
I-Butane	0.000
N-Butane	0.030
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.014
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.07
Lower Flammability limit	4.95
Upper Flammability limit	70.06
Ratio of upper to lower	14.15
Wobbe Index	27.59
Compressibility Factor	1.0076
Ideal Gas Density (Rel to air = 1)	0.175
Real gas Density (Rel to air = 1)	0.174
Ideal Nett Calorific Value MJ/m^3	9.90
Ideal Gross Calorific Value MJ/m^3	11.54
Real Nett Calorific Value MJ/m^3	9.82
Real Gross Calorific Value MJ/m^3	11.45
Gross calorific value of water-saturated gas MJ/m^3	11.32

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 21-02-97

amdel

PETROLEUM SERVICES GAS ANALYSIS

415227

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 43units
12/02/97, 1505 h, Cyl# 136
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	14.42
Carbon Dioxide	0.00
Hydrogen	79.29
Methane	6.01
Ethane	0.20
Propane	0.038
I-Butane	0.000
N-Butane	0.031
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.014
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.25
Lower Flammability limit	4.73
Upper Flammability limit	66.92
Ratio of upper to lower	14.15
Wobbe Index	36.09
Compressibility Factor	1.0080
Ideal Gas Density (Rel to air = 1)	0.112
Real gas Density (Rel to air = 1)	0.111
Ideal Nett Calorific Value MJ/m^3	10.36
Ideal Gross Calorific Value MJ/m^3	12.08
Real Nett Calorific Value MJ/m^3	10.28
Real Gross Calorific Value MJ/m^3	11.99
Gross calorific value of water-saturated gas MJ/m^3	11.85

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 21-02-97

amdel

415228

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHTTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 55units
12/02/97, 1528 h, Cyl# 132
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	17.46
Nitrogen	82.11
Helium	0.03
Carbon Dioxide	0.04
Hydrogen	0.34
Methane	0.02
Ethane	0.0009
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0002
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0002
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'es	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.62
Lower Flammability limit	1105.51
Upper Flammability limit	15824.91
Ratio of upper to lower	14.31
Wobbe Index	0.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.988
Real gas Density (Rel to air = 1)	0.988
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.02

This report relates specifically to the sample submitted for analysis.

Signed Cornelia Valentis

Date : 21-02-97

amdel

415229

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SITTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 55units
12/02/97, 1528 h, Cyl# 132
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.64
Helium	0.17
Carbon Dioxide	0.11
Hydrogen	1.93
Methane	0.14
Ethane	0.0051
Propane	0.0010
I-Butane	0.0000
N-Butane	0.0011
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0011
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher h'es	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.47
Lower Flammability limit	194.93
Upper Flammability limit	2790.34
Ratio of upper to lower	14.31
Wobbe Index	0.30
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.949
Real gas Density (Rel to air = 1)	0.948
Ideal Nett Calorific Value MJ/m^3	0.25
Ideal Gross Calorific Value MJ/m^3	0.29
Real Nett Calorific Value MJ/m^3	0.25
Real Gross Calorific Value MJ/m^3	0.29
Gross calorific value of water-saturated gas MJ/m^3	0.26

This report relates specifically to the sample submitted for analysis.

Signed Laurentia Valentis

Date : 21-02-97

amdel

415230

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHTTJM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 55units
12/02/97, 1528 h, Cyl# 132
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	7.23
Carbon Dioxide	4.75
Hydrogen	81.89
Methane	5.77
Ethane	0.22
Propane	0.045
I-Butane	0.000
N-Butane	0.047
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.045
Hexanes	0.004
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.11
Lower Flammability limit	4.59
Upper Flammability limit	65.71
Ratio of upper to lower	14.31
Wobbe Index	29.52
Compressibility Factor	1.0082
Ideal Gas Density (Rel to air = 1)	0.176
Real gas Density (Rel to air = 1)	0.175
Ideal Nett Calorific Value MJ/m^3	10.63
Ideal Gross Calorific Value MJ/m^3	12.40
Real Nett Calorific Value MJ/m^3	10.54
Real Gross Calorific Value MJ/m^3	12.30
Gross calorific value of water-saturated gas MJ/m^3	12.16

This report relates specifically to the sample submitted for analysis.

Signed Lucinda Valenta

Date : 21-02-97

amdel

415231

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1748.8m, 55units
12/02/97, 1528 h, Cyl# 132
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	7.59
Carbon Dioxide	0.00
Hydrogen	85.97
Methane	6.06
Ethane	0.23
Propane	0.047
I-Butane	0.000
N-Butane	0.049
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.048
Hexanes	0.005
Heptanes	0.000
Octanes and higher h'es	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.17
Lower Flammability limit	4.37
Upper Flammability limit	62.59
Ratio of upper to lower	14.31
Wobbe Index	39.37
Compressibility Factor	1.0086
Ideal Gas Density (Rel to air = 1)	0.109
Real gas Density (Rel to air = 1)	0.108
Ideal Nett Calorific Value MJ/m^3	11.16
Ideal Gross Calorific Value MJ/m^3	13.02
Real Nett Calorific Value MJ/m^3	11.07
Real Gross Calorific Value MJ/m^3	12.90
Gross calorific value of water-saturated gas MJ/m^3	12.77

This report relates specifically to the sample submitted for analysis.

Signed Carmelia Valenta

Date : 21-02-97

amdel

415232

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD *Report # LQ5591*

Sample: SHTTIM-1D, HOT WIRE
Cuttings Gas, 1751m, 18units
12/02/97, 1845 h, Cyl# 271
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.86
Nitrogen	80.90
Helium	0.01
Carbon Dioxide	0.08
Hydrogen	0.13
Methane	0.02
Ethane	0.0004
Propane	0.0000
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'es	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.74
Lower Flammability limit	2801.11
Upper Flammability limit	35701.90
Ratio of upper to lower	12.75
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Lauralin Valenta

Date : 21-02-97

amdel

415233

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ559J

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1751m, 18units
12/02/97, 1845 h, Cyl# 271
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	98.31
Helium	0.08
Carbon Dioxide	0.41
Hydrogen	1.07
Methane	0.13
Ethane	0.0036
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.77
Lower Flammability limit	339.50
Upper Flammability limit	4327.12
Ratio of upper to lower	12.75
Wobbe Index	0.18
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.959
Real gas Density (Rel to air = 1)	0.958
Ideal Nett Calorific Value MJ/m^3	0.15
Ideal Gross Calorific Value MJ/m^3	0.18
Real Nett Calorific Value MJ/m^3	0.15
Real Gross Calorific Value MJ/m^3	0.18
Gross calorific value of water-saturated gas MJ/m^3	0.14

This report relates specifically to the sample submitted for analysis.

Signed Lawrence Valenta

Date : 21-02-97

amdel

415234

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1751m, 18units
12/02/97, 1845 h, Cyl# 271
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	4.87
Carbon Dioxide	24.20
Hydrogen	63.31
Methane	7.40
Ethane	0.21
Propane	0.006
I-Butane	0.000
N-Butane	0.0010
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0010
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	13.38
Lower Flammability limit	5.75
Upper Flammability limit	73.31
Ratio of upper to lower	12.75
Wobbe Index	15.59
Compressibility Factor	1.0059
Ideal Gas Density (Rel to air = 1)	0.462
Real gas Density (Rel to air = 1)	0.459
Ideal Nett Calorific Value MJ/m^3	9.13
Ideal Gross Calorific Value MJ/m^3	10.59
Real Nett Calorific Value MJ/m^3	9.07
Real Gross Calorific Value MJ/m^3	10.53
Gross calorific value of water-saturated gas MJ/m^3	10.39

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valentis

Date : 21-02-97

amdel

415235

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5591

Sample: SHITTIM-1D, HOT WIRE
Cuttings Gas, 1751m, 18units
12/02/97, 1845 h, Cyl# 271
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	6.42
Carbon Dioxide	0.00
Hydrogen	83.52
Methane	9.77
Ethane	0.28
Propane	0.008
I-Butane	0.000
N-Butane	0.0013
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0013
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'es	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.60
Lower Flammability limit	4.36
Upper Flammability limit	55.57
Ratio of upper to lower	12.75
Wobbe Index	39.66
Compressibility Factor	1.0084
Ideal Gas Density (Rel to air = 1)	0.124
Real gas Density (Rel to air = 1)	0.123
Ideal Nett Calorific Value MJ/m^3	12.04
Ideal Gross Calorific Value MJ/m^3	13.98
Real Nett Calorific Value MJ/m^3	11.94
Real Gross Calorific Value MJ/m^3	13.86
Gross calorific value of water-saturated gas MJ/m^3	13.71

This report relates specifically to the sample submitted for analysis.

Signed Lucinda Valenta

Date : 21-02-97

1. INTRODUCTION

Three (3) gas samples from Shittim-1 were received for stable isotopic $^{13}C/^{12}C$ determination of the methane component. This report is a formal presentation of results forwarded by facsimile as they became available.

2. ANALYTICAL PROCEDURES

All stable isotope determinations were performed at the CSIRO Division of Petroleum Resources in Sydney on a Finnigan MAT252 mass spectrometer.

3. RESULTS

Sample	$\delta^{13}C$ ‰ PDB
Cyl # 180 A-Choke Manifold 03/12/96, 2 psi, 12°C, 4:00 h	-59.4
Sample No. 3 Bottled Samples	-57.2
Cyl # 162 Shittim-1D, 1735.9 HW. Trip Gas 302 units, 11/02/97, 1:00 h	-56.7

amdel

415237

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0850 h, Cyl# 222
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	2.28
Nitrogen	92.11
Helium	0.06
Carbon Dioxide	0.19
Hydrogen	0.00
Methane	5.36
Ethane	0.0043
Propane	0.0006
I-Butane	0.0000
N-Butane	0.0006
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0006
Hexanes	0.0002
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.48
Lower Flammability limit	93.03
Upper Flammability limit	279.38
Ratio of upper to lower	3.00
Wobbe Index	2.08
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.949
Real gas Density (Rel to air = 1)	0.949
Ideal Nett Calorific Value MJ/m^3	1.82
Ideal Gross Calorific Value MJ/m^3	2.03
Real Nett Calorific Value MJ/m^3	1.82
Real Gross Calorific Value MJ/m^3	2.03
Gross calorific value of water-saturated gas MJ/m^3	1.96

This report relates specifically to the sample submitted for analysis.

Signed Cornelius Valentis

Date : 26-03-97

amdel

415238

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0850 h, Cyl# 222
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.72
Helium	0.08
Carbon Dioxide	0.21
Hydrogen	0.00
Methane	5.98
Ethane	0.0054
Propane	0.0007
I-Butane	0 0000
N-Butane	0.0008
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0008
Hexanes	0.0003
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.31
Lower Flammability limit	83.33
Upper Flammability limit	250.26
Ratio of upper to lower	3.00
Wobbe Index	2.33
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.943
Real gas Density (Rel to air = 1)	0.943
Ideal Nett Calorific Value MJ/m^3	2.04
Ideal Gross Calorific Value MJ/m^3	2.26
Real Nett Calorific Value MJ/m^3	2.04
Real Gross Calorific Value MJ/m^3	2.26
Gross calorific value of water-saturated gas MJ/m^3	2.19

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415239

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SIBTTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0850 h, Cyl# 222
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	1.22
Carbon Dioxide	3.36
Hydrogen	0.00
Methane	95.30
Ethane	0.086
Propane	0.012
I-Butane	0.000
N-Butane	0.012
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.013
Hexanes	0.004
Heptanes	0.002
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	16.87
Lower Flammability limit	5.23
Upper Flammability limit	15.71
Ratio of upper to lower	3.00
Wobbe Index	47.22
Compressibility Factor	0.9981
Ideal Gas Density (Rel to air = 1)	0.582
Real gas Density (Rel to air = 1)	0.583
Ideal Nett Calorific Value MJ/m^3	32.44
Ideal Gross Calorific Value MJ/m^3	36.03
Real Nett Calorific Value MJ/m^3	32.51
Real Gross Calorific Value MJ/m^3	36.10
Gross calorific value of water-saturated gas MJ/m^3	35.40

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

415240

amdel

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0850 h, Cyl# 222
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	1.26
Carbon Dioxide	0.00
Hydrogen	0.00
Methane	98.62
Ethane	0.089
Propane	0.012
I-Butane	0.000
N-Butane	0.012
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.014
Hexanes	0.004
Heptanes	0.002
Octanes and higher h'cs	0.000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	15.92
Lower Flammability limit	5.06
Upper Flammability limit	15.18
Ratio of upper to lower	3.00
Wobbe Index	50.28
Compressibility Factor	0.9982
Ideal Gas Density (Rel to air = 1)	0.550
Real gas Density (Rel to air = 1)	0.551
Ideal Nett Calorific Value MJ/m^3	33.57
Ideal Gross Calorific Value MJ/m^3	37.28
Real Nett Calorific Value MJ/m^3	33.63
Real Gross Calorific Value MJ/m^3	37.35
Gross calorific value of water-saturated gas MJ/m^3	36.63

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415241

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0720 h, Cyl# 271
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	4.74
Nitrogen	88.98
Helium	0.05
Carbon Dioxide	0.07
Hydrogen	0.77
Methane	5.39
Ethane	0.0003
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0003
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0001
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.36
Lower Flammability limit	78.71
Upper Flammability limit	270.58
Ratio of upper to lower	3.44
Wobbe Index	2.19
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.945
Real gas Density (Rel to air = 1)	0.944
Ideal Nett Calorific Value MJ/m^3	1.91
Ideal Gross Calorific Value MJ/m^3	2.12
Real Nett Calorific Value MJ/m^3	1.91
Real Gross Calorific Value MJ/m^3	2.13
Gross calorific value of water-saturated gas MJ/m^3	2.06

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415242

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: *SHTTIM-1D*
Choke Swab from 1568m, 5psig
26/02/97, 0720 h, Cyl# 271
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	91.88
Helium	0.07
Carbon Dioxide	0.08
Hydrogen	1.11
Methane	6.86
Ethane	0.0005
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0004
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0005
Hexanes	0.0001
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.90
Lower Flammability limit	60.58
Upper Flammability limit	211.55
Ratio of upper to lower	3.49
Wobbe Index	2.83
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.929
Real gas Density (Rel to air = 1)	0.929
Ideal Nett Calorific Value MJ/m^3	2.44
Ideal Gross Calorific Value MJ/m^3	2.72
Real Nett Calorific Value MJ/m^3	2.45
Real Gross Calorific Value MJ/m^3	2.72
Gross calorific value of water-saturated gas MJ/m^3	2.65

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415243

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SIUTTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0720 h, Cyl# 271
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.89
Carbon Dioxide	1.02
Hydrogen	13.64
Methane	84.42
Ethane	0.0061
Propane	0.0029
I-Butane	0.0000
N-Butane	0.0054
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0056
Hexanes	0.0015
Heptanes	0.0010
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.32
Lower Flammability limit	4.92
Upper Flammability limit	17.20
Ratio of upper to lower	3.49
Wobbe Index	47.65
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.494
Real gas Density (Rel to air = 1)	0.494
Ideal Nett Calorific Value MJ/m^3	30.07
Ideal Gross Calorific Value MJ/m^3	33.50
Real Nett Calorific Value MJ/m^3	30.08
Real Gross Calorific Value MJ/m^3	33.50
Gross calorific value of water-saturated gas MJ/m^3	32.91

This report relates specifically to the sample submitted for analysis

Signed Carmelina Valenti

Date : 26-03-97

amdel

415244

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0720 h, Cyl# 271
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.89
Carbon Dioxide	0.00
Hydrogen	13.78
Methane	85.30
Ethane	0.0062
Propane	0.0030
I-Butane	0.0000
N-Butane	0.0054
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0056
Hexanes	0.0015
Heptanes	0.0010
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.01
Lower Flammability limit	4.87
Upper Flammability limit	17.02
Ratio of upper to lower	3.49
Wobbe Index	48.66
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.484
Real gas Density (Rel to air = 1)	0.484
Ideal Nett Calorific Value MJ/m^3	30.38
Ideal Gross Calorific Value MJ/m^3	33.85
Real Nett Calorific Value MJ/m^3	30.38
Real Gross Calorific Value MJ/m^3	33.85
Gross calorific value of water-saturated gas MJ/m^3	33.25

This report relates specifically to the sample submitted for analysis.

Signed Carmelita Valenta

Date : 26-03-97

amdel

415245

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0554 h, Cyl# 343
Air Uncorrected

GAS	MOL. %
Oxygen plus Argon	2.42
Nitrogen	92.26
Helium	0.03
Carbon Dioxide	0.07
Hydrogen	0.64
Methane	4.58
Ethane	0.0043
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0005
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0005
Hexanes	0.0001
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.40
Lower Flammability limit	92.80
Upper Flammability limit	318.30
Ratio of upper to lower	3.43
Wobbe Index	1.86
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.946
Real gas Density (Rel to air = 1)	0.946
Ideal Nett Calorific Value MJ/m^3	1.62
Ideal Gross Calorific Value MJ/m^3	1.81
Real Nett Calorific Value MJ/m^3	1.62
Real Gross Calorific Value MJ/m^3	1.81
Gross calorific value of water-saturated gas MJ/m^3	1.75

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD — Report # LQ5639

Sample: SIHTTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0554 h, Cyl# 343
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.92
Helium	0.04
Carbon Dioxide	0.07
Hydrogen	0.82
Methane	5.14
Ethane	0.0054
Propane	0.0004
I-Butane	0.0000
N-Butane	0.0007
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0007
Hexanes	0.0002
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.19
Lower Flammability limit	80.98
Upper Flammability limit	282.35
Ratio of upper to lower	3.49
Wobbe Index	2.11
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.939
Real gas Density (Rel to air = 1)	0.939
Ideal Nett Calorific Value MJ/m^3	1.83
Ideal Gross Calorific Value MJ/m^3	2.04
Real Nett Calorific Value MJ/m^3	1.83
Real Gross Calorific Value MJ/m^3	2.04
Gross calorific value of water-saturated gas MJ/m^3	1.98

This report relates specifically to the sample submitted for analysis.

Signed Cornelia Valenta

Date : 26-03-97

amdel

415247

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0554 h, Cyl# 343
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.63
Carbon Dioxide	1.23
Hydrogen	13.45
Methane	84.57
Ethane	0.089
Propane	0.0067
I-Butane	0.000
N-Butane	0.011
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.011
Hexanes	0.0026
Heptanes	0.0016
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.45
Lower Flammability limit	4.92
Upper Flammability limit	17.15
Ratio of upper to lower	3.49
Wobbe Index	47.57
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.499
Real gas Density (Rel to air = 1)	0.499
Ideal Nett Calorific Value MJ/m^3	30.17
Ideal Gross Calorific Value MJ/m^3	33.61
Real Nett Calorific Value MJ/m^3	30.17
Real Gross Calorific Value MJ/m^3	33.61
Gross calorific value of water-saturated gas MJ/m^3	33.01

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415248

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 5psig
26/02/97, 0554 h, Cyl# 343
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.64
Carbon Dioxide	0.00
Hydrogen	13.61
Methane	85.63
Ethane	0.090
Propane	0.0067
I-Butane	0.000
N-Butane	0.011
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.011
Hexanes	0.0027
Heptanes	0.0016
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.08
Lower Flammability limit	4.86
Upper Flammability limit	16.94
Ratio of upper to lower	3.49
Wobbe Index	48.79
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.486
Real gas Density (Rel to air = 1)	0.486
Ideal Nett Calorific Value MJ/m^3	30.55
Ideal Gross Calorific Value MJ/m^3	34.03
Real Nett Calorific Value MJ/m^3	30.55
Real Gross Calorific Value MJ/m^3	34.03
Gross calorific value of water-saturated gas MJ/m^3	33.42

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415249

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 10psig
26/02/97, 0550 h, Cyl# 304
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	2.69
Nitrogen	91.88
Helium	0.03
Carbon Dioxide	0.02
Hydrogen	0.63
Methane	4.75
Ethane	0.0005
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0005
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0005
Hexanes	0.0001
Heptanes	0.0001
Octanes and higher h'es	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.38
Lower Flammability limit	90.20
Upper Flammability limit	307.34
Ratio of upper to lower	3.41
Wobbe Index	1.92
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.945
Real gas Density (Rel to air = 1)	0.945
Ideal Nett Calorific Value MJ/m^3	1.68
Ideal Gross Calorific Value MJ/m^3	1.87
Real Nett Calorific Value MJ/m^3	1.68
Real Gross Calorific Value MJ/m^3	1.87
Gross calorific value of water-saturated gas MJ/m^3	1.81

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415250

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 10psig
26/02/97, 0550 h, Cyl# 304
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.73
Helium	0.04
Carbon Dioxide	0.01
Hydrogen	0.81
Methane	5.41
Ethane	0.0006
Propane	0.0004
I-Butane	0.0000
N-Butane	0.0006
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0006
Hexanes	0.0002
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.15
Lower Flammability limit	77.80
Upper Flammability limit	268.89
Ratio of upper to lower	3.46
Wobbe Index	2.21
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.937
Real gas Density (Rel to air = 1)	0.937
Ideal Nett Calorific Value MJ/m^3	1.92
Ideal Gross Calorific Value MJ/m^3	2.14
Real Nett Calorific Value MJ/m^3	1.92
Real Gross Calorific Value MJ/m^3	2.14
Gross calorific value of water-saturated gas MJ/m^3	2.07

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415251

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHTTTM-1D
Choke Swab from 1568m, 10psig
26/02/97, 0550 h, Cyl# 304
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.61
Carbon Dioxide	0.22
Hydrogen	12.86
Methane	86.27
Ethane	0.010
Propane	0.0059
I-Butane	0.000
N-Butane	0.010
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.010
Hexanes	0.0027
Heptanes	0.0012
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.24
Lower Flammability limit	4.88
Upper Flammability limit	16.87
Ratio of upper to lower	3.46
Wobbe Index	48.66
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.492
Real gas Density (Rel to air = 1)	0.492
Ideal Nett Calorific Value MJ/m^3	30.63
Ideal Gross Calorific Value MJ/m^3	34.12
Real Nett Calorific Value MJ/m^3	30.64
Real Gross Calorific Value MJ/m^3	34.12
Gross calorific value of water-saturated gas MJ/m^3	33.52

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valente

Date : 26-03-97

amdel

415252

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 10psig
26/02/97, 0550 h, Cyl# 304
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.61
Carbon Dioxide	0.00
Hydrogen	12.89
Methane	86.46
Ethane	0.010
Propane	0.0059
I-Butane	0.000
N-Butane	0.010
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.010
Hexanes	0.0027
Heptanes	0.0012
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.18
Lower Flammability limit	4.87
Upper Flammability limit	16.83
Ratio of upper to lower	3.46
Wobbe Index	48.88
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.489
Real gas Density (Rel to air = 1)	0.489
Ideal Nett Calorific Value MJ/m^3	30.70
Ideal Gross Calorific Value MJ/m^3	34.19
Real Nett Calorific Value MJ/m^3	30.71
Real Gross Calorific Value MJ/m^3	34.20
Gross calorific value of water-saturated gas MJ/m^3	33.59

This report relates specifically to the sample submitted for analysis.

Signed Lucinda Valenti

Date : 26-03-97

amdel

415253

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: *SIITTIM-1D*
Choke Swab from 1568m, 15psig
26/02/97, 0540 h, Cyl# 136
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	2.87
Nitrogen	91.78
Helium	0.03
Carbon Dioxide	0.04
Hydrogen	0.58
Methane	4.70
Ethane	0.0006
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0005
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0006
Hexanes	0.0005
Heptanes	0.0018
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.42
Lower Flammability limit	91.92
Upper Flammability limit	310.96
Ratio of upper to lower	3.38
Wobbe Index	1.90
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.947
Real gas Density (Rel to air = 1)	0.946
Ideal Nett Calorific Value MJ/m^3	1.66
Ideal Gross Calorific Value MJ/m^3	1.85
Real Nett Calorific Value MJ/m^3	1.66
Real Gross Calorific Value MJ/m^3	1.85
Gross calorific value of water-saturated gas MJ/m^3	1.79

This report relates specifically to the sample submitted for analysis.

Signed Carmelia Valenti

Date : 26-03-97

amdel

415254

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 15psig
26/02/97, 0540 h, Cyl# 136
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.77
Helium	0.04
Carbon Dioxide	0.04
Hydrogen	0.75
Methane	5.40
Ethane	0.0008
Propane	0.0004
I-Butane	0.0000
N-Butane	0.0007
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0007
Hexanes	0.0007
Heptanes	0.0023
Octanes and higher hcs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.17
Lower Flammability limit	78.64
Upper Flammability limit	269.64
Ratio of upper to lower	3.43
Wobbe Index	2.20
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.938
Real gas Density (Rel to air = 1)	0.938
Ideal Nett Calorific Value MJ/m^3	1.92
Ideal Gross Calorific Value MJ/m^3	2.14
Real Nett Calorific Value MJ/m^3	1.92
Real Gross Calorific Value MJ/m^3	2.14
Gross calorific value of water-saturated gas MJ/m^3	2.07

This report relates specifically to the sample submitted for analysis.

Signed Cornelia Valenta

Date : 26-03-97

amdel

415255

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 15psig
26/02/97, 0540 h, Cyl# 136
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.62
Carbon Dioxide	0.66
Hydrogen	12.01
Methane	86.62
Ethane	0.012
Propane	0.006
I-Butane	0.000
N-Butane	0.011
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.012
Hexanes	0.011
Heptanes	0.037
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.52
Lower Flammability limit	4.90
Upper Flammability limit	16.81
Ratio of upper to lower	3.43
Wobbe Index	48.36
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.501
Real gas Density (Rel to air = 1)	0.501
Ideal Nett Calorific Value MJ/m^3	30.75
Ideal Gross Calorific Value MJ/m^3	34.24
Real Nett Calorific Value MJ/m^3	30.76
Real Gross Calorific Value MJ/m^3	34.25
Gross calorific value of water-saturated gas MJ/m^3	33.64

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenta

Date : 26-03-97

amdel

415256

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 15psig
26/02/97, 0540 h, Cyl# 136
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.63
Carbon Dioxide	0.00
Hydrogen	12.09
Methane	87.19
Ethane	0.012
Propane	0.006
I-Butane	0.000
N-Butane	0.011
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.012
Hexanes	0.011
Heptanes	0.037
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.33
Lower Flammability limit	4.87
Upper Flammability limit	16.70
Ratio of upper to lower	3.43
Wobbe Index	49.01
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.495
Real gas Density (Rel to air = 1)	0.495
Ideal Nett Calorific Value MJ/m^3	30.96
Ideal Gross Calorific Value MJ/m^3	34.47
Real Nett Calorific Value MJ/m^3	30.97
Real Gross Calorific Value MJ/m^3	34.48
Gross calorific value of water-saturated gas MJ/m^3	33.86

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415257

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 20psig
26/02/97, 0522 h, Cyl# 174
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	4.09
Nitrogen	93.99
Helium	0.03
Carbon Dioxide	0.27
Hydrogen	0.58
Methane	1.04
Ethane	0.0009
Propane	0.0004
I-Butane	0.0000
N-Butane	0.0006
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0007
Hexanes	0.0010
Heptanes	0.0012
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.94
Lower Flammability limit	280.95
Upper Flammability limit	1289.08
Ratio of upper to lower	4.59
Wobbe Index	0.48
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.965
Real gas Density (Rel to air = 1)	0.965
Ideal Nett Calorific Value MJ/m^3	0.42
Ideal Gross Calorific Value MJ/m^3	0.47
Real Nett Calorific Value MJ/m^3	0.42
Real Gross Calorific Value MJ/m^3	0.47
Gross calorific value of water-saturated gas MJ/m^3	0.43

This report relates specifically to the sample submitted for analysis.

Signed Annelie Valents

Date : 26-03-97

amdel

415258

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 20psig
26/02/97, 0522 h, Cyl# 174
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.51
Helium	0.04
Carbon Dioxide	0.33
Hydrogen	0.85
Methane	1.27
Ethane	0.0013
Propane	0.0006
I-Butane	0.0000
N-Butane	0.0009
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0011
Hexanes	0.0015
Heptanes	0.0017
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.69
Lower Flammability limit	211.81
Upper Flammability limit	1028.53
Ratio of upper to lower	4.86
Wobbe Index	0.61
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.956
Real gas Density (Rel to air = 1)	0.956
Ideal Nett Calorific Value MJ/m^3	0.53
Ideal Gross Calorific Value MJ/m^3	0.59
Real Nett Calorific Value MJ/m^3	0.53
Real Gross Calorific Value MJ/m^3	0.59
Gross calorific value of water-saturated gas MJ/m^3	0.55

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenta

Date : 26-03-97

amdel

415259

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHTTTM-1D
Choke Swab from 1568m, 20psig
26/02/97, 0522 h, Cyl# 174
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	1.75
Carbon Dioxide	13.22
Hydrogen	33.90
Methane	50.85
Ethane	0.051
Propane	0.023
I-Butane	0.000
N-Butane	0.035
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.043
Hexanes	0.060
Heptanes	0.068
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.93
Lower Flammability limit	5.31
Upper Flammability limit	25.77
Ratio of upper to lower	4.86
Wobbe Index	32.98
Compressibility Factor	1.0023
Ideal Gas Density (Rel to air = 1)	0.515
Real gas Density (Rel to air = 1)	0.514
Ideal Nett Calorific Value MJ/m^3	21.10
Ideal Gross Calorific Value MJ/m^3	23.67
Real Nett Calorific Value MJ/m^3	21.05
Real Gross Calorific Value MJ/m^3	23.62
Gross calorific value of water-saturated gas MJ/m^3	23.25

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415260

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 20psig
26/02/97, 0522 h, Cyl# 174
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	2.02
Carbon Dioxide	0.00
Hydrogen	39.06
Methane	58.59
Ethane	0.059
Propane	0.027
I-Butane	0.000
N-Butane	0.040
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.049
Hexanes	0.069
Heptanes	0.078
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	10.49
Lower Flammability limit	4.61
Upper Flammability limit	22.37
Ratio of upper to lower	4.86
Wobbe Index	45.32
Compressibility Factor	1.0032
Ideal Gas Density (Rel to air = 1)	0.362
Real gas Density (Rel to air = 1)	0.361
Ideal Nett Calorific Value MJ/m^3	24.32
Ideal Gross Calorific Value MJ/m^3	27.28
Real Nett Calorific Value MJ/m^3	24.24
Real Gross Calorific Value MJ/m^3	27.19
Gross calorific value of water-saturated gas MJ/m^3	26.79

This report relates specifically to the sample submitted for analysis.

Signed Carmelia Valenti

Date : 26-03-97

amdel

415261

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 25psig
26/02/97, 0517 h, Cyl# 321
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	6.38
Nitrogen	89.55
Helium	0.03
Carbon Dioxide	0.05
Hydrogen	0.40
Methane	3.59
Ethane	0.0005
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0004
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0002
Hexanes	0.0002
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.73
Lower Flammability limit	122.11
Upper Flammability limit	408.31
Ratio of upper to lower	3.34
Wobbe Index	1.43
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.958
Real gas Density (Rel to air = 1)	0.957
Ideal Nett Calorific Value MJ/m^3	1.26
Ideal Gross Calorific Value MJ/m^3	1.40
Real Nett Calorific Value MJ/m^3	1.26
Real Gross Calorific Value MJ/m^3	1.40
Gross calorific value of water-saturated gas MJ/m^3	1.35

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415262

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 25psig
26/02/97, 0517 h, Cyl# 321
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	94.21
Helium	0.05
Carbon Dioxide	0.05
Hydrogen	0.63
Methane	5.06
Ethane	0.0008
Propane	0.0004
I-Butane	0.0000
N-Butane	0.0007
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0003
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.24
Lower Flammability limit	85.39
Upper Flammability limit	288.79
Ratio of upper to lower	3.38
Wobbe Index	2.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.941
Real gas Density (Rel to air = 1)	0.940
Ideal Nett Calorific Value MJ/m^3	1.79
Ideal Gross Calorific Value MJ/m^3	1.99
Real Nett Calorific Value MJ/m^3	1.79
Real Gross Calorific Value MJ/m^3	1.99
Gross calorific value of water-saturated gas MJ/m^3	1.92

This report relates specifically to the sample submitted for analysis.

Signed Cornelia Valenta

Date : 26-03-97

amdel

415263

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SIUTTIM-1D
Choke Swab from 1568m, 25psig
26/02/97, 0517 h, Cyl# 321
Air & Nitrogen Corrected

GAS	MOL. %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.81
Carbon Dioxide	0.92
Hydrogen	10.84
Methane	87.39
Ethane	0.014
Propane	0.0070
I-Butane	0.000
N-Butane	0.012
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.0056
Hexanes	0.0050
Heptanes	0.0021
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.70
Lower Flammability limit	4.95
Upper Flammability limit	16.73
Ratio of upper to lower	3.38
Wobbe Index	48.15
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.507
Real gas Density (Rel to air = 1)	0.507
Ideal Nett Calorific Value MJ/m^3	30.81
Ideal Gross Calorific Value MJ/m^3	34.30
Real Nett Calorific Value MJ/m^3	30.82
Real Gross Calorific Value MJ/m^3	34.32
Gross calorific value of water-saturated gas MJ/m^3	33.69

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415264

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SIITTIM-1D
Choke Swab from 1568m, 25psig
26/02/97, 0517 h, Cyl# 321
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.82
Carbon Dioxide	0.00
Hydrogen	10.94
Methane	88.19
Ethane	0.014
Propane	0.0071
I-Butane	0.000
N-Butane	0.012
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.0056
Hexanes	0.0050
Heptanes	0.0021
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.43
Lower Flammability limit	4.90
Upper Flammability limit	16.58
Ratio of upper to lower	3.38
Wobbe Index	49.05
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.498
Real gas Density (Rel to air = 1)	0.498
Ideal Nett Calorific Value MJ/m^3	31.10
Ideal Gross Calorific Value MJ/m^3	34.62
Real Nett Calorific Value MJ/m^3	31.11
Real Gross Calorific Value MJ/m^3	34.63
Gross calorific value of water-saturated gas MJ/m^3	34.01

This report relates specifically to the sample submitted for analysis.

Signed Carmelin Valenti

Date : 26-03-97

amdel

415265

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1558m, 30psig
26/02/97, 0510 h, Cyl# 132
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	3.14
Nitrogen	91.83
Helium	0.03
Carbon Dioxide	0.03
Hydrogen	0.57
Methane	4.40
Ethane	0.0007
Propane	0.0004
I-Butane	0.0000
N-Butane	0.0005
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0006
Hexanes	0.0002
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.46
Lower Flammability limit	97.62
Upper Flammability limit	331.75
Ratio of upper to lower	3.40
Wobbe Index	1.78
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.948
Real gas Density (Rel to air = 1)	0.948
Ideal Nett Calorific Value MJ/m^3	1.55
Ideal Gross Calorific Value MJ/m^3	1.73
Real Nett Calorific Value MJ/m^3	1.56
Real Gross Calorific Value MJ/m^3	1.73
Gross calorific value of water-saturated gas MJ/m^3	1.67

This report relates specifically to the sample submitted for analysis.

Signed Carmelin Valenti

Date : 26-03-97

amdel

415266

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SIITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0510 h, Cyl# 132
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	94.05
Helium	0.04
Carbon Dioxide	0.03
Hydrogen	0.74
Methane	5.14
Ethane	0.0009
Propane	0.0005
I-Butane	0.0000
N-Butane	0.0007
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0008
Hexanes	0.0002
Heptanes	0.0001
Octanes and higher h'es	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.20
Lower Flammability limit	82.34
Upper Flammability limit	283.52
Ratio of upper to lower	3.44
Wobbe Index	2.09
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.939
Real gas Density (Rel to air = 1)	0.939
Ideal Nett Calorific Value MJ/m^3	1.82
Ideal Gross Calorific Value MJ/m^3	2.03
Real Nett Calorific Value MJ/m^3	1.82
Real Gross Calorific Value MJ/m^3	2.03
Gross calorific value of water-saturated gas MJ/m^3	1.96

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valente

Date : 26-03-97

amdel

415267

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0510 h, Cyl# 132
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.66
Carbon Dioxide	0.45
Hydrogen	12.49
Methane	86.36
Ethane	0.014
Propane	0.0083
I-Butane	0.000
N-Butane	0.011
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.014
Hexanes	0.0040
Heptanes	0.0011
Octanes and higher hcs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.36
Lower Flammability limit	4.90
Upper Flammability limit	16.86
Ratio of upper to lower	3.44
Wobbe Index	48.46
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.496
Real gas Density (Rel to air = 1)	0.496
Ideal Nett Calorific Value MJ/m^3	30.64
Ideal Gross Calorific Value MJ/m^3	34.12
Real Nett Calorific Value MJ/m^3	30.64
Real Gross Calorific Value MJ/m^3	34.13
Gross calorific value of water-saturated gas MJ/m^3	33.52

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valente

Date : 26-03-97

amdel

415268

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0510 h, Cyl# 132
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.66
Carbon Dioxide	0.00
Hydrogen	12.55
Methane	86.75
Ethane	0.014
Propane	0.0083
I-Butane	0.000
N-Butane	0.011
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.014
Hexanes	0.0040
Heptanes	0.0011
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.22
Lower Flammability limit	4.87
Upper Flammability limit	16.79
Ratio of upper to lower	3.44
Wobbe Index	48.91
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.491
Real gas Density (Rel to air = 1)	0.491
Ideal Nett Calorific Value MJ/m^3	30.78
Ideal Gross Calorific Value MJ/m^3	34.27
Real Nett Calorific Value MJ/m^3	30.78
Real Gross Calorific Value MJ/m^3	34.28
Gross calorific value of water-saturated gas MJ/m^3	33.67

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415269

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0514 h, Cyl# 250
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	3.32
Nitrogen	91.63
Helium	0.03
Carbon Dioxide	0.01
Hydrogen	0.58
Methane	4.43
Ethane	0.0001
Propane	0.0000
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.46
Lower Flammability limit	97.03
Upper Flammability limit	330.03
Ratio of upper to lower	3.40
Wobbe Index	1.79
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.948
Real gas Density (Rel to air = 1)	0.948
Ideal Nett Calorific Value MJ/m^3	1.56
Ideal Gross Calorific Value MJ/m^3	1.74
Real Nett Calorific Value MJ/m^3	1.56
Real Gross Calorific Value MJ/m^3	1.74
Gross calorific value of water-saturated gas MJ/m^3	1.68

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415270

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0514 h, Cyl# 250
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.98
Helium	0.04
Carbon Dioxide	0.01
Hydrogen	0.76
Methane	5.21
Ethane	0.0001
Propane	0.0000
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.18
Lower Flammability limit	81.06
Upper Flammability limit	279.42
Ratio of upper to lower	3.45
Wobbe Index	2.12
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.939
Real gas Density (Rel to air = 1)	0.938
Ideal Nett Calorific Value MJ/m^3	1.85
Ideal Gross Calorific Value MJ/m^3	2.06
Real Nett Calorific Value MJ/m^3	1.85
Real Gross Calorific Value MJ/m^3	2.06
Gross calorific value of water-saturated gas MJ/m^3	1.99

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415271

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0514 h, Cyl# 250
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.66
Carbon Dioxide	0.11
Hydrogen	12.68
Methane	86.55
Ethane	0.0012
Propane	0.0004
I-Butane	0.0003
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.22
Lower Flammability limit	4.88
Upper Flammability limit	16.83
Ratio of upper to lower	3.45
Wobbe Index	48.76
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.491
Real gas Density (Rel to air = 1)	0.491
Ideal Nett Calorific Value MJ/m^3	30.67
Ideal Gross Calorific Value MJ/m^3	34.16
Real Nett Calorific Value MJ/m^3	30.68
Real Gross Calorific Value MJ/m^3	34.17
Gross calorific value of water-saturated gas MJ/m^3	33.56

This report relates specifically to the sample submitted for analysis.

Signed Cornelia Valenta

Date : 26-03-97

amdel

415272

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0514 h, Cyl# 250
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.66
Carbon Dioxide	0.00
Hydrogen	12.69
Methane	86.65
Ethane	0.0012
Propane	0.0004
I-Butane	0.0003
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.18
Lower Flammability limit	4.88
Upper Flammability limit	16.81
Ratio of upper to lower	3.45
Wobbe Index	48.87
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.490
Real gas Density (Rel to air = 1)	0.490
Ideal Nett Calorific Value MJ/m^3	30.71
Ideal Gross Calorific Value MJ/m^3	34.20
Real Nett Calorific Value MJ/m^3	30.71
Real Gross Calorific Value MJ/m^3	34.20
Gross calorific value of water-saturated gas MJ/m^3	33.59

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415273

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0455 h, Cyl# 341
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	5.00
Nitrogen	90.24
Helium	0.03
Carbon Dioxide	0.01
Hydrogen	0.38
Methane	4.34
Ethane	0.0004
Propane	0.0002
I-Butane	0.0000
N-Butane	0.0003
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.59
Lower Flammability limit	103.78
Upper Flammability limit	339.50
Ratio of upper to lower	3.27
Wobbe Index	1.72
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.953
Real gas Density (Rel to air = 1)	0.952
Ideal Nett Calorific Value MJ/m^3	1.51
Ideal Gross Calorific Value MJ/m^3	1.68
Real Nett Calorific Value MJ/m^3	1.51
Real Gross Calorific Value MJ/m^3	1.68
Gross calorific value of water-saturated gas MJ/m^3	1.62

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 26-03-97

amdel

415274

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0455 h, Cyl# 341
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	93.78
Helium	0.04
Carbon Dioxide	0.01
Hydrogen	0.55
Methane	5.62
Ethane	0.0005
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0004
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0004
Hexanes	0.0001
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.19
Lower Flammability limit	79.22
Upper Flammability limit	261.58
Ratio of upper to lower	3.30
Wobbe Index	2.26
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.939
Real gas Density (Rel to air = 1)	0.939
Ideal Nett Calorific Value MJ/m^3	1.97
Ideal Gross Calorific Value MJ/m^3	2.19
Real Nett Calorific Value MJ/m^3	1.97
Real Gross Calorific Value MJ/m^3	2.19
Gross calorific value of water-saturated gas MJ/m^3	2.12

This report relates specifically to the sample submitted for analysis.

Signed Romulin Valenta

Date : 26-03-97

amdel

415275

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5639

Sample: SHITTIM-1D
Choke Swab from 1568m, 30psig
26/02/97, 0455 h, Cyl# 341
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.70
Carbon Dioxide	0.13
Hydrogen	8.82
Methane	90.32
Ethane	0.0081
Propane	0.0042
I-Butane	0.0000
N-Butane	0.0063
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0062
Hexanes	0.0016
Heptanes	0.0010
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.77
Lower Flammability limit	4.93
Upper Flammability limit	16.28
Ratio of upper to lower	3.30
Wobbe Index	49.22
Compressibility Factor	0.9993
Ideal Gas Density (Rel to air = 1)	0.510
Real gas Density (Rel to air = 1)	0.510
Ideal Nett Calorific Value MJ/m^3	31.58
Ideal Gross Calorific Value MJ/m^3	35.14
Real Nett Calorific Value MJ/m^3	31.60
Real Gross Calorific Value MJ/m^3	35.17
Gross calorific value of water-saturated gas MJ/m^3	34.52

This report relates specifically to the sample submitted for analysis.

Signed Carmelin Valenta

Date : 26-03-97

amdel

415276

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD *Report # LQ5639*

Sample: *SHITTIM-1D*
Choke Swab from 1568m, 30psig
26/02/97, 0455 h, Cyl# 341
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.70
Carbon Dioxide	0.00
Hydrogen	8.83
Methane	90.44
Ethane	0.0082
Propane	0.0043
I-Butane	0.0000
N-Butane	0.0063
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0062
Hexanes	0.0016
Heptanes	0.0010
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	14.73
Lower Flammability limit	4.92
Upper Flammability limit	16.26
Ratio of upper to lower	3.30
Wobbe Index	49.35
Compressibility Factor	0.9993
Ideal Gas Density (Rel to air = 1)	0.509
Real gas Density (Rel to air = 1)	0.509
Ideal Nett Calorific Value MJ/m^3	31.63
Ideal Gross Calorific Value MJ/m^3	35.19
Real Nett Calorific Value MJ/m^3	31.65
Real Gross Calorific Value MJ/m^3	35.21
Gross calorific value of water-saturated gas MJ/m^3	34.57

This report relates specifically to the sample submitted for analysis.

Signed Carmelia Valenti

Date : 26-03-97

97-4088
VOL 3 of 6

418277

MICROFILMED
FICHE No.014529-39

APPENDIX 1
(Part 2)

Vol 3 of 6

Great South Land Minerals Pty Ltd

A.C.N. 068 650 386

Amdel Limited Petroleum Services
Gas and Water Analysis

Report Number	Date
LQ5699	Apr 97
LQ5765	Apr 97
LQ5820	June 97
LQ5906-1	June 97
LQ5906-2	Aug 97
LQ5978	Aug 97
LQ6088	Aug 97
LQ6130	Sept 97
LQ6216	Sept 97

97-4088

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415278

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 258m, 38units
14/03/97, 1458 h, Cyl# 336
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.87
Nitrogen	79.78
Helium	0.00
Carbon Dioxide	0.08
Hydrogen	0.26
Methane	0.01
Ethane	0.0003
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.75
Lower Flammability limit	1500.36
Upper Flammability limit	24853.90
Ratio of upper to lower	16.57
Wobbe Index	0.03
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.993
Real gas Density (Rel to air = 1)	0.993
Ideal Nett Calorific Value MJ/m^3	0.03
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.03
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415279

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 258m, 38units
14/03/97, 1458 h, Cyl# 336
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.17
Helium	0.00
Carbon Dioxide	0.58
Hydrogen	3.16
Methane	0.09
Ethane	0.0041
Propane	0.0015
I-Butane	0.0000
N-Butane	0.0004
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0003
Hexanes	0.0000
Heptanes	0.0004
Octanes and higher hcs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.28
Lower Flammability limit	123.63
Upper Flammability limit	2047.98
Ratio of upper to lower	16.57
Wobbe Index	0.43
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.942
Real gas Density (Rel to air = 1)	0.941
Ideal Nett Calorific Value MJ/m^3	0.36
Ideal Gross Calorific Value MJ/m^3	0.42
Real Nett Calorific Value MJ/m^3	0.36
Real Gross Calorific Value MJ/m^3	0.42
Gross calorific value of water-saturated gas MJ/m^3	0.38

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

415280

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD — Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 258m, 38units
14/03/97, 1458 h, Cyl# 336
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	15.09
Hydrogen	82.50
Methane	2.23
Ethane	0.11
Propane	0.039
I-Butane	0.000
N-Butane	0.0092
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0076
Hexanes	0.0000
Heptanes	0.011
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	8.73
Lower Flammability limit	4.73
Upper Flammability limit	78.33
Ratio of upper to lower	16.57
Wobbe Index	19.98
Compressibility Factor	1.0081
Ideal Gas Density (Rel to air = 1)	0.302
Real gas Density (Rel to air = 1)	0.299
Ideal Nett Calorific Value MJ/m^3	9.34
Ideal Gross Calorific Value MJ/m^3	10.97
Real Nett Calorific Value MJ/m^3	9.26
Real Gross Calorific Value MJ/m^3	10.88
Gross calorific value of water-saturated gas MJ/m^3	10.75

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415281

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 258m, 38units
14/03/97, 1458 h, Cyl# 336
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	97.16
Methane	2.63
Ethane	0.13
Propane	0.046
I-Butane	0.00
N-Butane	0.011
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.0090
Hexanes	0.0000
Heptanes	0.013
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.46
Lower Flammability limit	4.01
Upper Flammability limit	66.51
Ratio of upper to lower	16.57
Wobbe Index	44.29
Compressibility Factor	1.0098
Ideal Gas Density (Rel to air = 1)	0.085
Real gas Density (Rel to air = 1)	0.084
Ideal Nett Calorific Value MJ/m^3	11.00
Ideal Gross Calorific Value MJ/m^3	12.92
Real Nett Calorific Value MJ/m^3	10.89
Real Gross Calorific Value MJ/m^3	12.79
Gross calorific value of water-saturated gas MJ/m^3	12.67

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

PETROLEUM SERVICES GAS ANALYSIS 415282

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 235.3m, 50units
12/03/97, 0735 h, Cyl# 334
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.62
Nitrogen	79.94
Helium	0.00
Carbon Dioxide	0.05
Hydrogen	0.35
Methane	0.04
Ethane	0.0004
Propane	0.0000
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.71
Lower Flammability limit	1040.76
Upper Flammability limit	13233.47
Ratio of upper to lower	12.72
Wobbe Index	0.06
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.991
Real gas Density (Rel to air = 1)	0.991
Ideal Nett Calorific Value MJ/m^3	0.05
Ideal Gross Calorific Value MJ/m^3	0.06
Real Nett Calorific Value MJ/m^3	0.05
Real Gross Calorific Value MJ/m^3	0.06
Gross calorific value of water-saturated gas MJ/m^3	0.03

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

415283

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 235.3m, 50units
12/03/97, 0735 h, Cyl# 334
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	95.55
Helium	0.00
Carbon Dioxide	0.21
Hydrogen	3.79
Methane	0.45
Ethane	0.0039
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0008
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.01
Lower Flammability limit	96.16
Upper Flammability limit	1222.69
Ratio of upper to lower	12.72
Wobbe Index	0.66
Compressibility Factor	1.0001
Ideal Gas Density (Rel to air = 1)	0.932
Real gas Density (Rel to air = 1)	0.932
Ideal Nett Calorific Value MJ/m^3	0.55
Ideal Gross Calorific Value MJ/m^3	0.63
Real Nett Calorific Value MJ/m^3	0.55
Real Gross Calorific Value MJ/m^3	0.63
Gross calorific value of water-saturated gas MJ/m^3	0.59

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415284

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 235.3m, 50units
12/03/97, 0735 h, Cyl# 334
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	4.67
Hydrogen	85.01
Methane	10.21
Ethane	0.087
Propane	0.0032
I-Butane	0.000
N-Butane	0.017
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.0024
Hexanes	0.0022
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.45
Lower Flammability limit	4.28
Upper Flammability limit	54.48
Ratio of upper to lower	12.72
Wobbe Index	32.77
Compressibility Factor	1.0085
Ideal Gas Density (Rel to air = 1)	0.188
Real gas Density (Rel to air = 1)	0.186
Ideal Nett Calorific Value MJ/m^3	12.24
Ideal Gross Calorific Value MJ/m^3	14.21
Real Nett Calorific Value MJ/m^3	12.14
Real Gross Calorific Value MJ/m^3	14.09
Gross calorific value of water-saturated gas MJ/m^3	13.94

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

415285

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 235.3m, 50units
12/03/97, 0735 h, Cyl# 334
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	89.18
Methane	10.71
Ethane	0.091
Propane	0.0033
I-Butane	0.000
N-Butane	0.018
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.0025
Hexanes	0.0023
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.56
Lower Flammability limit	4.08
Upper Flammability limit	51.94
Ratio of upper to lower	12.72
Wobbe Index	42.54
Compressibility Factor	1.0089
Ideal Gas Density (Rel to air = 1)	0.123
Real gas Density (Rel to air = 1)	0.122
Ideal Nett Calorific Value MJ/m^3	12.84
Ideal Gross Calorific Value MJ/m^3	14.91
Real Nett Calorific Value MJ/m^3	12.73
Real Gross Calorific Value MJ/m^3	14.78
Gross calorific value of water-saturated gas MJ/m^3	14.63

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415286

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 350m, 70units
19/03/97, 0900 h, Cyl# 335
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.55
Nitrogen	80.92
Helium	0.00
Carbon Dioxide	0.03
Hydrogen	0.48
Methane	0.02
Ethane	0.0007
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0002
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.63
Lower Flammability limit	804.52
Upper Flammability limit	12768.69
Ratio of upper to lower	15.87
Wobbe Index	0.07
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.989
Real gas Density (Rel to air = 1)	0.988
Ideal Nett Calorific Value MJ/m^3	0.06
Ideal Gross Calorific Value MJ/m^3	0.07
Real Nett Calorific Value MJ/m^3	0.06
Real Gross Calorific Value MJ/m^3	0.07
Gross calorific value of water-saturated gas MJ/m^3	0.03

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415287

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 350m, 70units
19/03/97, 0900 h, Cyl# 335
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.27
Helium	0.00
Carbon Dioxide	0.04
Hydrogen	3.54
Methane	0.14
Ethane	0.0051
Propane	0.0020
I-Butane	0.0000
N-Butane	0.0011
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0004
Hexanes	0.0002
Heptanes	0.0003
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.09
Lower Flammability limit	109.18
Upper Flammability limit	1732.83
Ratio of upper to lower	15.87
Wobbe Index	0.50
Compressibility Factor	1.0001
Ideal Gas Density (Rel to air = 1)	0.935
Real gas Density (Rel to air = 1)	0.935
Ideal Nett Calorific Value MJ/m^3	0.42
Ideal Gross Calorific Value MJ/m^3	0.49
Real Nett Calorific Value MJ/m^3	0.42
Real Gross Calorific Value MJ/m^3	0.49
Gross calorific value of water-saturated gas MJ/m^3	0.45

This report relates specifically to the sample submitted for analysis

Signed _____

Date : 25-03-97

415288

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 350m, 70units
19/03/97, 0900 h, Cyl# 335
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	1.20
Hydrogen	94.86
Methane	3.69
Ethane	0.14
Propane	0.052
I-Butane	0.000
N-Butane	0.030
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.012
Hexanes	0.0057
Heptanes	0.0083
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.13
Lower Flammability limit	4.07
Upper Flammability limit	64.61
Ratio of upper to lower	15.87
Wobbe Index	39.77
Compressibility Factor	1.0095
Ideal Gas Density (Rel to air = 1)	0.108
Real gas Density (Rel to air = 1)	0.107
Ideal Nett Calorific Value MJ/m^3	11.16
Ideal Gross Calorific Value MJ/m^3	13.08
Real Nett Calorific Value MJ/m^3	11.06
Real Gross Calorific Value MJ/m^3	12.96
Gross calorific value of water-saturated gas MJ/m^3	12.83

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415289

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 350m, 70units
19/03/97, 0900 h, Cyl# 335
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	96.01
Methane	3.74
Ethane	0.14
Propane	0.053
I-Butane	0.000
N-Butane	0.030
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.012
Hexanes	0.0058
Heptanes	0.0084
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.64
Lower Flammability limit	4.02
Upper Flammability limit	63.84
Ratio of upper to lower	15.87
Wobbe Index	43.86
Compressibility Factor	1.0096
Ideal Gas Density (Rel to air = 1)	0.091
Real gas Density (Rel to air = 1)	0.090
Ideal Nett Calorific Value MJ/m^3	11.30
Ideal Gross Calorific Value MJ/m^3	13.24
Real Nett Calorific Value MJ/m^3	11.19
Real Gross Calorific Value MJ/m^3	13.12
Gross calorific value of water-saturated gas MJ/m^3	12.99

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415290

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 277m, 60units
15/03/97, 0635 h, Cyl# 333
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.55
Nitrogen	79.00
Helium	0.00
Carbon Dioxide	0.04
Hydrogen	0.39
Methane	0.02
Ethane	0.0006
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.74
Lower Flammability limit	987.10
Upper Flammability limit	15423.43
Ratio of upper to lower	15.63
Wobbe Index	0.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.992
Real gas Density (Rel to air = 1)	0.992
Ideal Nett Calorific Value MJ/m^3	0.05
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.05
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.02

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415291

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 277m, 60units
15/03/97, 0635 h, Cyl# 333
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	92.36
Helium	0.00
Carbon Dioxide	0.24
Hydrogen	7.08
Methane	0.31
Ethane	0.012
Propane	0.0022
I-Butane	0.0000
N-Butane	0.0005
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0011
Hexanes	0.0002
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.17
Lower Flammability limit	54.39
Upper Flammability limit	849.91
Ratio of upper to lower	15.63
Wobbe Index	1.04
Compressibility Factor	1.0004
Ideal Gas Density (Rel to air = 1)	0.904
Real gas Density (Rel to air = 1)	0.903
Ideal Nett Calorific Value MJ/m^3	0.84
Ideal Gross Calorific Value MJ/m^3	0.99
Real Nett Calorific Value MJ/m^3	0.84
Real Gross Calorific Value MJ/m^3	0.99
Gross calorific value of water-saturated gas MJ/m^3	0.94

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415292

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 277m, 60units
15/03/97, 0635 h, Cyl# 333
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	3.08
Hydrogen	92.61
Methane	4.11
Ethane	0.15
Propane	0.029
I-Butane	0.000
N-Butane	0.006
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.014
Hexanes	0.0026
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.95
Lower Flammability limit	4.16
Upper Flammability limit	64.95
Ratio of upper to lower	15.63
Wobbe Index	34.93
Compressibility Factor	1.0093
Ideal Gas Density (Rel to air = 1)	0.137
Real gas Density (Rel to air = 1)	0.135
Ideal Nett Calorific Value MJ/m^3	11.02
Ideal Gross Calorific Value MJ/m^3	12.91
Real Nett Calorific Value MJ/m^3	10.92
Real Gross Calorific Value MJ/m^3	12.79
Gross calorific value of water-saturated gas MJ/m^3	12.66

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

415293

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 277m, 60units
15/03/97, 0635 h, Cyl# 333
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	95.55
Methane	4.24
Ethane	0.16
Propane	0.030
I-Butane	0.000
N-Butane	0.0061
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.015
Hexanes	0.0027
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.68
Lower Flammability limit	4.03
Upper Flammability limit	62.95
Ratio of upper to lower	15.63
Wobbe Index	43.75
Compressibility Factor	1.0096
Ideal Gas Density (Rel to air = 1)	0.093
Real gas Density (Rel to air = 1)	0.092
Ideal Nett Calorific Value MJ/m^3	11.37
Ideal Gross Calorific Value MJ/m^3	13.32
Real Nett Calorific Value MJ/m^3	11.26
Real Gross Calorific Value MJ/m^3	13.19
Gross calorific value of water-saturated gas MJ/m^3	13.06

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

415294

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 232.3m, 55units
12/03/97, 1755 h, Cyl# 338
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.96
Nitrogen	80.57
Helium	0.00
Carbon Dioxide	0.05
Hydrogen	0.37
Methane	0.05
Ethane	0.0003
Propane	0.0000
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0001
Hexanes	0.0001
Heptanes	0.0002
Octanes and higher hcs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.67
Lower Flammability limit	963.48
Upper Flammability limit	11515.86
Ratio of upper to lower	11.95
Wobbe Index	0.07
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.990
Real gas Density (Rel to air = 1)	0.990
Ideal Nett Calorific Value MJ/m^3	0.06
Ideal Gross Calorific Value MJ/m^3	0.07
Real Nett Calorific Value MJ/m^3	0.06
Real Gross Calorific Value MJ/m^3	0.07
Gross calorific value of water-saturated gas MJ/m^3	0.03

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

415295

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: *CONDOR OIL INVESTMENTS PTY LTD* *Report # LQ5699*

Sample: JERICHO-1A
Hot Wire Cuttings Gas 232.3m, 55units
12/03/97, 1755 h, Cyl# 338
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	96.30
Helium	0.00
Carbon Dioxide	0.17
Hydrogen	3.08
Methane	0.45
Ethane	0.0022
Propane	0.0003
I-Butane	0.0000
N-Butane	0.0002
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0006
Hexanes	0.0007
Heptanes	0.0014
Octanes and higher Hcs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.19
Lower Flammability limit	115.59
Upper Flammability limit	1381.52
Ratio of upper to lower	11.95
Wobbe Index	0.57
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.939
Real gas Density (Rel to air = 1)	0.938
Ideal Nett Calorific Value MJ/m^3	0.48
Ideal Gross Calorific Value MJ/m^3	0.55
Real Nett Calorific Value MJ/m^3	0.48
Real Gross Calorific Value MJ/m^3	0.55
Gross calorific value of water-saturated gas MJ/m^3	0.51

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

415296

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 232.3m, 55units
12/03/97, 1755 h, Cyl# 338
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	4.54
Hydrogen	83.09
Methane	12.22
Ethane	0.058
Propane	0.0085
I-Butane	0.0000
N-Butane	0.0065
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.015
Hexanes	0.020
Heptanes	0.038
Octanes and higher h'es	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.72
Lower Flammability limit	4.29
Upper Flammability limit	51.28
Ratio of upper to lower	11.95
Wobbe Index	33.38
Compressibility Factor	1.0083
Ideal Gas Density (Rel to air = 1)	0.198
Real gas Density (Rel to air = 1)	0.196
Ideal Nett Calorific Value MJ/m^3	12.82
Ideal Gross Calorific Value MJ/m^3	14.84
Real Nett Calorific Value MJ/m^3	12.72
Real Gross Calorific Value MJ/m^3	14.72
Gross calorific value of water-saturated gas MJ/m^3	14.56

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

415297

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS PTY LTD Report # LQ5699

Sample: JERICHO-1A
Hot Wire Cuttings Gas 232.3m, 55units
12/03/97, 1755 h, Cyl# 338
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	87.05
Methane	12.79
Ethane	0.061
Propane	0.0089
I-Butane	0.0000
N-Butane	0.0068
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.016
Hexanes	0.020
Heptanes	0.039
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.90
Lower Flammability limit	4.10
Upper Flammability limit	48.95
Ratio of upper to lower	11.95
Wobbe Index	42.35
Compressibility Factor	1.0087
Ideal Gas Density (Rel to air = 1)	0.135
Real gas Density (Rel to air = 1)	0.134
Ideal Nett Calorific Value MJ/m^3	13.43
Ideal Gross Calorific Value MJ/m^3	15.55
Real Nett Calorific Value MJ/m^3	13.31
Real Gross Calorific Value MJ/m^3	15.41
Gross calorific value of water-saturated gas MJ/m^3	15.25

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 25-03-97

amdel

415298

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 30units, 458m
24/03/97, 1110h, Cyl# 351
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.67
Nitrogen	79.27
Helium	0.00
Carbon Dioxide	0.06
Hydrogen	0.00
Methane	0.004
Ethane	0.0002
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.85
Lower Flammability limit	100247.35
Upper Flammability limit	325524.32
Ratio of upper to lower	3.25
Wobbe Index	0.00
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.996
Real gas Density (Rel to air = 1)	0.996
Ideal Nett Calorific Value MJ/m^3	0.00
Ideal Gross Calorific Value MJ/m^3	0.00
Real Nett Calorific Value MJ/m^3	0.00
Real Gross Calorific Value MJ/m^3	0.00
Gross calorific value of water-saturated gas MJ/m^3	-0.03

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 15-04-97

amdel

415299

PETROLEUM SERVICES GAS ANALYSIS

Method OL-01-01/02

ASTM D 1945-91 (modified)

Report # LQ5765

Client: CONDOR OIL INVESTMENTS

Sample: JERICHO-1A
Cuttings Gas 30units, 458m
24/03/97, 1110h, Cyl# 351
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	99.27
Helium	0.00
Carbon Dioxide	0.62
Hydrogen	0.00
Methane	0.10
Ethane	0.0055
Propane	0.0019
I-Butane	0.0000
N-Butane	0.0017
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0010
Hexanes	0.0005
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.10
Lower Flammability limit	4185.89
Upper Flammability limit	13592.45
Ratio of upper to lower	3.25
Wobbe Index	0.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.970
Real gas Density (Rel to air = 1)	0.970
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.01

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 15-04-97

amdel

415300

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JUKUCHO-1A
Cuttings Gas 30units, 458m
24/03/97, 1110h, Cyl# 351
Air & Nitrogen Corrected

GAS	MOL. %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	85.38
Hydrogen	0.00
Methane	13.17
Ethane	0.76
Propane	0.26
I-Butane	0.00
N-Butane	0.23
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.13
Hexanes	0.07
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	40.32
Lower Flammability limit	30.29
Upper Flammability limit	98.35
Ratio of upper to lower	3.25
Wobbe Index	5.35
Compressibility Factor	0.9948
Ideal Gas Density (Rel to air = 1)	1.392
Real gas Density (Rel to air = 1)	1.399
Ideal Nett Calorific Value MJ/m³	5.71
Ideal Gross Calorific Value MJ/m³	6.31
Real Nett Calorific Value MJ/m³	5.74
Real Gross Calorific Value MJ/m³	6.35
Gross calorific value of water-saturated gas MJ/m³	6.18

This report relates specifically to the sample submitted for analysis.

Signed Lavrentin Valentis

Date : 15-04-97

amdel

415301

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 30units, 458m
24/03/97, 1110h, Cyl# 351
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	0.00
Methane	90.06
Ethane	5.20
Propane	1.81
I-Butane	0.00
N-Butane	1.58
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.90
Hexanes	0.45
Heptanes	0.00
Octanes and higher h'os	0.00
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	18.77
Lower Flammability limit	4.43
Upper Flammability limit	14.39
Ratio of upper to lower	3.25
Wobbe Index	53.62
Compressibility Factor	0.9972
Ideal Gas Density (Rel to air = 1)	0.648
Real gas Density (Rel to air = 1)	0.650
Ideal Nett Calorific Value MJ/m^3	39.04
Ideal Gross Calorific Value MJ/m^3	43.16
Real Nett Calorific Value MJ/m^3	39.15
Real Gross Calorific Value MJ/m^3	43.29
Gross calorific value of water-saturated gas MJ/m^3	42.41

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 15-04-97

amdel

415302

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 28units, 500m
25/03/97, 1315h, Cyl# 352
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.70
Nitrogen	79.24
Hellum	0.01
Carbon Dioxide	0.04
Hydrogen	0.00
Methane	0.01
Ethane	0.0003
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0002
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher H'ds	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.84
Lower Flammability limit	43425.00
Upper Flammability limit	136816.36
Ratio of upper to lower	3.15
Wobbe Index	0.00
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.996
Real gas Density (Rel to air = 1)	0.996
Ideal Nett Calorific Value MJ/m^3	0.00
Ideal Gross Calorific Value MJ/m^3	0.00
Real Nett Calorific Value MJ/m^3	0.00
Real Gross Calorific Value MJ/m^3	0.00
Gross calorific value of water-saturated gas MJ/m^3	-0.03

This report relates specifically to the sample submitted for analysis.

Signed Lawrence Valenti

Date : 15-04-97

amdel

415303

PETROLEUM SERVICES GAS ANALYSIS

Method OL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS — Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 28units, 500m
25/03/97, 1315h, Cyl# 352
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	99.35
Helium	0.21
Carbon Dioxide	0.22
Hydrogen	0.00
Methane	0.21
Ethane	0.0067
Propane	0.0027
I-Butane	0.0000
N-Butane	0.0031
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0008
Hexanes	0.0004
Heptanes	0.0000
Octanes and higher H'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.98
Lower Flammability limit	2084.02
Upper Flammability limit	6565.97
Ratio of upper to lower	3.15
Wobbe Index	0.09
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.966
Real gas Density (Rel to air = 1)	0.966
Ideal Nett Calorific Value MJ/m^3	0.08
Ideal Gross Calorific Value MJ/m^3	0.09
Real Nett Calorific Value MJ/m^3	0.08
Real Gross Calorific Value MJ/m^3	0.09
Gross calorific value of water-saturated gas MJ/m^3	0.06

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenti

Date : 15-04-97

amdel

415304

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 2Runits, 500m
25/03/97, 1315h, Cyl# 352
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	31.83
Carbon Dioxide	34.21
Hydrogen	0.00
Methane	31.86
Ethane	1.02
Propane	0.41
I-Butane	0.00
N-Butane	0.48
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.13
Hexanes	0.06
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	22.35
Lower Flammability limit	13.64
Upper Flammability limit	42.99
Ratio of upper to lower	3.15
Wobbe Index	15.89
Compressibility Factor	0.9986
Ideal Gas Density (Rel to air = 1)	0.772
Real gas Density (Rel to air = 1)	0.773
Ideal Nett Calorific Value MJ/m^3	12.60
Ideal Gross Calorific Value MJ/m^3	13.96
Real Nett Calorific Value MJ/m^3	12.62
Real Gross Calorific Value MJ/m^3	13.98
Gross calorific value of water-saturated gas MJ/m^3	13.69

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valentos

Date : 15-04-97

amdel

415305

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 28units, 500m
25/03/97, 1315h, Cyl# 352
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	48.38
Carbon Dioxide	0.00
Hydrogen	0.00
Methane	48.42
Ethane	1.58
Propane	0.26
I-Butane	0.00
N-Butane	0.35
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.02
Hexanes	0.01
Heptanes	0.00
Octanes and higher h'os	0.00
Total	99.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	11.09
Lower Flammability limit	8.98
Upper Flammability limit	28.28
Ratio of upper to lower	3.15
Wobbe Index	34.28
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.383
Real gas Density (Rel to air = 1)	0.383
Ideal Nett Calorific Value MJ/m^3	19.16
Ideal Gross Calorific Value MJ/m^3	21.21
Real Nett Calorific Value MJ/m^3	19.16
Real Gross Calorific Value MJ/m^3	21.22
Gross calorific value of water-saturated gas MJ/m^3	20.83

This report relates specifically to the sample submitted for analysis.

Signed Lawrence Valente

Date : 15-04-97

yamdel

415306

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 14units, 436m
22/03/97, 1400h, Cyl# 249
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.76
Nitrogen	79.11
Helium	0.01
Carbon Dioxide	0.01
Hydrogen	0.10
Methane	0.01
Ethane	0.0003
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.81
Lower Flammability limit	3674.42
Upper Flammability limit	48791.05
Ratio of upper to lower	13.28
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.995
Real gas Density (Rel to air = 1)	0.995
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.02

This report relates specifically to the sample submitted for analysis.

Signed Lavrentios Valentis

Date : 15-04-97

amdel

415307

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 14units, 436m
22/03/97, 1400h, Cyl# 249
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.37
Helium	0.22
Carbon Dioxide	0.00
Hydrogen	2.19
Methane	0.21
Ethane	0.0100
Propane	0.0000
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'os	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.37
Lower Flammability limit	167.61
Upper Flammability limit	2225.66
Ratio of upper to lower	13.28
Wobbe Index	0.37
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0 945
Real gas Density (Rel to air = 1)	0.945
Ideal Nett Calorific Value MJ/m^3	0.31
Ideal Gross Calorific Value MJ/m^3	0.36
Real Nett Calorific Value MJ/m^3	0.31
Real Gross Calorific Value MJ/m^3	0.36
Gross calorific value of water-saturated gas MJ/m^3	0.32

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenta

Date : 15-04-97

amdel

415308

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 14units, 436m
22/03/97, 1400h, Cyl# 249
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	8.32
Carbon Dioxide	0.00
Hydrogen	83.16
Methane	7.99
Ethane	0.26
Propane	0.11
I-Butane	0.00
N-Butane	0.10
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.03
Hexanes	0.03
Heptanes	0.00
Octanes and higher h'os	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.52
Lower Flammability limit	4.42
Upper Flammability limit	58.67
Ratio of upper to lower	13.28
Wobbe Index	38.88
Compressibility Factor	1.0083
Ideal Gas Density (Rel to air = 1)	0.122
Real gas Density (Rel to air = 1)	0.121
Ideal Nett Calorific Value MJ/m^3	11.68
Ideal Gross Calorific Value MJ/m^3	13.56
Real Nett Calorific Value MJ/m^3	11.58
Real Gross Calorific Value MJ/m^3	13.45
Gross calorific value of water-saturated gas MJ/m^3	13.30

This report relates specifically to the sample submitted for analysis.

Signed Lavinia Valenta

Date 15-04-97

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS — Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 14units, 436m
22/03/97, 1400h, Cyl# 249
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	8.32
Carbon Dioxide	0.00
Hydrogen	83.16
Methane	7.99
Ethane	0.26
Propane	0.11
I-Butane	0.00
N-Butane	0.10
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.03
Hexanes	0.03
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.52
Lower Flammability limit	4.42
Upper Flammability limit	58.67
Ratio of upper to lower	13.28
Wobbe Index	38.88
Compressibility Factor	1.0083
Ideal Gas Density (Rel to air = 1)	0.122
Real gas Density (Rel to air = 1)	0.121
Ideal Nett Calorific Value MJ/m^3	11.68
Ideal Gross Calorific Value MJ/m^3	13.56
Real Nett Calorific Value MJ/m^3	11.58
Real Gross Calorific Value MJ/m^3	13.45
Gross calorific value of water-saturated gas MJ/m^3	13.30

This report relates specifically to the sample submitted for analysis.

Signed: Cornelia Valents

Date : 15-04-97

amdel

415310

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Report # LQ5765

Client: CONDOR OIL INVESTMENTS

Sample: JERICHO-1A
Cuttings Gas 638446m
09/04/97, 1430h, Cyl# 349
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.77
Nitrogen	79.10
Helium	0.01
Carbon Dioxide	0.06
Hydrogen	0.05
Methane	0.01
Ethane	0.0002
Propane	0.0000
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.83
Lower Flammability limit	7065.65
Upper Flammability limit	82817.15
Ratio of upper to lower	11.72
Wobbe Index	0.01
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.996
Real gas Density (Rel to air = 1)	0.996
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.01
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.01
Gross calorific value of water-saturated gas MJ/m^3	-0.02

This report relates specifically to the sample submitted for analysis

Signed

Date : 15-04-97

amdel

415311

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Report # LQ5765

Client: CONDOR OIL INVESTMENTS

Sample: JERICHO-1A
Cuttings Gas 638446m
09/04/97, 1430h, Cyl# 349
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	97.85
Helium	0.22
Carbon Dioxide	0.64
Hydrogen	1.12
Methane	0.17
Ethane	0.0038
Propane	0.0009
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0010
Hexanes	0.0006
Heptanes	0.0000
Octanes and higher hcs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.75
Lower Flammability limit	315.76
Upper Flammability limit	3701.07
Ratio of upper to lower	11.72
Wobbe Index	0.21
Compressibility Factor	0.9998
Ideal Gas Density (Rel to air = 1)	0.958
Real gas Density (Rel to air = 1)	0.958
Ideal Nett Calorific Value MJ/m^3	0.18
Ideal Gross Calorific Value MJ/m^3	0.21
Real Nett Calorific Value MJ/m^3	0.18
Real Gross Calorific Value MJ/m^3	0.21
Gross calorific value of water-saturated gas MJ/m^3	0.17

This report relates specifically to the sample submitted for analysis.

Signed Lucinda Valentis

Date : 15-04-97

amdel

415312

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Report # LQ5765

Client: CONDOR OIL INVESTMENTS

Sample: JERICHO-1A
Cuttings Gas 638446m
09/04/97, 1430h, Cyl# 349
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	10.34
Carbon Dioxide	29.77
Hydrogen	51.71
Methane	7.88
Ethane	0.18
Propane	0.04
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.05
Hexanes	0.03
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present.
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	15.95
Lower Flammability limit	6.83
Upper Flammability limit	80.07
Ratio of upper to lower	11.72
Wobbe Index	12.79
Compressibility Factor	1.0046
Ideal Gas Density (Rel to air = 1)	0.551
Real gas Density (Rel to air = 1)	0.548
Ideal Nett Calorific Value MJ/m^3	8.21
Ideal Gross Calorific Value MJ/m^3	9.49
Real Nett Calorific Value MJ/m^3	8.17
Real Gross Calorific Value MJ/m^3	9.45
Gross calorific value of water-saturated gas MJ/m^3	9.30

This report relates specifically to the sample submitted for analysis

Signed Lumelin Valentis

Date : 15-04-97

amdel

415313

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 638446m
09/04/97, 1430h, Cyl# 349
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	14.73
Carbon Dioxide	0.00
Hydrogen	73.64
Methane	11.22
Ethane	0.25
Propane	0.06
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.06
Hexanes	0.04
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.05
Lower Flammability limit	4.80
Upper Flammability limit	56.23
Ratio of upper to lower	11.72
Wobbe Index	36.13
Compressibility Factor	1.0074
Ideal Gas Density (Rel to air = 1)	0.140
Real gas Density (Rel to air = 1)	0.139
Ideal Nett Calorific Value MJ/m^3	11.69
Ideal Gross Calorific Value MJ/m^3	13.51
Real Nett Calorific Value MJ/m^3	11.61
Real Gross Calorific Value MJ/m^3	13.42
Gross calorific value of water-saturated gas MJ/m^3	13.26

This report relates specifically to the sample submitted for analysis.

Signed Carmelin Valenta

Date : 15-04-97

amdel

415314

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 25units, 446m
22/03/97, 1610h, Cyl# 350
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.87
Nitrogen	78.94
Helium	0.00
Carbon Dioxide	0.02
Hydrogen	0.16
Methane	0.01
Ethane	0.0003
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'os	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.81
Lower Flammability limit	2410.19
Upper Flammability limit	38008.18
Ratio of upper to lower	15.77
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.995
Real gas Density (Rel to air = 1)	0.995
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Lyndsay Valentine

Date : 15-04-97

amdel

415315

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5765

Sample: JERICHO-1A
Cuttings Gas 25units, 446m
22/03/97, 1610h, Cyl# 350
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	95.94
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	3.89
Methane	0.16
Ethane	0.0072
Propane	0.0025
I-Butane	0.0000
N-Butane	0.0020
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.98
Lower Flammability limit	99.08
Upper Flammability limit	1562.50
Ratio of upper to lower	15.77
Wobbe Index	0.56
Compressibility Factor	1.0001
Ideal Gas Density (Rel to air = 1)	0.932
Real gas Density (Rel to air = 1)	0.931
Ideal Nett Calorific Value MJ/m^3	0.46
Ideal Gross Calorific Value MJ/m^3	0.54
Real Nett Calorific Value MJ/m^3	0.46
Real Gross Calorific Value MJ/m^3	0.54
Gross calorific value of water-saturated gas MJ/m^3	0.50

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valentino

Date : 15-04-97

Gamdel

415316

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Report # LQ5705

Client: CONDOR OIL INVESTMENTS

Sample: JERICHO-1A
Cuttings Gas 25units, 446m
22/03/97, 1610h, Cyl# 350
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	95.84
Methane	3.87
Ethane	0.18
Propane	0.061
I-Butane	0.000
N-Butane	0.049
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.000
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'ds	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.66
Lower Flammability limit	4.02
Upper Flammability limit	63.46
Ratio of upper to lower	15.77
Wobbe Index	43.81
Compressibility Factor	[illegible]
Ideal Gas Density (Rel to air = 1)	0.092
Real gas Density (Rel to air = 1)	0.091
Ideal Nett Calorific Value MJ/m^3	11.33
Ideal Gross Calorific Value MJ/m^3	13.28
Real Nett Calorific Value MJ/m^3	11.23
Real Gross Calorific Value MJ/m^3	13.16
Gross calorific value of water-saturated gas MJ/m^3	13.03

This report relates specifically to the sample submitted for analysis.

Signed Carmelina Valenta

Date : 15-04-97

1. INTRODUCTION

Three (3) samples were received for gas composition and one sample for stable isotopic $^{13}C/^{12}C$ determination of the methane component on 11 April 1997.

2. ANALYTICAL PROCEDURES

Headspace analysis was determined by injection onto a Perkin Elmer Sigma 2 gas chromatograph equipped with a packed alumina column.

Nitrogen and carbon dioxide were determined by injection onto a Varian 6000 gas chromatograph equipped with a porapak column, thermal conductivity detector and helium carrier gas.

Hydrogen and helium were determined by injection onto a Varian 6000 gas chromatograph equipped with a molecular sieve column, thermal conductivity detector and argon carrier.

Concentrations were calculated from peak areas measured with an integrator and compared with peak areas taken from standard gas mixtures of known concentrations injected onto the same chromatograph using the same conditions.

Stable isotope determination was performed at the CSIRO Division of Petroleum Resources in Sydney on a Finnigan MAT252 Mass Spectrometer.

3. RESULTS

Gas composition results are presented on the following pages.

	$\delta^{13}C$‰ PDB
Jericho-1B Hot Wire 500 units	
Bottoms Up 600 m	-33.9
14 kPag, 15°C, 17/04/97 1000 h, Cyl #347	

amdel

415318

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1B
Hot Wire Bottoms Up, 140 units
14 kPag @ 15°C, 17/04/97, 1000h, Cyl# 180
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	18.62
Nitrogen	79.26
Helium	0.00
Carbon Dioxide	0.18
Carbon Monoxide	0.48
Hydrogen	0.86
Methane	0.51
Ethane	0.07
Propane	0.02
I-Butane	0.000
N-Butane	0.003
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.001
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.50
Lower Flammability limit	257.86
Upper Flammability limit	1687.56
Ratio of upper to lower	6.54
Wobbe Index	0.42
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.984
Real gas Density (Rel to air = 1)	0.984
Ideal Nett Calorific Value MJ/m^3	0.38
Ideal Gross Calorific Value MJ/m^3	0.42
Real Nett Calorific Value MJ/m^3	0.38
Real Gross Calorific Value MJ/m^3	0.42
Gross calorific value of water-saturated gas MJ/m^3	0.38

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-05-97

amdel

415319

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1B
Hot Wire Bottoms Up, 140 units
14 kPag @ 15°C, 17/04/97, 1000h, Cyl# 180
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	84.49
Helium	0.00
Carbon Dioxide	1.04
Carbon Monoxide	3.78
Hydrogen	6.77
Methane	3.36
Ethane	0.43
Propane	0.10
I-Butane	0.000
N-Butane	0.02
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.006
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	26.05
Lower Flammability limit	34.72
Upper Flammability limit	242.00
Ratio of upper to lower	6.97
Wobbe Index	3.11
Compressibility Factor	1.0003
Ideal Gas Density (Rel to air = 1)	0.899
Real gas Density (Rel to air = 1)	0.899
Ideal Nett Calorific Value MJ/m^3	2.66
Ideal Gross Calorific Value MJ/m^3	2.95
Real Nett Calorific Value MJ/m^3	2.66
Real Gross Calorific Value MJ/m^3	2.95
Gross calorific value of water-saturated gas MJ/m^3	2.87

This report relates specifically to the sample submitted for analysis.

Signed Dian Cass

Date : 06-05-97

amdel

415320

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1B
Hot Wire Bottoms Up, 140 units
14 kPag @ 15°C, 17/04/97, 1000h, Cyl# 180
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	6.71
Carbon Monoxide	24.37
Hydrogen	43.65
Methane	21.66
Ethane	2.79
Propane	0.67
I-Butane	0.000
N-Butane	0.11
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.04
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	15.36
Lower Flammability limit	5.39
Upper Flammability limit	37.55
Ratio of upper to lower	6.97
Wobbe Index	26.12
Compressibility Factor	1.0038
Ideal Gas Density (Rel to air = 1)	0.530
Real gas Density (Rel to air = 1)	0.528
Ideal Nett Calorific Value MJ/m^3	17.17
Ideal Gross Calorific Value MJ/m^3	19.02
Real Nett Calorific Value MJ/m^3	17.10
Real Gross Calorific Value MJ/m^3	18.95
Gross calorific value of water-saturated gas MJ/m^3	18.67

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-05-97

amdel

415321

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1B
Hot Wire Bottoms Up, 140 units
14 kPag @ 15°C, 17/04/97, 1000h, Cyl# 180
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Carbon Monoxide	26.12
Hydrogen	46.80
Methane	23.21
Ethane	2.99
Propane	0.72
I-Butane	0.000
N-Butane	0.12
Neo Pentane	0.000
I-Pentane	0.000
N-Pentane	0.04
Hexanes	0.000
Heptanes	0.000
Octanes and higher h'cs	0.000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	13.30
Lower Flammability limit	5.03
Upper Flammability limit	35.02
Ratio of upper to lower	6.97
Wobbe Index	30.09
Compressibility Factor	1.0043
Ideal Gas Density (Rel to air = 1)	0.459
Real gas Density (Rel to air = 1)	0.457
Ideal Nett Calorific Value MJ/m^3	18.40
Ideal Gross Calorific Value MJ/m^3	20.39
Real Nett Calorific Value MJ/m^3	18.33
Real Gross Calorific Value MJ/m^3	20.30
Gross calorific value of water-saturated gas MJ/m^3	20.01

This report relates specifically to the sample submitted for analysis.

Signed Graeme Cass

Date : 06-05-97

amdel

415322

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1A
Hot Wire Cuttings Gas, 27 units
640m, 10/04/97, 1200h, Cyl# 202
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.34
Nitrogen	79.30
Helium	0.00
Carbon Dioxide	0.20
Hydrogen	0.00
Methane	1.16
Ethane	0.0004
Propane	0.0001
I-Butane	0.0000
N-Butane	0.0000
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.68
Lower Flammability limit	429.99
Upper Flammability limit	1290.33
Ratio of upper to lower	3.00
Wobbe Index	0.44
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.990
Real gas Density (Rel to air = 1)	0.990
Ideal Nett Calorific Value MJ/m^3	0.39
Ideal Gross Calorific Value MJ/m^3	0.44
Real Nett Calorific Value MJ/m^3	0.39
Real Gross Calorific Value MJ/m^3	0.44
Gross calorific value of water-saturated gas MJ/m^3	0.40

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-05-97

amdel

415323

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1A
Hot Wire Cuttings Gas, 27 units
640m, 10/04/97, 1200h, Cyl# 202
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	88.55
Helium	0.00
Carbon Dioxide	1.50
Hydrogen	0.00
Methane	9.95
Ethane	0.004
Propane	0.001
I-Butane	0.0000
N-Butane	0.0001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.06
Lower Flammability limit	50.22
Upper Flammability limit	150.71
Ratio of upper to lower	3.00
Wobbe Index	3.88
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.934
Real gas Density (Rel to air = 1)	0.934
Ideal Nett Calorific Value MJ/m^3	3.38
Ideal Gross Calorific Value MJ/m^3	3.75
Real Nett Calorific Value MJ/m^3	3.38
Real Gross Calorific Value MJ/m^3	3.75
Gross calorific value of water-saturated gas MJ/m^3	3.66

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-05-97

amdel

415324

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1A
Hot Wire Cuttings Gas, 27 units
640m, 10/04/97, 1200h, Cyl# 202
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	13.13
Hydrogen	0.00
Methane	86.82
Ethane	0.04
Propane	0.009
I-Butane	0.0000
N-Butane	0.0009
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	19.72
Lower Flammability limit	5.75
Upper Flammability limit	17.26
Ratio of upper to lower	3.00
Wobbe Index	39.70
Compressibility Factor	0.9977
Ideal Gas Density (Rel to air = 1)	0.681
Real gas Density (Rel to air = 1)	0.682
Ideal Nett Calorific Value MJ/m^3	29.50
Ideal Gross Calorific Value MJ/m^3	32.76
Real Nett Calorific Value MJ/m^3	29.56
Real Gross Calorific Value MJ/m^3	32.84
Gross calorific value of water-saturated gas MJ/m^3	32.18

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-05-97

amdel

415325

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1A
Hot Wire Cuttings Gas, 27 units
640m, 10/04/97, 1200h, Cyl# 202
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	0.00
Methane	99.95
Ethane	0.04
Propane	0.01
I-Butane	0.0000
N-Butane	0.001
Neo Pentane	0.0000
I-Pentane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	16.05
Lower Flammability limit	5.00
Upper Flammability limit	15.00
Ratio of upper to lower	3.00
Wobbe Index	50.66
Compressibility Factor	0.9981
Ideal Gas Density (Rel to air = 1)	0.554
Real gas Density (Rel to air = 1)	0.555
Ideal Nett Calorific Value MJ/m^3	33.95
Ideal Gross Calorific Value MJ/m^3	37.71
Real Nett Calorific Value MJ/m^3	34.02
Real Gross Calorific Value MJ/m^3	37.78
Gross calorific value of water-saturated gas MJ/m^3	37.05

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-05-97

amdel

415326

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1B
Hot Wire 500 units, Bottoms Up 600 m
14 kPag @ 15°C, 17/04/97, 1000 h, Cyl# 347
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	13.44
Nitrogen	82.76
Carbon Dioxide	0.19
Methane	3.21
Ethane	0.36
Propane	0.04
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.21
Lower Flammability limit	127.44
Upper Flammability limit	406.90
Ratio of upper to lower	3.19
Wobbe Index	1.50
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.974
Real gas Density (Rel to air = 1)	0.974
Ideal Nett Calorific Value MJ/m^3	1.34
Ideal Gross Calorific Value MJ/m^3	1.48
Real Nett Calorific Value MJ/m^3	1.34
Real Gross Calorific Value MJ/m^3	1.49
Gross calorific value of water-saturated gas MJ/m^3	1.43

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 01-07-97

amdel

415327

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1B
Hot Wire 500 units, Bottoms Up 600 m
14 kPag @ 15°C, 17/04/97, 1000 h, Cyl# 347
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	90.17
Carbon Dioxide	0.50
Methane	8.30
Ethane	0.92
Propane	0.11
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.14
Lower-Flammability limit	49.24
Upper Flammability limit	157.23
Ratio of upper to lower	3.19
Wobbe Index	3.97
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.937
Real gas Density (Rel to air = 1)	0.937
Ideal Nett Calorific Value MJ/m^3	3.47
Ideal Gross Calorific Value MJ/m^3	3.84
Real Nett Calorific Value MJ/m^3	3.47
Real Gross Calorific Value MJ/m^3	3.84
Gross calorific value of water-saturated gas MJ/m^3	3.75

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 01-07-97

amdel

415328

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1B
Hot Wire 500 units, Bottoms Up 600 m
14 kPag @ 15°C, 17/04/97, 1000 h, Cyl# 347
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	5.10
Methane	84.42
Ethane	9.35
Propane	1.13
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	19.10
Lower Flammability limit	4.84
Upper Flammability limit	15.46
Ratio of upper to lower	3.19
Wobbe Index	48.10
Compressibility Factor	0.9974
Ideal Gas Density (Rel to air = 1)	0.659
Real gas Density (Rel to air = 1)	0.661
Ideal Nett Calorific Value MJ/m^3	35.27
Ideal Gross Calorific Value MJ/m^3	39.06
Real Nett Calorific Value MJ/m^3	35.37
Real Gross Calorific Value MJ/m^3	39.16
Gross calorific value of water-saturated gas MJ/m^3	38.37

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 01-07-97

amdel

415329

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5820

Sample: JERICHO-1B
Hot Wire 500 units, Bottoms Up 600 m
14 kPag @ 15°C, 17/04/97, 1000 h, Cyl# 347
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Carbon Dioxide	0.00
Methane	88.96
Ethane	9.85
Propane	1.19
I-Butane	0.00
N-Butane	0.00
Neo Pentane	0.00
I-Pentane	0.00
N-Pentane	0.00
Hexanes	0.00
Heptanes	0.00
Octanes and higher h'cs	0.00
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	17.76
Lower Flammability limit	4.60
Upper Flammability limit	14.68
Ratio of upper to lower	3.19
Wobbe Index	52.56
Compressibility Factor	0.9975
Ideal Gas Density (Rel to air = 1)	0.613
Real gas Density (Rel to air = 1)	0.614
Ideal Nett Calorific Value MJ/m^3	37.17
Ideal Gross Calorific Value MJ/m^3	41.16
Real Nett Calorific Value MJ/m^3	37.26
Real Gross Calorific Value MJ/m^3	41.26
Gross calorific value of water-saturated gas MJ/m^3	40.44

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 01-07-97

1. INTRODUCTION

Four (4) samples were received for gas composition and one (1) water sample for extraction and water analysis on 29 May 1997.

2. ANALYTICAL PROCEDURES

Headspace analysis was determined by injection onto a Perkin Elmer Sigma 2 gas chromatograph equipped with a packed alumina column.

Nitrogen and carbon dioxide were determined by injection onto a Varian 6000 gas chromatograph equipped with a porapak column, thermal conductivity detector and helium carrier gas.

Hydrogen and helium were determined by injection onto a Varian 6000 gas chromatograph equipped with a molecular sieve column, thermal conductivity detector and argon carrier.

Concentrations were calculated from peak areas measured with an integrator and compared with peak areas taken from standard gas mixtures of known concentrations injected onto the same chromatograph using the same conditions.

A small volume of water was sub sampled prior to extraction for standard water analysis according to APHA methods (19th Edition). The remainder of the water sample was extracted with dichloromethane in a separating funnel. Removal of solvent by careful rotary evaporation gave the extract, which was subsequently analysed by gas chromatography. The gas chromatograph was setup with a capillary column, a flame ionisation detector and nitrogen carrier gas.

3. RESULTS

Gas composition and water analysis results are presented on the following pages. The water extract yield for Lonnavale-1 @ 50m was determined to be 3 mg/L.

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415331

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings gas, 60m, 1 unit
27/05/97, 1000 h, Cyl# 122
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.61
Nitrogen	77.66
Helium	0.00
Carbon Dioxide	0.71
Hydrogen	0.00
Methane	0.02
Ethane	0.0001
Propane	0.0002
N-Butane	0.0003
N-Pentane	0.0004
Hexanes	0.0008
Heptanes	0.0008
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.99
Lower Flammability limit	15084.51
Upper Flammability limit	53670.51
Ratio of upper to lower	3.56
Wobbe Index	0.01
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	1.001
Real gas Density (Rel to air = 1)	1.001
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.01
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.01
Gross calorific value of water-saturated gas MJ/m^3	-0.02

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415332

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings gas, 60m, 1 unit
27/05/97, 1000 h, Cyl# 122
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	45.00
Helium	0.00
Carbon Dioxide	52.98
Hydrogen	0.00
Methane	1.79
Ethane	0.01
Propane	0.01
N-Butane	0.03
N-Pentane	0.04
Hexanes	0.07
Heptanes	0.07
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	36.39
Lower Flammability limit	186.64
Upper Flammability limit	675.89
Ratio of upper to lower	3.62
Wobbe Index	0.93
Compressibility Factor	0.9976
Ideal Gas Density (Rel to air = 1)	1.256
Real gas Density (Rel to air = 1)	1.259
Ideal Nett Calorific Value MJ/m^3	0.95
Ideal Gross Calorific Value MJ/m^3	1.05
Real Nett Calorific Value MJ/m^3	0.95
Real Gross Calorific Value MJ/m^3	1.05
Gross calorific value of water-saturated gas MJ/m^3	1.00

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415333

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings gas, 60m, 1 unit
27/05/97, 1000 h, Cyl# 122
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	96.34
Hydrogen	0.00
Methane	3.25
Ethane	0.02
Propane	0.02
N-Butane	0.05
N-Pentane	0.07
Hexanes	0.12
Heptanes	0.13
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	43.25
Lower Flammability limit	102.64
Upper Flammability limit	371.70
Ratio of upper to lower	3.62
Wobbe Index	1.56
Compressibility Factor	0.9943
Ideal Gas Density (Rel to air = 1)	1.493
Real gas Density (Rel to air = 1)	1.501
Ideal Nett Calorific Value MJ/m^3	1.73
Ideal Gross Calorific Value MJ/m^3	1.90
Real Nett Calorific Value MJ/m^3	1.74
Real Gross Calorific Value MJ/m^3	1.91
Gross calorific value of water-saturated gas MJ/m^3	1.84

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415334

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings gas, 60m, 1 unit
27/05/97, 1000 h, Cyl# 122
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	0.00
Methane	88.75
Ethane	0.58
Propane	0.67
N-Butane	1.32
N-Pentane	1.80
Hexanes	3.41
Heptanes	3.47
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	23.18
Lower Flammability limit	3.76
Upper Flammability limit	13.62
Ratio of upper to lower	3.62
Wobbe Index	58.05
Compressibility Factor	0.9951
Ideal Gas Density (Rel to air = 1)	0.800
Real gas Density (Rel to air = 1)	0.804
Ideal Nett Calorific Value MJ/m^3	47.22
Ideal Gross Calorific Value MJ/m^3	51.94
Real Nett Calorific Value MJ/m^3	47.46
Real Gross Calorific Value MJ/m^3	52.19
Gross calorific value of water-saturated gas MJ/m^3	51.03

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415335

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings Gas, 90m, 1 unit
27/05/97, 1210 h, Cyl# 251
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.14
Nitrogen	77.78
Helium	0.00
Carbon Dioxide	2.08
Hydrogen	0.00
Methane	0.0006
Ethane	0.0001
Propane	0.0001
Butanes	0.0001
Pentanes	0.0001
Hexanes	0.0002
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	29.15
Lower Flammability limit	169509.23
Upper Flammability limit	806645.74
Ratio of upper to lower	4.76
Wobbe Index	0.00
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	1.006
Real gas Density (Rel to air = 1)	1.006
Ideal Nett Calorific Value MJ/m^3	0.00
Ideal Gross Calorific Value MJ/m^3	0.00
Real Nett Calorific Value MJ/m^3	0.00
Real Gross Calorific Value MJ/m^3	0.00
Gross calorific value of water-saturated gas MJ/m^3	-0.03

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415336

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: JERICHO-1B
Circulation from 620m, 350 units
02/05/97, 1215 h, Cyl#348
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	17.36
Nitrogen	76.67
Helium	0.00
Carbon Dioxide	0.06
Hydrogen	4.06
Methane	1.43
Ethane	0.27
Propane	0.10
Butanes	0.03
Pentanes	0.008
Hexanes	0.007
Heptanes	0.001
Octanes and higher h'cs	0.001
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.53
Lower Flammability limit	67.89
Upper Flammability limit	534.04
Ratio of upper to lower	7.87
Wobbe Index	1.40
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.950
Real gas Density (Rel to air = 1)	0.950
Ideal Nett Calorific Value MJ/m^3	1.21
Ideal Gross Calorific Value MJ/m^3	1.37
Real Nett Calorific Value MJ/m^3	1.21
Real Gross Calorific Value MJ/m^3	1.37
Gross calorific value of water-saturated gas MJ/m^3	1.31

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415337

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: JERICHO-1B
Circulation from 620m, 350 units
02/05/97, 1215 h, Cyl#348
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	68.00
Helium	0.00
Carbon Dioxide	0.18
Hydrogen	23.28
Methane	6.58
Ethane	1.26
Propane	0.47
Butanes	0.13
Pentanes	0.04
Hexanes	0.04
Heptanes	0.006
Octanes and higher h'cs	0.007
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	21.39
Lower Flammability limit	12.59
Upper Flammability limit	107.96
Ratio of upper to lower	8.57
Wobbe Index	8.01
Compressibility Factor	1.0020
Ideal Gas Density (Rel to air = 1)	0.739
Real gas Density (Rel to air = 1)	0.737
Ideal Nett Calorific Value MJ/m^3	6.07
Ideal Gross Calorific Value MJ/m^3	6.88
Real Nett Calorific Value MJ/m^3	6.06
Real Gross Calorific Value MJ/m^3	6.87
Gross calorific value of water-saturated gas MJ/m^3	6.74

This report relates specifically to the sample submitted for analysis.

Signed Dave Cass

Date : 04-06-97

amdel

415338

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: JERICHO-1B
Circulation from 620m, 350 units
02/05/97, 1215 h, Cyl#348
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.56
Hydrogen	72.77
Methane	20.58
Ethane	3.93
Propane	1.46
Butanes	0.41
Pentanes	0.12
Hexanes	0.13
Heptanes	0.02
Octanes and higher h'cs	0.02
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	7.32
Lower Flammability limit	4.03
Upper Flammability limit	34.55
Ratio of upper to lower	8.57
Wobbe Index	42.80
Compressibility Factor	1.0070
Ideal Gas Density (Rel to air = 1)	0.253
Real gas Density (Rel to air = 1)	0.251
Ideal Nett Calorific Value MJ/m^3	18.98
Ideal Gross Calorific Value MJ/m^3	21.52
Real Nett Calorific Value MJ/m^3	18.85
Real Gross Calorific Value MJ/m^3	21.37
Gross calorific value of water-saturated gas MJ/m^3	21.12

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415339

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: JERICHO-1B
Circulation from 620m, 350 units
02/05/97, 1215 h, Cyl#348
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	73.18
Methane	20.69
Ethane	3.95
Propane	1.47
Butanes	0.42
Pentanes	0.12
Hexanes	0.13
Heptanes	0.02
Octanes and higher h'cs	0.02
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	7.11
Lower Flammability limit	4.01
Upper Flammability limit	34.35
Ratio of upper to lower	8.57
Wobbe Index	43.67
Compressibility Factor	1.0071
Ideal Gas Density (Rel to air = 1)	0.246
Real gas Density (Rel to air = 1)	0.244
Ideal Nett Calorific Value MJ/m^3	19.09
Ideal Gross Calorific Value MJ/m^3	21.64
Real Nett Calorific Value MJ/m^3	18.96
Real Gross Calorific Value MJ/m^3	21.49
Gross calorific value of water-saturated gas MJ/m^3	21.24

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

415340

amdel
Petroleum Services

TABLE 1 - WATER ANALYSIS

JOB NUMBER: LQ5906

WELL / ID: Lonnavale-1
SAMPLE TYPE: Water
SAMPLE POINT: -
DATE COLLECTED 27/05/97,1000h
DATE RECEIVED: 30/05/97

FORMATION: -
INTERVAL: 50m
COLLECTED BY: Client

PROPERTIES:

pH (measured) = 7.68
Resistivity (Ohm.M @ 25°C) = 13.50
Electrical Conductivity (µS/cm @ 25°C) = 741
Specific Gravity (S.G. @ 20°C) = na
Measured Total Dissolved Solids(Evap@180°C) mg/L = na
Measured Total Suspended Solids mg/L = na

CHEMICAL COMPOSITION

CATIONS		mg/L	meq/L	ANIONS		mg/L	meq/L
Ammonium	as NH_4	na	na	Bromide	as Br	na	na
Potassium	as K	nd	nd	Chloride	as Cl	88	2.48
Sodium	as Na	49	2.13	Fluoride	as F	na	na
Barium	as Ba	na	na	Hydroxide	as OH	nd	nd
Calcium	as Ca	47	2.35	Nitrite	as NO_2	na	na
Iron	as Fe	na	na	Nitrate	as NO_3	nd	nd
Magnesium	as Mg	54	4.44	Sulphide	as S	na	na
Strontium	as Sr	na	na	Bicarbonate	as HCO_3	268	4.39
Boron	as B	na	na	Carbonate	as CO_3	nd	nd
				Sulphite	as SO_3	na	na
				Sulphate	as SO_4	103	2.14
Total Cations		150	8.92	**Total Anions**		459	9.02

DERIVED PARAMETERS

a) Ion Balance (Diff*100/Sum) (%) = 0.53
b) Total Alkalinity (calc as $CaCO_3$) (mg/L) = 220
c) Total of Cations + Anions = 609
(measured dissolved salts)

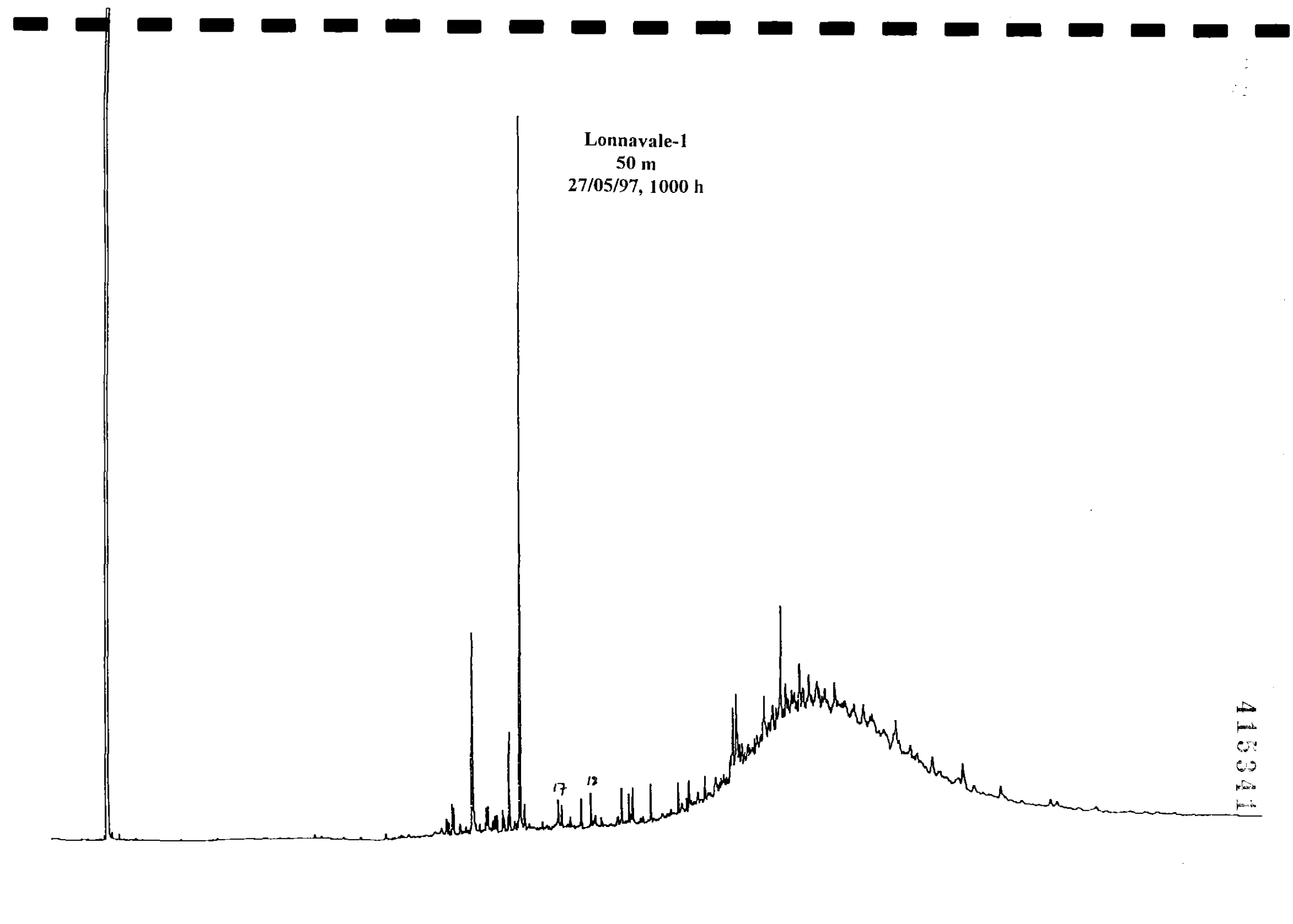
d) Theoretical Result of Evaporation Test = 474.24
(From Electrical Conductivity)
e) 0.6 x Concentration of Bicarbonate ion* = 160.8
f) Theoretical Total Dissolved Salts d) + e) = 635.04

QUALITY CONTROL COMMENTS

Item	Actual Value	Acceptance Criteria	Satisfactory? (Yes/No)
Ion Balance (%) =	0.53	5%	Yes
Undetected ions % =	4.10	10%	Yes
(from comparison of measured vs theoretical salts derived from measured conductivity)			
Expected pH range		< 8.3	Yes
% difference between measured total dissolved solids and calc total dissolved salts (from ionic comp) =	na	5%	na

na = not applicable
nd = not detected
is = insufficent sample

If No - what action is recommended by Amdel


Lonnavale-1
50 m
27/05/97, 1000 h
17
18
4153-14

amdel

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings Gas, 90m, 1 unit
27/05/97, 1210 h, Cyl# 251
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	74.27
Helium	0.00
Carbon Dioxide	25.72
Hydrogen	0.00
Methane	0.01
Ethane	0.002
Propane	0.002
Butanes	0.002
Pentanes	0.001
Hexanes	0.002
Heptanes	0.001
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	32.13
Lower Flammability limit	11893.26
Upper Flammability limit	56596.61
Ratio of upper to lower	4.76
Wobbe Index	0.02
Compressibility Factor	0.9990
Ideal Gas Density (Rel to air = 1)	1.109
Real gas Density (Rel to air = 1)	1.110
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415343

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings Gas, 90m, 1 unit
27/05/97, 1210 h, Cyl# 251
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	99.91
Hydrogen	0.00
Methane	0.03
Ethane	0.007
Propane	0.007
Butanes	0.008
Pentanes	0.006
Hexanes	0.008
Heptanes	0.005
Octanes and higher h'cs	0.0000
Total	99.98

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	44.01
Lower Flammability limit	3058.53
Upper Flammability limit	14554.68
Ratio of upper to lower	4.76
Wobbe Index	0.05
Compressibility Factor	0.9943
Ideal Gas Density (Rel to air = 1)	1.519
Real gas Density (Rel to air = 1)	1.528
Ideal Nett Calorific Value MJ/m^3	0.06
Ideal Gross Calorific Value MJ/m^3	0.07
Real Nett Calorific Value MJ/m^3	0.06
Real Gross Calorific Value MJ/m^3	0.07
Gross calorific value of water-saturated gas MJ/m^3	0.03

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415344

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings Gas, 90m, 1 unit
27/05/97, 1210 h, Cyl# 251
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	0.00
Methane	44.88
Ethane	9.41
Propane	8.89
Butanes	10.54
Pentanes	7.91
Hexanes	11.45
Heptanes	6.93
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	42.59
Lower Flammability limit	2.25
Upper Flammability limit	10.71
Ratio of upper to lower	4.76
Wobbe Index	74.81
Compressibility Factor	0.9807
Ideal Gas Density (Rel to air = 1)	1.470
Real gas Density (Rel to air = 1)	1.499
Ideal Nett Calorific Value MJ/m^3	83.39
Ideal Gross Calorific Value MJ/m^3	90.71
Real Nett Calorific Value MJ/m^3	85.03
Real Gross Calorific Value MJ/m^3	92.49
Gross calorific value of water-saturated gas MJ/m^3	89.15

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

415345

amdel

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings Gas, 96m, 2 units
27/05/97, 1240 h, Cyl# 287
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	19.50
Nitrogen	77.90
Helium	0.00
Carbon Dioxide	2.60
Hydrogen	0.00
Methane	0.0004
Ethane	0.0000
Propane	0.0000
Butanes	0.0001
Pentanes	0.0001
Hexanes	0.0001
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	29.21
Lower Flammability limit	264368.13
Upper Flammability limit	1330550.19
Ratio of upper to lower	5.03
Wobbe Index	0.00
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	1.008
Real gas Density (Rel to air = 1)	1.008
Ideal Nett Calorific Value MJ/m^3	0.00
Ideal Gross Calorific Value MJ/m^3	0.00
Real Nett Calorific Value MJ/m^3	0.00
Real Gross Calorific Value MJ/m^3	0.00
Gross calorific value of water-saturated gas MJ/m^3	-0.03

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings Gas, 96m, 2 units
27/05/97, 1240 h, Cyl# 287
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	76.43
Helium	0.00
Carbon Dioxide	23.57
Hydrogen	0.00
Methane	0.004
Ethane	0.0002
Propane	0.0002
Butanes	0.0007
Pentanes	0.0006
Hexanes	0.0009
Heptanes	0.001
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	31.79
Lower Flammability limit	25216.57
Upper Flammability limit	126913.62
Ratio of upper to lower	5.03
Wobbe Index	0.01
Compressibility Factor	0.9990
Ideal Gas Density (Rel to air = 1)	1.097
Real gas Density (Rel to air = 1)	1.098
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.01
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.01
Gross calorific value of water-saturated gas MJ/m^3	-0.02

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

amdel

415347

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings Gas, 96m, 2 units
27/05/97, 1240 h, Cyl# 287
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	99.97
Hydrogen	0.00
Methane	0.02
Ethane	0.0009
Propane	0.0007
Butanes	0.003
Pentanes	0.003
Hexanes	0.004
Heptanes	0.006
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	44.01
Lower Flammability limit	5945.70
Upper Flammability limit	29924.38
Ratio of upper to lower	5.03
Wobbe Index	0.03
Compressibility Factor	0.9943
Ideal Gas Density (Rel to air = 1)	1.520
Real gas Density (Rel to air = 1)	1.528
Ideal Nett Calorific Value MJ/m^3	0.03
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.03
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

415348

amdel

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ5906

Sample: LONNAVALE-1
BUP Cuttings Gas, 96m, 2 units
27/05/97, 1240 h, Cyl# 287
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	0.00
Methane	51.91
Ethane	2.68
Propane	1.91
Butanes	8.04
Pentanes	7.53
Hexanes	10.46
Heptanes	17.47
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	46.60
Lower Flammability limit	2.07
Upper Flammability limit	10.43
Ratio of upper to lower	5.03
Wobbe Index	77.77
Compressibility Factor	0.9750
Ideal Gas Density (Rel to air = 1)	1.609
Real gas Density (Rel to air = 1)	1.650
Ideal Nett Calorific Value MJ/m^3	90.80
Ideal Gross Calorific Value MJ/m^3	98.65
Real Nett Calorific Value MJ/m^3	93.13
Real Gross Calorific Value MJ/m^3	101.18
Gross calorific value of water-saturated gas MJ/m^3	96.96

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 04-06-97

1. INTRODUCTION

The water sample from Lonnavale-1 50 m which was previously extracted and reported in Amdel Report LQ5906 - Part 1 was further analysed using both liquid and gas chromatography. This report is a formal presentation of results reported by facsimile on 25 June 1997.

2. ANALYTICAL PROCEDURE

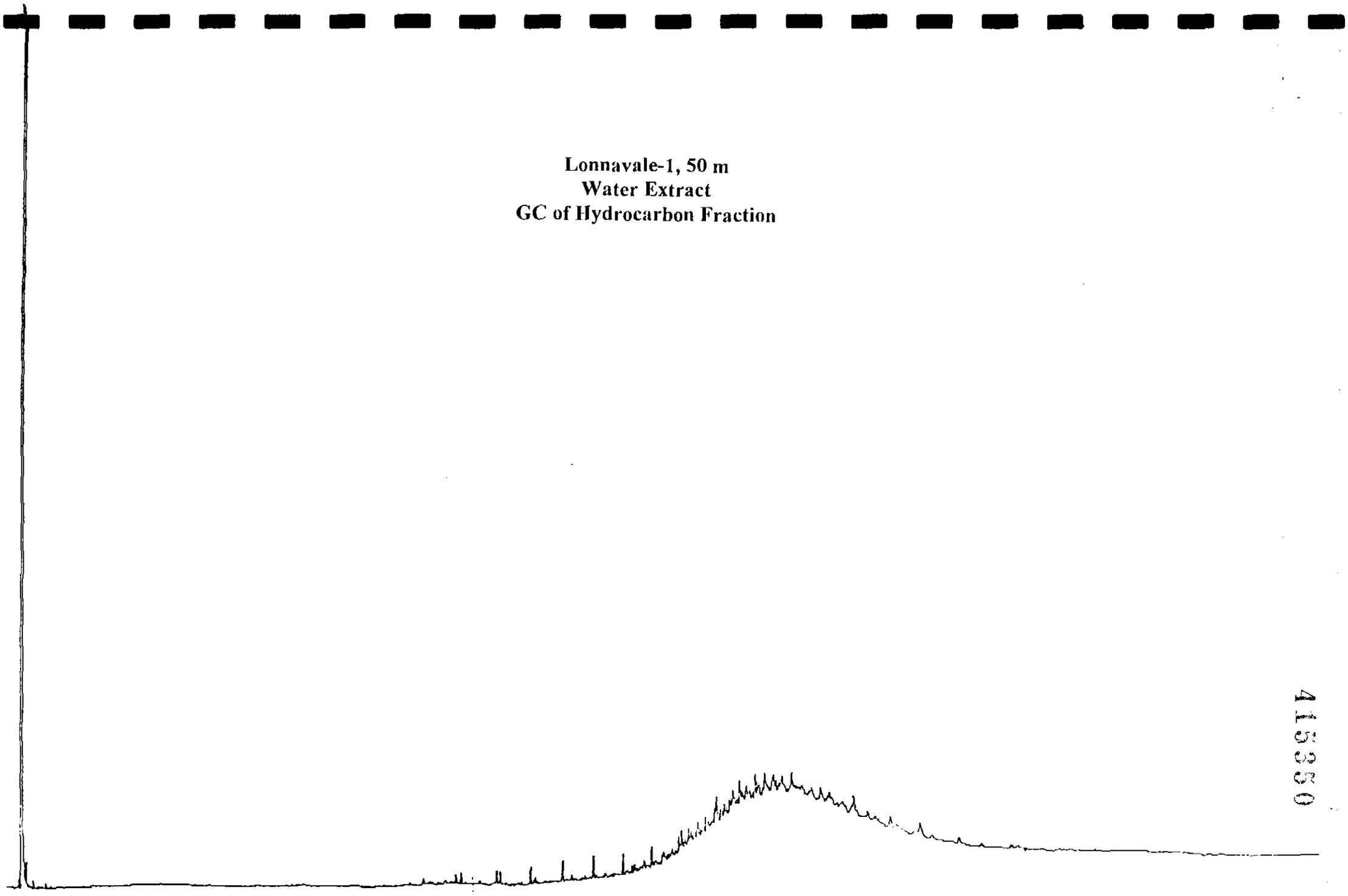
The extracted sample was separated into hydrocarbons and non-hydrocarbon compounds by liquid chromatography on activated alumina (sample:absorbent ratio = 1:100). Hydrocarbons were eluted with petroleum ether/dichloromethane (75:25).

The hydrocarbon fraction was subsequently analysed by gas chromatography using a capillary column, flame ionisation detector and nitrogen carrier gas.

3. RESULTS

The hydrocarbon fraction of the sample was determined to be >90% by weight with the non-hydrocarbon fraction <10% by weight. The gas chromatograph of the hydrocarbon fraction is presented on the following page.

Lonnavale-1, 50 m
Water Extract
GC of Hydrocarbon Fraction



41539

1. INTRODUCTION

Three (3) water samples from Lonnavale-1 were received for extraction and gas chromatography. This report is a formal presentation of results forwarded by facsimile on 10 July 1997.

2. ANALYTICAL PROCEDURES

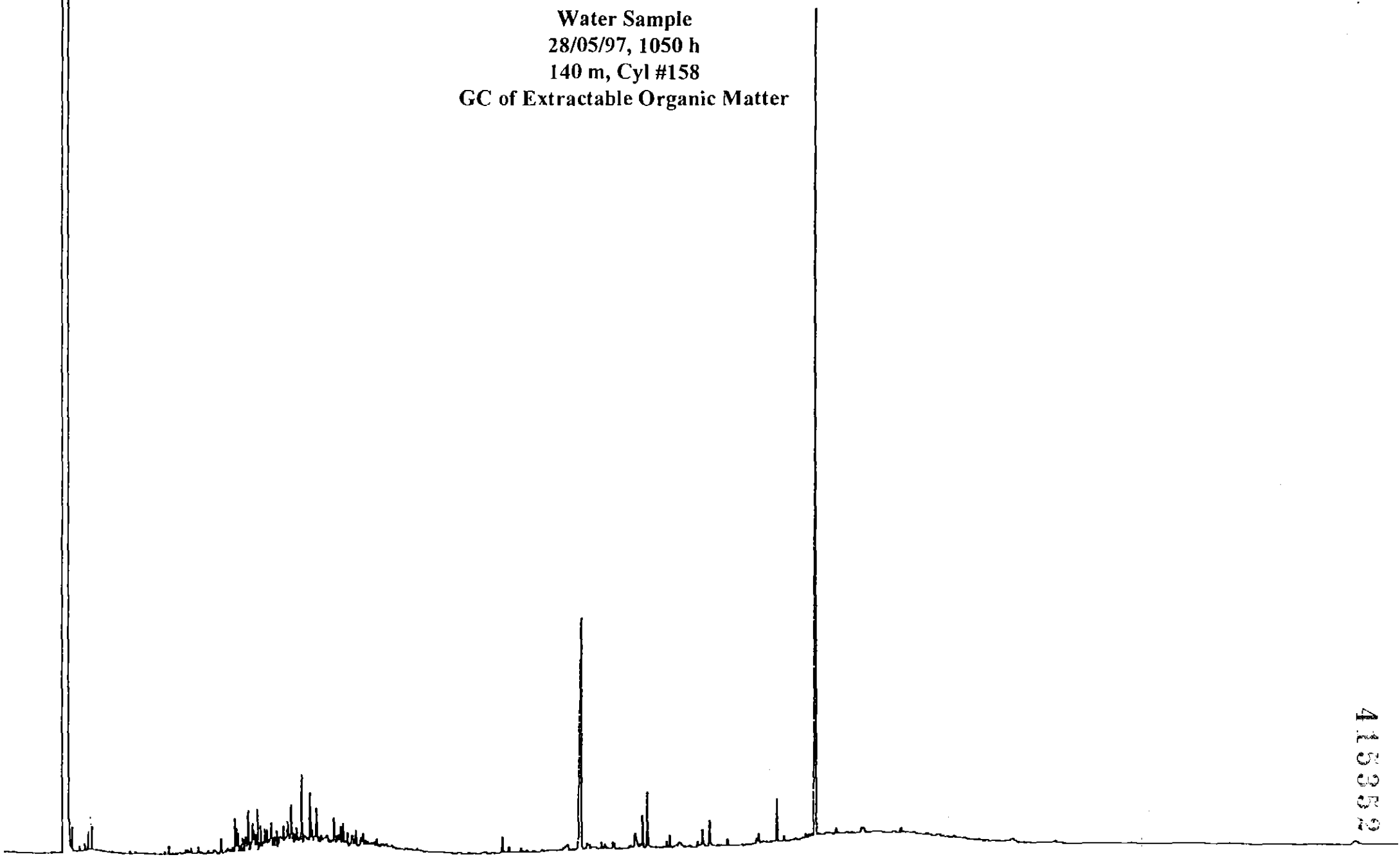
The water was extracted with dichloromethane in a separating funnel. Removal of solvent by careful rotary evaporation gave the extract which was subsequently analysed by gas chromatography. The gas chromatograph was setup with a capillary column, a flame ionisation detector and nitrogen carrier gas.

3. RESULTS

The extract yields of the three samples are given below with the gas chromatograms presented on the following pages.

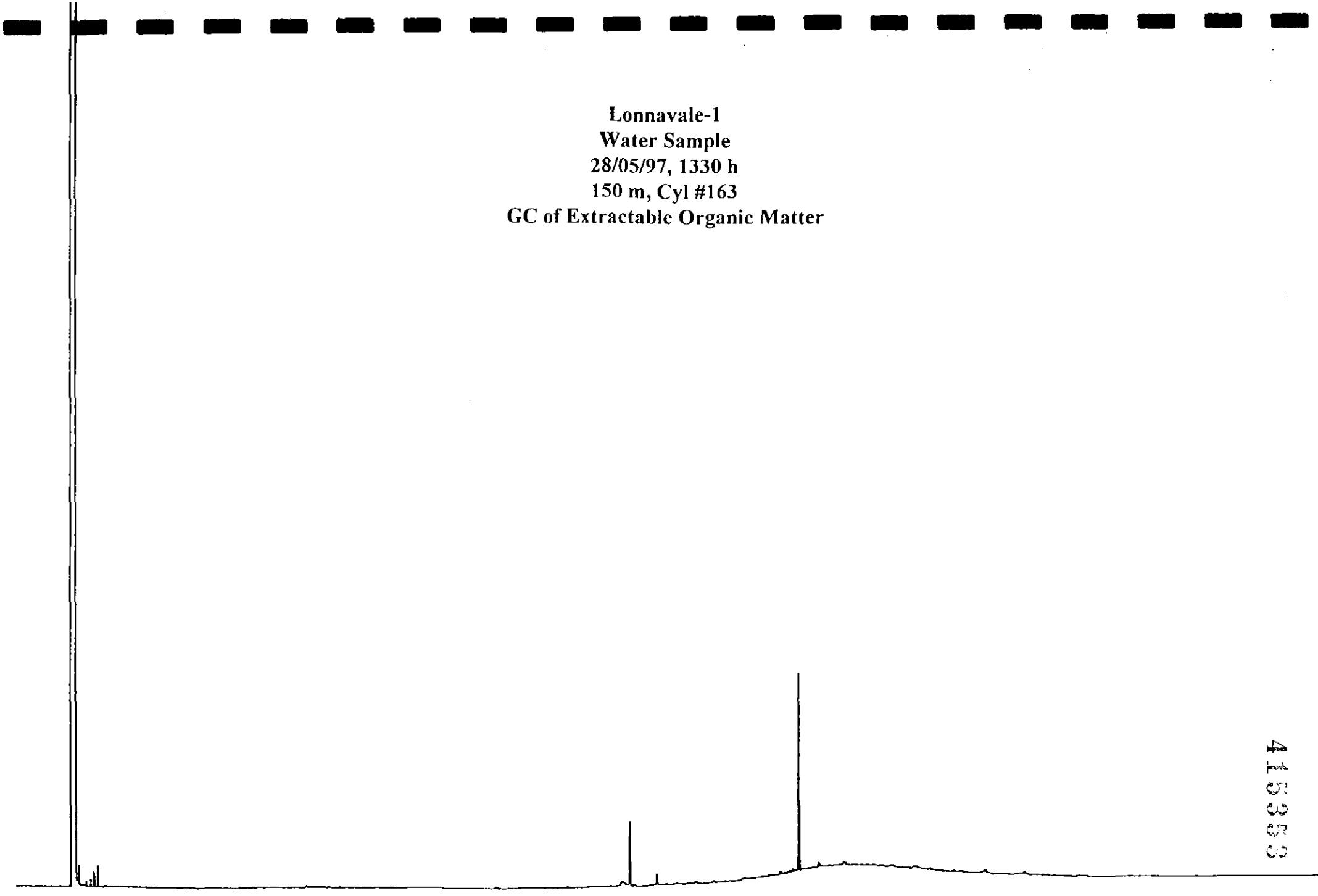
Sample Depth (m)	Extractable Organic Matter (mg/L)
140	0.2
150	0.6
161	1.2

Lonnavale-1
Water Sample
28/05/97, 1050 h
140 m, Cyl #158
GC of Extractable Organic Matter



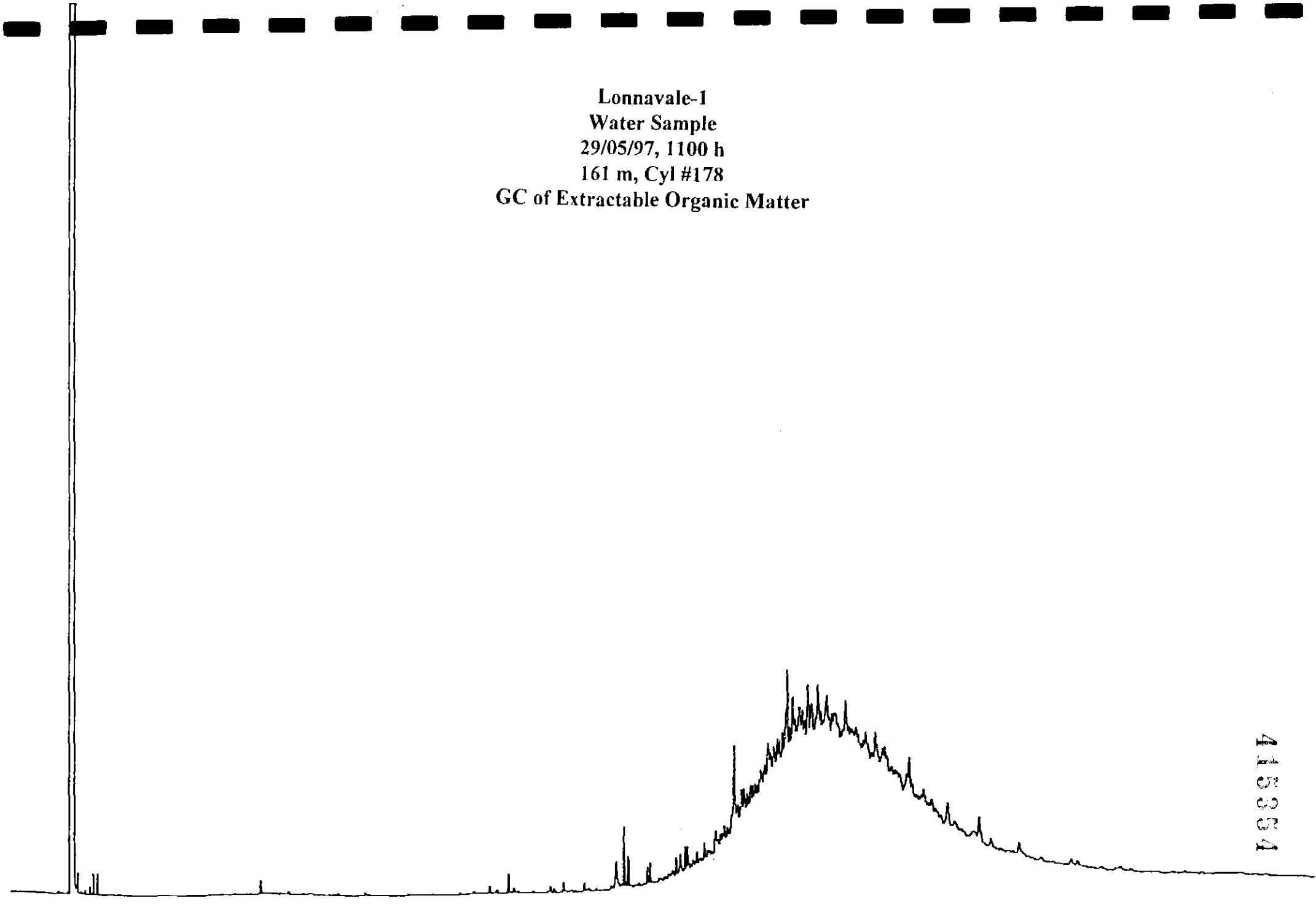
41559

Lonnavale-1
Water Sample
28/05/97, 1330 h
150 m, Cyl #163
GC of Extractable Organic Matter



41533

Lonnavale-1
Water Sample
29/05/97, 1100 h
161 m, Cyl #178
GC of Extractable Organic Matter



1. INTRODUCTION

Three (3) samples were received for gas composition on 21 July 1997.

2. ANALYTICAL PROCEDURES

Headspace analysis was determined by injection onto a Perkin Elmer Sigma 2 gas chromatograph equipped with a packed alumina column.

Nitrogen, oxygen and carbon dioxide were determined by injection onto a Varian 6000 gas chromatograph equipped with a porapak column, thermal conductivity detector and helium carrier gas.

Hydrogen and helium were determined by injection onto a Varian 6000 gas chromatograph equipped with a molecular sieve column, thermal conductivity detector and argon carrier.

Concentrations were calculated from peak areas measured with an integrator and compared with peak areas taken from standard gas mixtures of known concentrations injected onto the same chromatograph using the same conditions.

3. RESULTS

Gas compositions are presented on the following pages.

415356

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PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 173.4m, 6 units
18/07/97, 1030h, Cyl# 285
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.97
Nitrogen	77.90
Helium	0.00
Carbon Dioxide	0.01
Hydrogen	0.12
Methane	0.004
Ethane	0.0004
Propane	0.0002
Butanes	0.0000
Pentanes	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.86
Lower Flammability limit	3217.92
Upper Flammability limit	51277.28
Ratio of upper to lower	15.93
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.996
Real gas Density (Rel to air = 1)	0.996
Ideal Nett Calorific Value MJ/m^3	0.01
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.01
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.02

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

amdel

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 173.4m, 6 units
18/07/97, 1030h, Cyl# 285
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	99.85
Helium	0.00
Carbon Dioxide	0.01
Hydrogen	0.14
Methane	0.005
Ethane	0.0004
Propane	0.0002
Butanes	0.0000
Pentanes	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	27.98
Lower Flammability limit	2741.74
Upper Flammability limit	43689.43
Ratio of upper to lower	15.93
Wobbe Index	0.02
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.966
Real gas Density (Rel to air = 1)	0.966
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

amdel

415358

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 173.4m, 6 units
18/07/97, 1030h, Cyl# 285
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	5.59
Hydrogen	90.77
Methane	3.21
Ethane	0.27
Propane	0.14
Butanes	0.01
Pentanes	0.01
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	4.96
Lower Flammability limit	4.25
Upper Flammability limit	67.79
Ratio of upper to lower	15.93
Wobbe Index	30.25
Compressibility Factor	1.0091
Ideal Gas Density (Rel to air = 1)	0.171
Real gas Density (Rel to air = 1)	0.170
Ideal Nett Calorific Value MJ/m^3	10.68
Ideal Gross Calorific Value MJ/m^3	12.52
Real Nett Calorific Value MJ/m^3	10.59
Real Gross Calorific Value MJ/m^3	12.41
Gross calorific value of water-saturated gas MJ/m^3	12.28

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

amdel

415359

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 173.4m, 6 units
18/07/97, 1030h, Cyl# 285
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	96.15
Methane	3.40
Ethane	0.28
Propane	0.15
Butanes	0.01
Pentanes	0.01
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.65
Lower Flammability limit	4.02
Upper Flammability limit	64.00
Ratio of upper to lower	15.93
Wobbe Index	43.86
Compressibility Factor	1.0097
Ideal Gas Density (Rel to air = 1)	0.091
Real gas Density (Rel to air = 1)	0.091
Ideal Nett Calorific Value MJ/m^3	11.32
Ideal Gross Calorific Value MJ/m^3	13.26
Real Nett Calorific Value MJ/m^3	11.21
Real Gross Calorific Value MJ/m^3	13.14
Gross calorific value of water-saturated gas MJ/m^3	13.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

amdel

415360

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 176.7m, 38 units
18/07/97, 1600h, Cyl# 137
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.53
Nitrogen	78.09
Helium	0.00
Carbon Dioxide	0.03
Hydrogen	0.34
Methane	0.01
Ethane	0.0007
Propane	0.0003
Butanes	0.0002
Pentanes	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.79
Lower Flammability limit	1130.98
Upper Flammability limit	17675.17
Ratio of upper to lower	15.63
Wobbe Index	0.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.994
Real gas Density (Rel to air = 1)	0.994
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.02

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

amdel

415361

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 176.7m, 38 units
18/07/97, 1600h, Cyl# 137
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	75.75
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	23.19
Methane	0.98
Ethane	0.05
Propane	0.02
Butanes	0.01
Pentanes	0.002
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	21.88
Lower Flammability limit	16.58
Upper Flammability limit	259.13
Ratio of upper to lower	15.63
Wobbe Index	3.74
Compressibility Factor	1.0021
Ideal Gas Density (Rel to air = 1)	0.755
Real gas Density (Rel to air = 1)	0.753
Ideal Nett Calorific Value MJ/m^3	2.77
Ideal Gross Calorific Value MJ/m^3	3.25
Real Nett Calorific Value MJ/m^3	2.77
Real Gross Calorific Value MJ/m^3	3.24
Gross calorific value of water-saturated gas MJ/m^3	3.16

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

amdel

415362

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 176.7m, 38 units
18/07/97, 1600h, Cyl# 137
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	95.60
Methane	4.02
Ethane	0.21
Propane	0.10
Butanes	0.06
Pentanes	0.01
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.72
Lower Flammability limit	4.02
Upper Flammability limit	62.86
Ratio of upper to lower	15.63
Wobbe Index	43.70
Compressibility Factor	1.0096
Ideal Gas Density (Rel to air = 1)	0.094
Real gas Density (Rel to air = 1)	0.093
Ideal Nett Calorific Value MJ/m^3	11.43
Ideal Gross Calorific Value MJ/m^3	13.39
Real Nett Calorific Value MJ/m^3	11.32
Real Gross Calorific Value MJ/m^3	13.26
Gross calorific value of water-saturated gas MJ/m^3	13.13

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

amdel

415363

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 176.7m, 38 units
18/07/97, 1600h, Cyl# 137
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	95.60
Methane	4.02
Ethane	0.21
Propane	0.10
Butanes	0.06
Pentanes	0.01
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.72
Lower Flammability limit	4.02
Upper Flammability limit	62.86
Ratio of upper to lower	15.63
Wobbe Index	43.70
Compressibility Factor	1.0096
Ideal Gas Density (Rel to air = 1)	0.094
Real gas Density (Rel to air = 1)	0.093
Ideal Nett Calorific Value MJ/m^3	11.43
Ideal Gross Calorific Value MJ/m^3	13.39
Real Nett Calorific Value MJ/m^3	11.32
Real Gross Calorific Value MJ/m^3	13.26
Gross calorific value of water-saturated gas MJ/m^3	13.13

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

415364

amdel

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 176.7m, 41 units
18/07/97, 1440h, Cyl# 162
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.99
Nitrogen	78.65
Helium	0.00
Carbon Dioxide	0.03
Hydrogen	0.32
Methane	0.01
Ethane	0.0009
Propane	0.0004
Butanes	0.0002
Pentanes	0.0001
Hexanes	0.0001
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.77
Lower Flammability limit	1198.18
Upper Flammability limit	18576.89
Ratio of upper to lower	15.50
Wobbe Index	0.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.993
Real gas Density (Rel to air = 1)	0.993
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

415365

amdel

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 176.7m, 41 units
18/07/97, 1440h, Cyl# 162
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	90.77
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	8.81
Methane	0.38
Ethane	0.02
Propane	0.01
Butanes	0.006
Pentanes	0.002
Hexanes	0.002
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	25.68
Lower Flammability limit	43.53
Upper Flammability limit	674.89
Ratio of upper to lower	15.50
Wobbe Index	1.32
Compressibility Factor	1.0006
Ideal Gas Density (Rel to air = 1)	0.887
Real gas Density (Rel to air = 1)	0.886
Ideal Nett Calorific Value MJ/m^3	1.07
Ideal Gross Calorific Value MJ/m^3	1.25
Real Nett Calorific Value MJ/m^3	1.06
Real Gross Calorific Value MJ/m^3	1.25
Gross calorific value of water-saturated gas MJ/m^3	1.19

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

415366

amdel

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 176.7m, 41 units
18/07/97, 1440h, Cyl# 162
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.03
Hydrogen	95.37
Methane	4.13
Ethane	0.26
Propane	0.11
Butanes	0.07
Pentanes	0.02
Hexanes	0.02
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.79
Lower Flammability limit	4.02
Upper Flammability limit	62.33
Ratio of upper to lower	15.50
Wobbe Index	43.50
Compressibility Factor	1.0096
Ideal Gas Density (Rel to air = 1)	0.096
Real gas Density (Rel to air = 1)	0.095
Ideal Nett Calorific Value MJ/m^3	11.54
Ideal Gross Calorific Value MJ/m^3	13.50
Real Nett Calorific Value MJ/m^3	11.43
Real Gross Calorific Value MJ/m^3	13.37
Gross calorific value of water-saturated gas MJ/m^3	13.24

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

amdel

415367

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6088

Sample: LONNAVALE-1A
Cuttings Gas, 176.7m, 41 units
18/07/97, 1440h, Cyl# 162
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	95.40
Methane	4.13
Ethane	0.26
Propane	0.11
Butanes	0.07
Pentanes	0.02
Hexanes	0.02
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.78
Lower Flammability limit	4.02
Upper Flammability limit	62.31
Ratio of upper to lower	15.50
Wobbe Index	43.60
Compressibility Factor	1.0096
Ideal Gas Density (Rel to air = 1)	0.096
Real gas Density (Rel to air = 1)	0.095
Ideal Nett Calorific Value MJ/m^3	11.54
Ideal Gross Calorific Value MJ/m^3	13.50
Real Nett Calorific Value MJ/m^3	11.43
Real Gross Calorific Value MJ/m^3	13.38
Gross calorific value of water-saturated gas MJ/m^3	13.25

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 22-07-97

1. INTRODUCTION

Three (3) samples were received for gas composition on 1 August 1997.

2. ANALYTICAL PROCEDURES

Headspace analysis was determined by injection onto a Perkin Elmer Sigma 2 gas chromatograph equipped with a packed alumina column.

Nitrogen, oxygen and carbon dioxide were determined by injection onto a Varian 6000 gas chromatograph equipped with a porapak column, thermal conductivity detector and helium carrier gas.

Hydrogen and helium were determined by injection onto a Varian 6000 gas chromatograph equipped with a molecular sieve column, thermal conductivity detector and argon carrier.

Concentrations were calculated from peak areas measured with an integrator and compared with peak areas taken from standard gas mixtures of known concentrations injected onto the same chromatograph using the same conditions.

3. RESULTS

Gas compositions are presented on the following pages.

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415369

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 310 units
30/07/97, 1930 h, Cyl# 257
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	20.14
Nitrogen	76.61
Helium	0.00
Carbon Dioxide	0.45
Hydrogen	2.77
Methane	0.03
Ethane	0.002
Propane	0.0009
N-Butane	0.0005
N-Pentane	0.0001
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.17
Lower Flammability limit	142.76
Upper Flammability limit	2512.70
Ratio of upper to lower	17.60
Wobbe Index	0.36
Compressibility Factor	0.9999
Ideal Gas Density (Rel to air = 1)	0.972
Real gas Density (Rel to air = 1)	0.972
Ideal Nett Calorific Value MJ/m^3	0.30
Ideal Gross Calorific Value MJ/m^3	0.35
Real Nett Calorific Value MJ/m^3	0.30
Real Gross Calorific Value MJ/m^3	0.35
Gross calorific value of water-saturated gas MJ/m^3	0.31

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415370

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 310 units
30/07/97, 1930 h, Cyl# 257
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	12.43
Helium	0.00
Carbon Dioxide	1.12
Hydrogen	85.35
Methane	0.98
Ethane	0.07
Propane	0.03
N-Butane	0.02
N-Pentane	0.004
Hexanes	0.0004
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.90
Lower Flammability limit	4.63
Upper Flammability limit	81.55
Ratio of upper to lower	17.60
Wobbe Index	23.90
Compressibility Factor	1.0086
Ideal Gas Density (Rel to air = 1)	0.204
Real gas Density (Rel to air = 1)	0.202
Ideal Nett Calorific Value MJ/m^3	9.15
Ideal Gross Calorific Value MJ/m^3	10.79
Real Nett Calorific Value MJ/m^3	9.08
Real Gross Calorific Value MJ/m^3	10.70
Gross calorific value of water-saturated gas MJ/m^3	10.57

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415371

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 310 units
30/07/97, 1930 h, Cyl# 257
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	1.28
Hydrogen	97.47
Methane	1.12
Ethane	0.08
Propane	0.03
N-Butane	0.02
N-Pentane	0.004
Hexanes	0.0005
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.76
Lower Flammability limit	4.06
Upper Flammability limit	71.41
Ratio of upper to lower	17.60
Wobbe Index	39.91
Compressibility Factor	1.0098
Ideal Gas Density (Rel to air = 1)	0.095
Real gas Density (Rel to air = 1)	0.094
Ideal Nett Calorific Value MJ/m^3	10.45
Ideal Gross Calorific Value MJ/m^3	12.32
Real Nett Calorific Value MJ/m^3	10.35
Real Gross Calorific Value MJ/m^3	12.20
Gross calorific value of water-saturated gas MJ/m^3	12.08

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415372

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 310 units
30/07/97, 1930 h, Cyl# 257
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	98.73
Methane	1.13
Ethane	0.08
Propane	0.03
N-Butane	0.02
N-Pentane	0.004
Hexanes	0.0005
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.23
Lower Flammability limit	4.01
Upper Flammability limit	70.50
Ratio of upper to lower	17.60
Wobbe Index	45.02
Compressibility Factor	1.0099
Ideal Gas Density (Rel to air = 1)	0.077
Real gas Density (Rel to air = 1)	0.076
Ideal Nett Calorific Value MJ/m^3	10.59
Ideal Gross Calorific Value MJ/m^3	12.48
Real Nett Calorific Value MJ/m^3	10.49
Real Gross Calorific Value MJ/m^3	12.36
Gross calorific value of water-saturated gas MJ/m^3	12.24

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415373

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 198m, 24 units
23/07/97, 0520 h, Cyl# 360
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.09
Nitrogen	78.59
Helium	0.00
Carbon Dioxide	0.10
Hydrogen	0.22
Methane	0.004
Ethane	0.0004
Propane	0.0001
N-Butane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.81
Lower Flammability limit	1784.98
Upper Flammability limit	30488.41
Ratio of upper to lower	17.08
Wobbe Index	0.03
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.995
Real gas Density (Rel to air = 1)	0.995
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	0.00

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415374

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 198m, 24 units
23/07/97, 0520 h, Cyl# 360
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	54.99
Helium	0.00
Carbon Dioxide	1.23
Hydrogen	42.90
Methane	0.78
Ethane	0.07
Propane	0.02
N-Butane	0.007
N-Pentane	0.004
Hexanes	0.001
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	16.97
Lower Flammability limit	9.15
Upper Flammability limit	156.35
Ratio of upper to lower	17.08
Wobbe Index	7.27
Compressibility Factor	1.0042
Ideal Gas Density (Rel to air = 1)	0.586
Real gas Density (Rel to air = 1)	0.583
Ideal Nett Calorific Value MJ/m^3	4.73
Ideal Gross Calorific Value MJ/m^3	5.57
Real Nett Calorific Value MJ/m^3	4.71
Real Gross Calorific Value MJ/m^3	5.54
Gross calorific value of water-saturated gas MJ/m^3	5.44

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415375

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 198m, 24 units
23/07/97, 0520 h, Cyl# 360
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	2.73
Hydrogen	95.29
Methane	1.73
Ethane	0.17
Propane	0.05
N-Butane	0.016
N-Pentane	0.008
Hexanes	0.003
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.49
Lower Flammability limit	4.12
Upper Flammability limit	70.39
Ratio of upper to lower	17.08
Wobbe Index	35.62
Compressibility Factor	1.0096
Ideal Gas Density (Rel to air = 1)	0.121
Real gas Density (Rel to air = 1)	0.119
Ideal Nett Calorific Value MJ/m^3	10.51
Ideal Gross Calorific Value MJ/m^3	12.37
Real Nett Calorific Value MJ/m^3	10.41
Real Gross Calorific Value MJ/m^3	12.25
Gross calorific value of water-saturated gas MJ/m^3	12.13

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415376

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 198m, 24 units
23/07/97, 0520 h, Cyl# 360
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	97.97
Methane	1.78
Ethane	0.17
Propane	0.05
N-Butane	0.02
N-Pentane	0.008
Hexanes	0.003
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.35
Lower Flammability limit	4.01
Upper Flammability limit	68.46
Ratio of upper to lower	17.08
Wobbe Index	44.62
Compressibility Factor	1.0098
Ideal Gas Density (Rel to air = 1)	0.081
Real gas Density (Rel to air = 1)	0.080
Ideal Nett Calorific Value MJ/m^3	10.81
Ideal Gross Calorific Value MJ/m^3	12.71
Real Nett Calorific Value MJ/m^3	10.70
Real Gross Calorific Value MJ/m^3	12.59
Gross calorific value of water-saturated gas MJ/m^3	12.47

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415377

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 233m, 48 units
31/07/97, 0915 h, Cyl# 200
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.61
Nitrogen	77.61
Helium	0.00
Carbon Dioxide	0.41
Hydrogen	0.37
Methane	0.003
Ethane	0.0003
Propane	0.0001
N-Butane	0.0000
N-Pentane	0.0000
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.84
Lower Flammability limit	1071.99
Upper Flammability limit	19119.51
Ratio of upper to lower	17.84
Wobbe Index	0.05
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.996
Real gas Density (Rel to air = 1)	0.996
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.05
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.05
Gross calorific value of water-saturated gas MJ/m^3	0.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415378

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 233m, 48 units
31/07/97, 0915 h, Cyl# 200
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	9.91
Helium	0.00
Carbon Dioxide	7.25
Hydrogen	82.05
Methane	0.70
Ethane	0.06
Propane	0.02
N-Butane	0.006
N-Pentane	0.002
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	7.77
Lower Flammability limit	4.83
Upper Flammability limit	86.22
Ratio of upper to lower	17.84
Wobbe Index	19.80
Compressibility Factor	1.0082
Ideal Gas Density (Rel to air = 1)	0.268
Real gas Density (Rel to air = 1)	0.266
Ideal Nett Calorific Value MJ/m^3	8.69
Ideal Gross Calorific Value MJ/m^3	10.25
Real Nett Calorific Value MJ/m^3	8.62
Real Gross Calorific Value MJ/m^3	10.17
Gross calorific value of water-saturated gas MJ/m^3	10.05

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415379

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 233m, 48 units
31/07/97, 0915 h, Cyl# 200
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	8.06
Hydrogen	91.08
Methane	0.77
Ethane	0.06
Propane	0.02
N-Butane	0.007
N-Pentane	0.002
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.54
Lower Flammability limit	4.35
Upper Flammability limit	77.67
Ratio of upper to lower	17.84
Wobbe Index	26.03
Compressibility Factor	1.0091
Ideal Gas Density (Rel to air = 1)	0.191
Real gas Density (Rel to air = 1)	0.189
Ideal Nett Calorific Value MJ/m^3	9.65
Ideal Gross Calorific Value MJ/m^3	11.38
Real Nett Calorific Value MJ/m^3	9.56
Real Gross Calorific Value MJ/m^3	11.28
Gross calorific value of water-saturated gas MJ/m^3	11.16

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

amdel

415380

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6130

Sample: LONNAVALE-1A
Cuttings Gas, 233m, 48 units
31/07/97, 0915 h, Cyl# 200
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	99.05
Methane	0.84
Ethane	0.07
Propane	0.02
N-Butane	0.008
N-Pentane	0.002
Hexanes	0.0000
Heptanes	0.0000
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.17
Lower Flammability limit	4.00
Upper Flammability limit	71.42
Ratio of upper to lower	17.84
Wobbe Index	45.22
Compressibility Factor	1.0100
Ideal Gas Density (Rel to air = 1)	0.075
Real gas Density (Rel to air = 1)	0.074
Ideal Nett Calorific Value MJ/m^3	10.49
Ideal Gross Calorific Value MJ/m^3	12.38
Real Nett Calorific Value MJ/m^3	10.39
Real Gross Calorific Value MJ/m^3	12.25
Gross calorific value of water-saturated gas MJ/m^3	12.14

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-08-97

1. INTRODUCTION

Five (5) samples were received for gas composition on 27 August 1997.

2. ANALYTICAL PROCEDURES

Headspace analysis was determined by injection onto a Perkin Elmer Sigma 2 gas chromatograph equipped with a packed alumina column.

Nitrogen, oxygen and carbon dioxide were determined by injection onto a Varian 6000 gas chromatograph equipped with a porapak column, thermal conductivity detector and helium carrier gas.

Hydrogen and helium were determined by injection onto a Varian 6000 gas chromatograph equipped with a molecular sieve column, thermal conductivity detector and argon carrier.

Concentrations were calculated from peak areas measured with an integrator and compared with peak areas taken from standard gas mixtures of known concentrations injected onto the same chromatograph using the same conditions.

3. RESULTS

Gas compositions are presented on the following pages.

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415382

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 257m
8°C, 20/08/97, 1610 h, Cyl# 371
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.64
Nitrogen	78.05
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	0.30
Methane	0.005
Ethane	0.004
Propane	0.0004
Butanes	0.0003
Pentanes	0.00004
Hexanes	0.00003
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.80
Lower Flammability limit	1286.62
Upper Flammability limit	21024.83
Ratio of upper to lower	16.34
Wobbe Index	0.04
Compressibility Factor	0.9997
Ideal Gas Density (Rel to air = 1)	0.994
Real gas Density (Rel to air = 1)	0.994
Ideal Nett Calorific Value MJ/m^3	0.04
Ideal Gross Calorific Value MJ/m^3	0.04
Real Nett Calorific Value MJ/m^3	0.04
Real Gross Calorific Value MJ/m^3	0.04
Gross calorific value of water-saturated gas MJ/m^3	0.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

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415383

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 257m
8°C, 20/08/97, 1610 h, Cyl# 371
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	70.62
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	28.48
Methane	0.48
Ethane	0.35
Propane	0.04
Butanes	0.03
Pentanes	0.004
Hexanes	0.003
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	20.58
Lower Flammability limit	13.55
Upper Flammability limit	221.47
Ratio of upper to lower	16.34
Wobbe Index	4.68
Compressibility Factor	1.0027
Ideal Gas Density (Rel to air = 1)	0.711
Real gas Density (Rel to air = 1)	0.708
Ideal Nett Calorific Value MJ/m^3	3.37
Ideal Gross Calorific Value MJ/m^3	3.94
Real Nett Calorific Value MJ/m^3	3.36
Real Gross Calorific Value MJ/m^3	3.93
Gross calorific value of water-saturated gas MJ/m^3	3.85

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415384

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 — ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS — Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 257m
8°C, 20/08/97, 1610 h, Cyl# 371
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	96.91
Methane	1.63
Ethane	1.19
Propane	0.13
Butanes	0.11
Pentanes	0.01
Hexanes	0.01
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.71
Lower Flammability limit	3.98
Upper Flammability limit	65.08
Ratio of upper to lower	16.34
Wobbe Index	43.82
Compressibility Factor	1.0097
Ideal Gas Density (Rel to air = 1)	0.094
Real gas Density (Rel to air = 1)	0.093
Ideal Nett Calorific Value MJ/m^3	11.46
Ideal Gross Calorific Value MJ/m^3	13.42
Real Nett Calorific Value MJ/m^3	11.35
Real Gross Calorific Value MJ/m^3	13.29
Gross calorific value of water-saturated gas MJ/m^3	13.16

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415385

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 257m
8°C, 20/08/97, 1610 h, Cyl# 371
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	96.91
Methane	1.63
Ethane	1.19
Propane	0.13
Butanes	0.11
Pentanes	0.01
Hexanes	0.01
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.71
Lower Flammability limit	3.98
Upper Flammability limit	65.08
Ratio of upper to lower	16.34
Wobbe Index	43.82
Compressibility Factor	1.0097
Ideal Gas Density (Rel to air = 1)	0.094
Real gas Density (Rel to air = 1)	0.093
Ideal Nett Calorific Value MJ/m^3	11.46
Ideal Gross Calorific Value MJ/m^3	13.42
Real Nett Calorific Value MJ/m^3	11.35
Real Gross Calorific Value MJ/m^3	13.29
Gross calorific value of water-saturated gas MJ/m^3	13.16

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415386

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 298.4m, HW 20 units
7 kPag, 8°C, 25/08/97, 1320 h, Cyl# 246
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.43
Nitrogen	78.06
Helium	0.00
Carbon Dioxide	0.37
Hydrogen	0.13
Methane	0.01
Ethane	0.001
Propane	0.0004
Butanes	0.0003
Pentanes	0.0001
Hexanes	0.0001
Heptanes	0.0001
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.89
Lower Flammability limit	2803.39
Upper Flammability limit	37430.37
Ratio of upper to lower	13.35
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.998
Real gas Density (Rel to air = 1)	0.997
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415387

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 298.4m, HW 20 units
7 kPag, 8°C, 25/08/97, 1320 h, Cyl# 246
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	76.17
Helium	0.00
Carbon Dioxide	16.04
Hydrogen	7.08
Methane	0.58
Ethane	0.07
Propane	0.02
Butanes	0.01
Pentanes	0.006
Hexanes	0.006
Heptanes	0.006
Octanes and higher h'cs	0.0000
Total	99.99

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.69
Lower Flammability limit	51.45
Upper Flammability limit	686.92
Ratio of upper to lower	13.35
Wobbe Index	1.20
Compressibility Factor	1.0000
Ideal Gas Density (Rel to air = 1)	0.991
Real gas Density (Rel to air = 1)	0.990
Ideal Nett Calorific Value MJ/m^3	1.03
Ideal Gross Calorific Value MJ/m^3	1.19
Real Nett Calorific Value MJ/m^3	1.03
Real Gross Calorific Value MJ/m^3	1.19
Gross calorific value of water-saturated gas MJ/m^3	1.14

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415388

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 298.4m, HW 20 units
7 kPag, 8°C, 25/08/97, 1320 h, Cyl# 246
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	67.34
Hydrogen	29.73
Methane	2.42
Ethane	0.28
Propane	0.10
Butanes	0.06
Pentanes	0.02
Hexanes	0.03
Heptanes	0.02
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	30.85
Lower Flammability limit	12.26
Upper Flammability limit	163.67
Ratio of upper to lower	13.35
Wobbe Index	4.84
Compressibility Factor	1.0002
Ideal Gas Density (Rel to air = 1)	1.065
Real gas Density (Rel to air = 1)	1.064
Ideal Nett Calorific Value MJ/m^3	4.31
Ideal Gross Calorific Value MJ/m^3	4.99
Real Nett Calorific Value MJ/m^3	4.31
Real Gross Calorific Value MJ/m^3	4.99
Gross calorific value of water-saturated gas MJ/m^3	4.88

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415389

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 298.4m, HW 20 units
7 kPag, 8°C, 25/08/97, 1320 h, Cyl# 246
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	91.02
Methane	7.40
Ethane	0.87
Propane	0.30
Butanes	0.19
Pentanes	0.07
Hexanes	0.08
Heptanes	0.07
Octanes and higher h'cs	0.0000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.72
Lower Flammability limit	4.00
Upper Flammability limit	53.46
Ratio of upper to lower	13.35
Wobbe Index	42.64
Compressibility Factor	1.0091
Ideal Gas Density (Rel to air = 1)	0.128
Real gas Density (Rel to air = 1)	0.127
Ideal Nett Calorific Value MJ/m^3	13.19
Ideal Gross Calorific Value MJ/m^3	15.28
Real Nett Calorific Value MJ/m^3	13.07
Real Gross Calorific Value MJ/m^3	15.14
Gross calorific value of water-saturated gas MJ/m^3	14.99

This report relates specifically to the sample submitted for analysis.

Signed Dave Cass

Date : 03-09-97

amdel

415390

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 317.9m, HW 30 units
7 kPag, 8°C, 26/08/97, 1050 h, Cyl# 338
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.64
Nitrogen	78.13
Helium	0.00
Carbon Dioxide	0.03
Hydrogen	0.20
Methane	0.004
Ethane	0.0005
Propane	0.0001
Butanes	0.00007
Pentanes	0.00003
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.83
Lower Flammability limit	1953.77
Upper Flammability limit	32720.42
Ratio of upper to lower	16.75
Wobbe Index	0.03
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.995
Real gas Density (Rel to air = 1)	0.995
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.03
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.03
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415391

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 317.9m, HW 30 units
7 kPag, 8°C, 26/08/97, 1050 h, Cyl# 338
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	79.78
Helium	0.00
Carbon Dioxide	0.33
Hydrogen	19.39
Methane	0.43
Ethane	0.05
Propane	0.01
Butanes	0.01
Pentane	0.002
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	22.98
Lower Flammability limit	20.16
Upper Flammability limit	337.55
Ratio of upper to lower	16.75
Wobbe Index	2.88
Compressibility Factor	1.0017
Ideal Gas Density (Rel to air = 1)	0.793
Real gas Density (Rel to air = 1)	0.792
Ideal Nett Calorific Value MJ/m^3	2.18
Ideal Gross Calorific Value MJ/m^3	2.56
Real Nett Calorific Value MJ/m^3	2.18
Real Gross Calorific Value MJ/m^3	2.56
Gross calorific value of water-saturated gas MJ/m^3	2.49

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date 03-09-97

amdel

415392

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 317.9m, HW 30 units
7 kPag, 8°C, 26/08/97, 1050 h, Cyl# 338
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	1.64
Hydrogen	95.88
Methane	2.14
Ethane	0.24
Propane	0.07
Butanes	0.03
Pentanes	0.01
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	3.12
Lower Flammability limit	4.08
Upper Flammability limit	68.25
Ratio of upper to lower	16.75
Wobbe Index	38.59
Compressibility Factor	1.0096
Ideal Gas Density (Rel to air = 1)	0.108
Real gas Density (Rel to air = 1)	0.107
Ideal Nett Calorific Value MJ/m^3	10.79
Ideal Gross Calorific Value MJ/m^3	12.67
Real Nett Calorific Value MJ/m^3	10.68
Real Gross Calorific Value MJ/m^3	12.55
Gross calorific value of water-saturated gas MJ/m^3	12.43

This report relates specifically to the sample submitted for analysis.

Signed

Date : 03-09-97

amdel

415393

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 317.9m, HW 30 units
7 kPag, 8°C, 26/08/97, 1050 h, Cyl# 338
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	97.47
Methane	2.17
Ethane	0.24
Propane	0.07
Butanes	0.03
Pentanes	0.01
Hexanes	0.00000
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.44
Lower Flammability limit	4.01
Upper Flammability limit	67.14
Ratio of upper to lower	16.75
Wobbe Index	44.36
Compressibility Factor	1.0098
Ideal Gas Density (Rel to air = 1)	0.084
Real gas Density (Rel to air = 1)	0.084
Ideal Nett Calorific Value MJ/m^3	10.97
Ideal Gross Calorific Value MJ/m^3	12.89
Real Nett Calorific Value MJ/m^3	10.86
Real Gross Calorific Value MJ/m^3	12.76
Gross calorific value of water-saturated gas MJ/m^3	12.64

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415394

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 308.4m, HW 24 units
7 kPag, 8°C, 25/08/97, 1640 h, Cyl# 329
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	21.59
Nitrogen	78.14
Helium	0.00
Carbon Dioxide	0.09
Hydrogen	0.17
Methane	0.008
Ethane	0.0009
Propane	0.0002
Butanes	0.0001
Pentanes	0.00005
Hexanes	0.00003
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.84
Lower Flammability limit	2239.61
Upper Flammability limit	33915.50
Ratio of upper to lower	15.14
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.996
Real gas Density (Rel to air = 1)	0.996
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed _____

Date : 03-09-97

amdel

415395

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 308.4m, HW 24 units
7 kPag, 8°C, 25/08/97, 1640 h, Cyl# 329
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	81.08
Helium	0.00
Carbon Dioxide	4.19
Hydrogen	13.96
Methane	0.68
Ethane	0.07
Propane	0.01
Butanes	0.009
Pentanes	0.004
Hexanes	0.002
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.01

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	24.98
Lower Flammability limit	27.27
Upper Flammability limit	412.89
Ratio of upper to lower	15.14
Wobbe Index	2.18
Compressibility Factor	1.0011
Ideal Gas Density (Rel to air = 1)	0.863
Real gas Density (Rel to air = 1)	0.861
Ideal Nett Calorific Value MJ/m^3	1.73
Ideal Gross Calorific Value MJ/m^3	2.03
Real Nett Calorific Value MJ/m^3	1.73
Real Gross Calorific Value MJ/m^3	2.02
Gross calorific value of water-saturated gas MJ/m^3	1.96

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415396

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 308.4m, HW 24 units
7 kPag, 8°C, 25/08/97, 1640 h, Cyl# 329
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	22.14
Hydrogen	73.75
Methane	3.58
Ethane	0.38
Propane	0.07
Butanes	0.05
Pentanes	0.02
Hexanes	0.01
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	12.00
Lower Flammability limit	5.16
Upper Flammability limit	78.18
Ratio of upper to lower	15.14
Wobbe Index	16.62
Compressibility Factor	1.0071
Ideal Gas Density (Rel to air = 1)	0.414
Real gas Density (Rel to air = 1)	0.411
Ideal Nett Calorific Value MJ/m^3	9.15
Ideal Gross Calorific Value MJ/m^3	10.70
Real Nett Calorific Value MJ/m^3	9.09
Real Gross Calorific Value MJ/m^3	10.62
Gross calorific value of water-saturated gas MJ/m^3	10.49

This report relates specifically to the sample submitted for analysis.

Signed Peter Cass

Date : 03-09-97

amdel

415397

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 308.4m, HW 24 units
7 kPag, 8°C, 25/08/97, 1640 h, Cyl# 329
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	94.72
Methane	4.59
Ethane	0.49
Propane	0.10
Butanes	0.06
Pentanes	0.03
Hexanes	0.02
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.90
Lower Flammability limit	4.02
Upper Flammability limit	60.87
Ratio of upper to lower	15.14
Wobbe Index	43.39
Compressibility Factor	1.0095
Ideal Gas Density (Rel to air = 1)	0.100
Real gas Density (Rel to air = 1)	0.099
Ideal Nett Calorific Value MJ/m^3	11.76
Ideal Gross Calorific Value MJ/m^3	13.74
Real Nett Calorific Value MJ/m^3	11.65
Real Gross Calorific Value MJ/m^3	13.61
Gross calorific value of water-saturated gas MJ/m^3	13.48

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 03-09-97

amdel

415398

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 256m
8°C, 20/08/97, 1550 h, Cyl# 103
Air Uncorrected

GAS	MOL %
Oxygen plus Argon	22.21
Nitrogen	77.57
Helium	0.00
Carbon Dioxide	0.04
Hydrogen	0.17
Methane	0.006
Ethane	0.0001
Propane	0.0004
Butanes	0.0003
Pentanes	0.0001
Hexanes	0.00003
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	28.86
Lower Flammability limit	2266.47
Upper Flammability limit	36066.02
Ratio of upper to lower	15.91
Wobbe Index	0.02
Compressibility Factor	0.9996
Ideal Gas Density (Rel to air = 1)	0.996
Real gas Density (Rel to air = 1)	0.996
Ideal Nett Calorific Value MJ/m^3	0.02
Ideal Gross Calorific Value MJ/m^3	0.02
Real Nett Calorific Value MJ/m^3	0.02
Real Gross Calorific Value MJ/m^3	0.02
Gross calorific value of water-saturated gas MJ/m^3	-0.01

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-09-97

amdel

415399

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 256m
8°C, 20/08/97, 1550 h, Cyl# 103
Air Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	7.71
Hydrogen	88.81
Methane	3.02
Ethane	0.05
Propane	0.20
Butanes	0.14
Pentanes	0.05
Hexanes	0.02
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.90
Lower Flammability limit	4.34
Upper Flammability limit	69.03
Ratio of upper to lower	15.91
Wobbe Index	27.42
Compressibility Factor	1.0089
Ideal Gas Density (Rel to air = 1)	0.204
Real gas Density (Rel to air = 1)	0.202
Ideal Nett Calorific Value MJ/m^3	10.57
Ideal Gross Calorific Value MJ/m^3	12.38
Real Nett Calorific Value MJ/m^3	10.48
Real Gross Calorific Value MJ/m^3	12.27
Gross calorific value of water-saturated gas MJ/m^3	12.14

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-09-97

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 256m
8°C, 20/08/97, 1550 h, Cyl# 103
Air & Nitrogen Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	7.71
Hydrogen	88.81
Methane	3.02
Ethane	0.05
Propane	0.20
Butanes	0.14
Pentanes	0.05
Hexanes	0.02
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	5.90
Lower Flammability limit	4.34
Upper Flammability limit	69.03
Ratio of upper to lower	15.91
Wobbe Index	27.42
Compressibility Factor	1.0089
Ideal Gas Density (Rel to air = 1)	0.204
Real gas Density (Rel to air = 1)	0.202
Ideal Nett Calorific Value MJ/m^3	10.57
Ideal Gross Calorific Value MJ/m^3	12.38
Real Nett Calorific Value MJ/m^3	10.48
Real Gross Calorific Value MJ/m^3	12.27
Gross calorific value of water-saturated gas MJ/m^3	12.14

This report relates specifically to the sample submitted for analysis.

Signed

Date : 06-09-97

amdel

415401

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01/02 ASTM D 1945-91 (modified)

Client: CONDOR OIL INVESTMENTS Report # LQ6216

Sample: LONNAVALE-1
Cuttings Gas, 256m
8°C, 20/08/97, 1550 h, Cyl# 103
Air, Nitrogen & Carbon Dioxide Corrected

GAS	MOL %
Oxygen plus Argon	0.00
Nitrogen	0.00
Helium	0.00
Carbon Dioxide	0.00
Hydrogen	96.23
Methane	3.27
Ethane	0.06
Propane	0.22
Butanes	0.15
Pentanes	0.06
Hexanes	0.02
Heptanes	0.00000
Octanes and higher h'cs	0.00000
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present
The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs)

Average Molecular Weight	2.72
Lower Flammability limit	4.00
Upper Flammability limit	63.72
Ratio of upper to lower	15.91
Wobbe Index	43.74
Compressibility Factor	1.0097
Ideal Gas Density (Rel to air = 1)	0.094
Real gas Density (Rel to air = 1)	0.093
Ideal Nett Calorific Value MJ/m^3	11.46
Ideal Gross Calorific Value MJ/m^3	13.41
Real Nett Calorific Value MJ/m^3	11.35
Real Gross Calorific Value MJ/m^3	13.28
Gross calorific value of water-saturated gas MJ/m^3	13.16

This report relates specifically to the sample submitted for analysis.

Signed Diane Cass

Date : 06-09-97

415402

97-4088 VOL 4 of 6

EL1988 VOL 10

Vol. 4 of 6

See folio 34

MICROFILMED
FICHE No. 014529-39

GREAT SOUTH LAND MINERALS PTY. LTD.

ACN 068 650 386

Gas Detector - Chart Records

Lonnavale # 1	293 m - 557 m
Pelham # 1	300 m - 370 m

97-4088

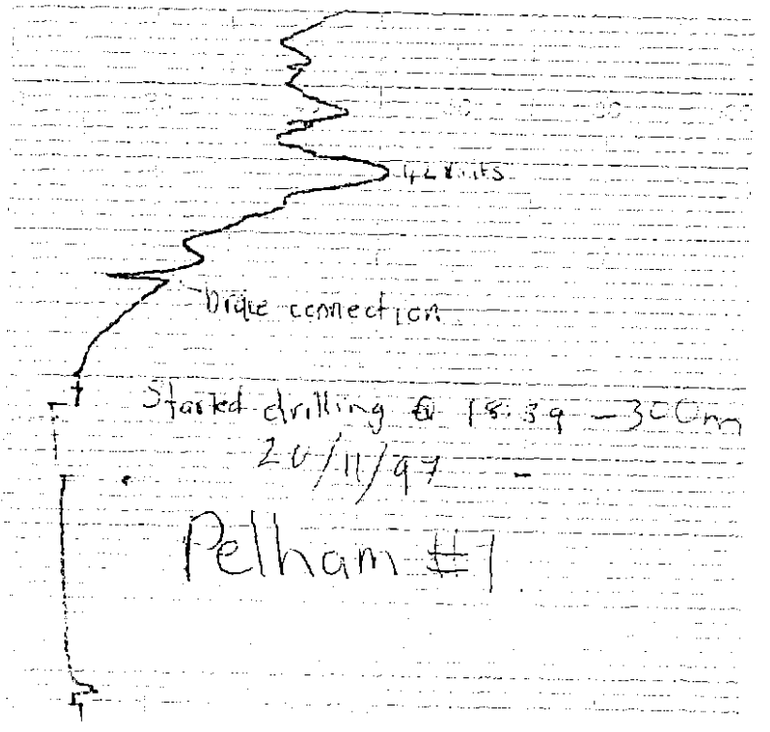
ANNUAL REPORT - 1997 VOL 4 of 6
EL'S 1.88, 9/95 & 21/95 - GREAT
SOUTHLAND MIN. BURRETT/TANNER

415403

Pelham #1

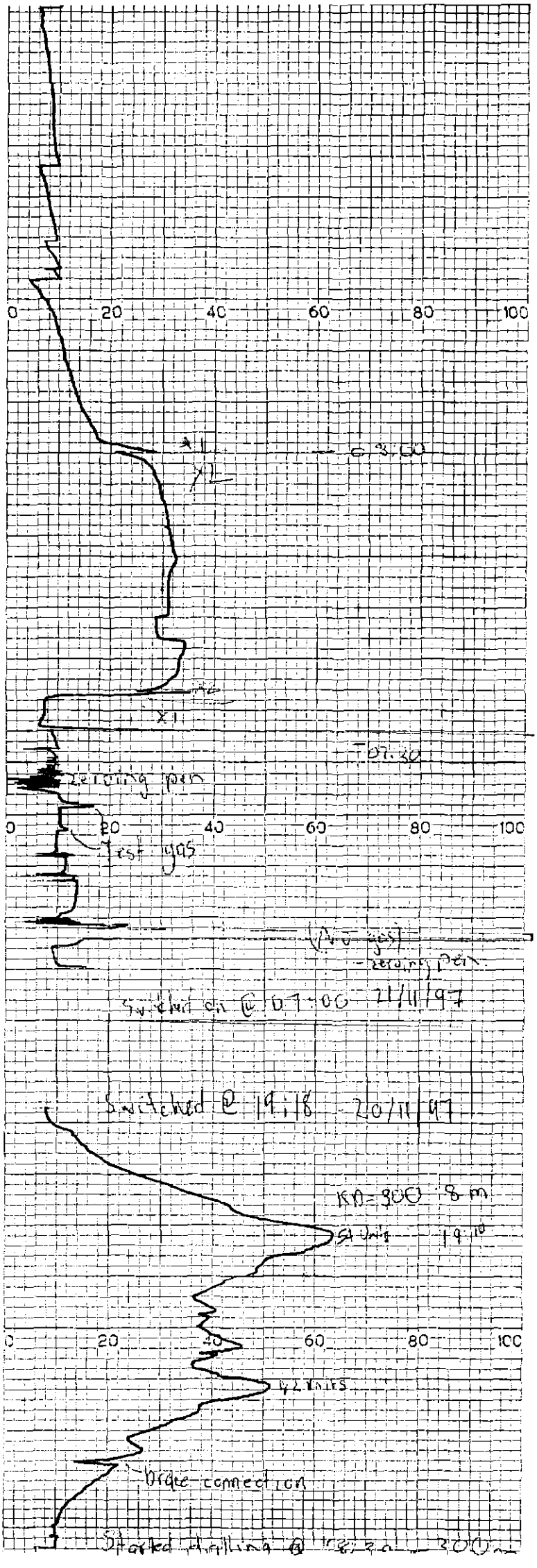
300m – 370m

415404

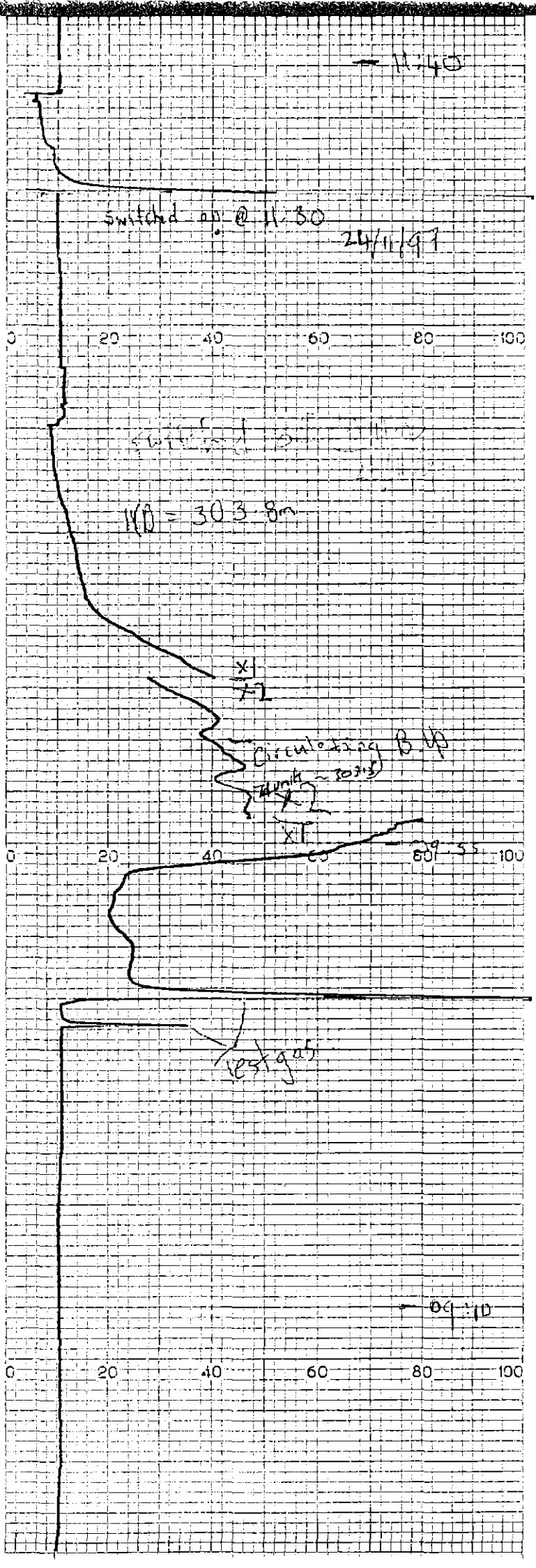

42 units
Drill connection
Started drilling @ 18.39 – 300m
20/11/97
Pelham #1

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415405



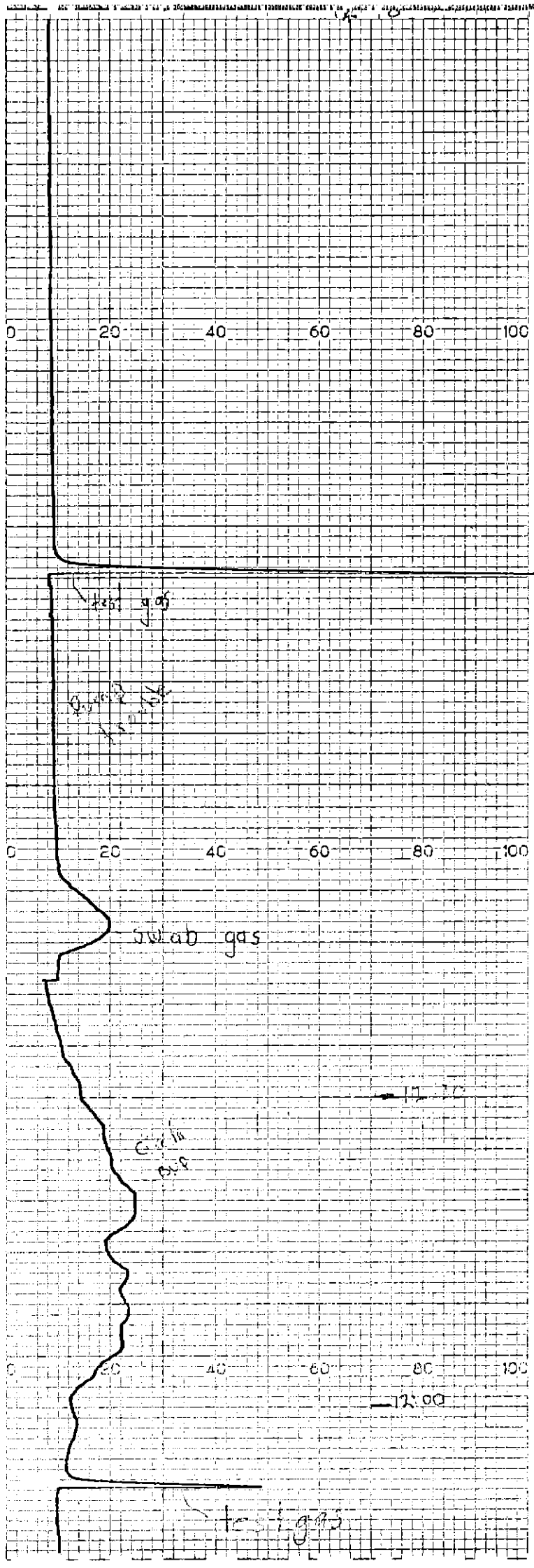
5900/



415406

Argus Electronics Co. Indianapolis, IN 46224

415407



415408

Stopped drill

23 Units

Chuck up

25 units 30 SCFM

Stopped drill

18 units

0 20 Angle up 60 80 100

Generator Stopped

Test gas

Test Gas

0 20 40 60 80 100

15:20

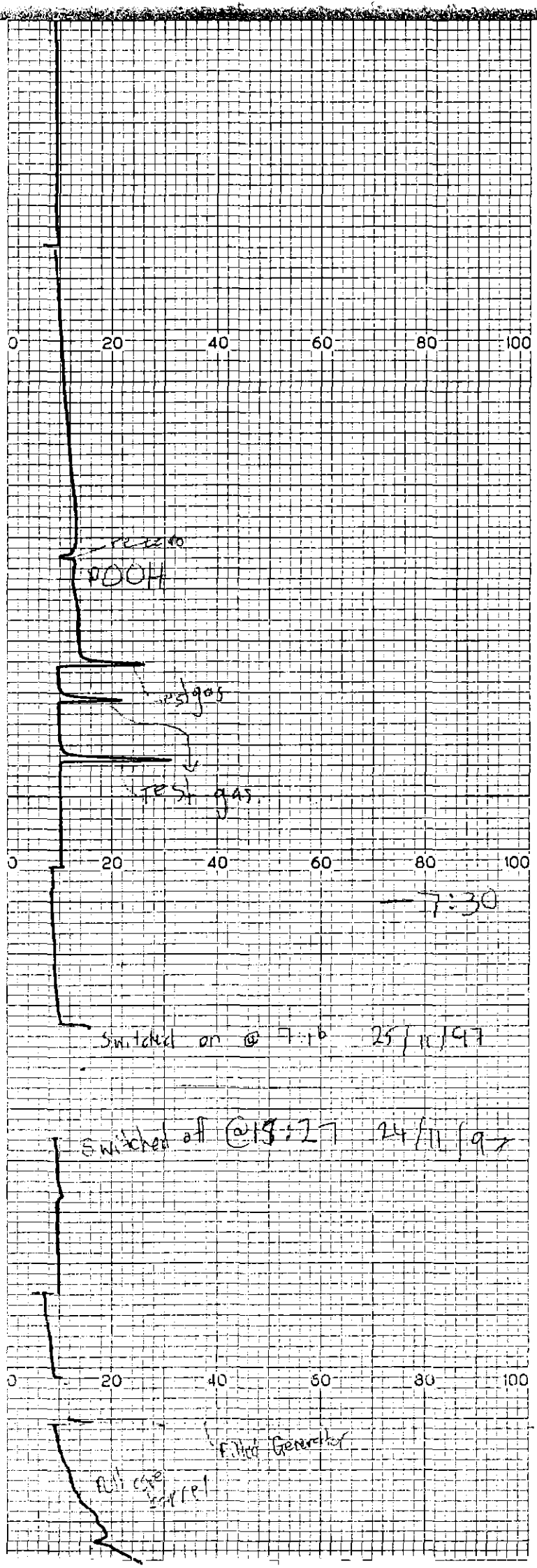
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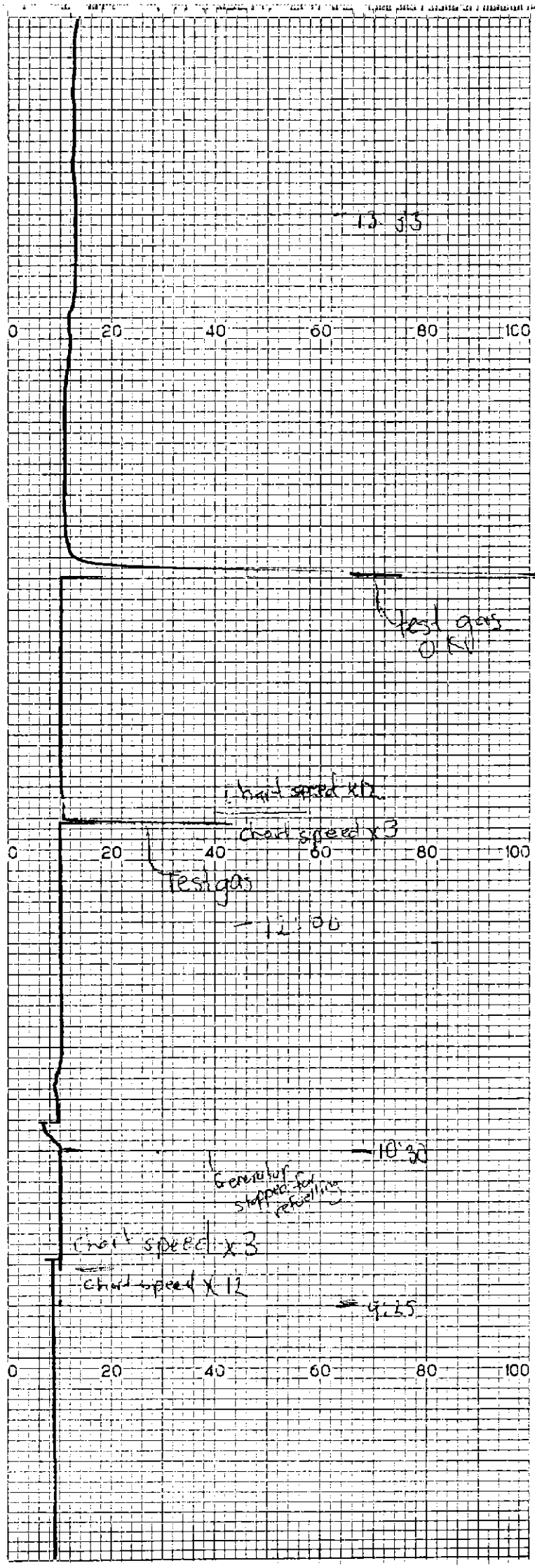
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415409

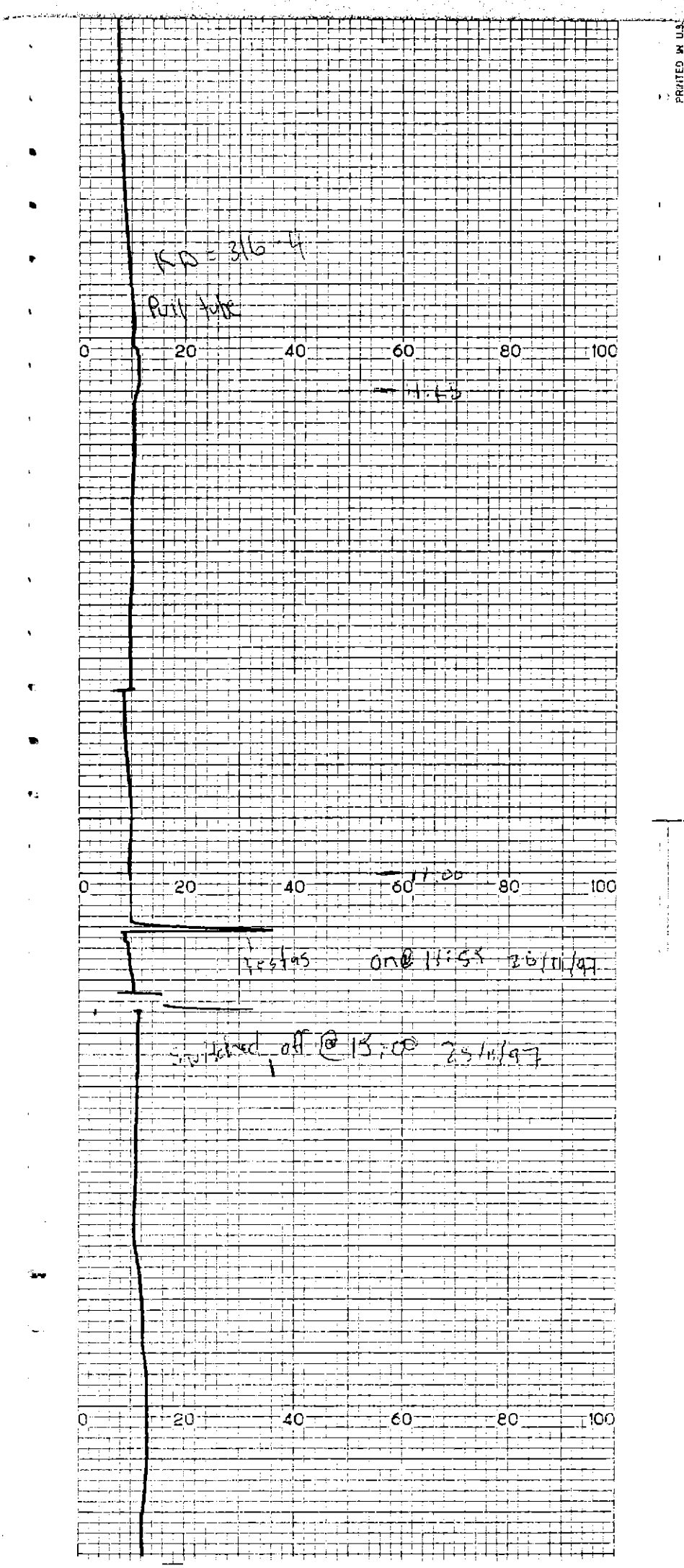




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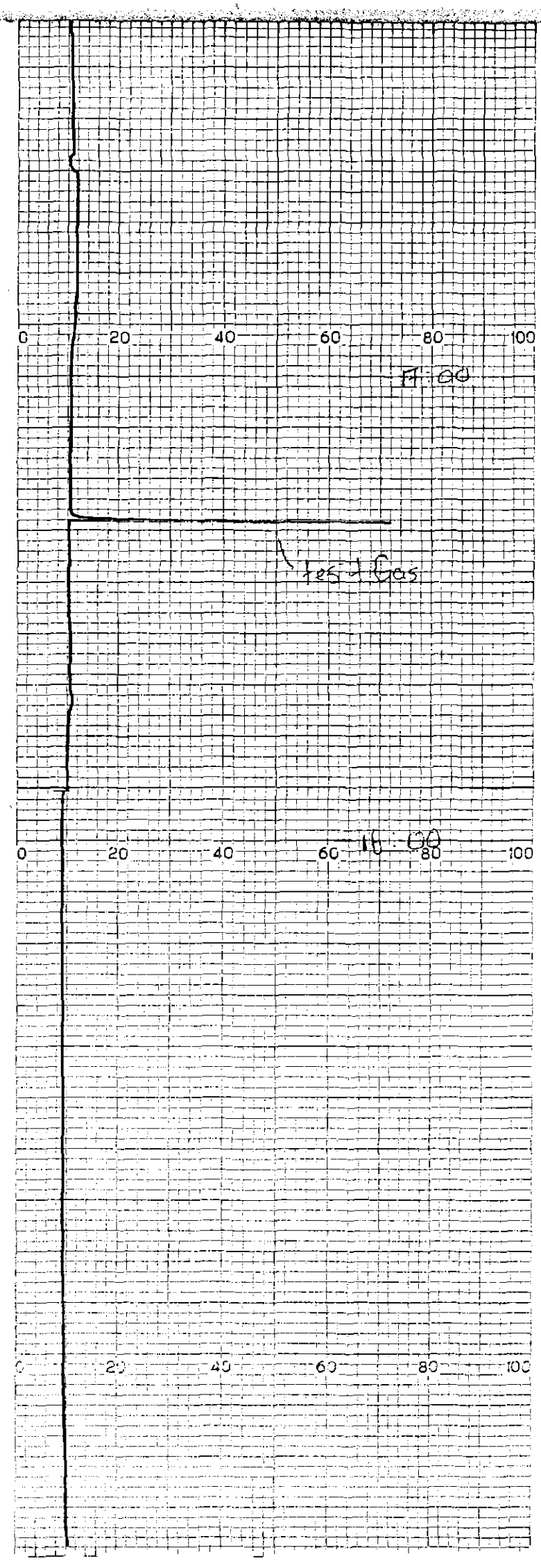
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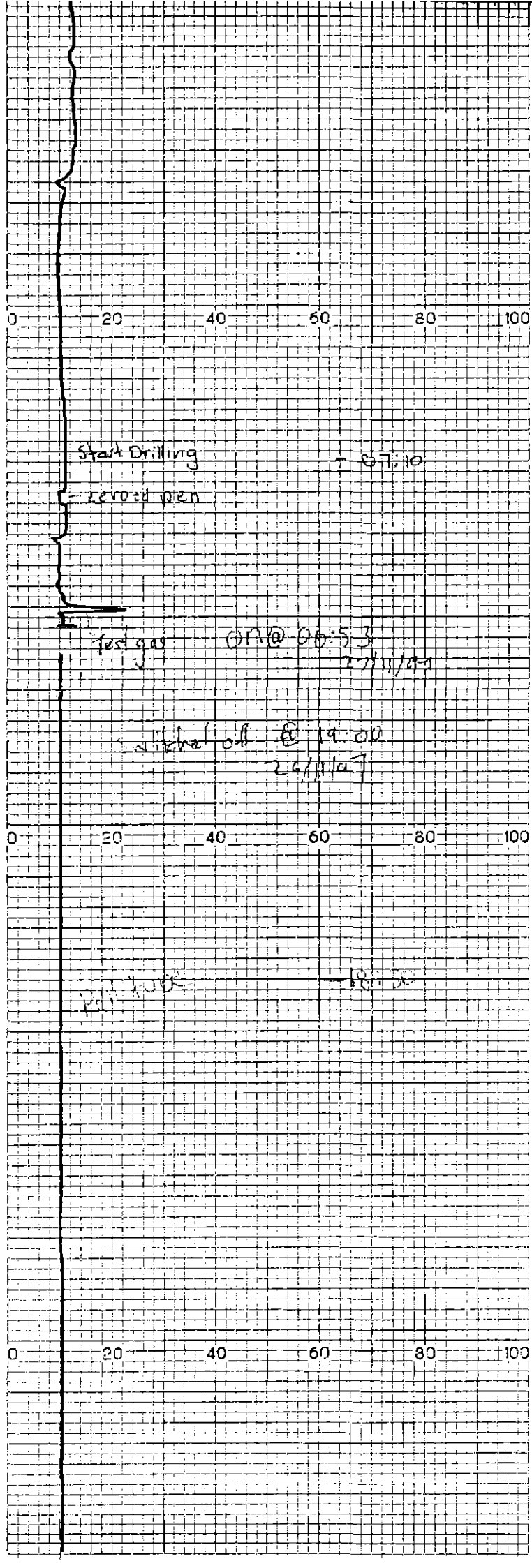


Drill probe
11:45
0
20
40
60
80
100
0
20
40
60
80
100
0
20
40
60
80
100
12:30
NO. 58
Angus Electronics Co. Indianapolis, IN 46224

415412

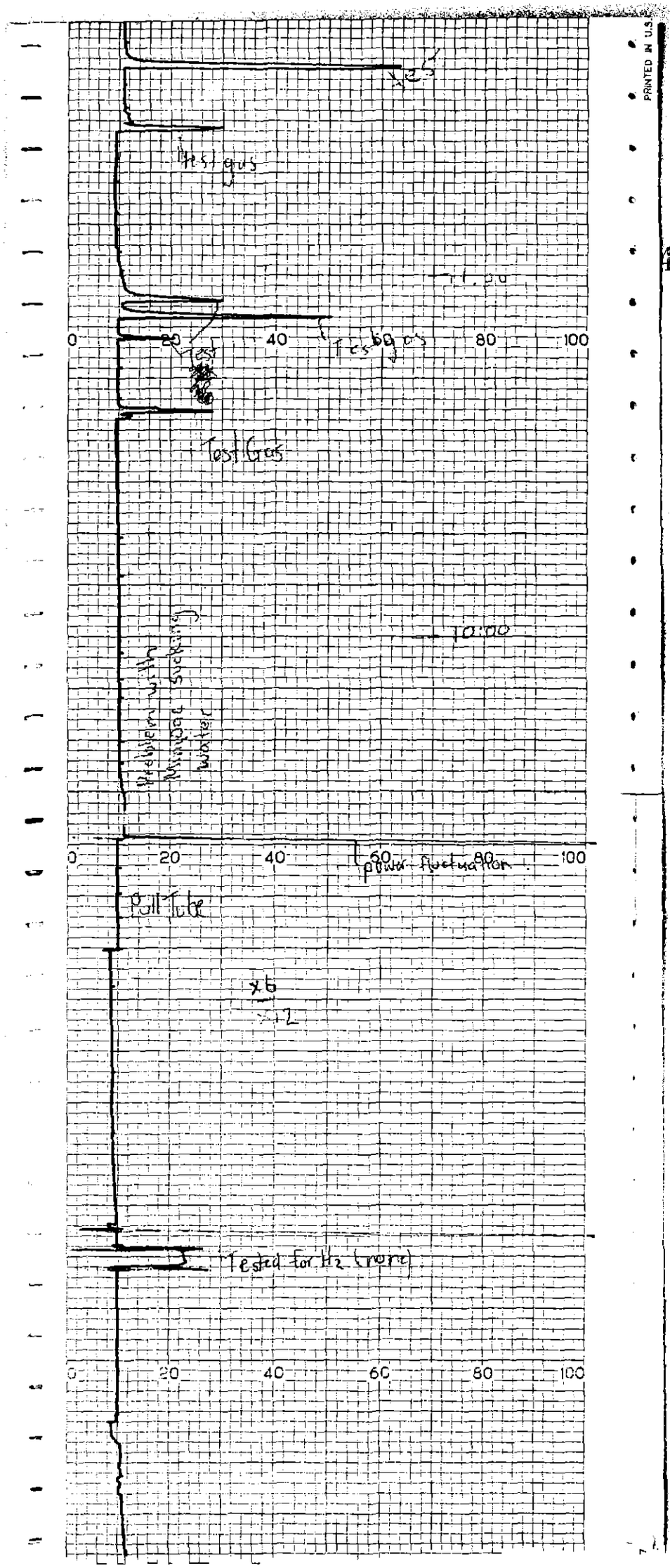
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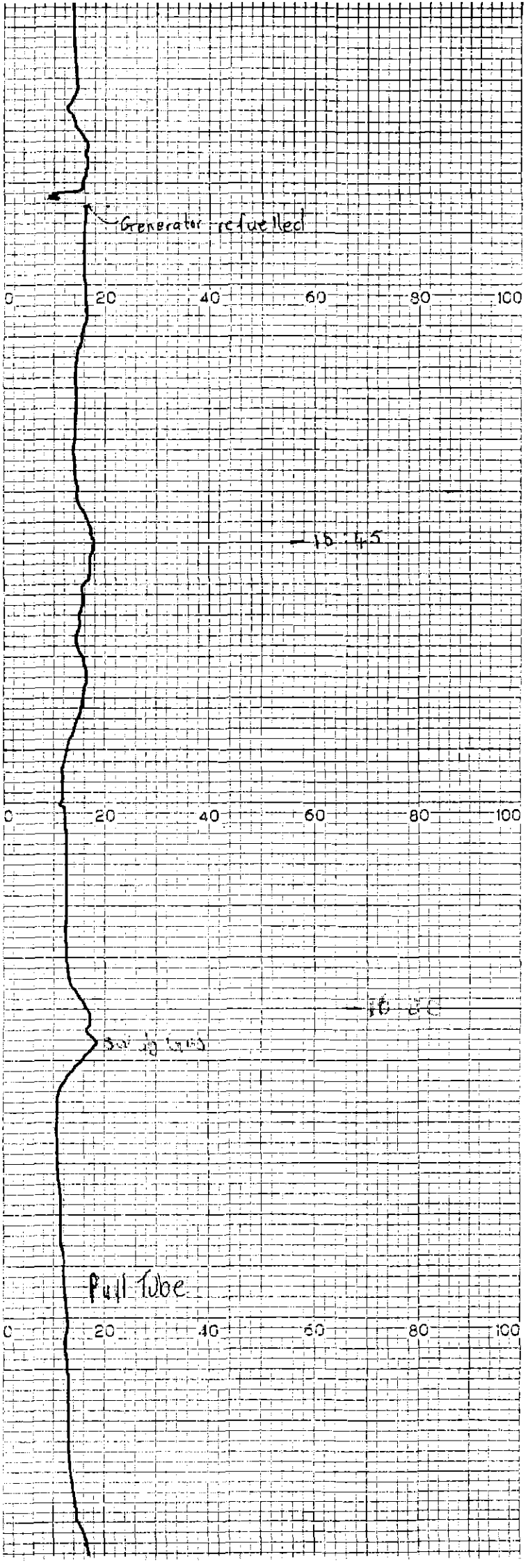
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115415
25
1st gas
11.00
0
20
40
Test gas
60
80
100
Test
Test Gas
10:00
Preliminary Standard Water
0
20
40
60
80
100
Power fluctuation
Pull Tube
x6
12
Tested for Hz (more)
0
20
40
60
80
100

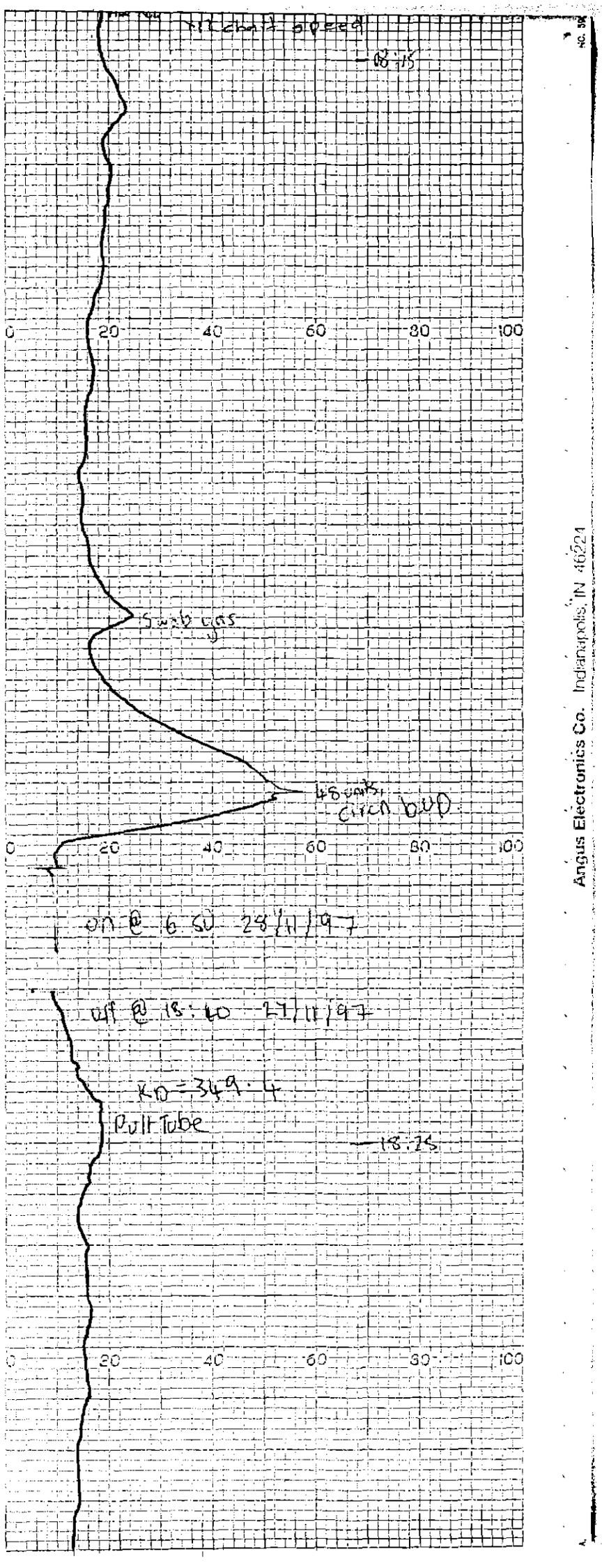
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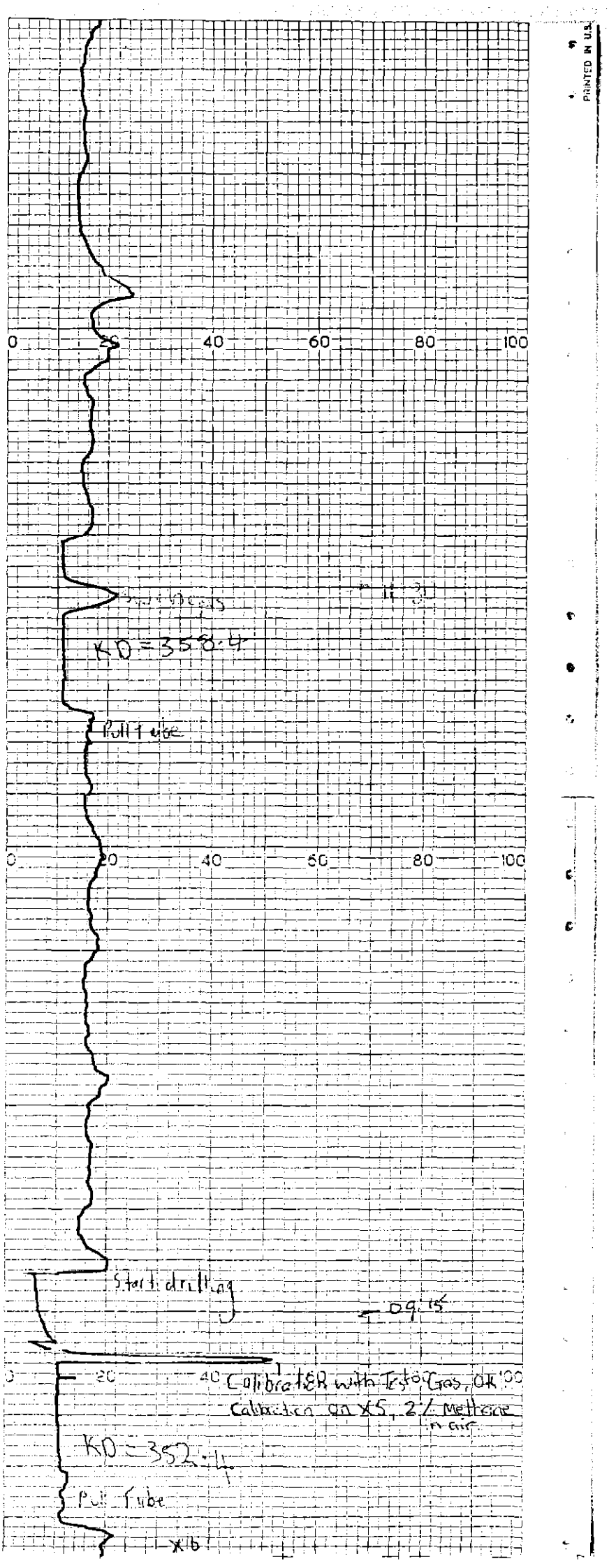
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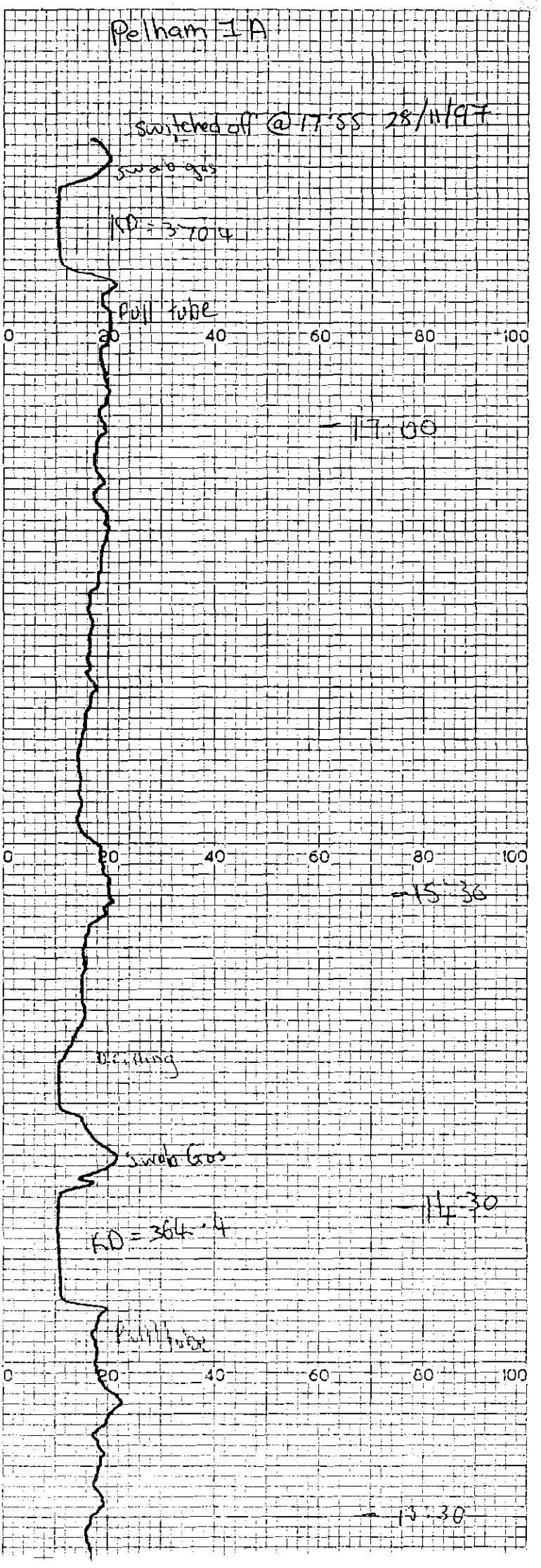

Chart speed
18.15
0
20
40
60
80
100
Swab gas
48 units
circ bup
on @ 6 SU 28/11/97
off @ 18:40 27/11/97
KD=349.4
Pulltube
18.25
Angus Electronics Co. Indianapolis, IN 46224

415418



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415419



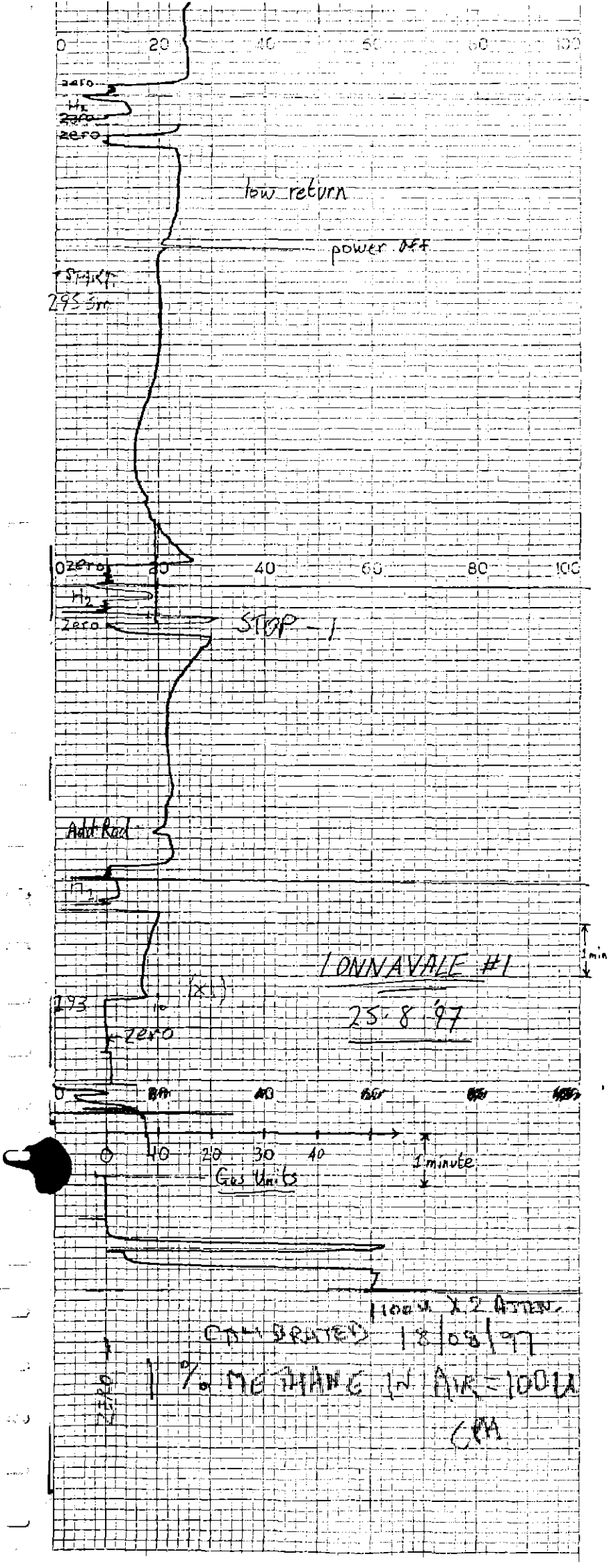
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41542

415421

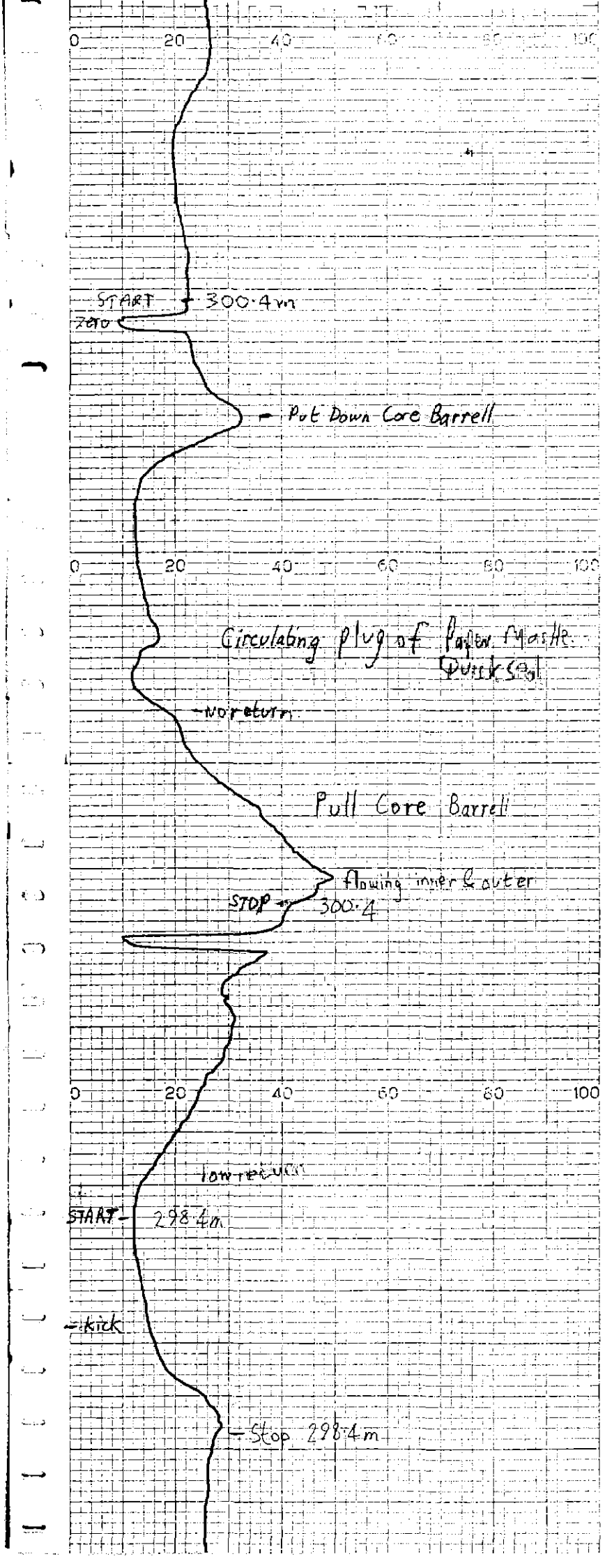
Lonnavale #1

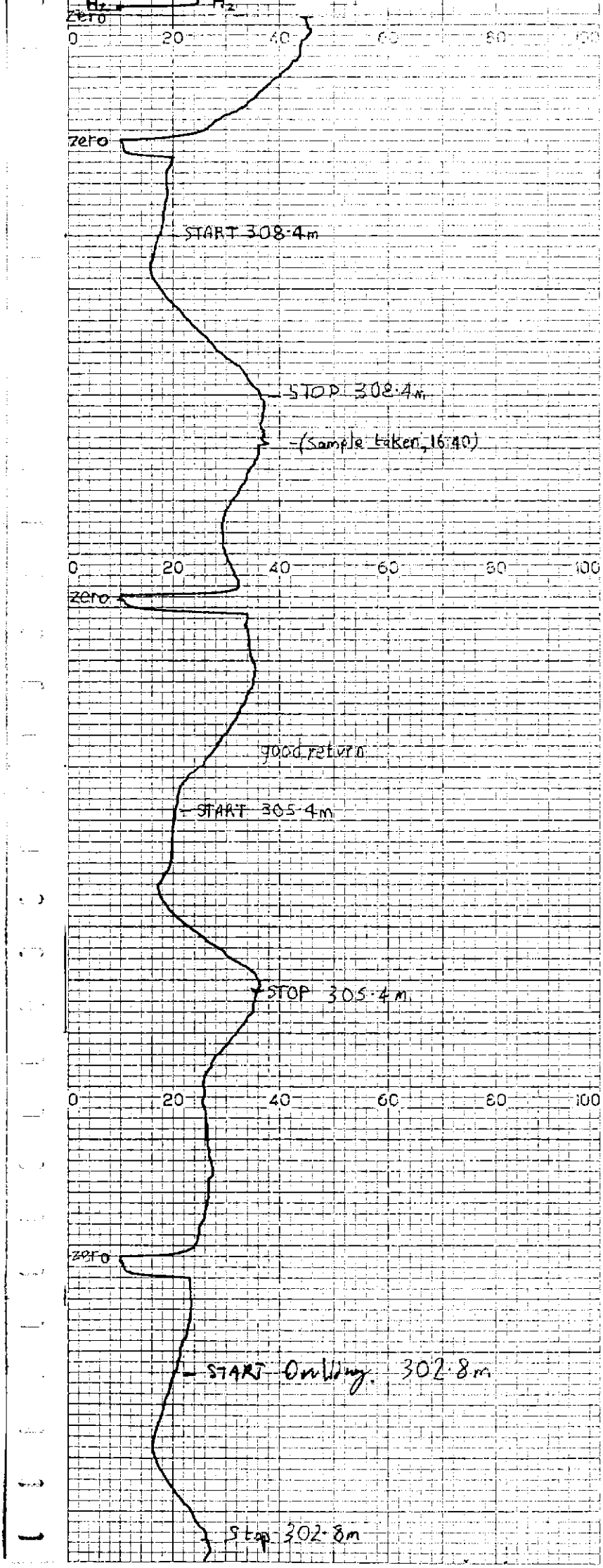
293m – 557m



NO 59307
Mus Electronics Co. Indianapolis, IN 46224

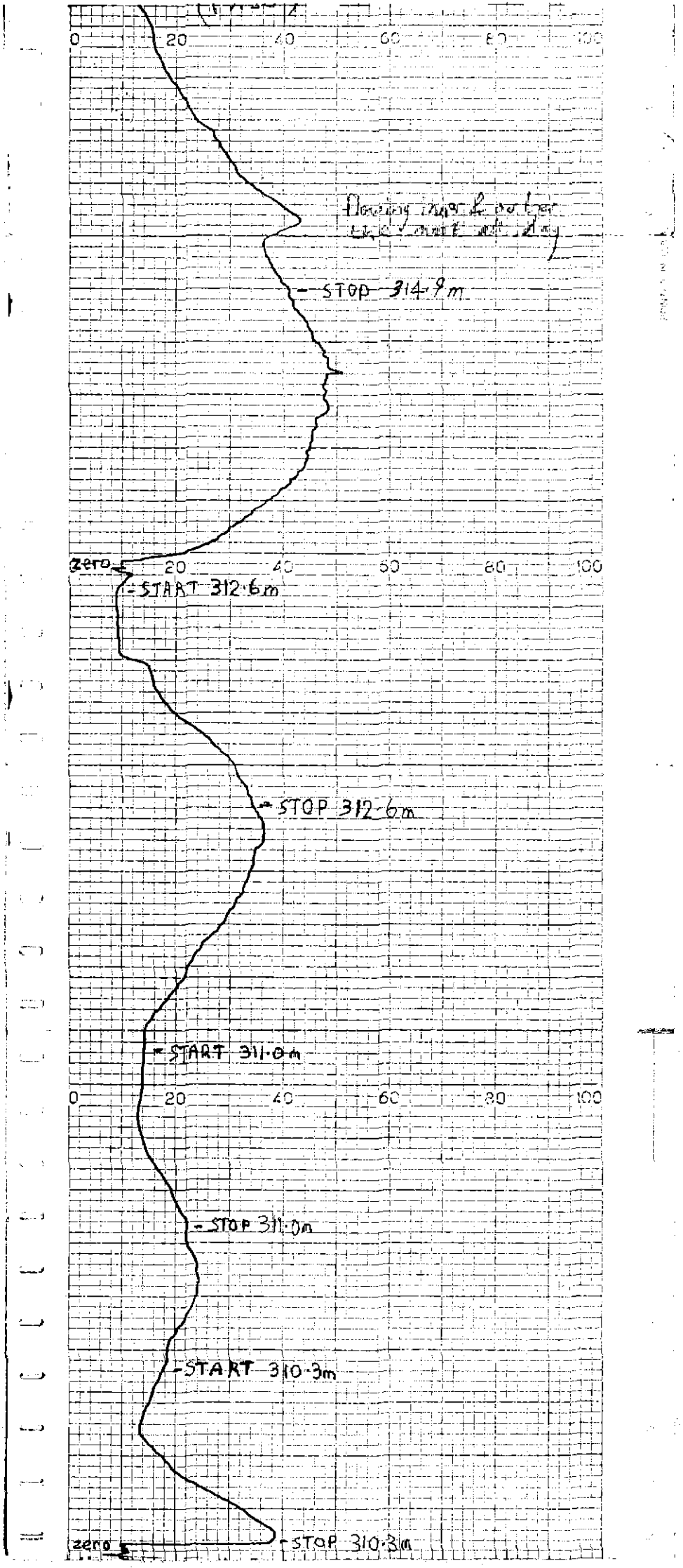
415423


0
20
40
60
80
100
START
300·4m
Zero
Put Down Core Barrell
Circulating plug of Paper Mache
Quick Gel
-no return
Pull Core Barrell
flowing inner & outer
STOP
300·4
low return
START
298·4m
-kick
-Stop 298·4m

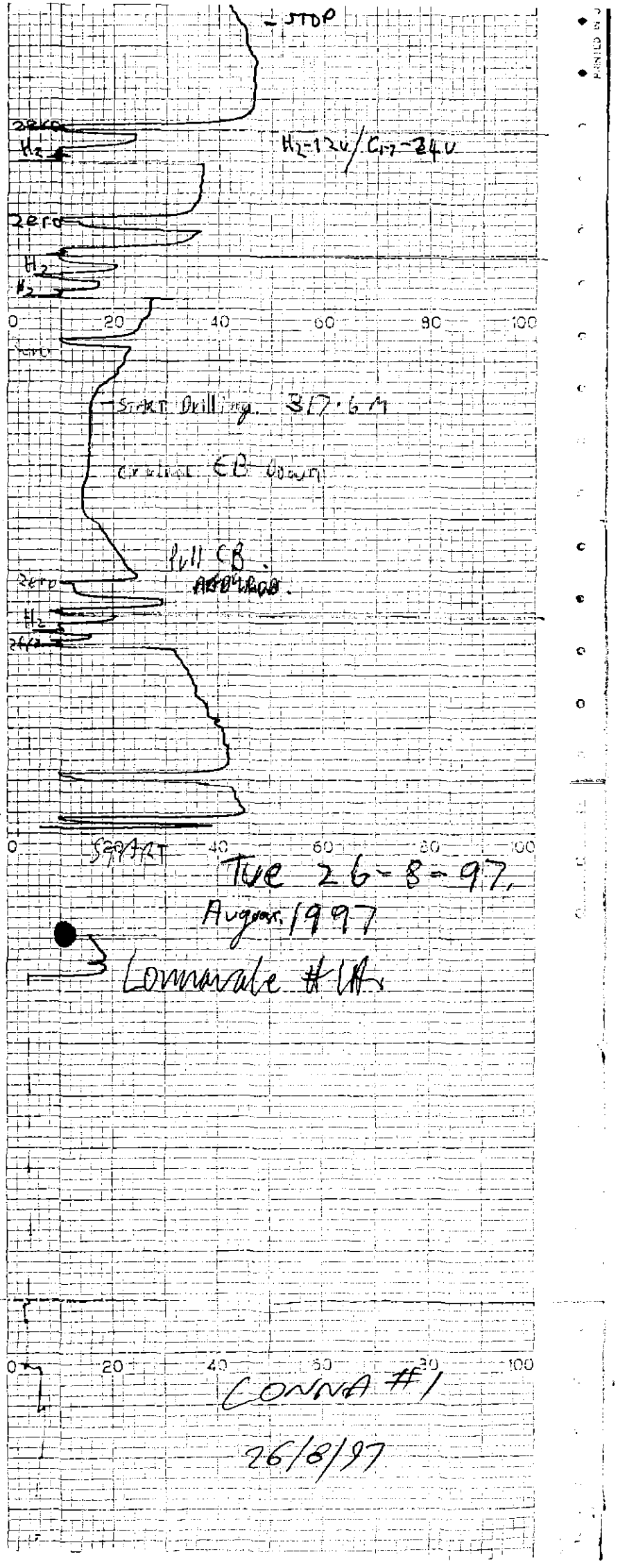


Angus Electronics Co. Indianapolis, IN 46224

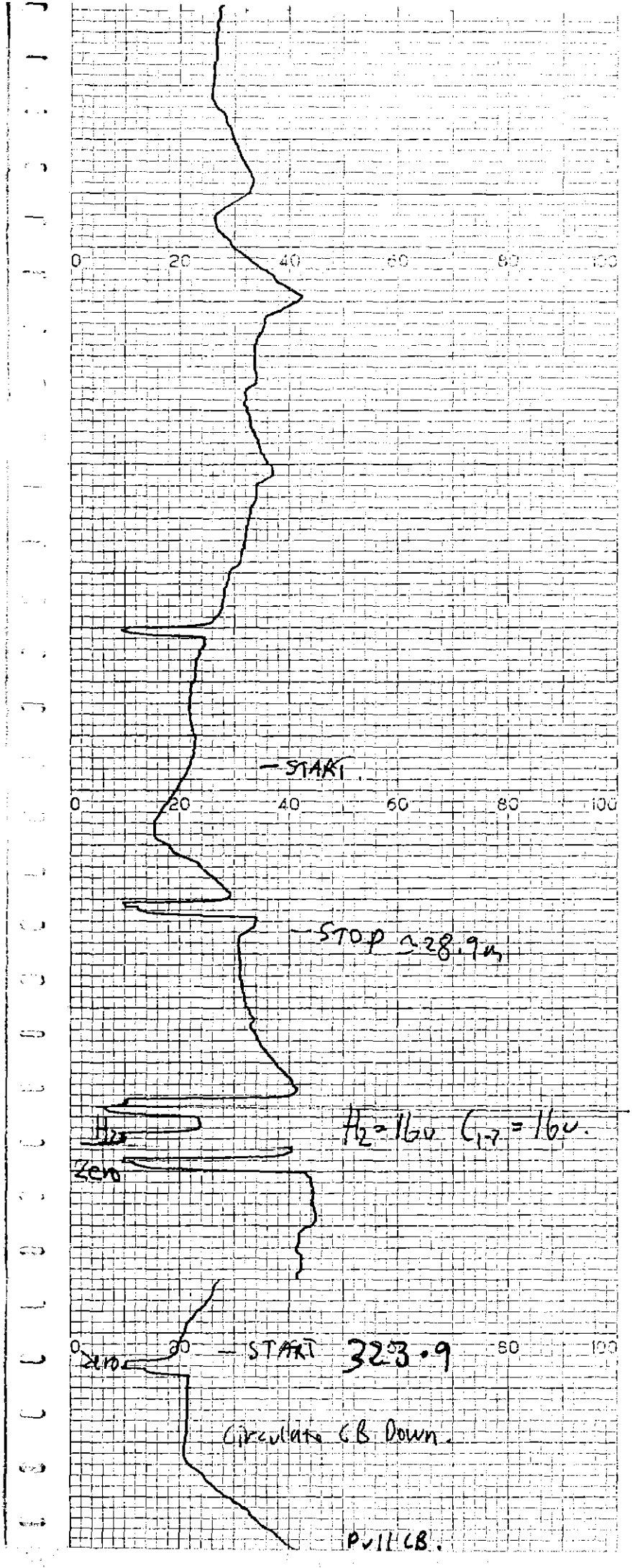
415425


0
20
40
60
80
100
flowing artesian water
at surface
STOP 314·9m
zero
START 312·6m
STOP 312·6m
START 311·0m
0
20
40
60
80
100
STOP 311·0m
START 310·3m
zero
STOP 310·3m

415426

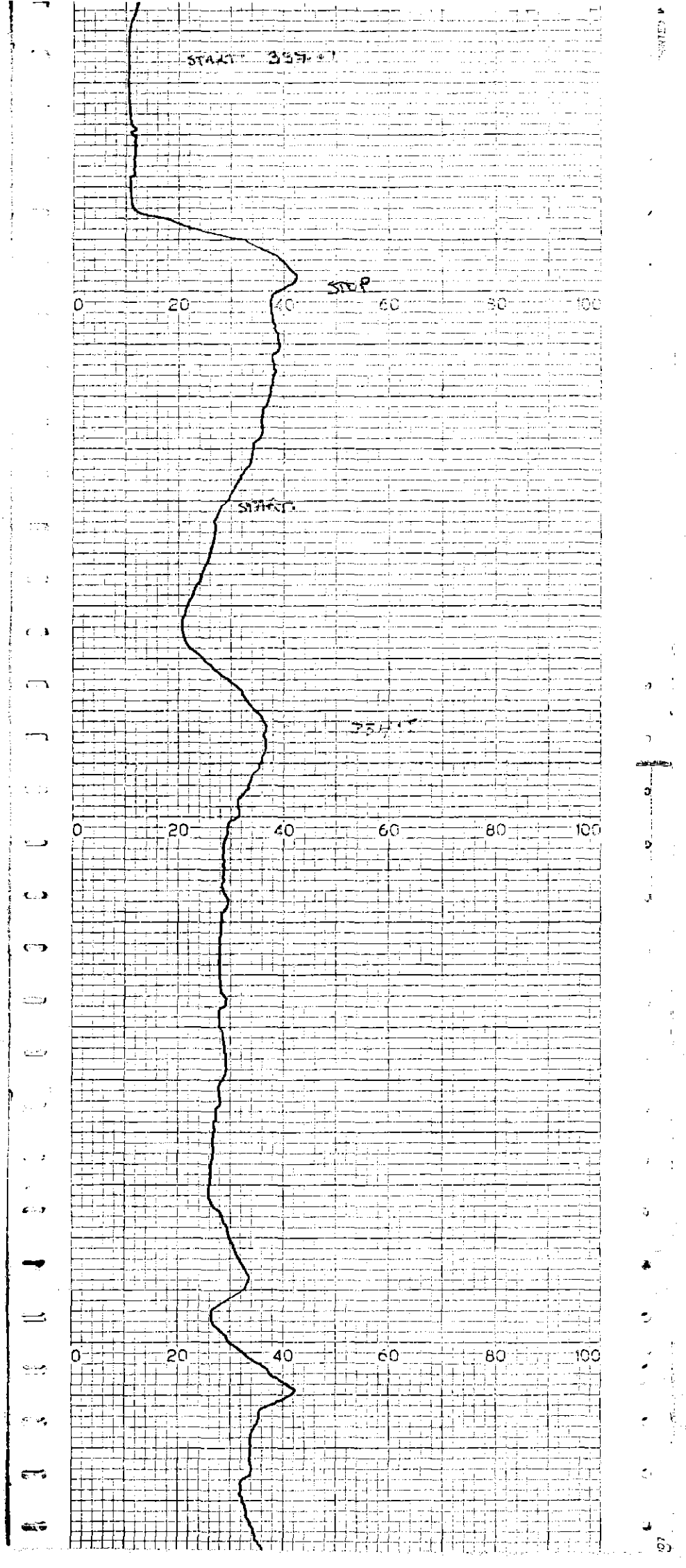

STOP
Zero
H_2
H_2
H_2

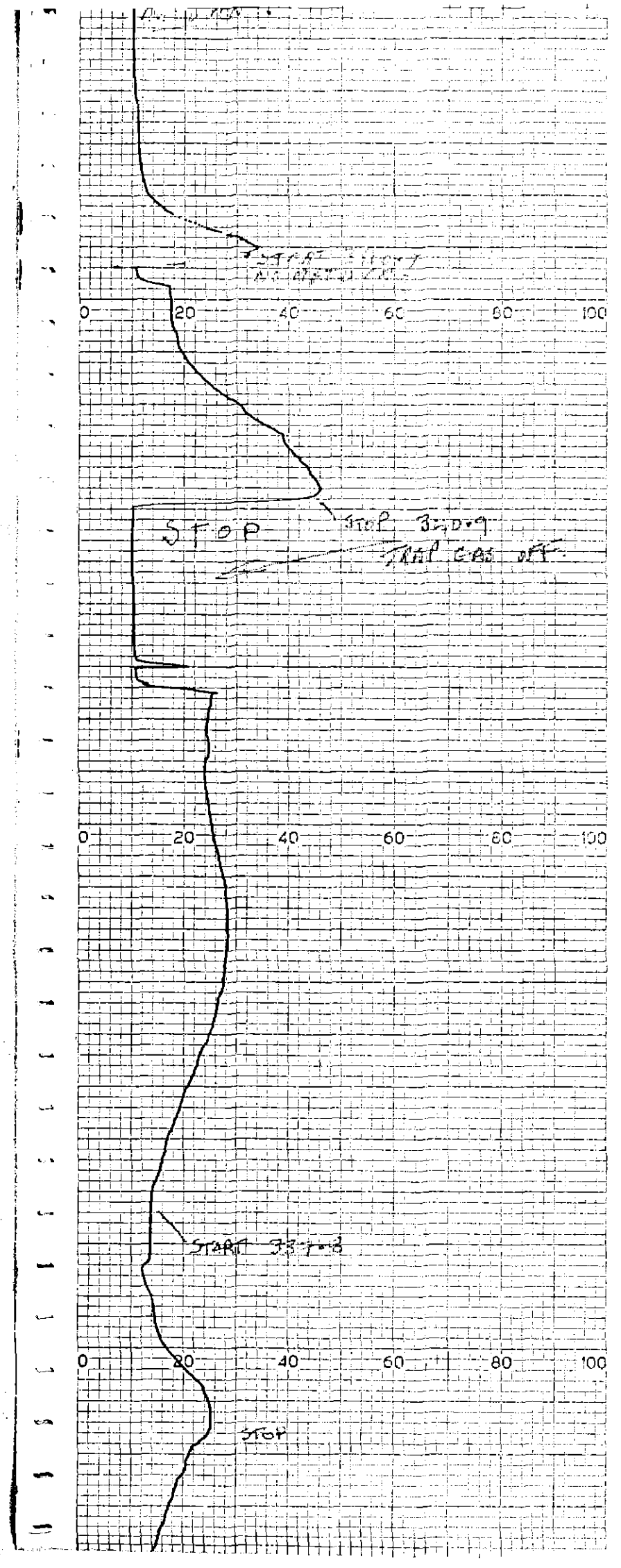
415427



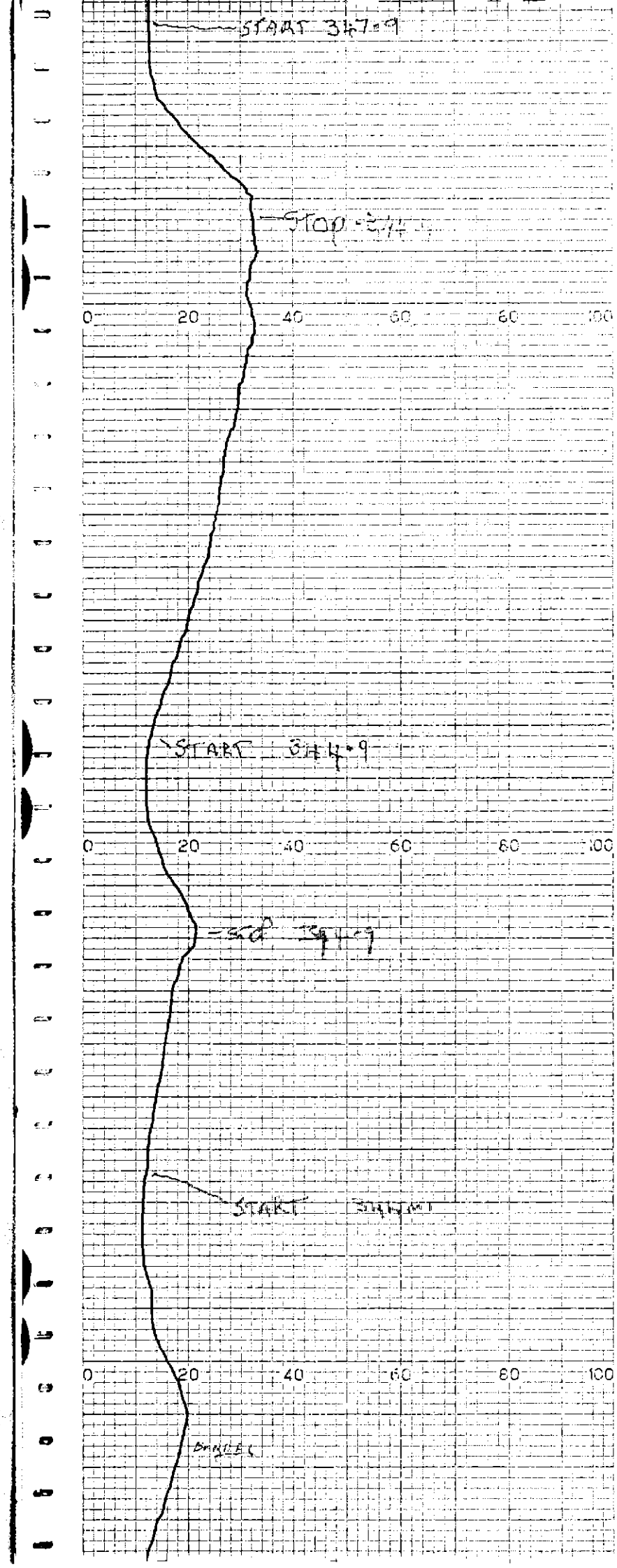
No. 59097
arics Co. Indianapolis, IN 46221

415428

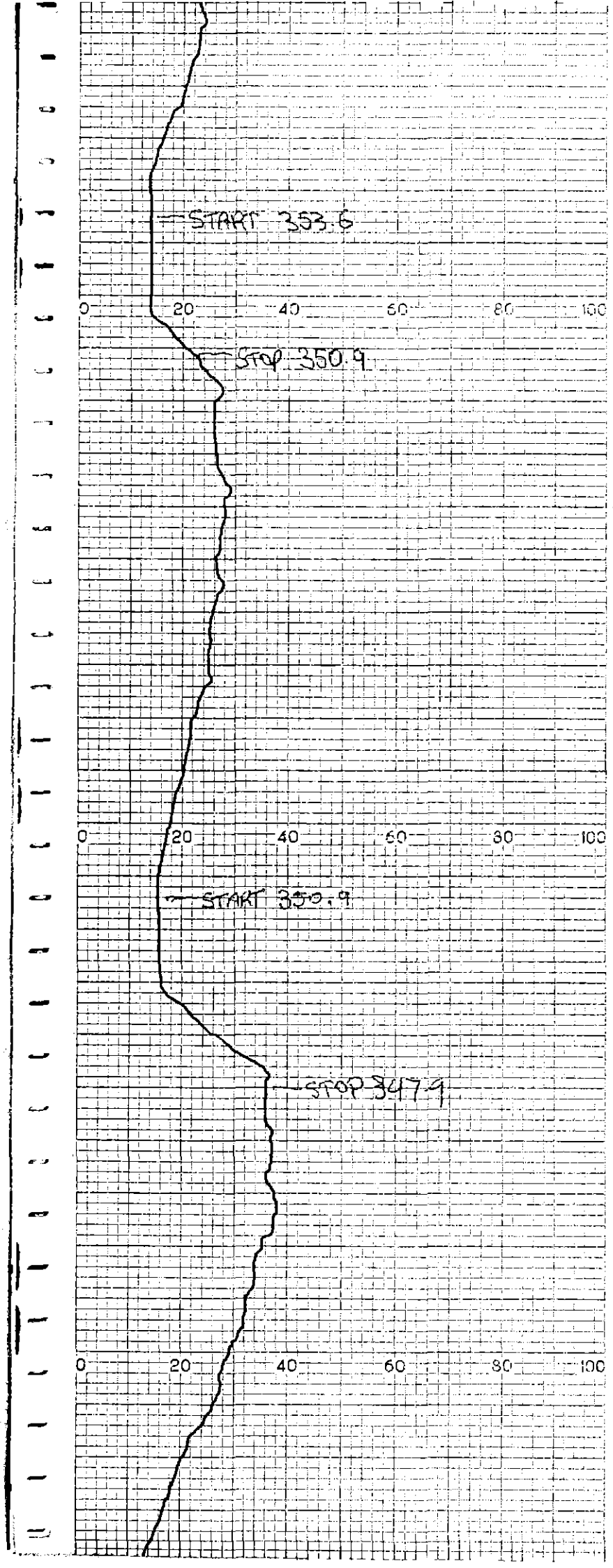




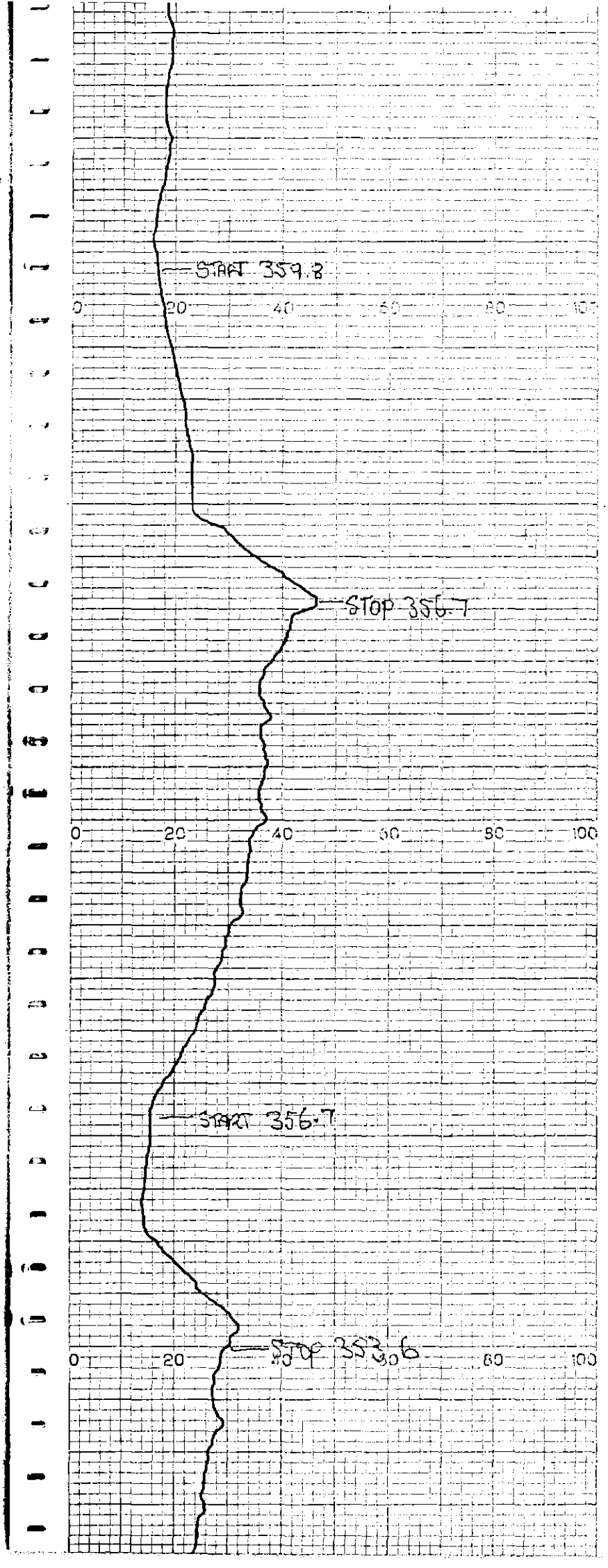
Angus Electronics Co. Indianapolis, IN 46224

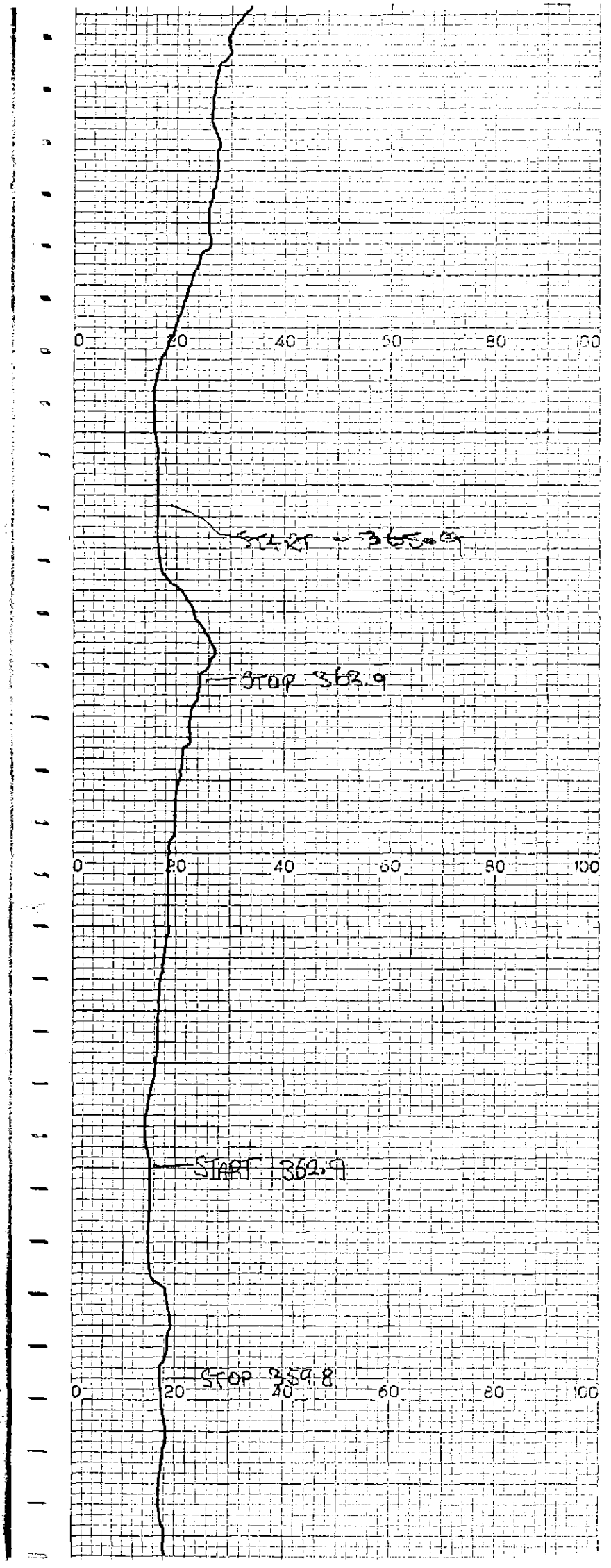

START 347.9
STOP 344.1
0
20
40
60
80
100
START 344.9
STOP 342.7
START
BREAK

415431



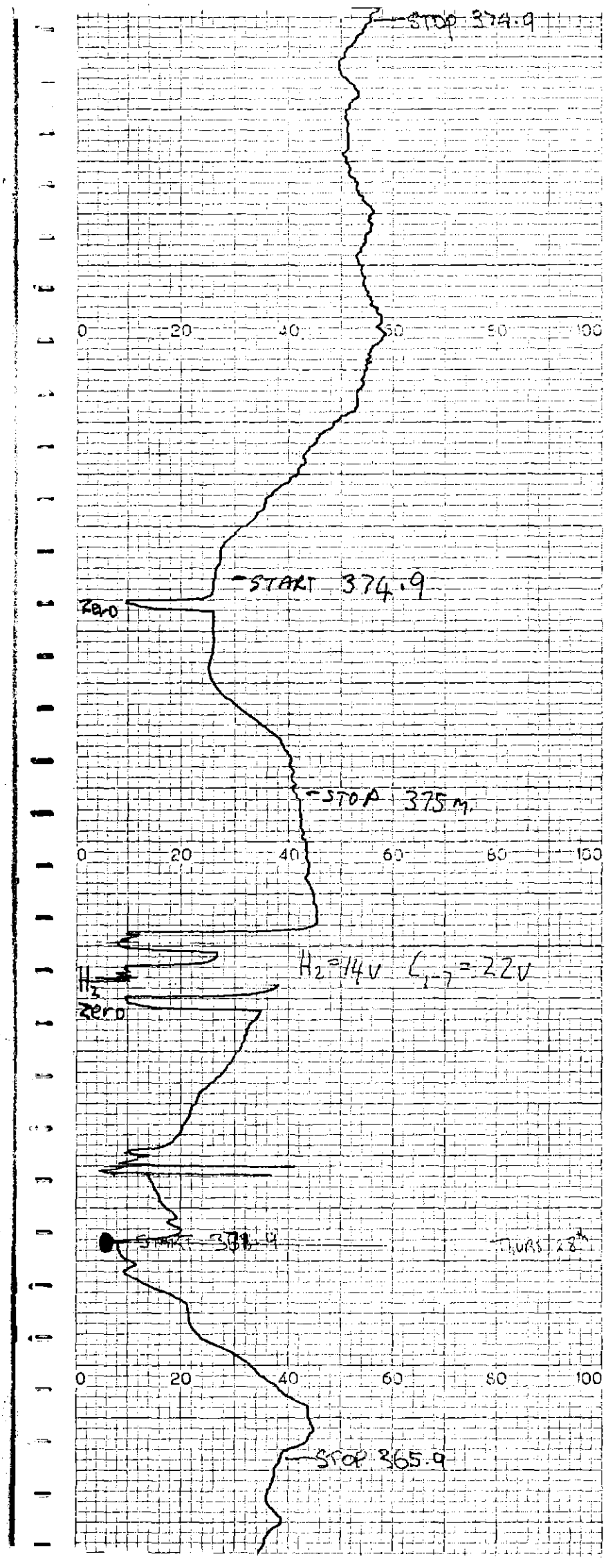
Angus Electronics Co. Indianapolis, IN 46224


START 359.8
STOP 356.7
START 356.7
STOP 353.6
0
20
40
60
80
100



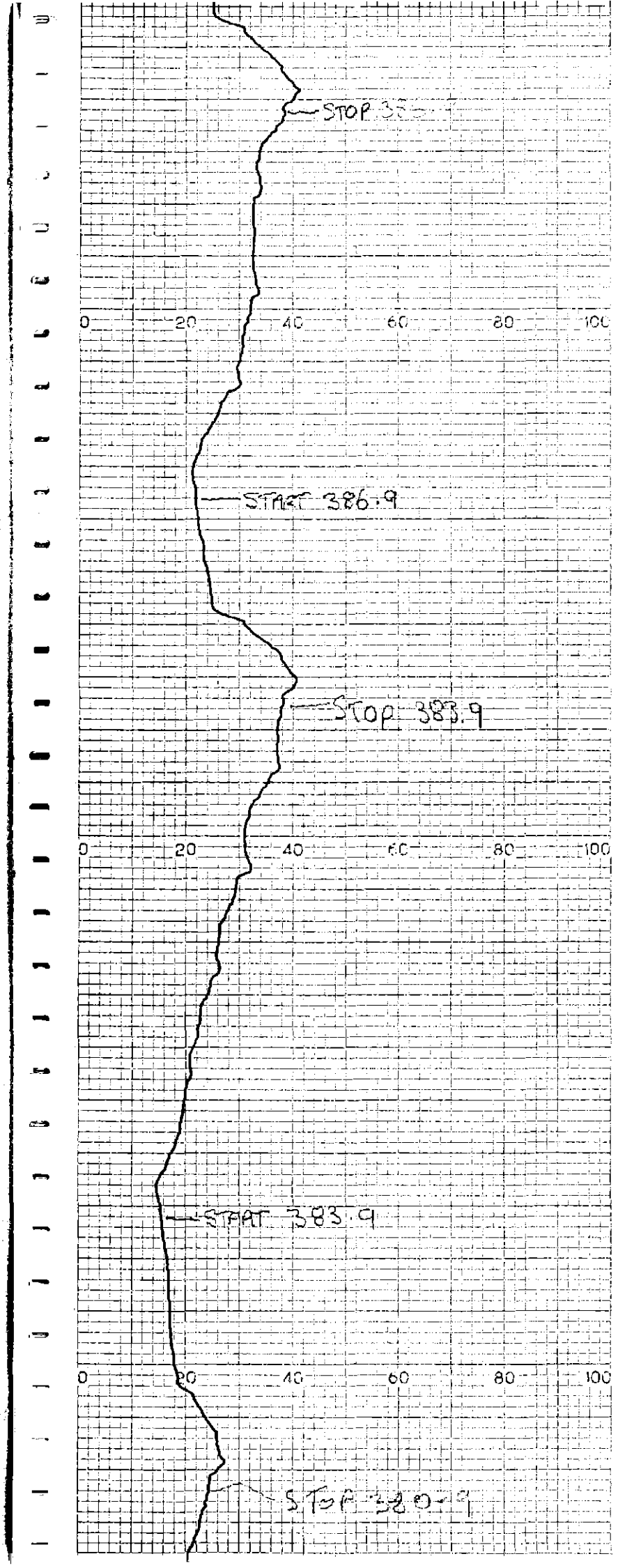
415433

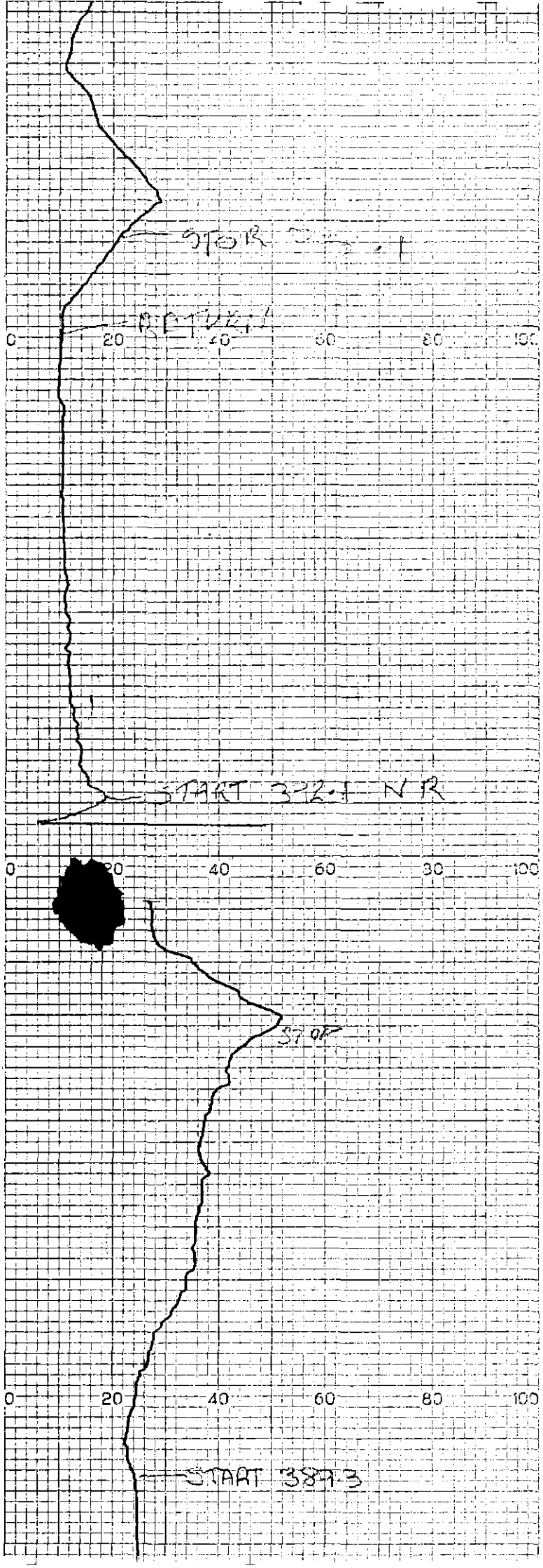
Angus Electronics Co. Indianapolis, IN 46224


STOP 374.9
0
20
40
60
80
100
START 374.9
zero
STOP 375 m.
0
20
40
60
80
100
H2=14V C1-7=22V
H1
zero
START 381.4
HOURS
0
20
40
60
80
100
STOP 365.9

415435

Angus Electronics Co. Indianapolis, IN 46224


STOP 35
0
20
40
60
80
100
START 386.9
STOP 383.9
0
20
40
60
80
100
START 383.9
0
20
40
60
80
100
STOP 380.9



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415437

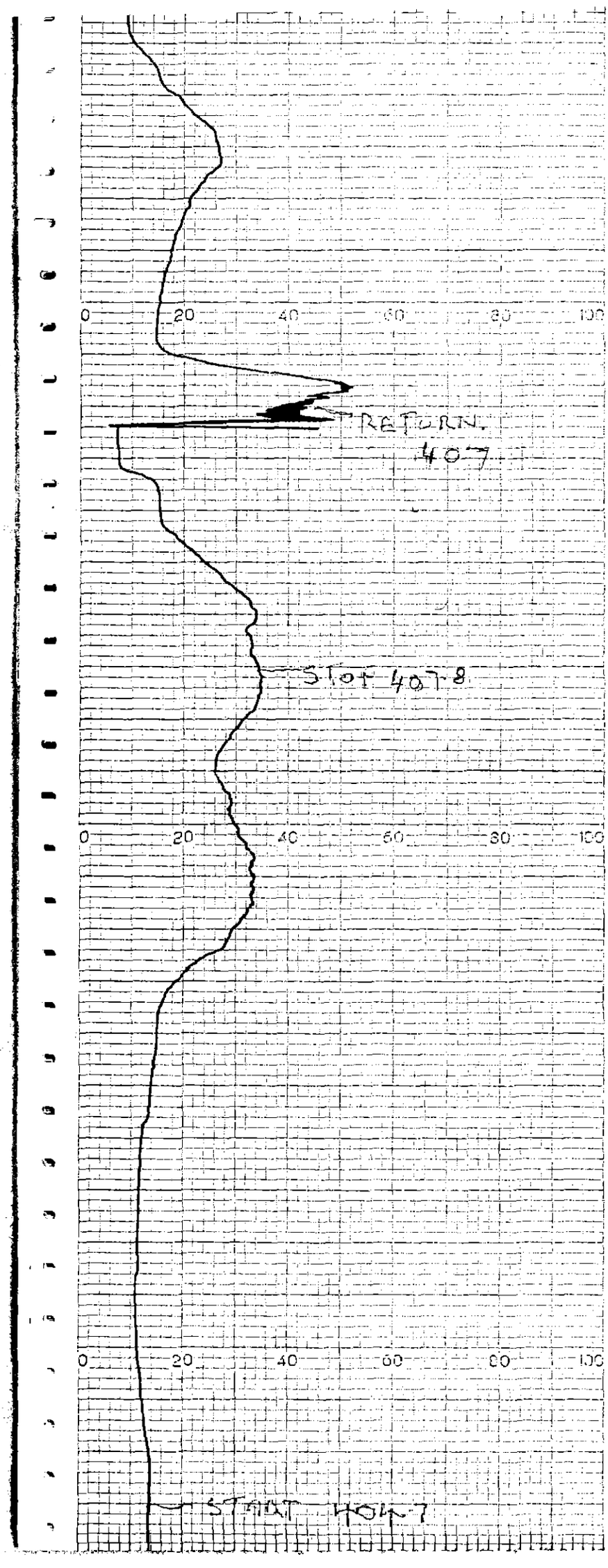
415438

5:15 P
0
20
40
60
80
100
START 3:13
0
20
40
60
80
100
STOP
0
20
40
60
80
100

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415439

415440



415441

STOP 410.6

0 20 40 60 80 100

0 20 40 60 80 100

START 410.6

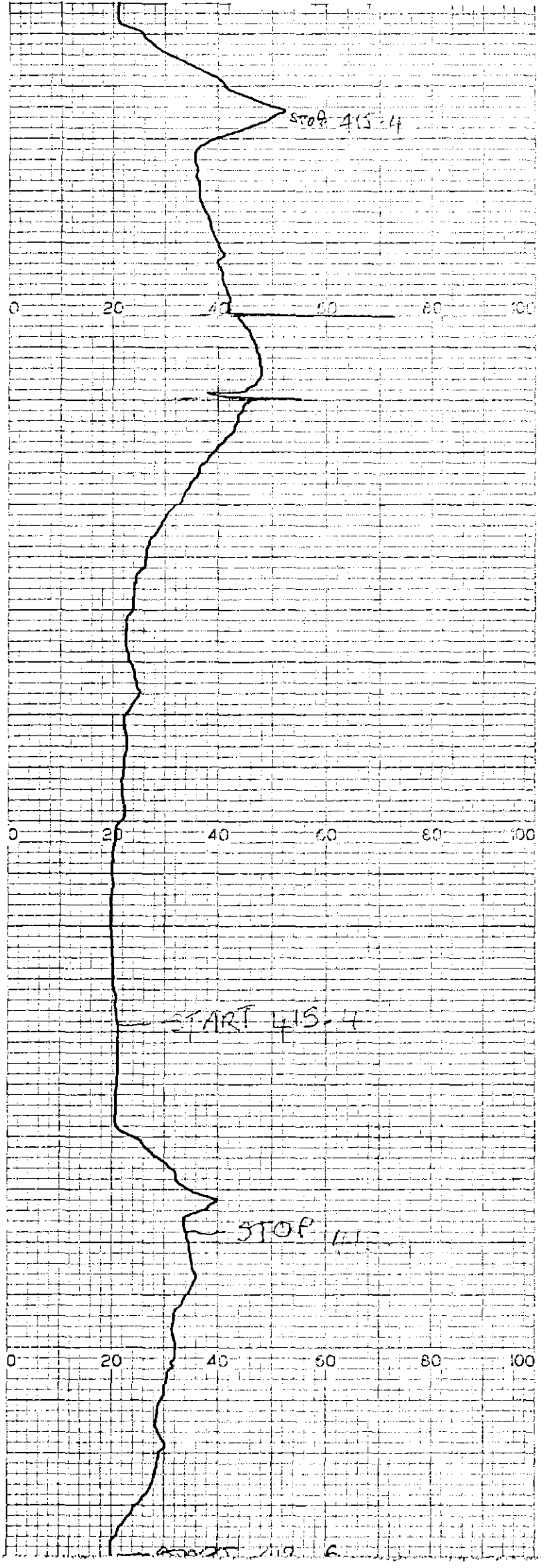
STOP 409.9

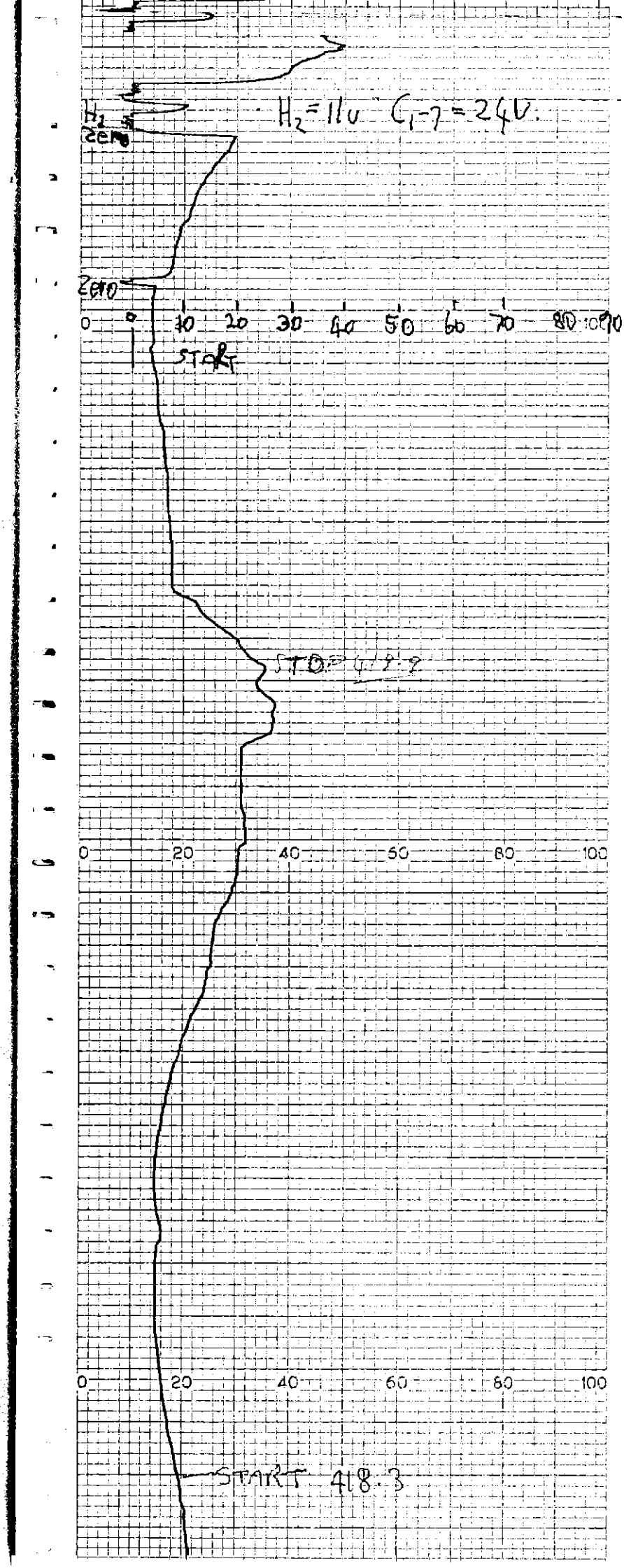
0 20 40 60 80 100

START 409.9

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415442

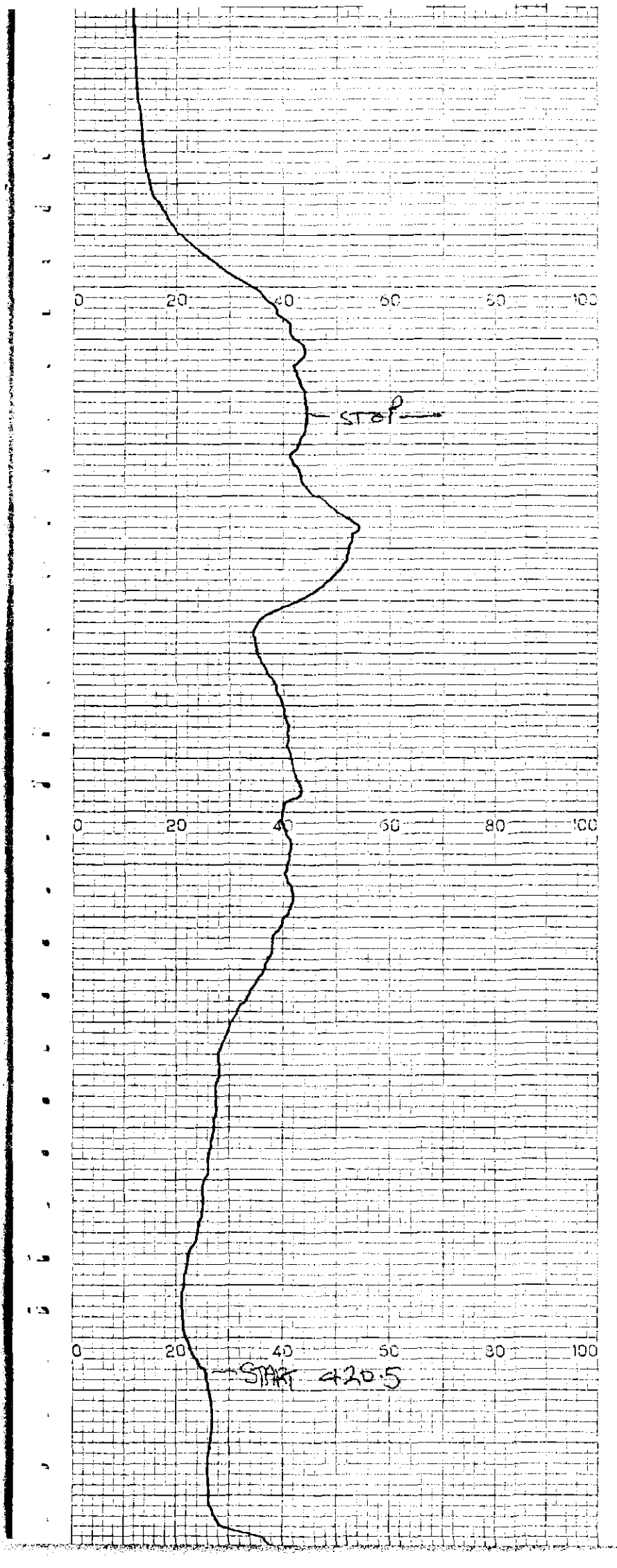


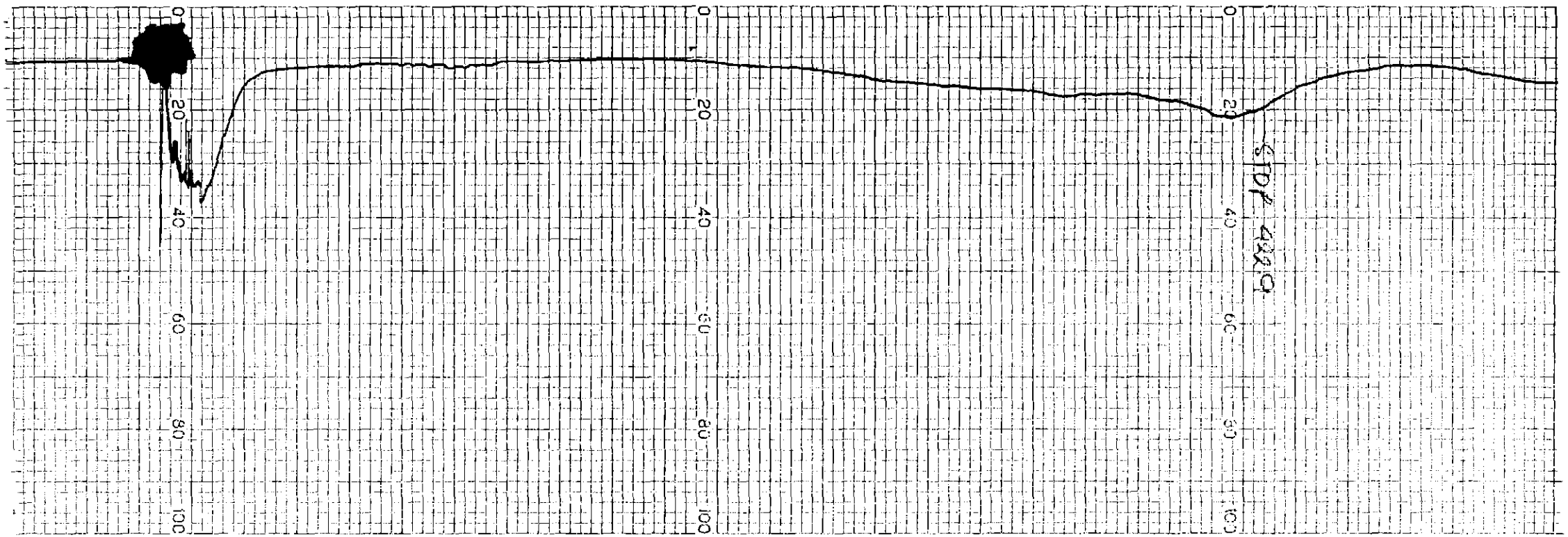


415443

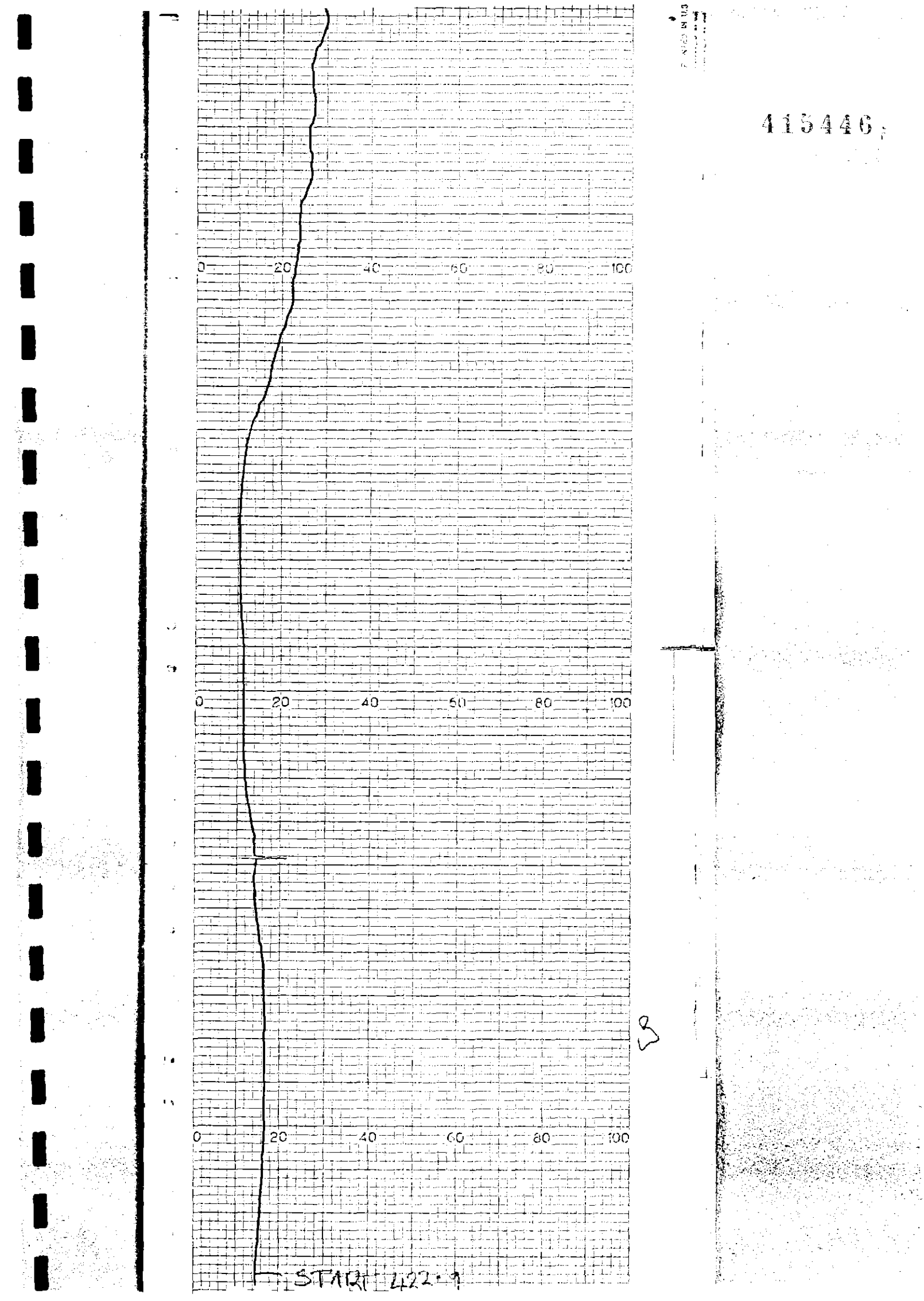
Angus Electronics Co. Indianapolis, IN 46224

415444



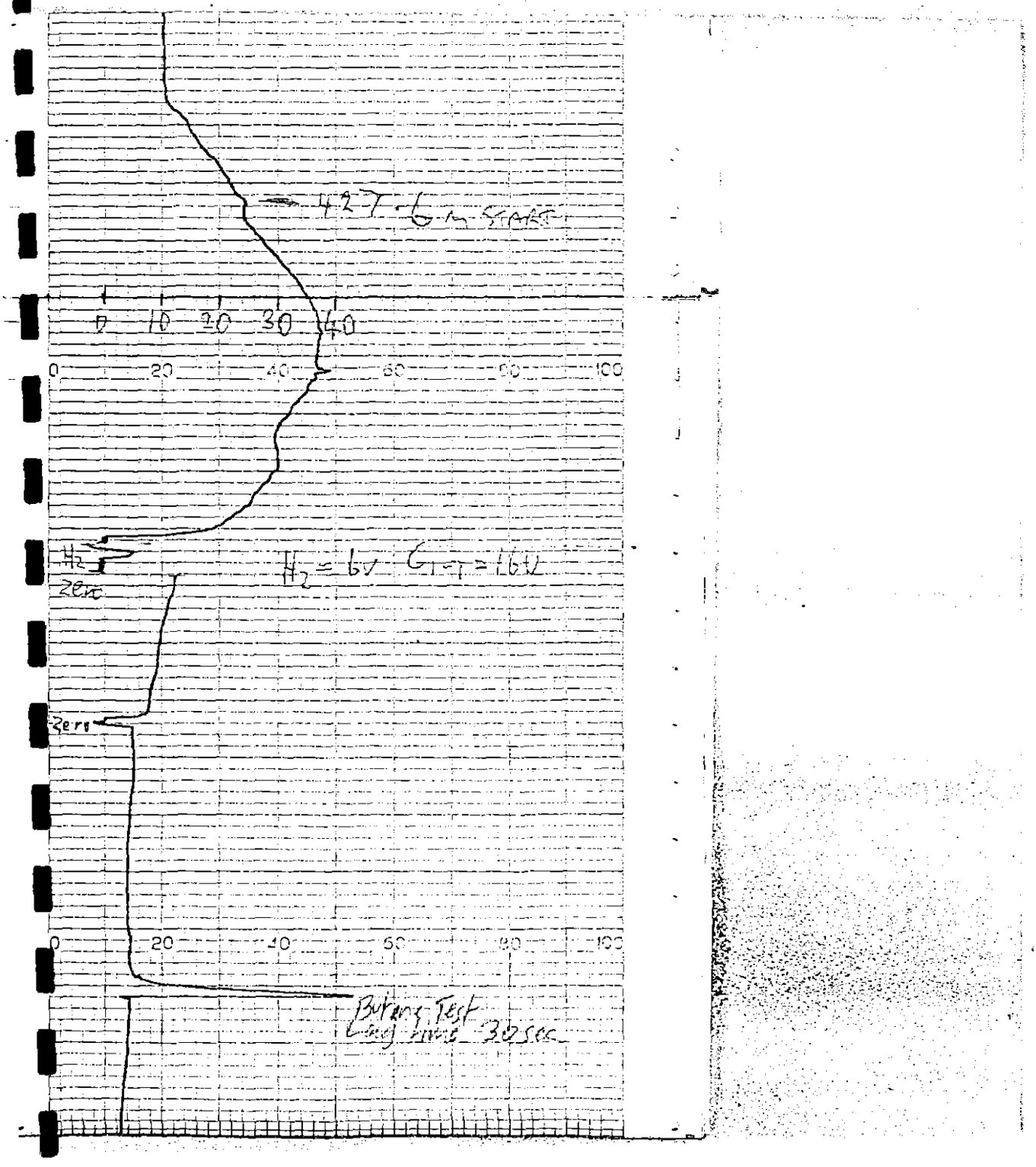


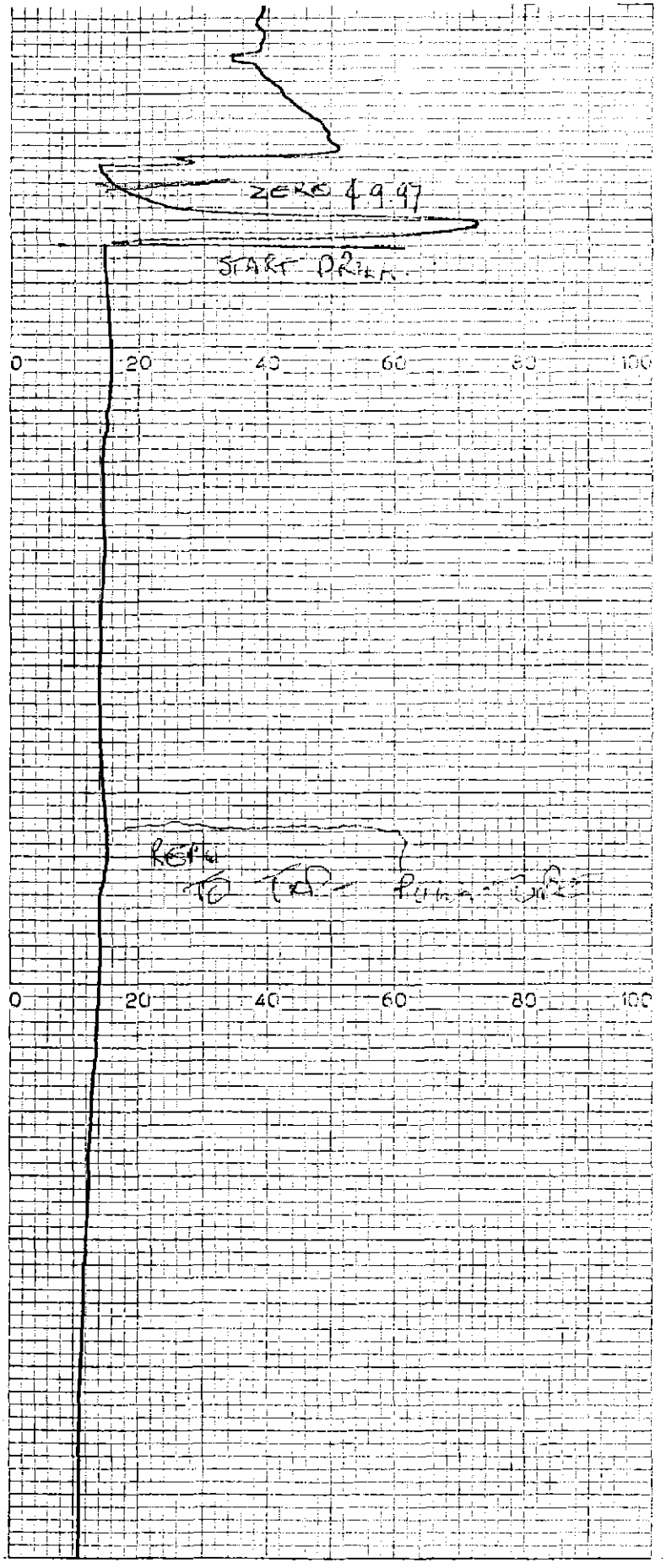
4154450


0
20
40
60
80
100
0
20
40
60
80
100
0
20
40
60
80
100
START 422.9

4154421

415448


427.6 m START
0 10 20 30 40
0 20 40 60 80 100
H2 zero
H2 = 6V G1-7 = 1.6V
Zero
0 20 40 60 80 100
Burning Test
Lasted about 30 sec



Angus Electronics Co. Indianapolis, IN 46

415449

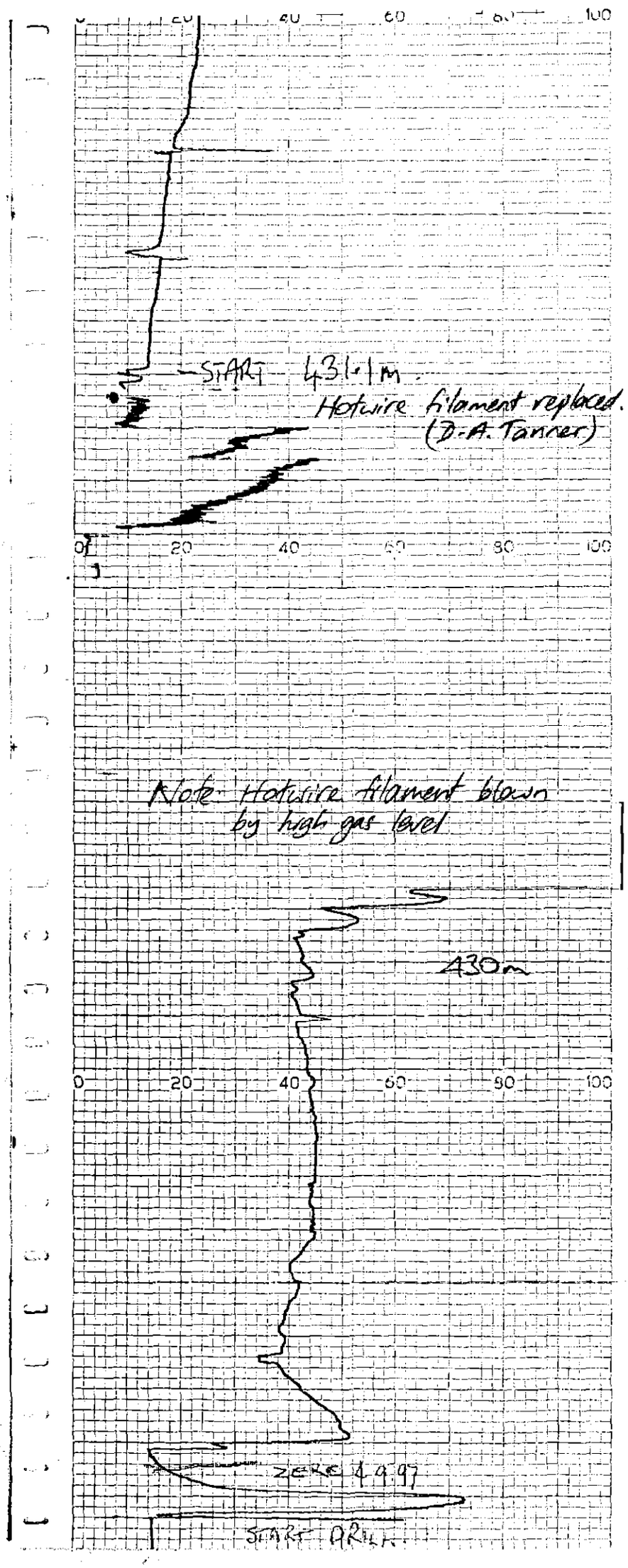
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LONNA #1

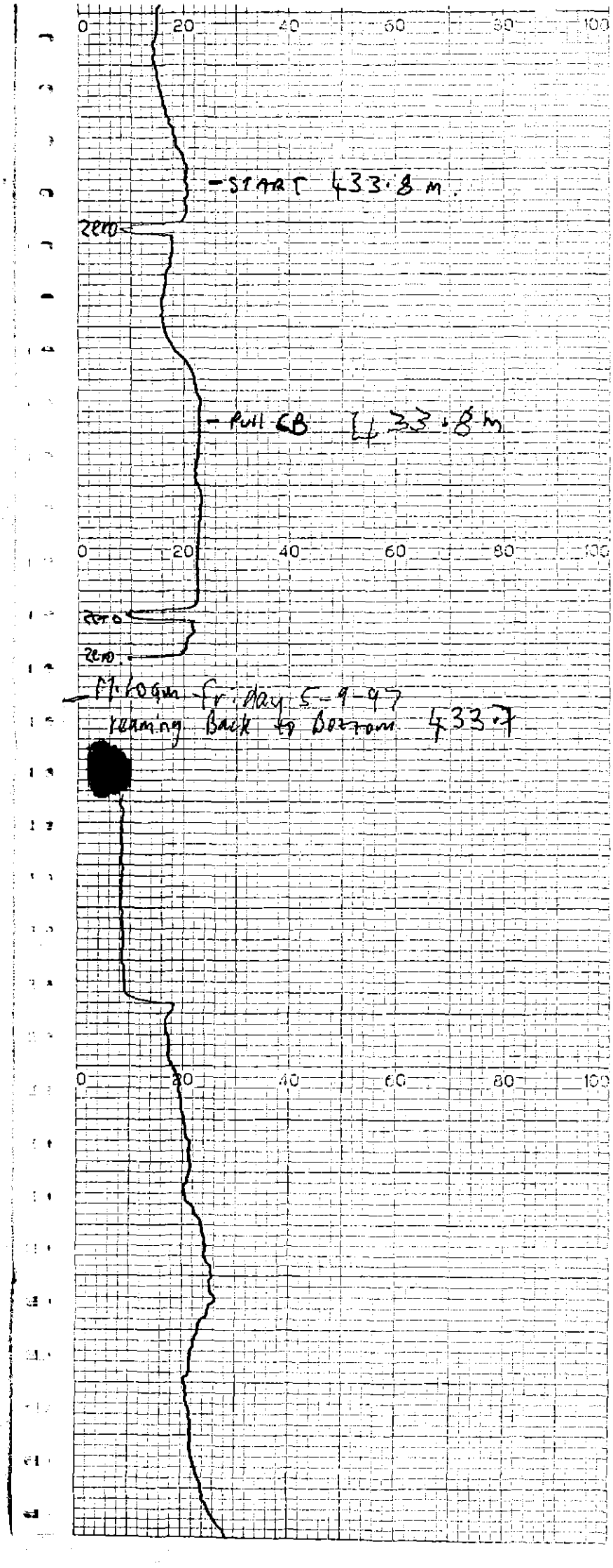
3/9/97

428 →

415450



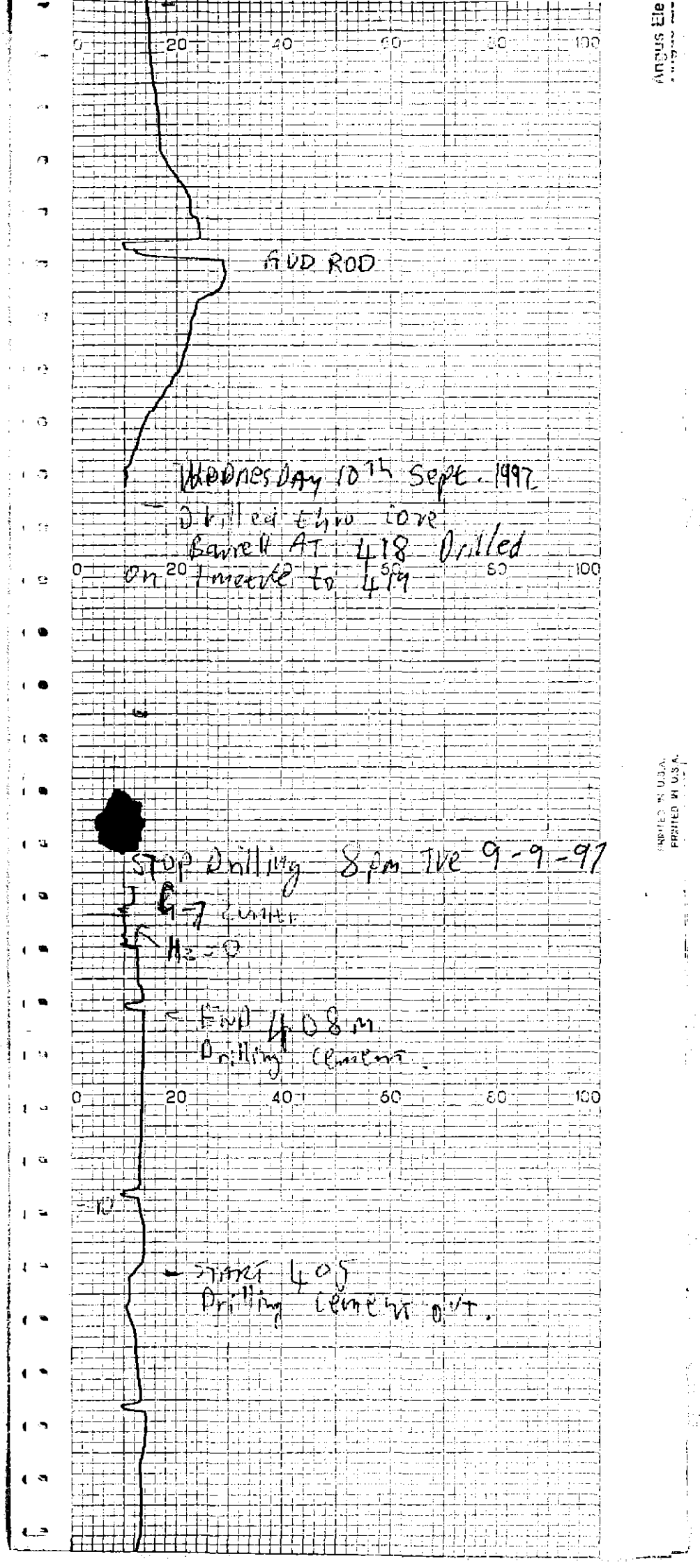
no. 5080
nics Co. Indianapolis, IN 46224


0
20
40
60
80
100
- START 433.8 m.
ZERO
- Pull CB 433.8 m
ZERO
ZERO
- Mobm Friday 5-9-97
Leaving Back to Bottom 433.7

415451

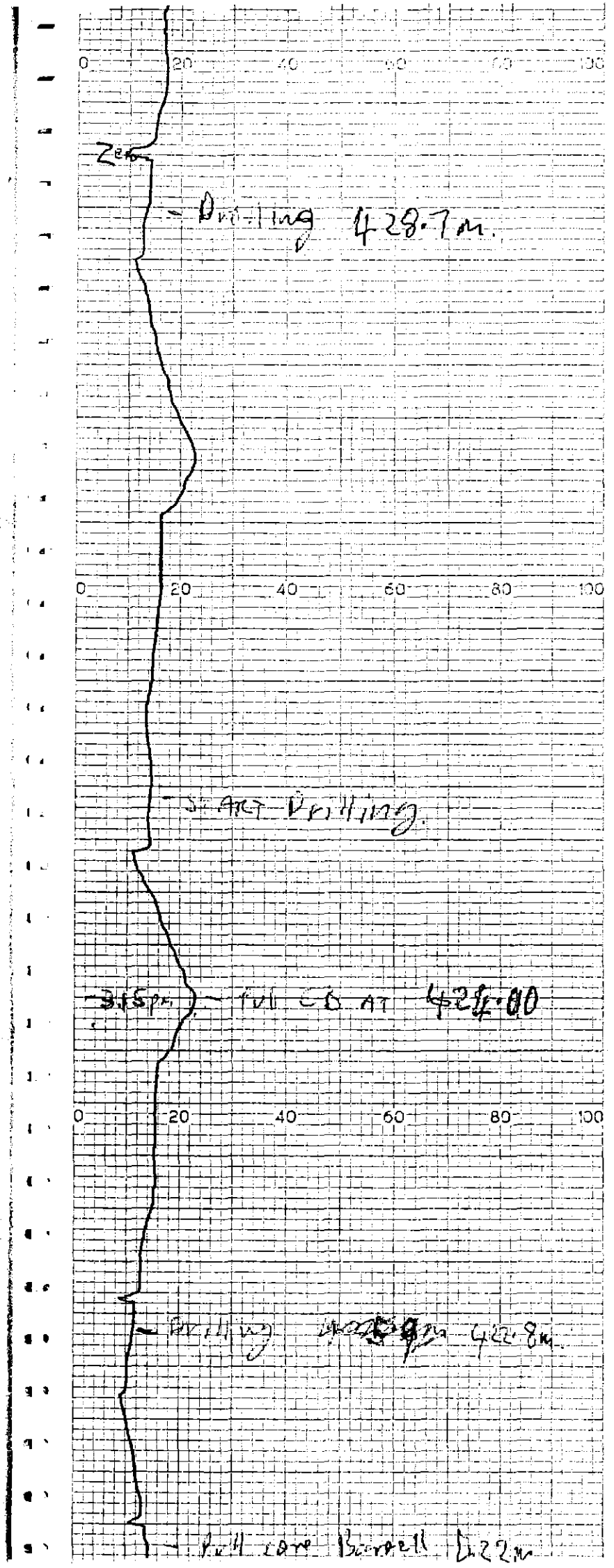
415452

NO. 59007
nics Co., Indianapolis, IN 46224


0
20
40
60
80
100
MUD ROD
Wednesday 10th Sept. 1997
Drilled thro' fore
barrel AT 418 Drilled
on 2 metres to 419
STOP Drilling 8 pm Tue 9-9-97
G=7 counter
H2=0
End 408m
Drilling cement.
Drilling cement out.

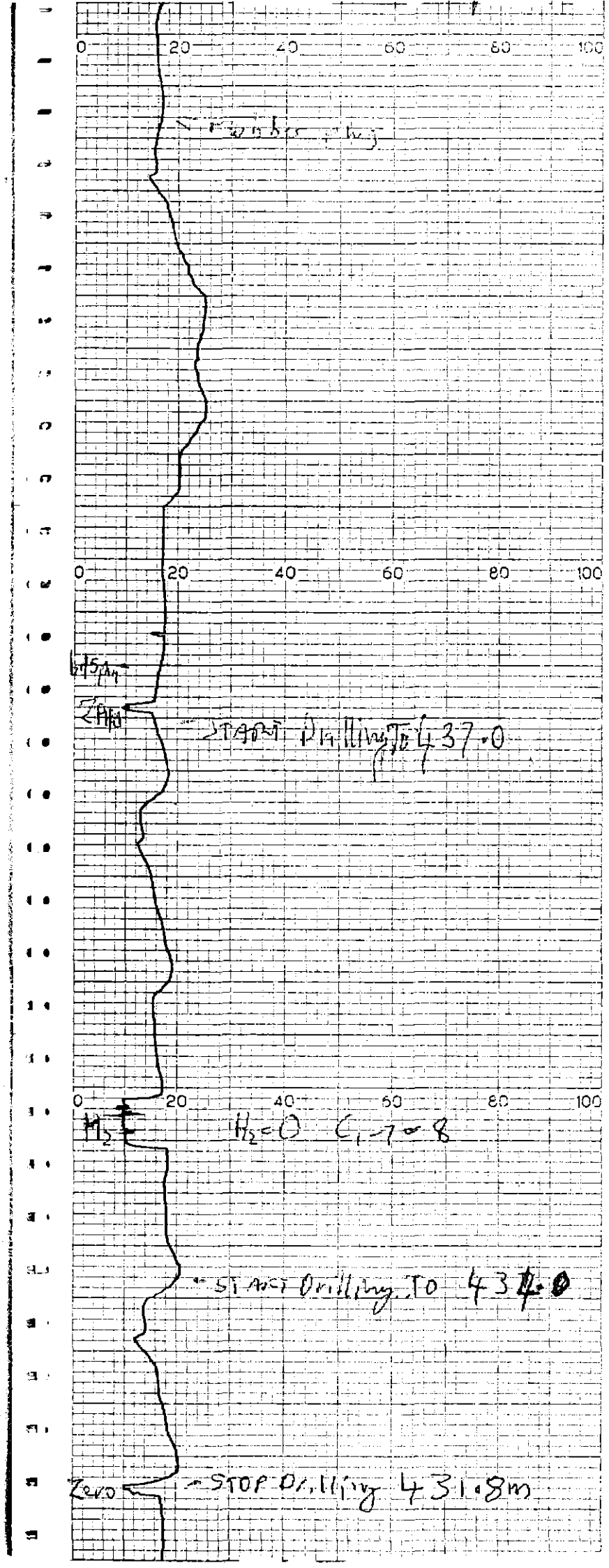
415453

415454



NO 59093
NO 59093
NO 59093

ics Co. Indianapolis, IN 46224
ics Co. Indianapolis, IN 46224



Argus Electronic

415455

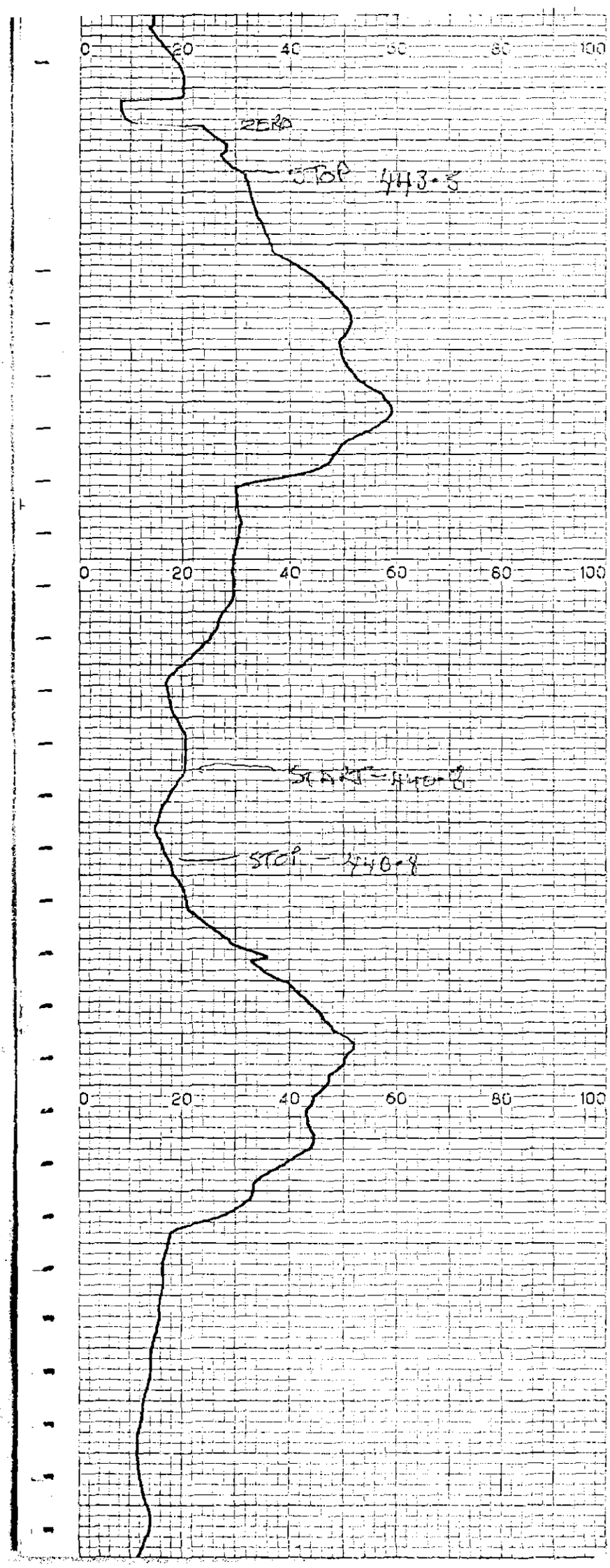
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415456

NO. 59007

Indianapolis, IN 46224

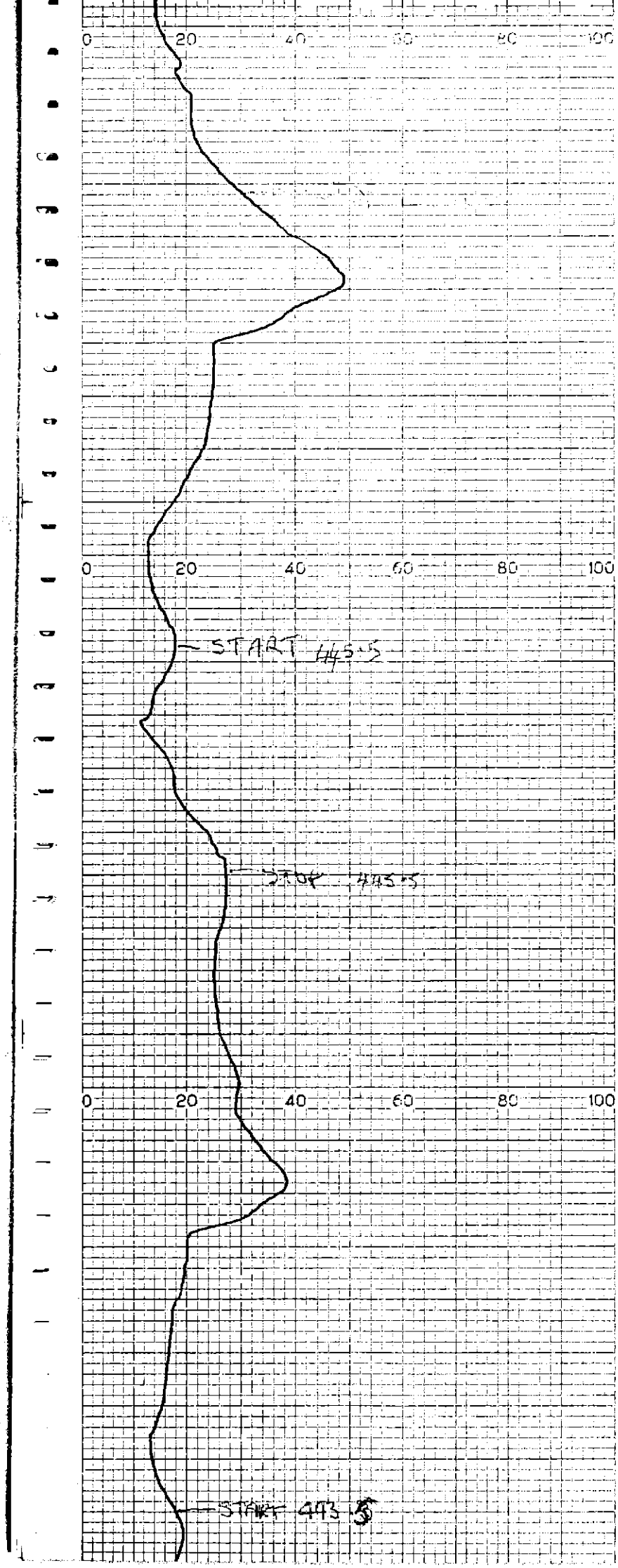
nics Co.



Angus Ele

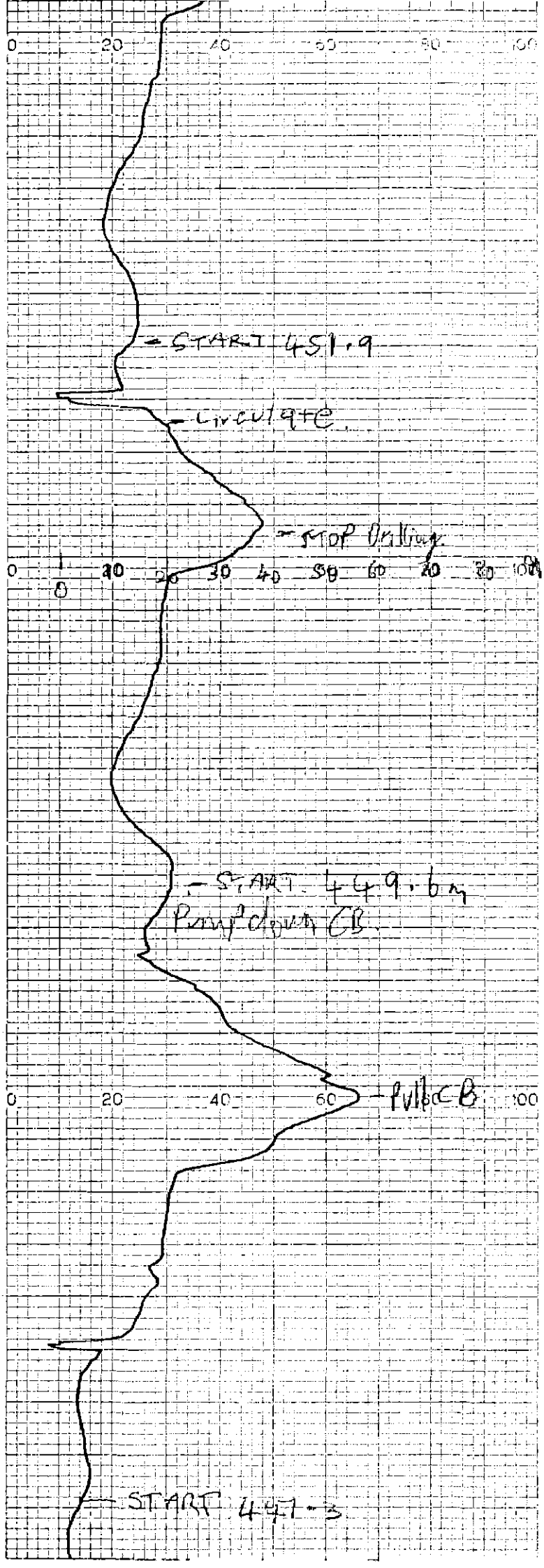
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415457

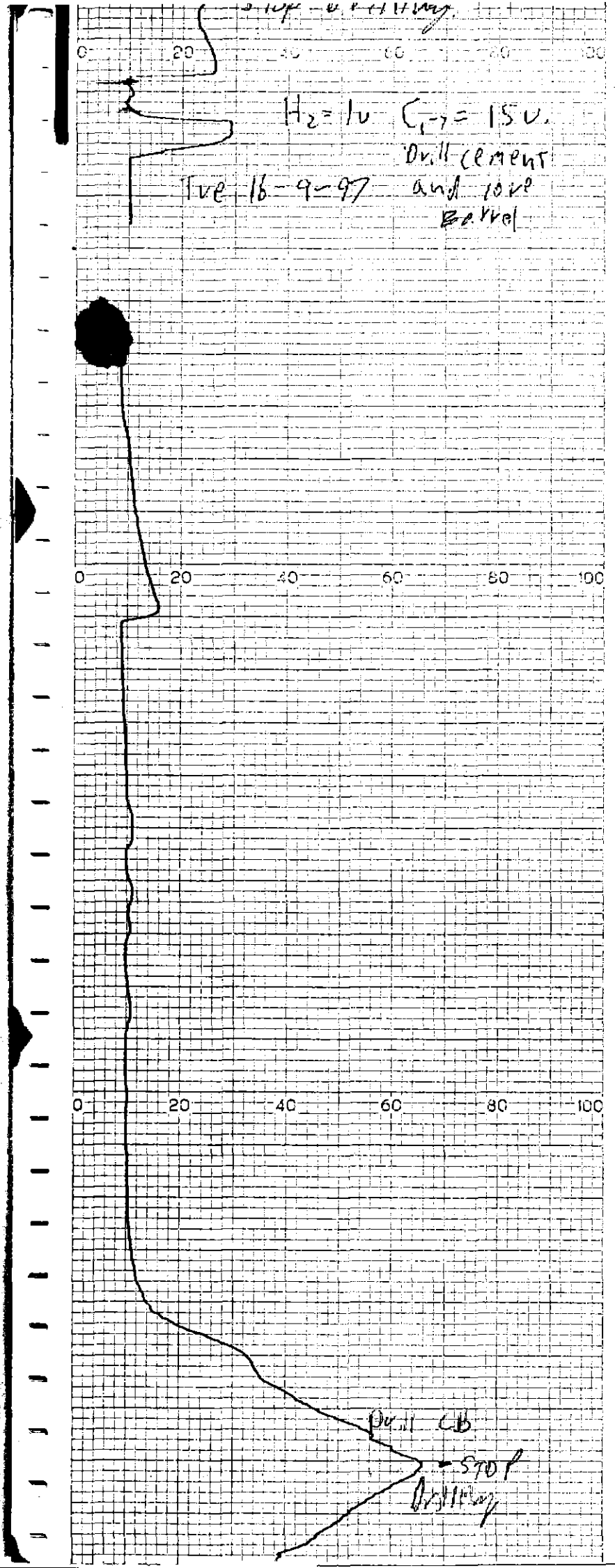


NO. 59007
Graphics Co. Indianapolis, IN 46224

415459

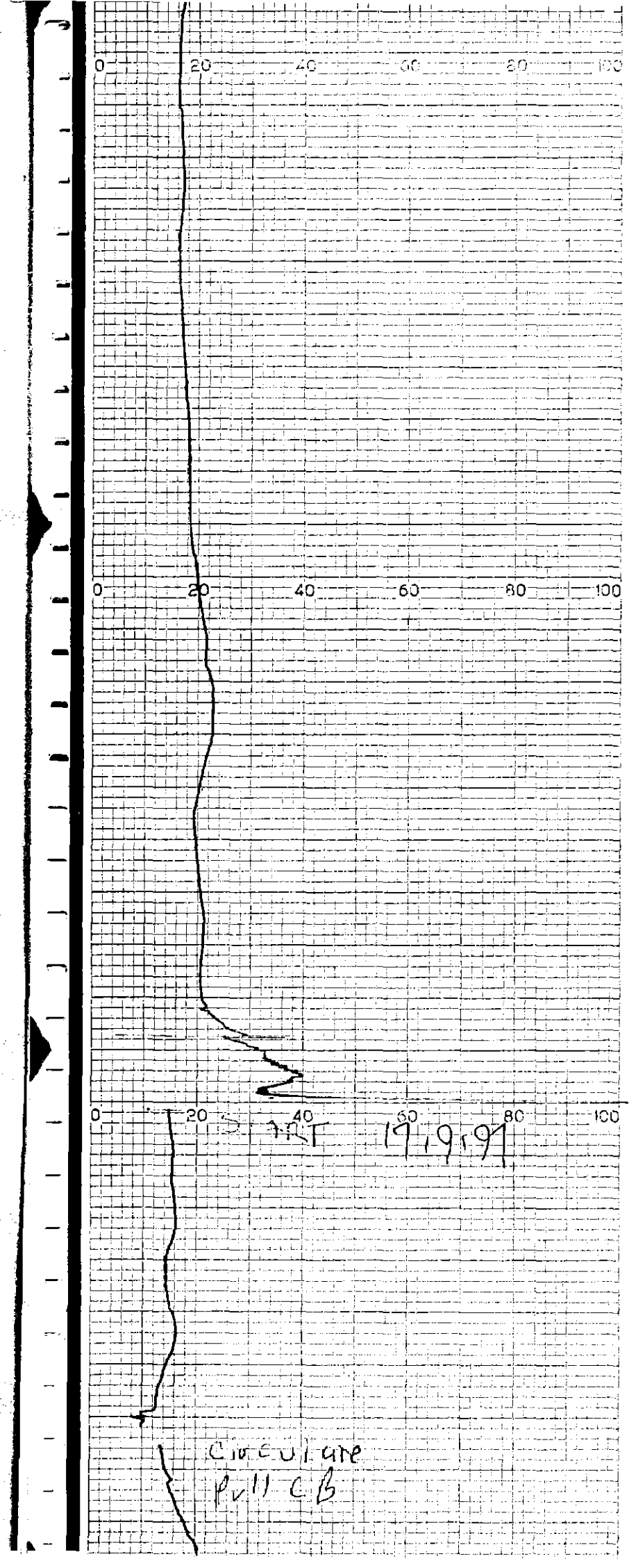


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415460

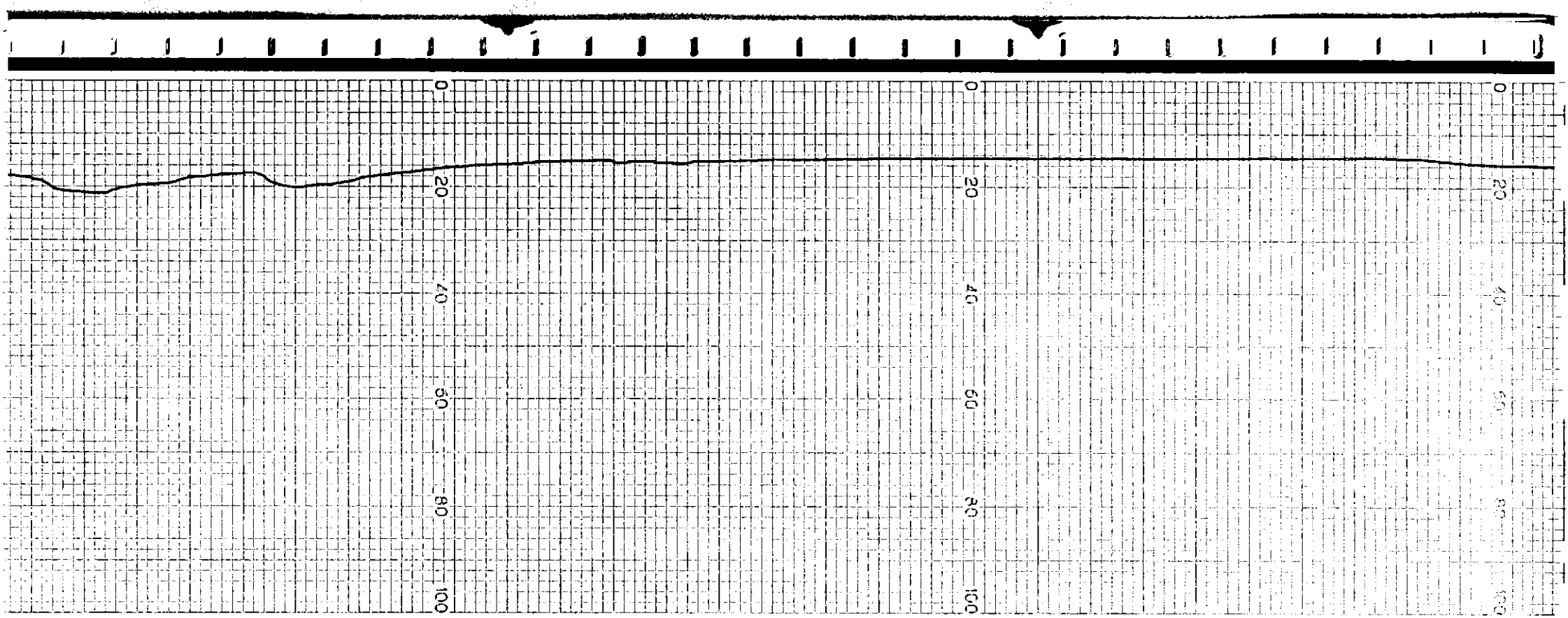
nics Co. Indianapolis, IN 46224



Angus Elect

415461

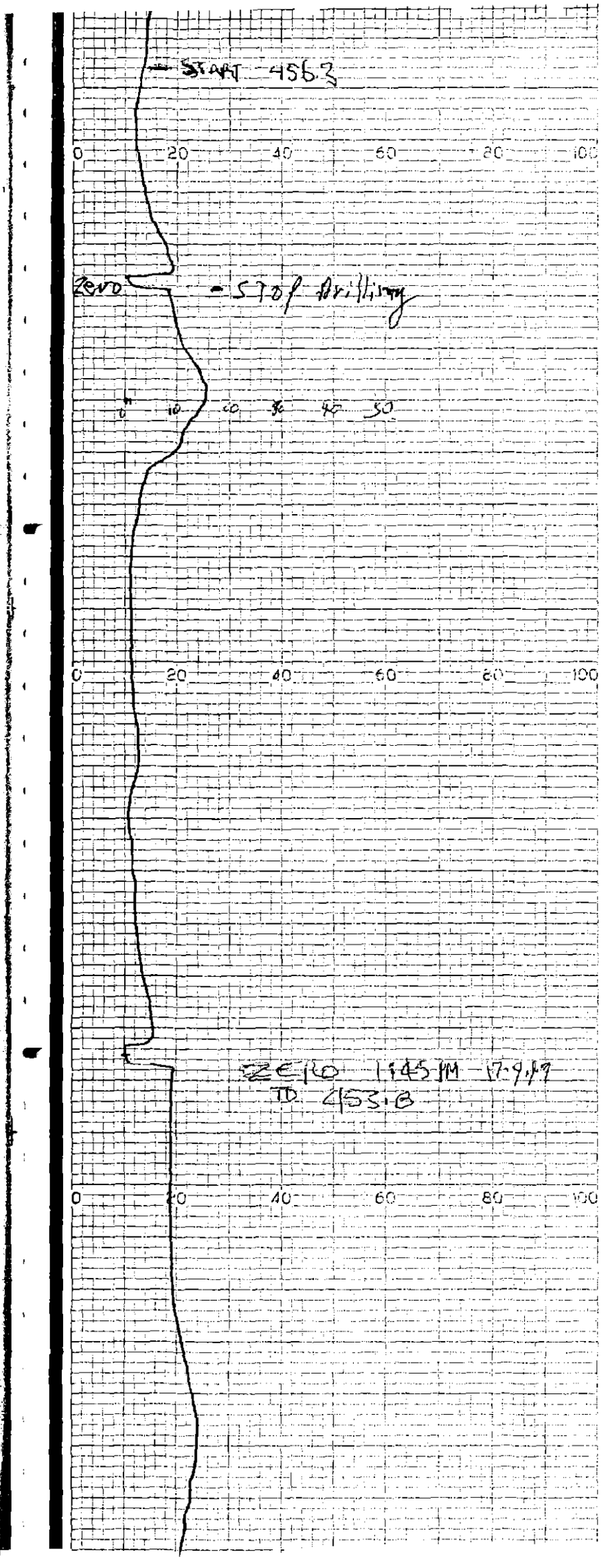
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cs Co. Indianapolis, IN 46224

NO. 59037

4134693



Ampyx Electronics Co.
Ampyx Drive

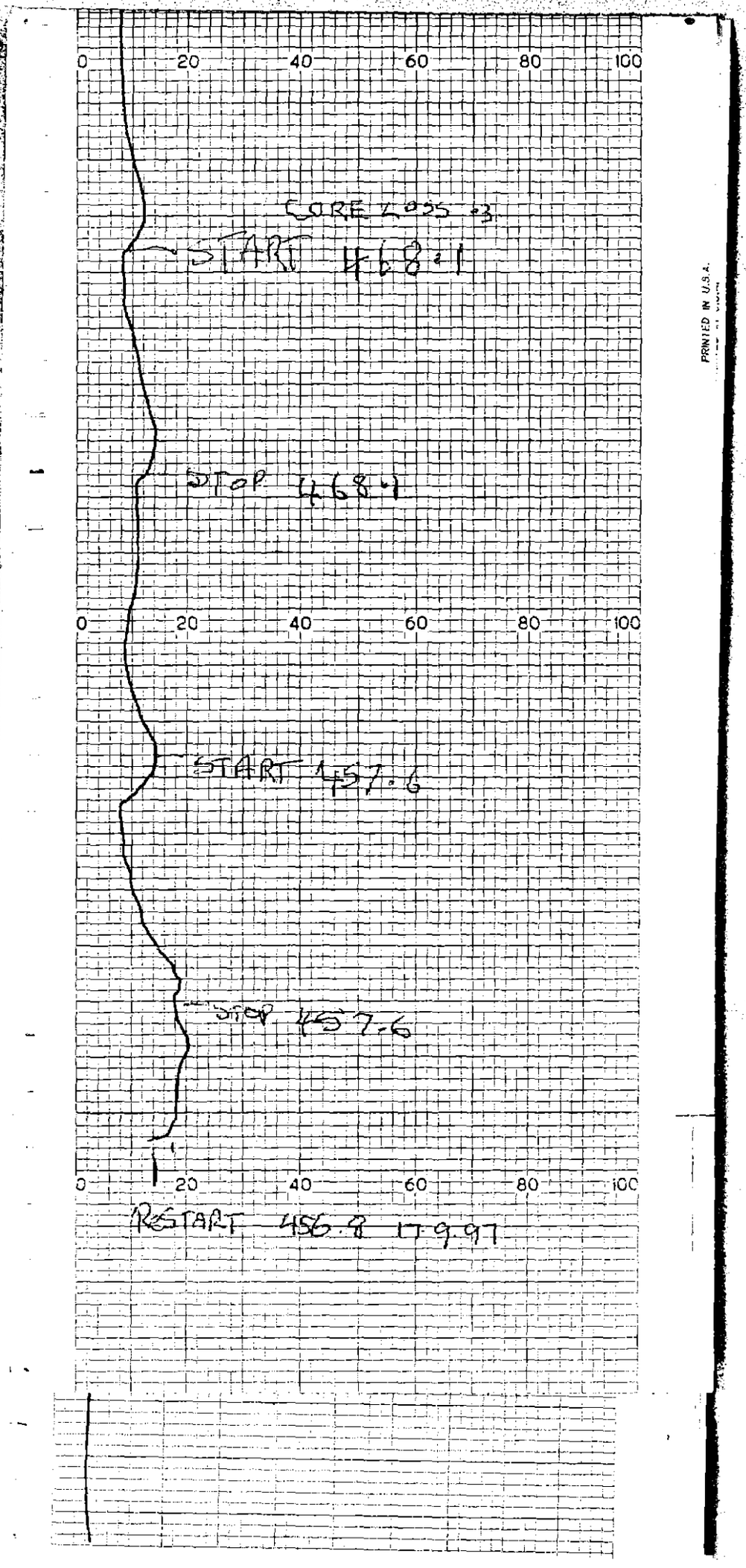
415463

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415464

NO. 5001

nics Co. Indianapolis, IN 46224


0
20
40
60
80
100
CORE 2.025 -3
START 468.1
STOP 468.1
START 457.6
STOP 457.6
RESTART 456.8 17.9.97
PRINTED IN U.S.A.

415466

0 20 40 60 80 100

START Drilling Thurs 8.9.07

4604

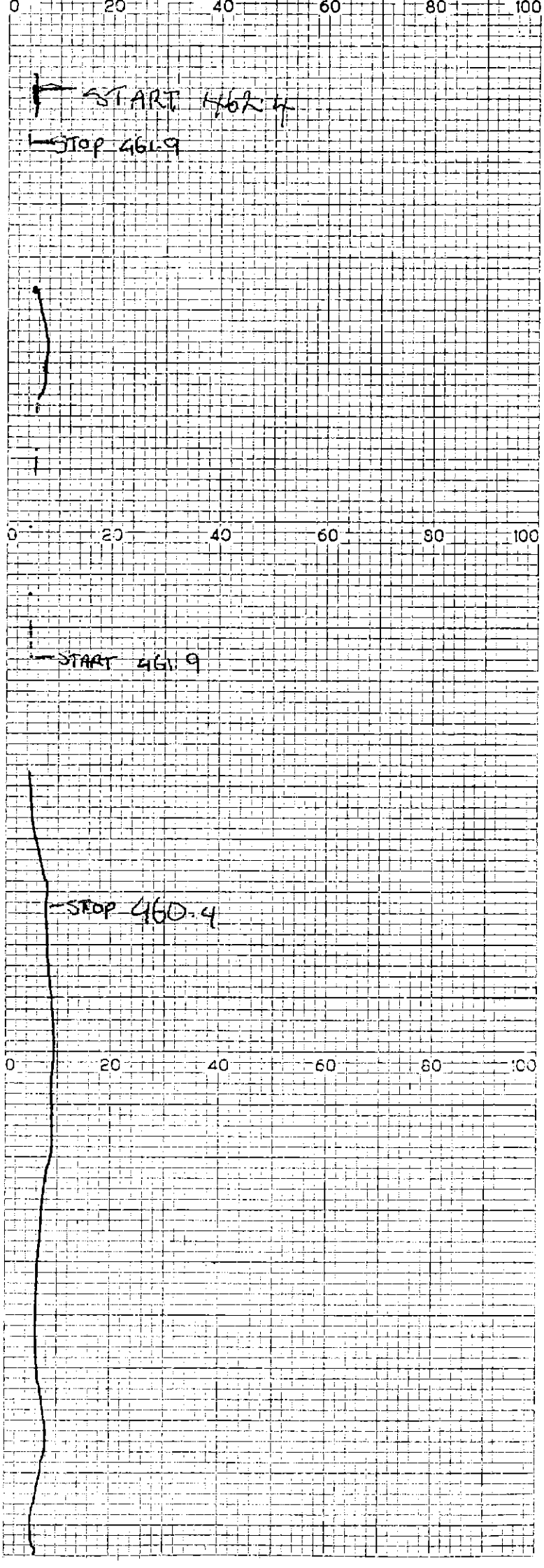
0 20 40 60 80 100

STOP

0 20 40 60 80 100

Angus Electronics Co. Indianapolis, IN 46224

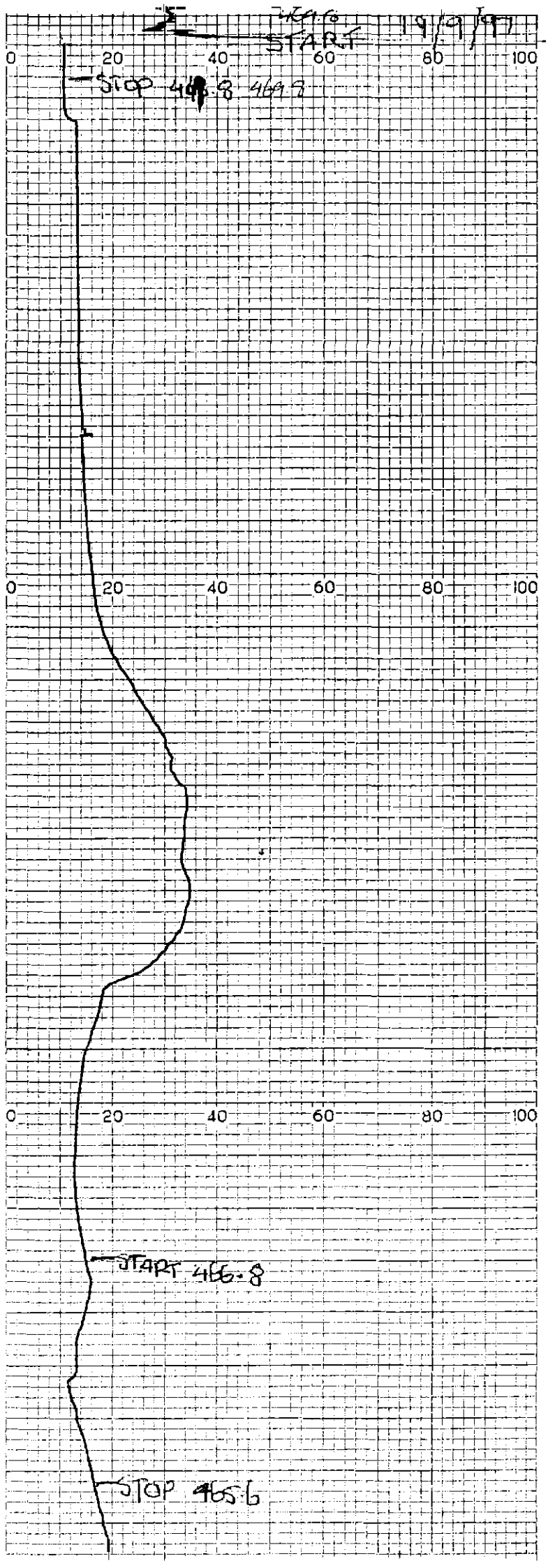
NO. 9N07



415467

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0
20
40
60
80
100
START
465.6
0
20
40
60
80
100
0
20
40
60
80
100
Angus Electronics Co. Indianapolis, IN 46224
NO. 59007

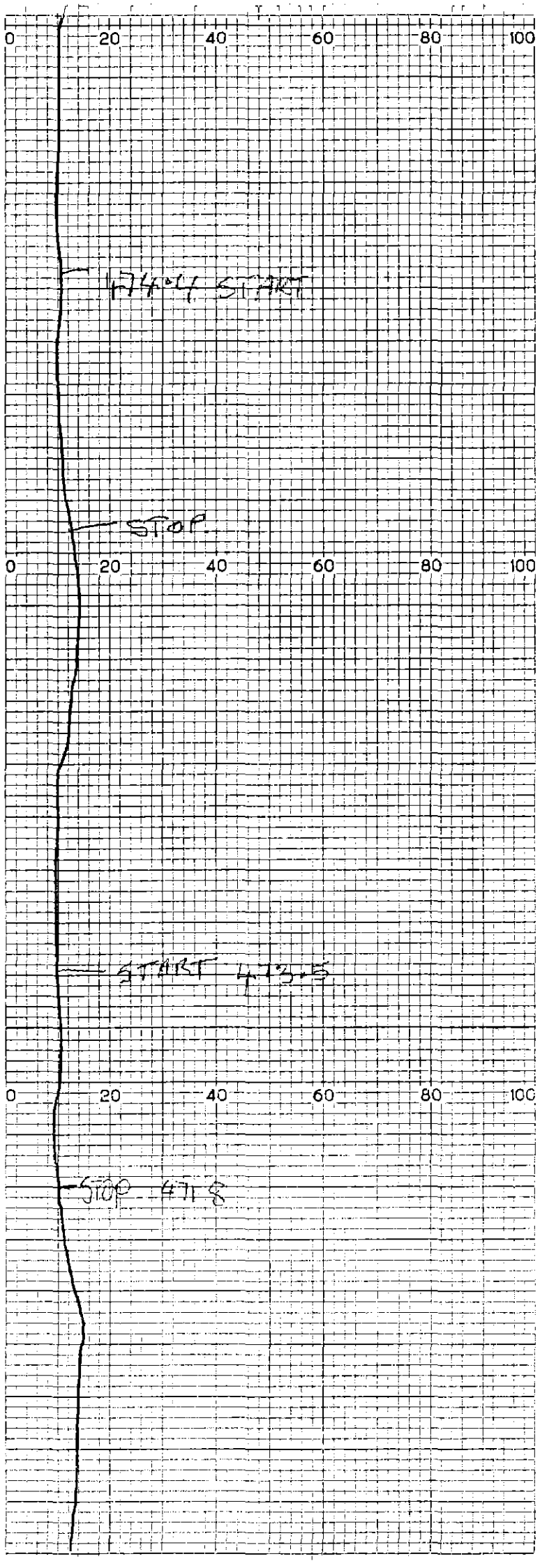


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15469

415470

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Angus Electronics Co. Indianapolis, IN 46224



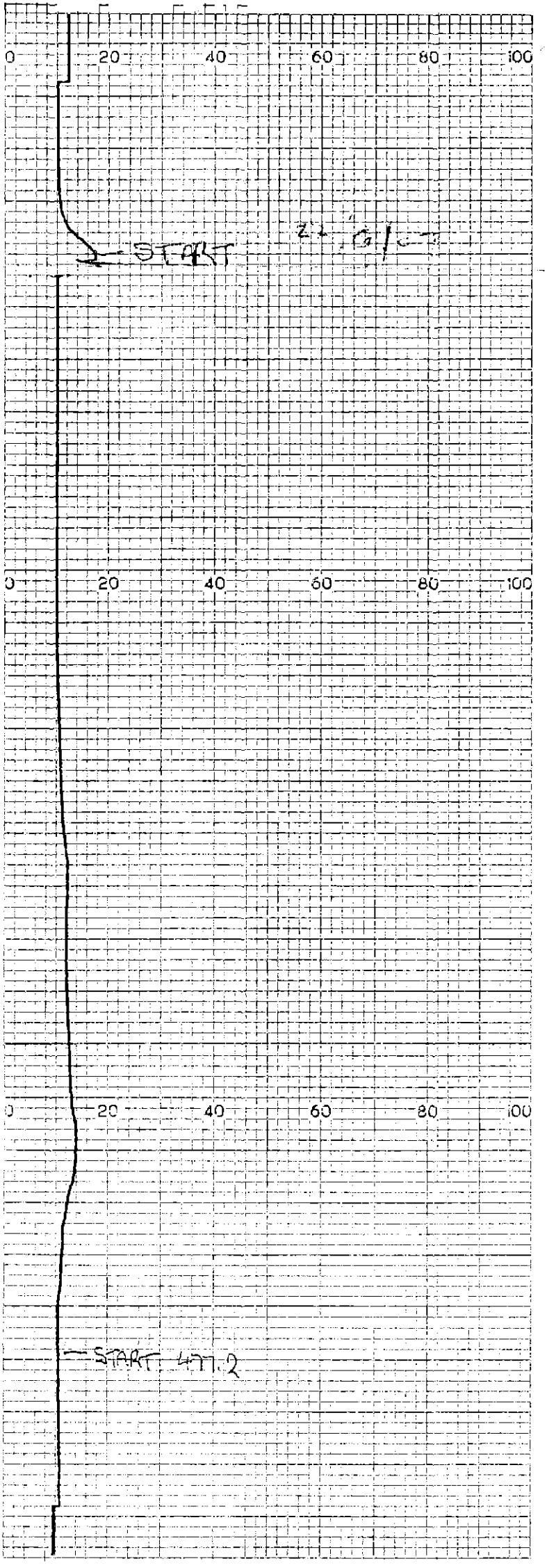
415471

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13472

Angus Electronics Co. Indianapolis, IN 46224

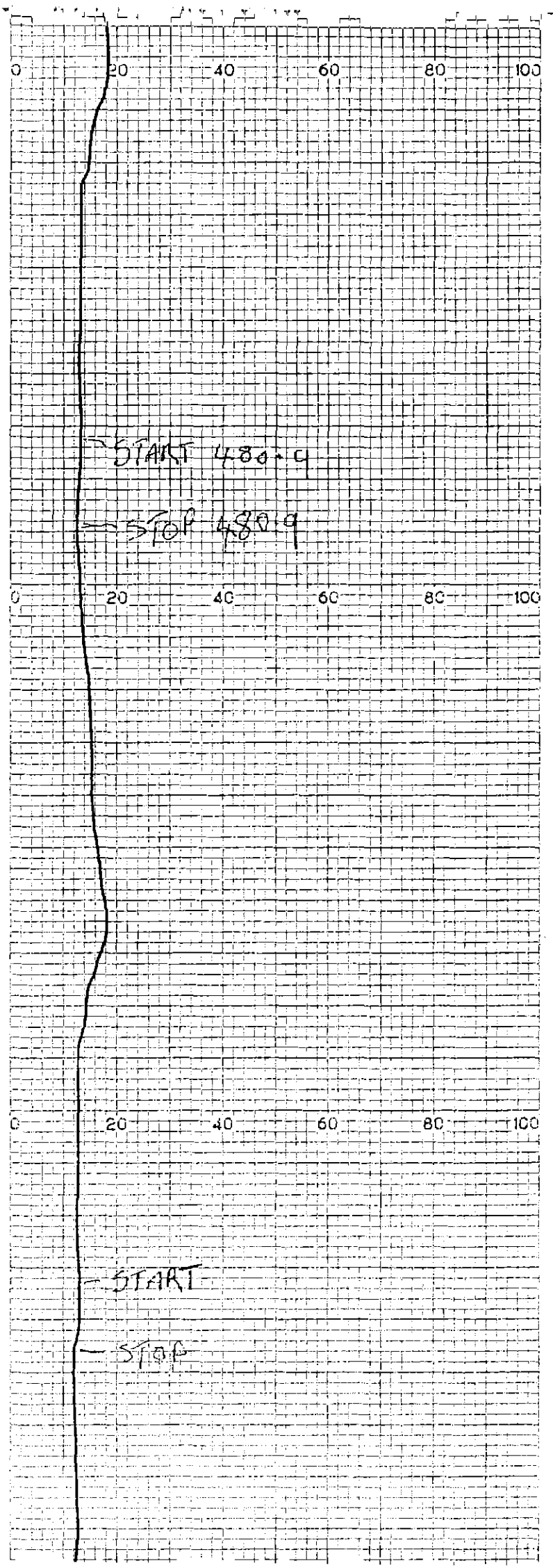
No. 59007



415473

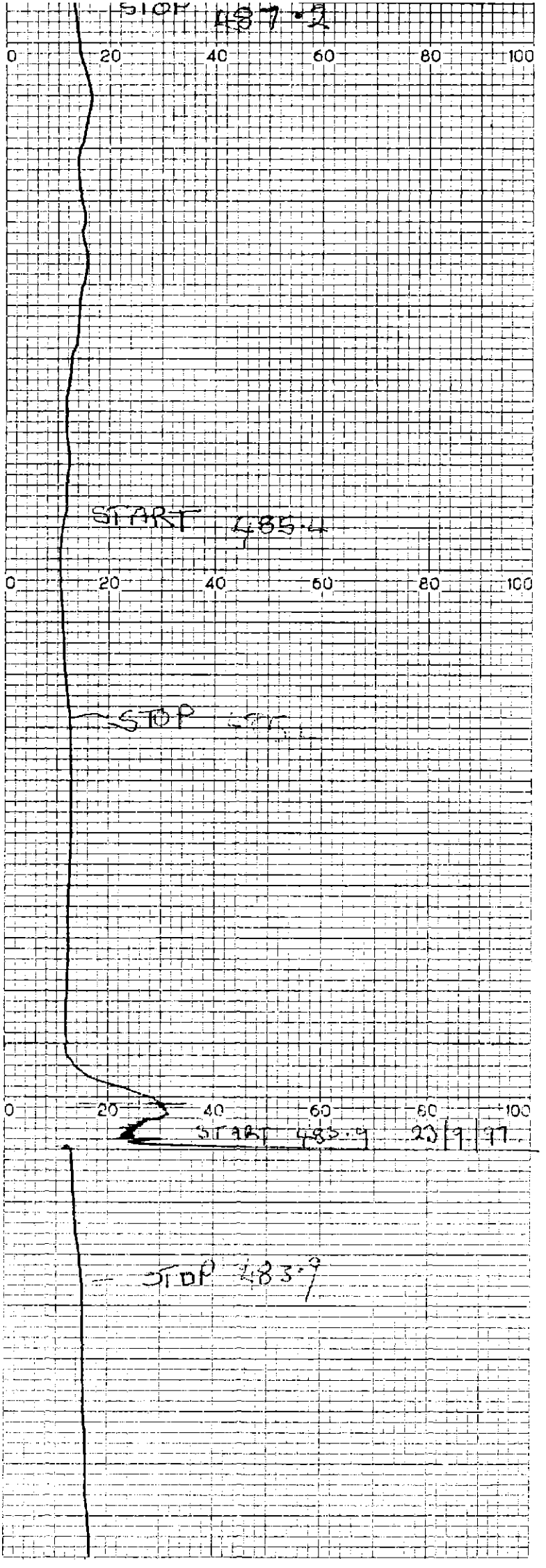
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15474



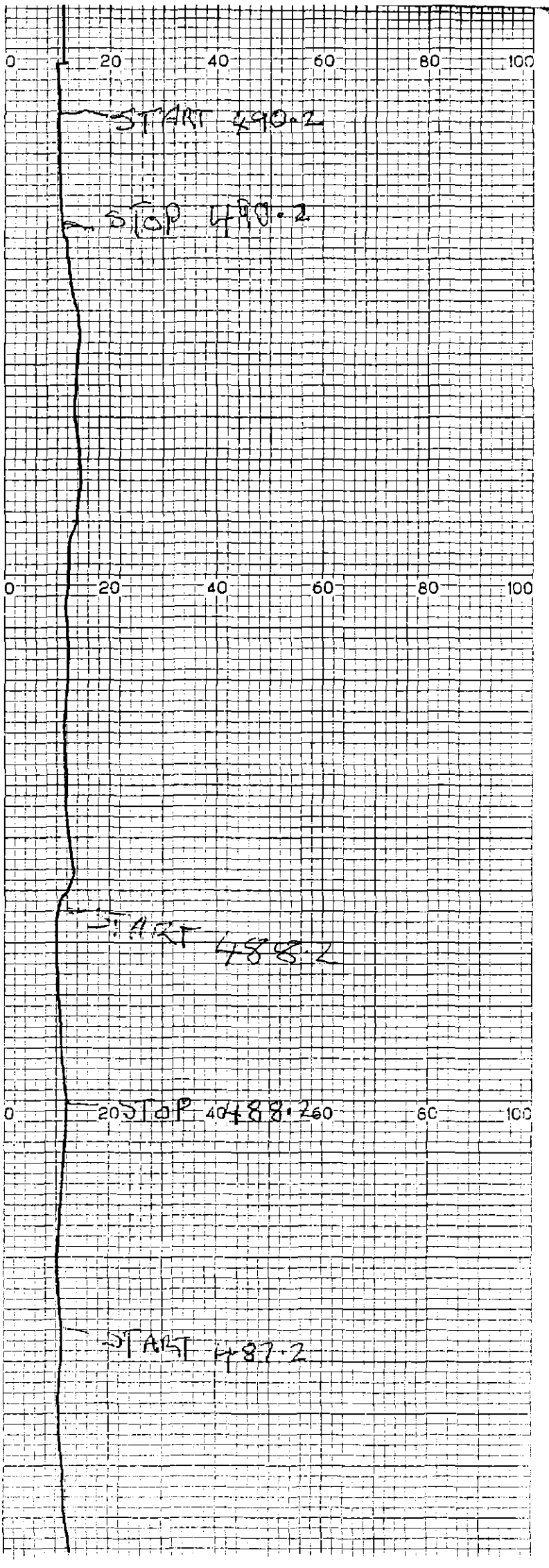
Angus Electronics Co. Indianapolis, IN 46224

No. 59007



415475

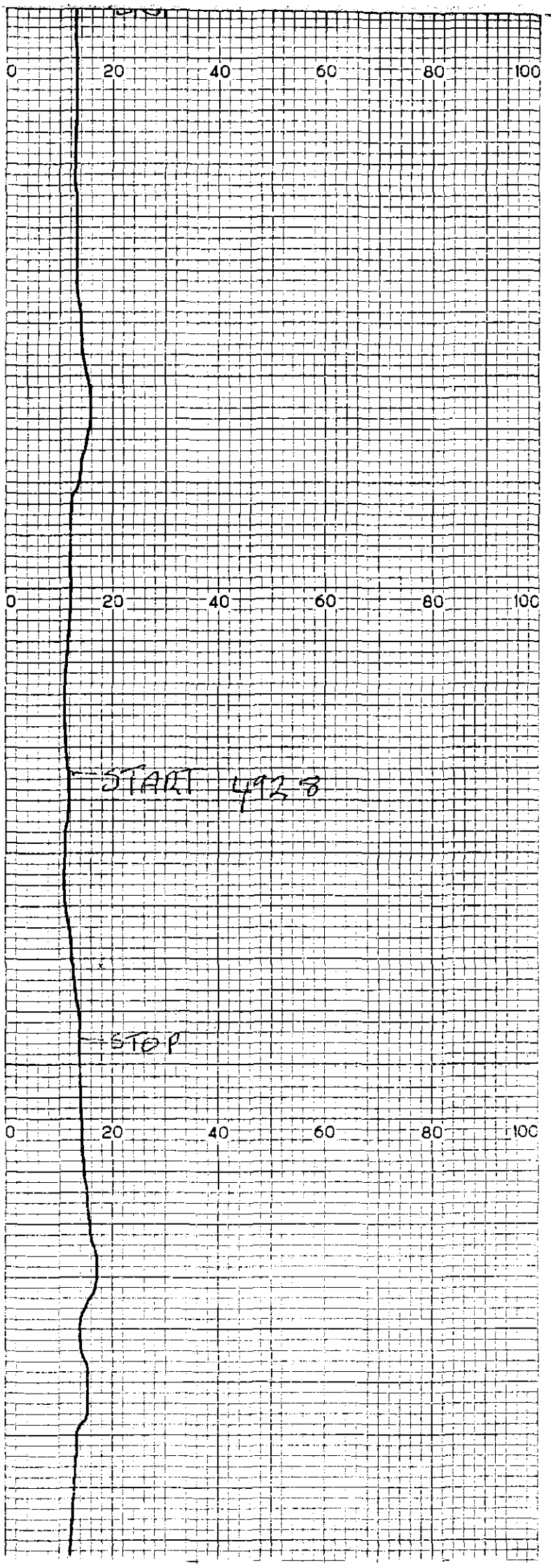
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415476

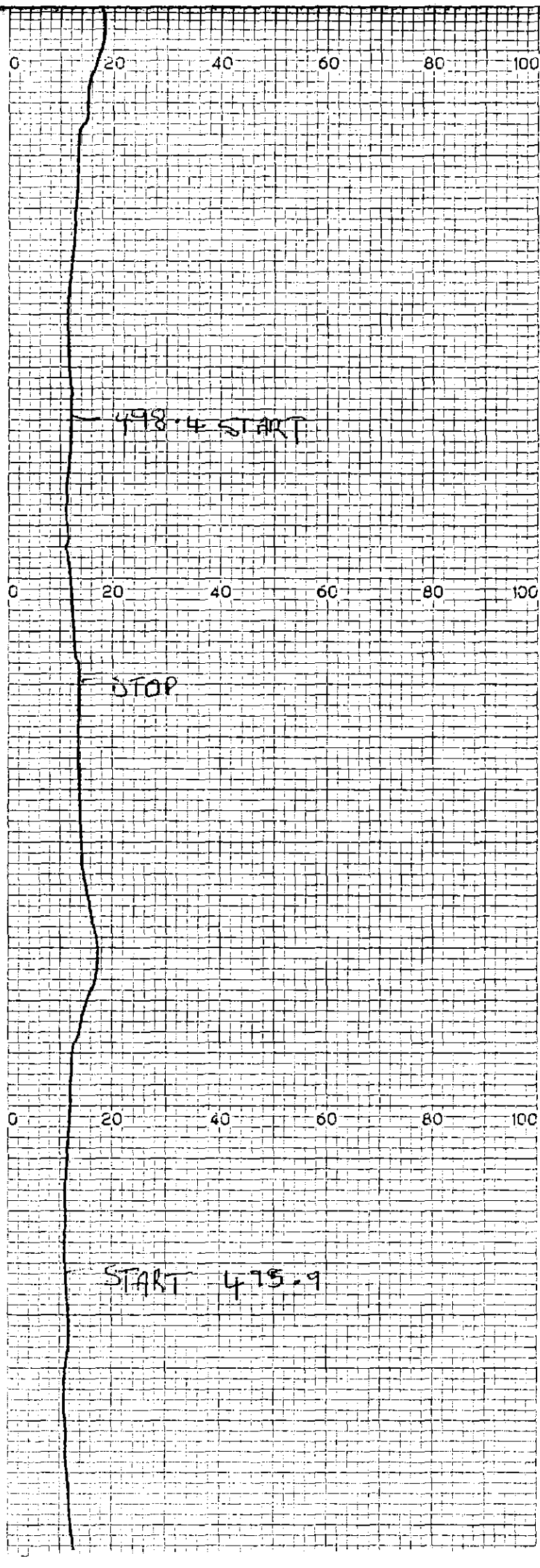
Angus Electronics Co. Indianapolis, IN 46224

NO. 59007

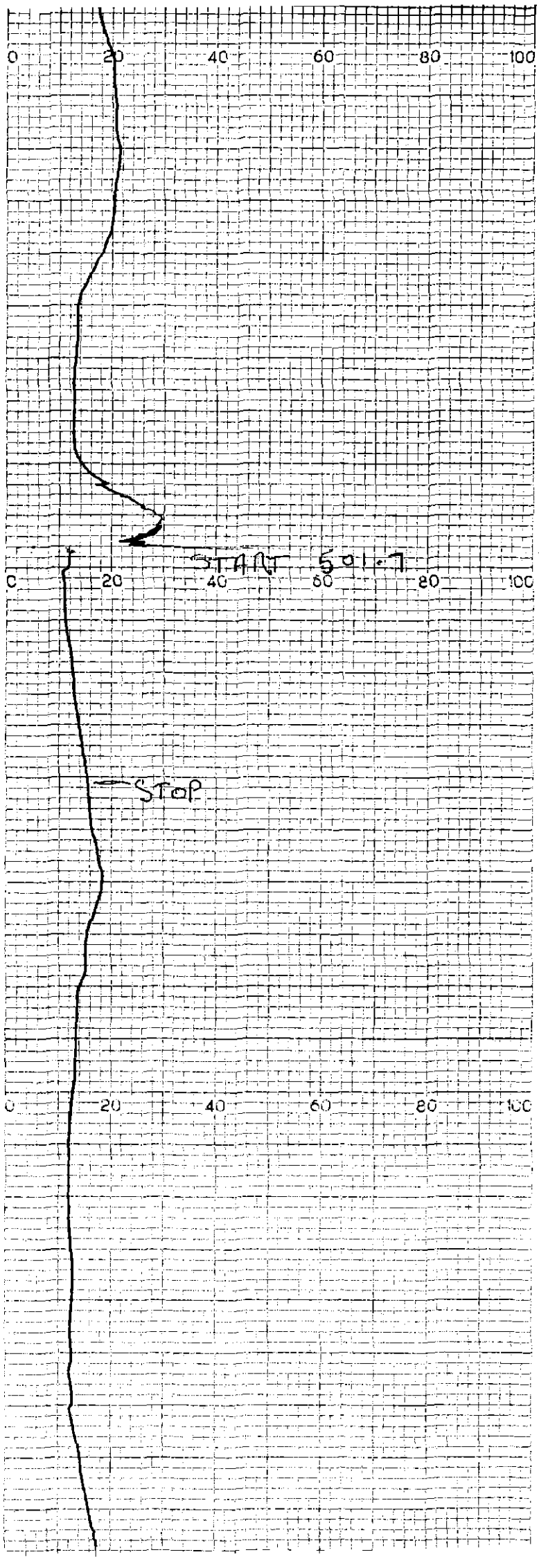


415477

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NO. 59C07
Angus Electronics Co. Indianapolis, IN 46224

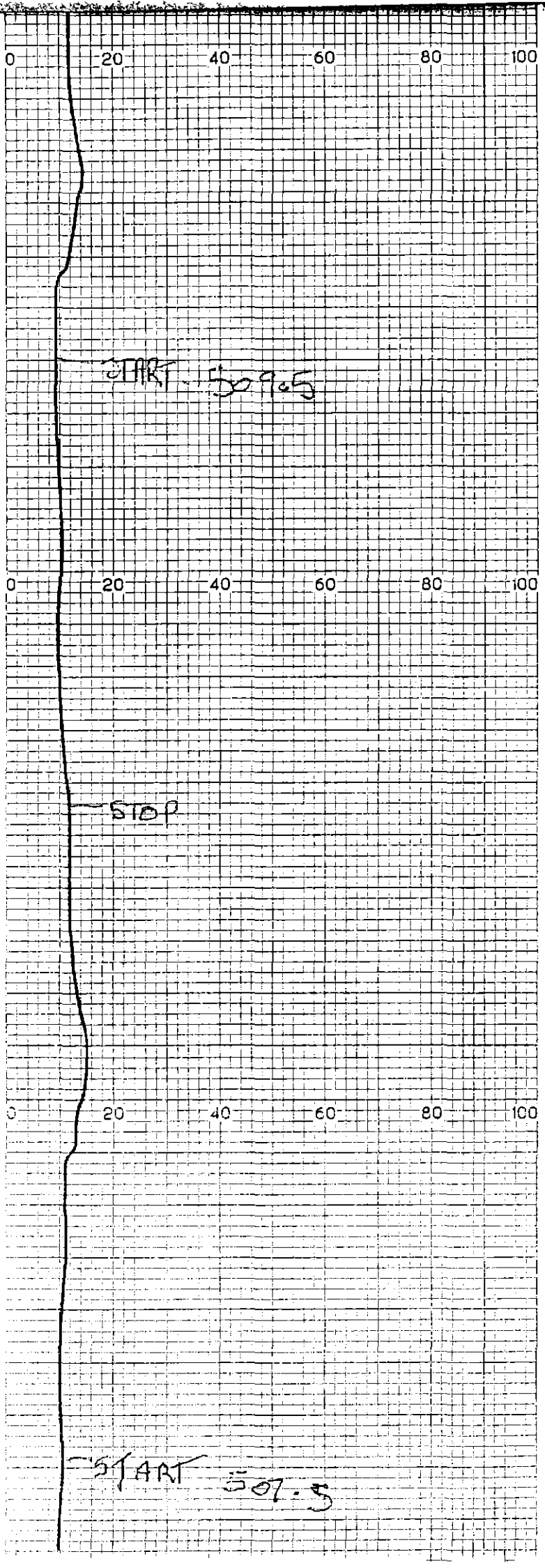


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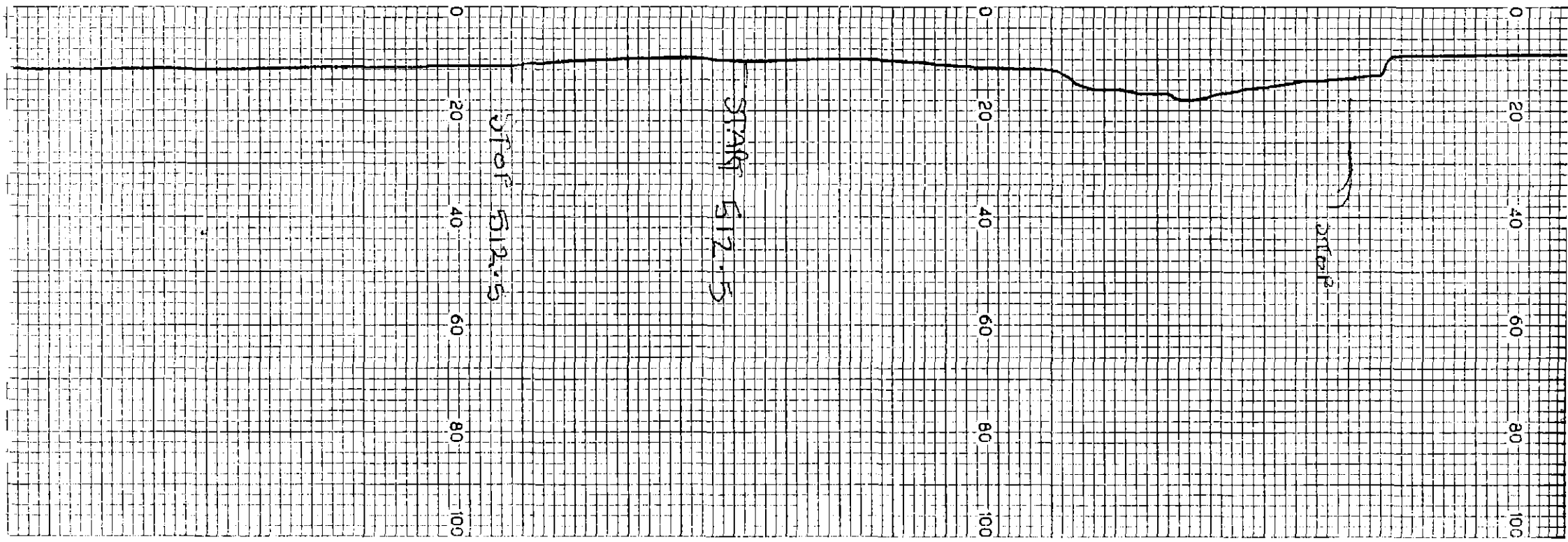
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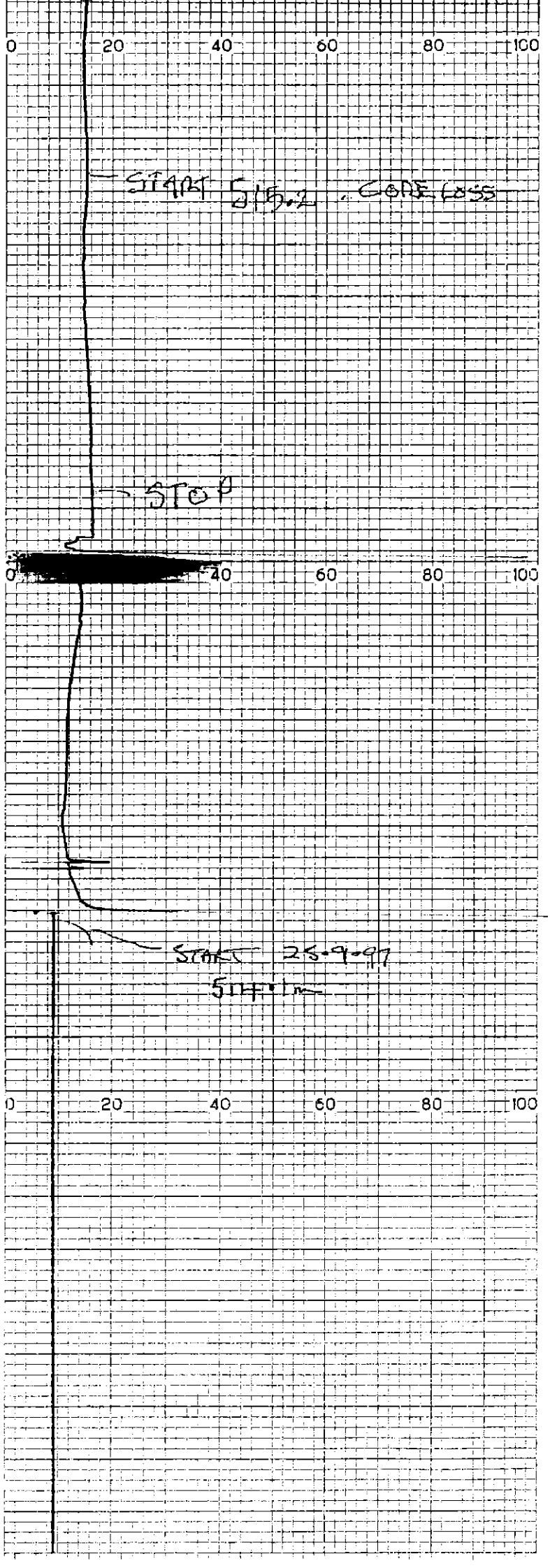
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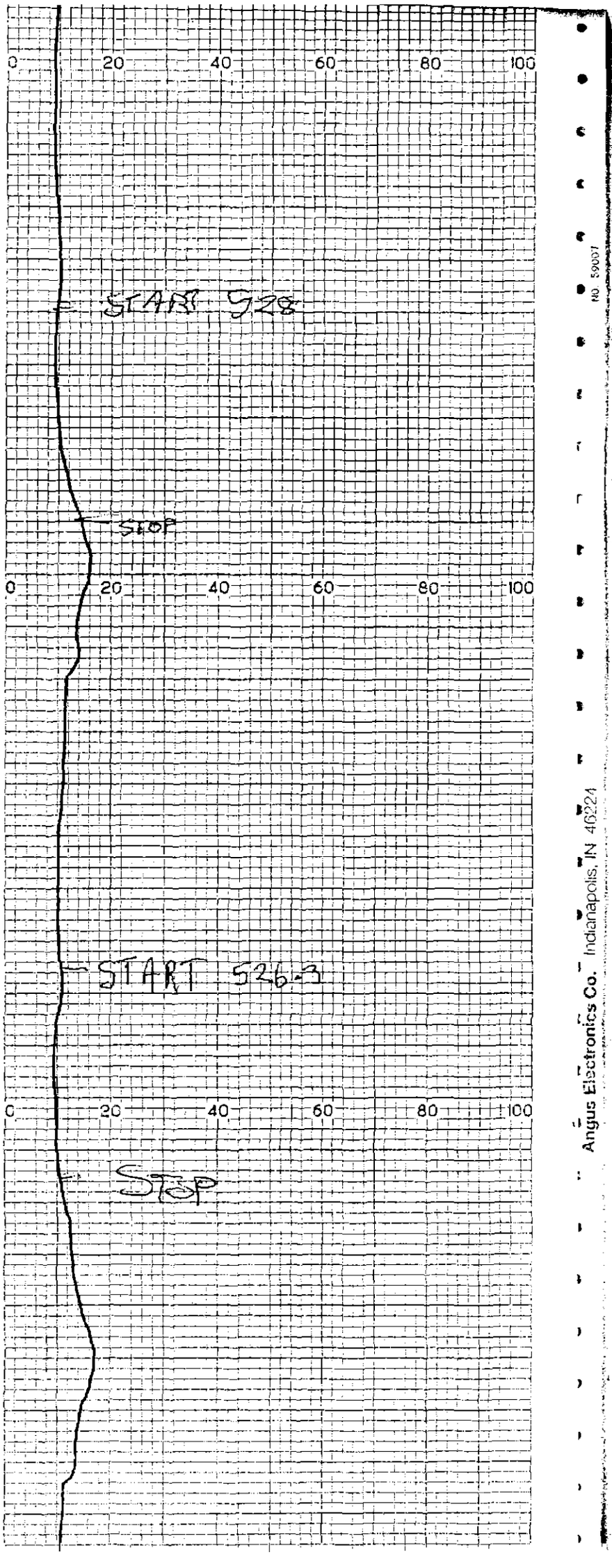
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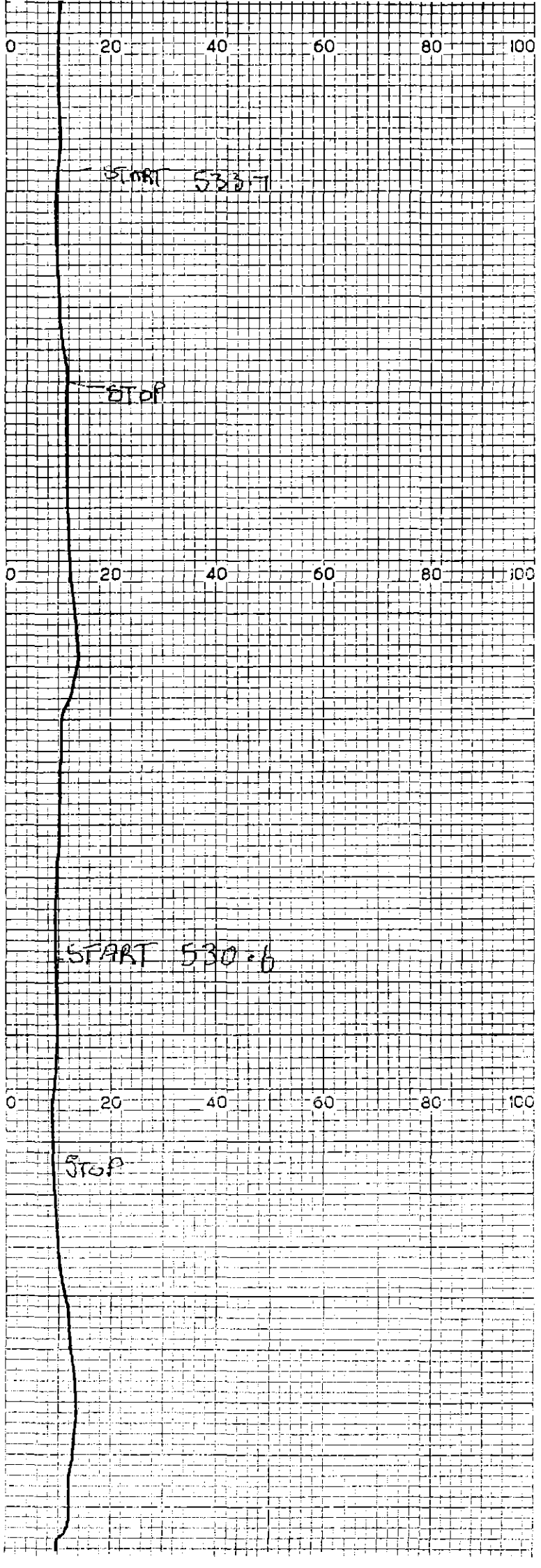
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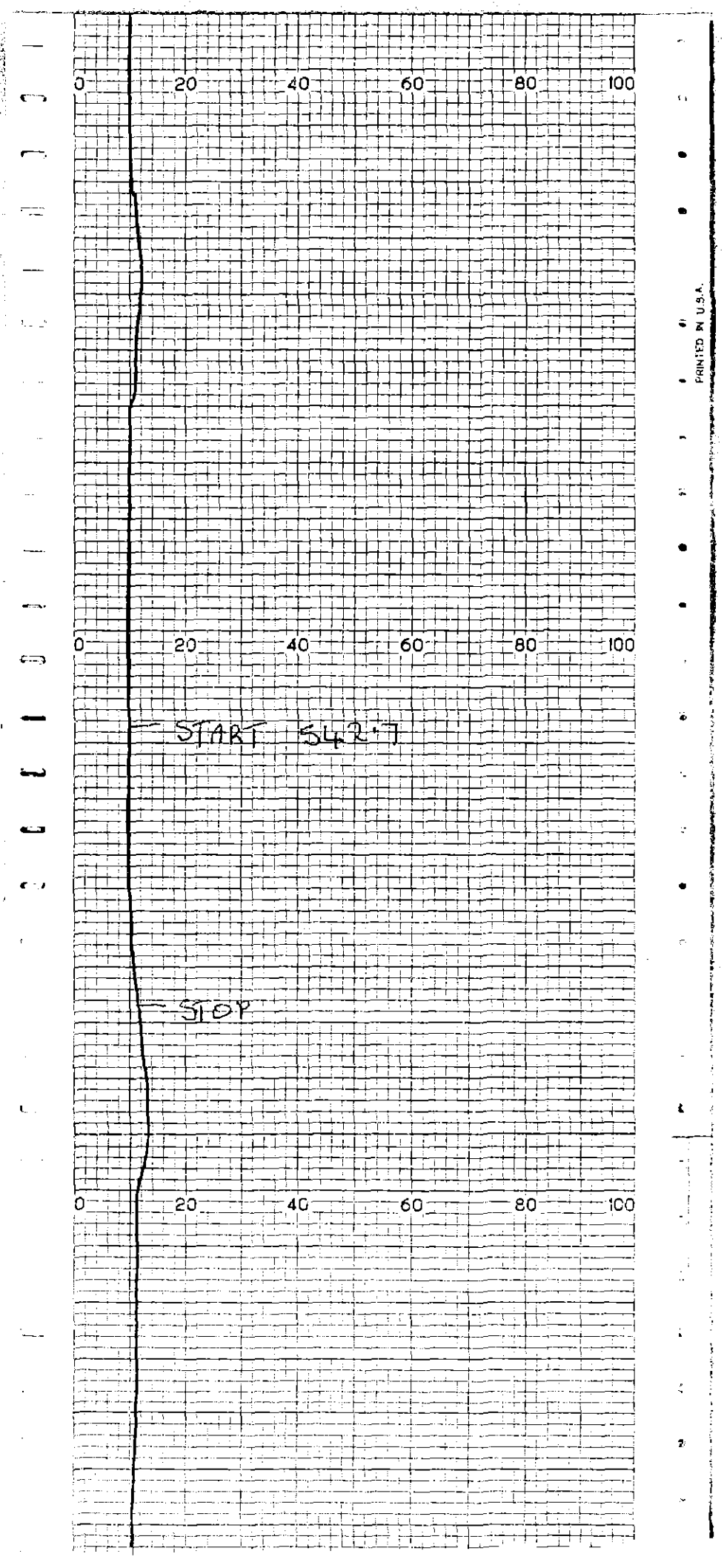
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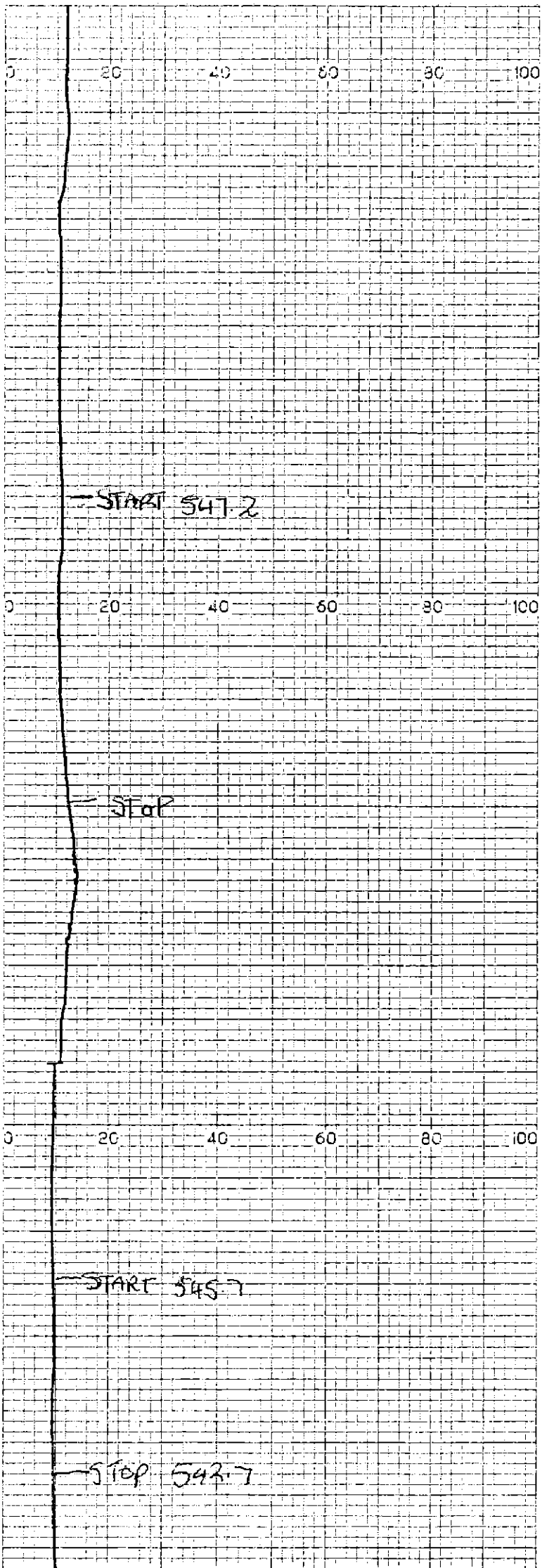
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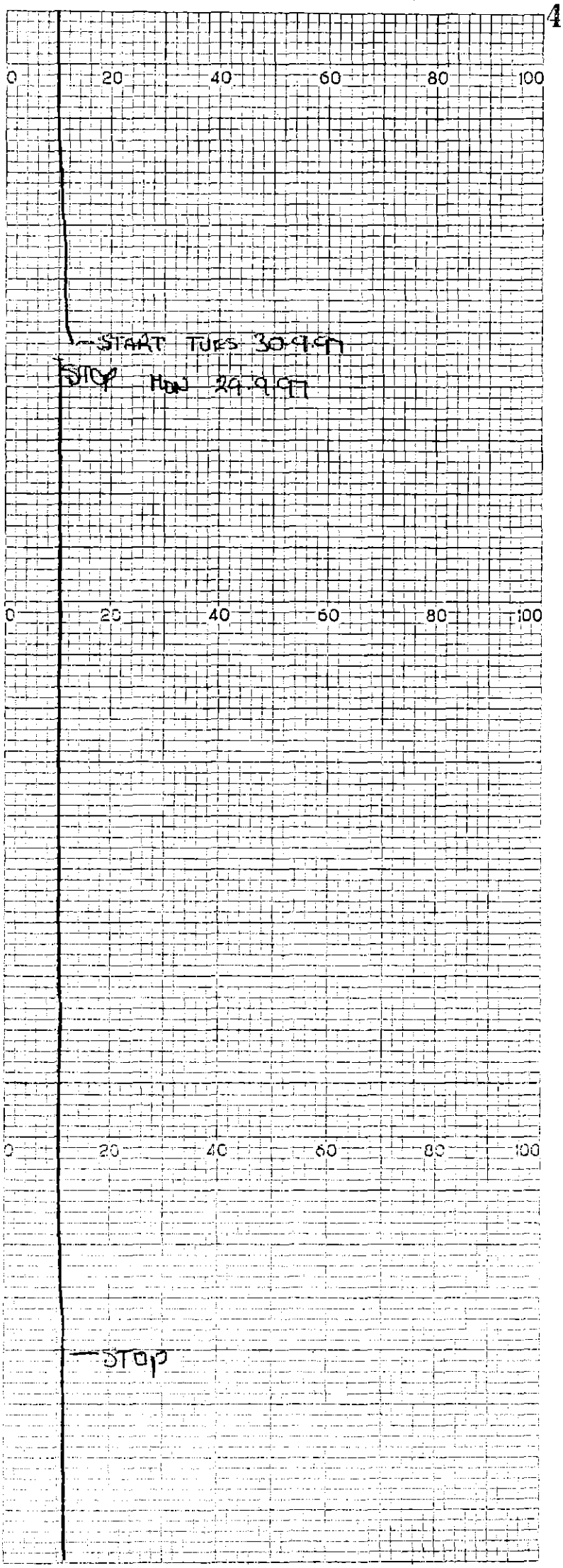

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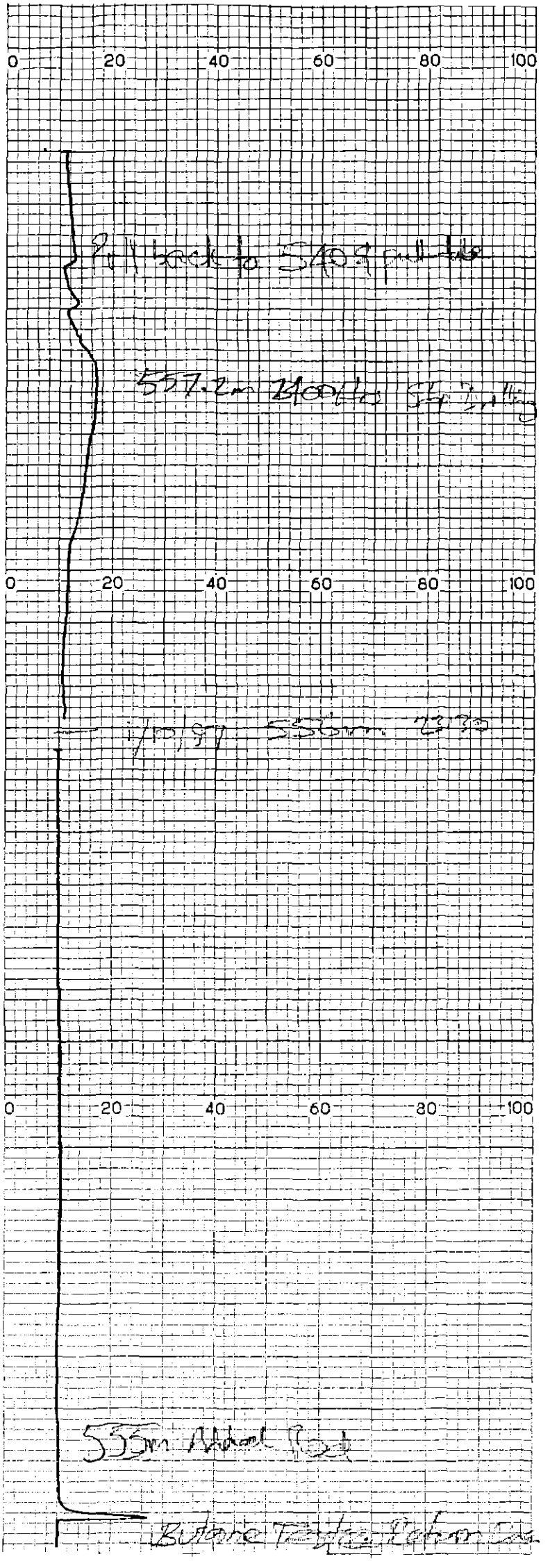

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-3 DEC 1997

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THE LONNAVALE OIL SEEP

A GEOCHEMICAL ANALYSIS

1 **The AMDEL Report**
for Great Southland Minerals P/Ls

2 **The Revill (CSIRO) Report**
for Tasmanian Development and Resources

amdel

415495

GEOCHEMICAL EVALUATION OF AN OIL SEEP SAMPLE FROM

LONNAVALE, TASMANIA

REPORT LQ4496 FOR

GREAT SOUTHLAND MINERALS PTY LTD

BY

SCOTT WYTHE

BRIAN WATSON

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1. Analytical Procedures

2. GC-MS of Branched/Cyclic Alkanes

3. TDR Report - Hydrocarbons Isolated From Lorna Vale Seep Swab and Bitumen Samples

1. INTRODUCTION

One oil seep sample was received from Lonnavale, Tasmania for physical testing and petroleum geochemical analyses. This report is a formal presentation of results forwarded by facsimile on 15 January 1996.

2. ANALYTICAL PROCEDURES

The analytical procedures used in this study are provided in Appendix 1.

3. RESULTS

Analytical data is presented in this report as follows:

Analysis	Table	Figure
Bulk Composition and GC of Whole Oils and Saturates	1	1 - 4
GC-MS of aromatic hydrocarbons	2	5 - 6
GC-MS of branched/cyclic hydrocarbons	3	7 - 9 Appendix 2

Due to the bituminous nature of the sample and its close association with an unidentified solid material no physical testing of the sample was possible. However sulphur analysis was performed on both a portion of the whole sample (including the solid material) and on the solid material alone following extraction of the oil. Both were found to contain 0.1% sulphur. This suggests a low sulphur content for the oil (ie.<0.1%).

4. GEOCHEMICAL INTERPRETATION OF SEEP SAMPLE

4.1 Maturity

Aromatic maturity indicators for the Lonnavale seep indicate that the sample was generated and expulsed from an early mature to mature source interval (Parameters A, C, E and F, Table 2). Parameter A indicates a maturity of VR_{equiv}=0.85%.

Maturities indicated for this sample by saturated biomarker maturity parameters are less precise than the aromatic derived biomarker ratios. These parameters (ie, C_{29} steranes and isosteranes - Biomarker Parameters 4 & 6, C_{27} diasteranes - Biomarker

Parameter 5, C_{27}, C_{30} & C_{32} hopanes - Biomarker Parameter 11, Table 2) all indicate that the sample has a moderate maturity.

The isoprenoid/n-alkane ratios (Figure 4) is unreliable for assessment of maturity due to pristane, phytane, n-C_{17} and n-C_{18} being affected by biodegradation and light end loss.

4.2 Source Affinity

The Lonnavale seep sample is aromatic-naphthenic in composition (Figure 2).

The pristane/phytane ratio (Table 1, Figures 1 & 7) is likely to be affected by biodegradation and light end loss. However despite these effects the ratio is still considered to indicate generation from sources deposited in anoxic conditions typical of a marine environment.

GC-MS of branched/cyclic alkanes for the sample has sterane and diasterane distributions (m/z 217, 218, 259; Table 3, Figures 7 & 9, Appendix 2) which contain significant C_{29} homologues of higher plant origin (Biomarker parameters 1, 2 & 3, Table 3) suggesting some terrestrial input into the precursor organic matter.

Tricyclic terpane distributions (m/z 191, Appendix 2) show that C_{19} - C_{31} tricyclics are the dominant compounds present in the sample. Such a distribution is characteristic of precursor organic matter rich in *Tasmanites* alga. Tasmanite is thought to have been deposited in a low energy, nearshore marine environment.

Hopane signatures (m/z 191, Appendix 2) are unreliable due to the dominance of tricyclic compounds. However the C_{29} norhopane is likely to be more abundant than the C_{30} hopane suggesting a likely carbonate source. The presence of significant amounts of diasteranes usually associated with clay-rich environments though suggests otherwise.

No significant amount of botryococcane was detected (m/z 183, Appendix 2).

This data suggests that the precursor organic matter of the Lonnavale oil seep sample has been derived from a somewhat mixed algal/terrestrial source containing abundant *Tasmanites* alga deposited in an anoxic, probably nearshore, marine environment.

The ratios of 1-methylphenanthrene/9-methylphenanthrene and 1,2,5-trimethylnaphthalene/1,3,6-trimethylnaphthalene (Figure 7) has been used to indicate source input from Araucariacean derived plant resins (trees from the Kauri pine group) which were most prominent in Early to Middle Jurassic times. The low relative abundance of 1-methylphenanthrene and 1,2,5-trimethylnaphthalene

implies that these resins were not significant components of the precursor organic matter. However, this does not preclude the possibility that this oil was generated from a source of Jurassic/Cretaceous age.

4.3 Post Pooling Alteration and Migration

The abundance of cycloalkanes and corresponding lack of n-alkanes in the sample (Figures 1 & 3) suggests that this condensate may have been subjected to light biodegradation. No evidence of significant biodegradation was observed in any of the biomarker compounds.

Figure 8 suggests that the sample is likely to have undergone a degree of migration since generation from its source interval.

5. CONCLUSIONS

5.1 Aromatic maturity indicators for the Lonnavale oil seep indicate that it was generated and expulsed from a moderately mature source interval ($VR_{equiv} \approx 0.80\%$). Saturated biomarker maturity indicators ratios support this level of maturity.

5.2 Various aspects of the molecular composition of the sample indicates that the precursor organic matter of the oil seep is likely to have been derived from a mixed algal/terrestrial source containing abundant *Tasmanites* alga deposited in an anoxic, possibly nearshore, marine environment.

5.3 The sample appears to have been subjected to light biodegradation.

5.4 The extract is likely to have undergone some migration since generation from its source interval.

TABLE 1

C_{12+} BULK COMPOSITION AND ALKANE RATIOS, LONNAVALE SEEP

	Composition (%)				Alkane Ratios			
EOM (%)	n+iso	Naph	Arom	NSO	Np/Pr	Pr/Ph	Pr/n-C_{17}	Ph/n-C_{18}
20.32	4.1	36.5	26.2	9.7	-	0.44	0.36	0.64

EOM = extractable organic matter
n+iso = normal + iso-alkanes
Naph = naphthenes (branched and cyclic alkanes)
Arom = aromatic hydrocarbons
NSO = compounds containing nitrogen, sulphur and oxygen

Np = norpristane
Pr = pristane
Ph = phytane
n-C_{17} = n-heptadecane
n-C_{18} = n-octadecane

EC 3 0 3 4 1 7

TABLE 2

AROMATIC MATURITY DATA, LONNAVALE SEEP

MPI	MPR	DNR	MPDF	VR CALC (%)					
				A	B	C	D	E	F
0.756	1.306	14.58	0.454	0.85	1.85	1.05	7.60	0.75	0.85

KEY TO AROMATIC MATURITY INDICATORS

Methylphenanthrene index (MPI), methylphenanthrene ratio (MPR), dimethylnaphthalene ratio (DNR) and calculated vitrinite reflectance (VR_{calc}) are derived from the following equations (after Radke and Welte, 1983; Radke *et al*, (1984):

$$MPI = \frac{1.5(2\text{-MP} + 3\text{-MP})}{P + 1\text{-MP} + 9\text{-MP}}$$

VR_{calc} (a) = 0.6 MPI + 0.4 (for VR < 1.35%)

VR_{calc} (b) = -0.6 MPI + 2.3 (for VR > 1.35%)

$$MPR = \frac{2\text{-MP}}{1\text{-MP}}$$

VR_{calc} (c) = 0.99 $\log_{10}$ MPR + 0.94(VR = 0.5-1.7%)

$$DNR = \frac{2,6\text{-DMN} + 2,7\text{-DMN}}{1,5\text{-DMN}}$$

VR_{calc} (d) = 0.46 DNR + 0.89 (for VR = 0.9-1.5%)

Where
P = phenanthrene
1-MP = 1-methylphenanthrene
2-MP = 2-methylphenanthrene
3-MP = 3-methylphenanthrene
9-MP = 9-methylphenanthrene
1,5-DMN = 1,5-dimethylnaphthalene
2,6-DMN = 2,6-dimethylnaphthalene
2,7-DMN = 2,7-dimethylnaphthalene

Peak areas measured from m/z 156 (dimethylnaphthalene), m/z 178 (phenanthrene) and m/z 192 (methylphenanthrene) mass fragmentograms of diaromatic and triaromatic hydrocarbon fraction isolated by thin layer chromatography.

Recalibration of the methylphenanthrene index using data from a suite of Australian coals has given rise to another equation for calculated vitrinite reflectance (after Boreham *et al*, 1988):

VR_{calc} (e) = 0.7 MPI + 0.22 (for VR < 1.7%)

The methylphenanthrene distribution ratio (MPDF) and calculated vitrinite reflectance VR_{calc} (f) is derived from the following equation (after Kvalheim *et al*, 1987):

$$MPDF = \frac{(2\text{-MP} + 3\text{-MP})}{(2\text{-MP} + 3\text{-MP} + 1\text{-MP} + 9\text{-MP})}$$

VR_{calc} (f) = -0.166 + 2.242 MPDF

TABLE 3

BIOMARKER PARAMETERS OF SOURCE, MATURITY, MIGRATION AND BIODEGRADATION, LONNAVALE SEEP

Steranes							Terpanes						Acyclic Alkanes		
Parameter															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
29:30:41	1.38	1.14	1.41	1.25	1.72	0.91	-	-	-	6.37	-	-	0.44	0.36	0.64

- = not determined

KEY TO BIOMARKER PARAMETERS OF SOURCE, MIGRATION AND BIODEGRADATION

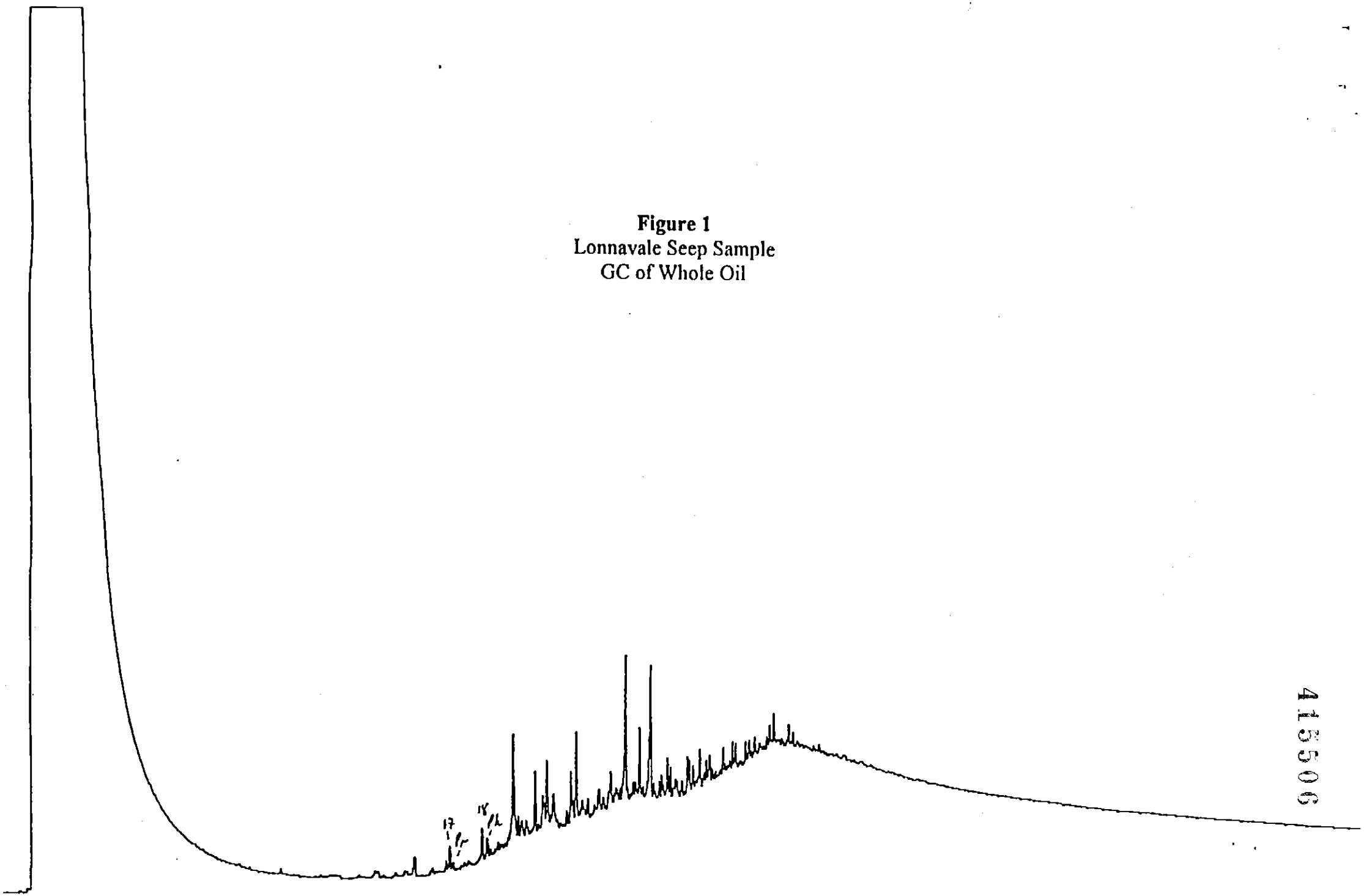
Parameter	Derivation*	Specificity
1	C_{27}:C_{28}:C_{29} 5α(H)14α(H)17α(H) 20S steranes	Source
2	C_{29} 5α(H)14α(H)17α(H) 20S sterane/C_{27} 5α(H)14α(H)17α(H) 20S sterane	Source
3	C_{29} 13β(H)17α(H) 20R diasterane/C_{27} 13β(H)17α(H) 20R diasterane	Source
4	C_{29} 5α(H)14α(H)17α(H) 20S sterane/C_{29} 5α(H)14α(H)17α(H) 20R sterane	Maturity, Biodegradation
5	C_{27} 13β(H)17α(H) 20S diasterane/C_{27} 13β(H)17α(H) 20R diasterane	Maturity
6	C_{29} 5α(H)14β(H)17β(H) 20R sterane/C_{29} 5α(H)14α(H)17α(H) 20R sterane	Maturity, Migration
7	C_{29} 13β(H)17α(H) 20R+20S diasteranes/C_{29} 5α(H) steranes	Migration, Source
8	18α(H)-30-norneohopane (C_{29}Ts)/C_{29} 17α(H) hopane + C_{29}Ts	Maturity, Source
9	17α(H) diahopane/18α(H)-30-norneohopane (C_{30}*/C_{29}TS)	Source, Maturity
10	C_{27} 18α(H)-22,29,30-trisnorhopane (Ts)/C_{27} 17α(H)-22,29,30-trisnorhopane (Tm)+ Ts	Maturity, Source
11	T_s/C_{30} 17α(H)21β(H) hopane	Maturity
12	C_{32} 17α(H)21β(H) 22S homohopane/C_{32} 17α(H)21β(H) 22R homohopane	Maturity
13	C_{30} 17β(H)21α(H) moretane/C_{30} 17α(H)21β(H) hopane	Maturity
14	pristane/phytane	Source
15	pristane/n-heptadecane	Source, Biodegradation, Maturity
16	phytane/n-octadecane	Source, Biodegradation, Maturity

* Ratios calculated from peak areas as follows:

Parameters	1-7	m/z = 217, 218, 259 mass fragmentograms
Parameters	8 - 13	m/z = 191 mass fragmentogram
Parameters	14 - 16	capillary gas chromatogram of alkanes or whole oil/extract

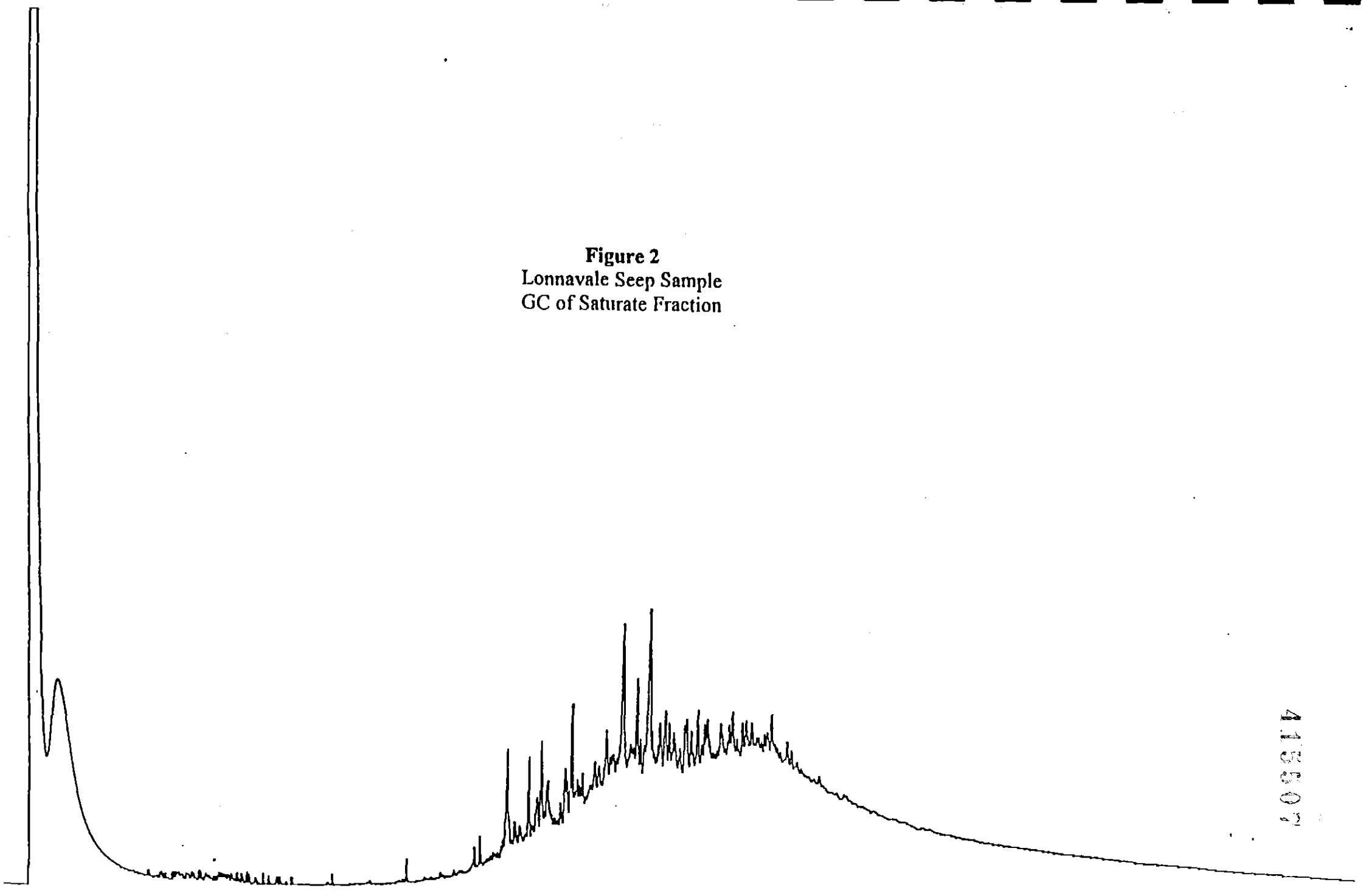
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Figure 1
Lonnavale Seep Sample
GC of Whole Oil



415509

Figure 2
Lonnavale Seep Sample
GC of Saturate Fraction



AF5508

FIGURE 3

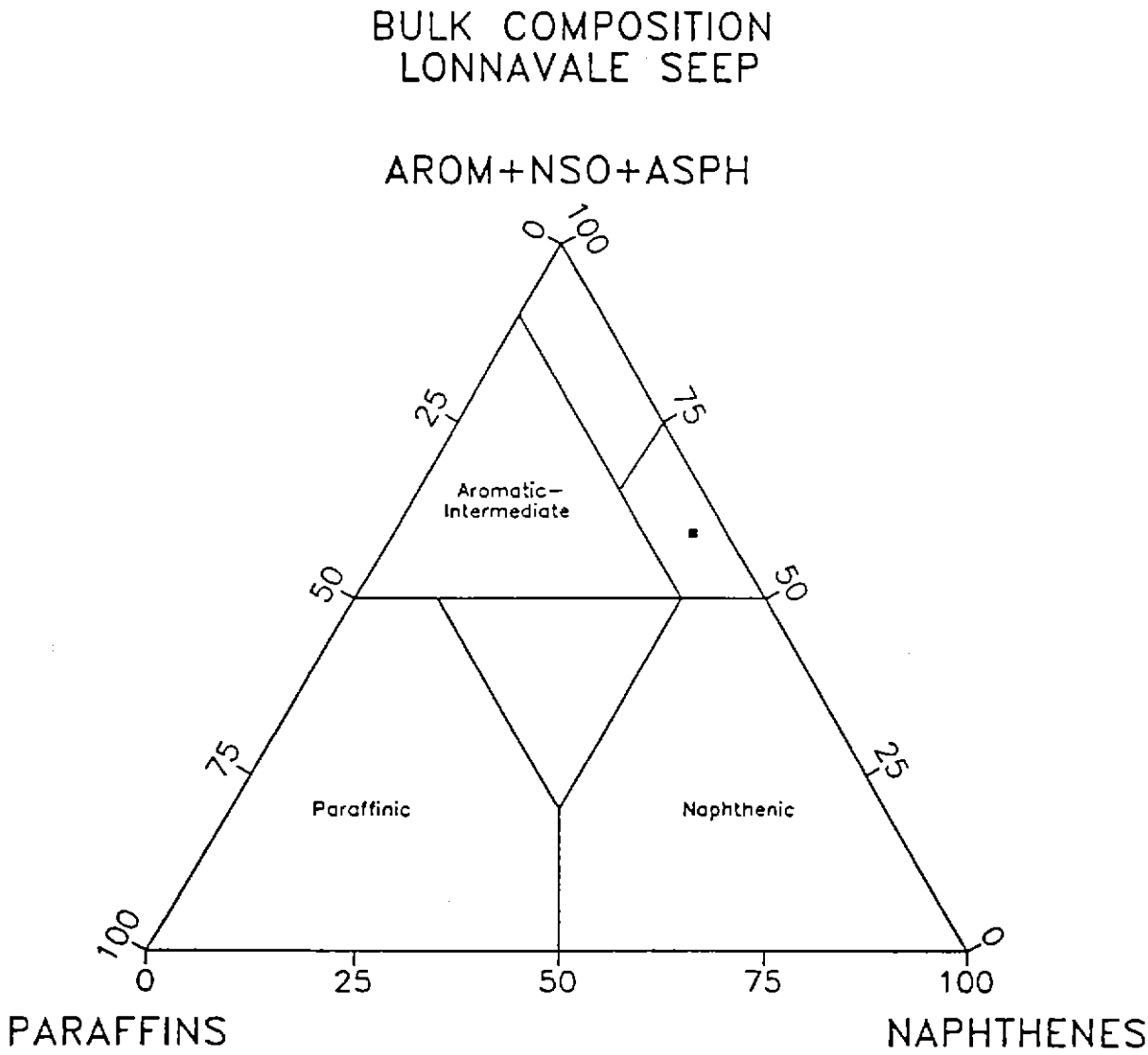


FIGURE 4

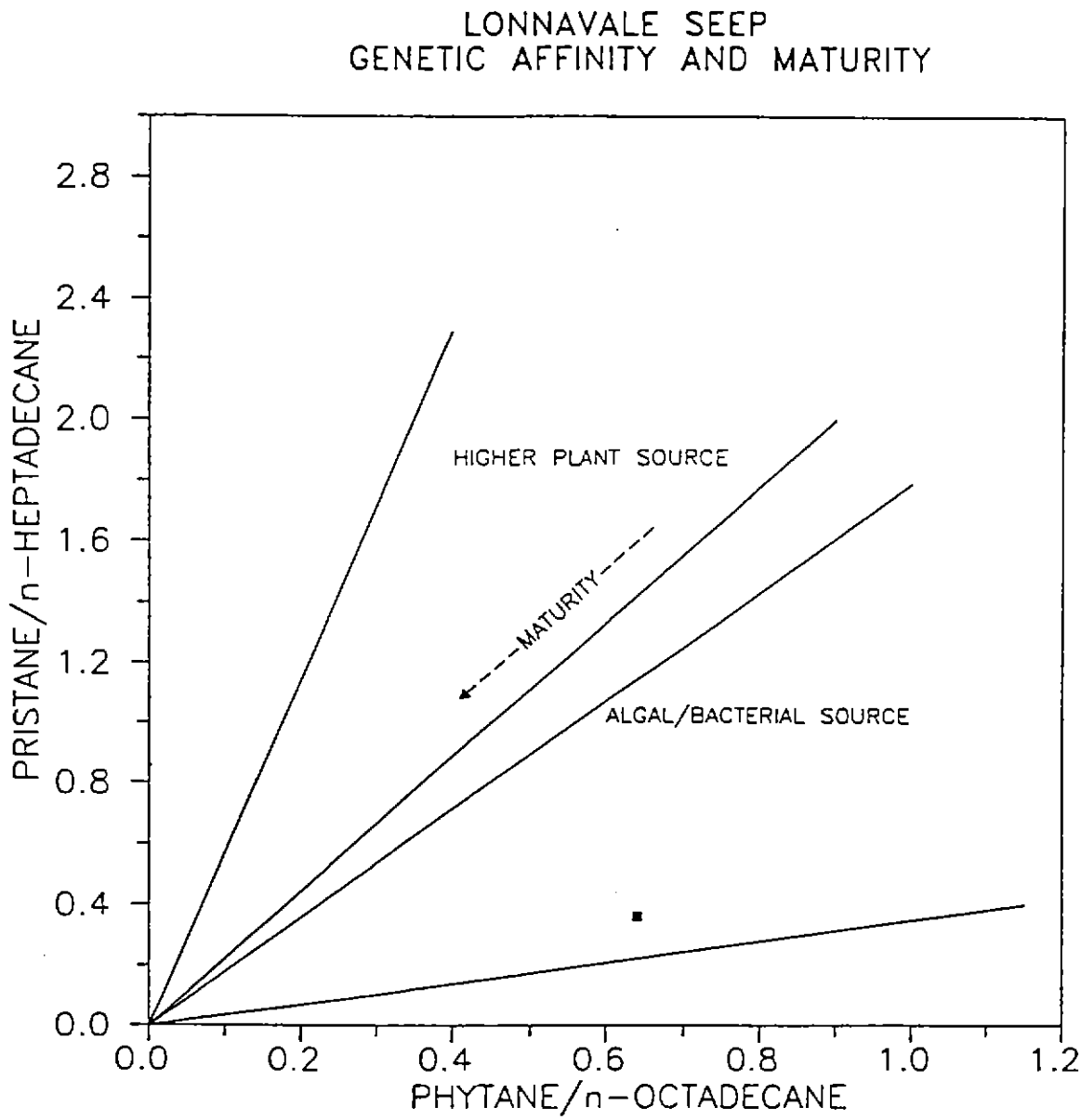

LONNAVALE SEEP
GENETIC AFFINITY AND MATURITY
PRISTANE/n-HEPTADECANE
PHYTANE/n-OCTADECANE
HIGHER PLANT SOURCE
MATURITY
ALGAL/BACTERIAL SOURCE
0.0
0.4
0.8
1.2
1.6
2.0
2.4
2.8
0.0
0.2
0.4
0.6
0.8
1.0
1.2

FIGURE 5a

File : C:\HPCHEM\1\DATA\UOFA\4496AROM.D
Operator : WYTHE
Acquired : 12 Jan 96 11:16 am using AcqMethod 60MAROM
Instrument : AMDEL-597
Sample Name: LONAVALE SEEP
Misc Info :
Vial Number: 1

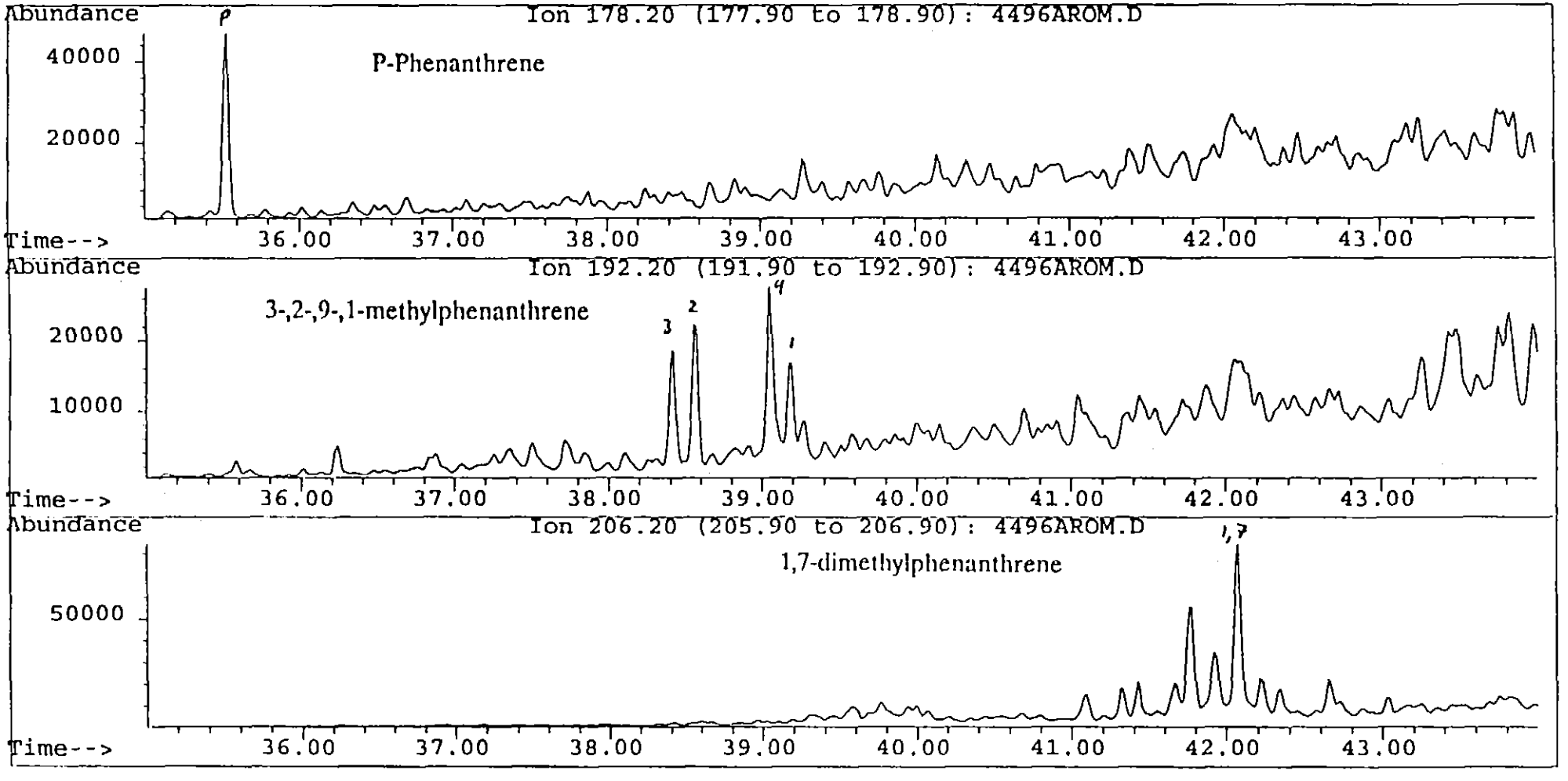


FIGURE 5b

File : C:\HPCHEM\1\DATA\UOFA\4496AROM.D
Operator : WYTHE
Acquired : 12 Jan 96 11:16 am using AcqMethod 60MAROM
Instrument : AMDEL-597
Sample Name: LONAVALE SEEP
Misc Info :
Vial Number: 1

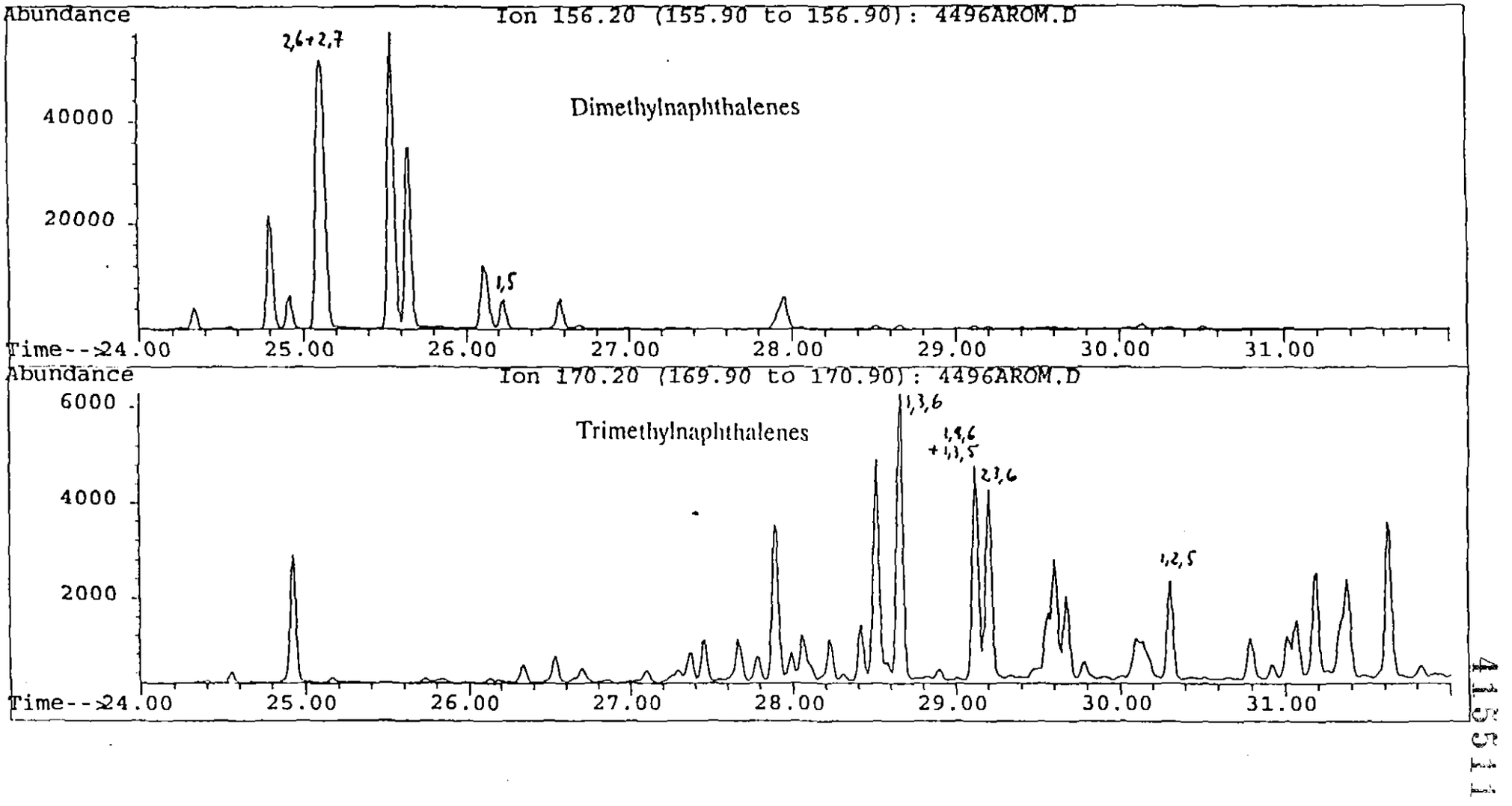


FIGURE 6

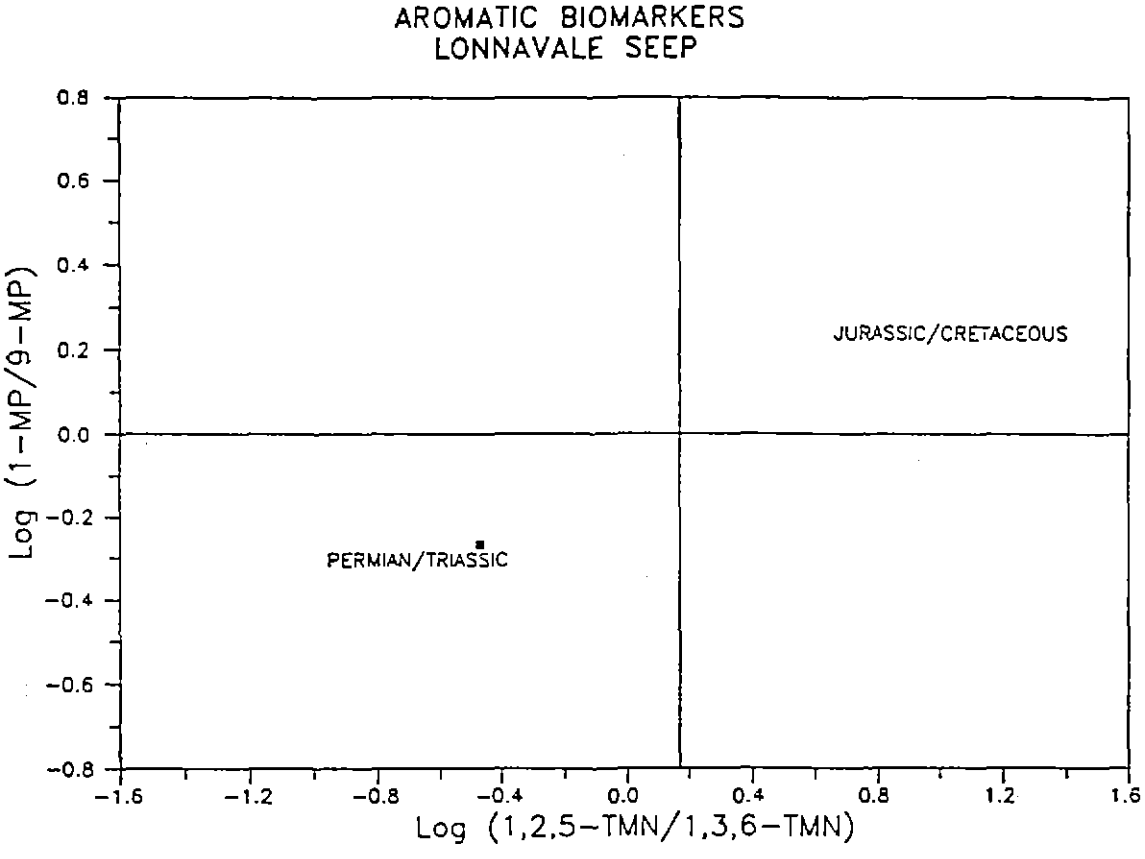

AROMATIC BIOMARKERS
LONNAVALE SEEP
JURASSIC/CRETACEOUS
PERMIAN/TRIASSIC
Log (1-MP/9-MP)
Log (1,2,5-TMN/1,3,6-TMN)
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.6
-1.2
-0.8
-0.4
0.0
0.4
0.8
1.2
1.6

FIGURE 7

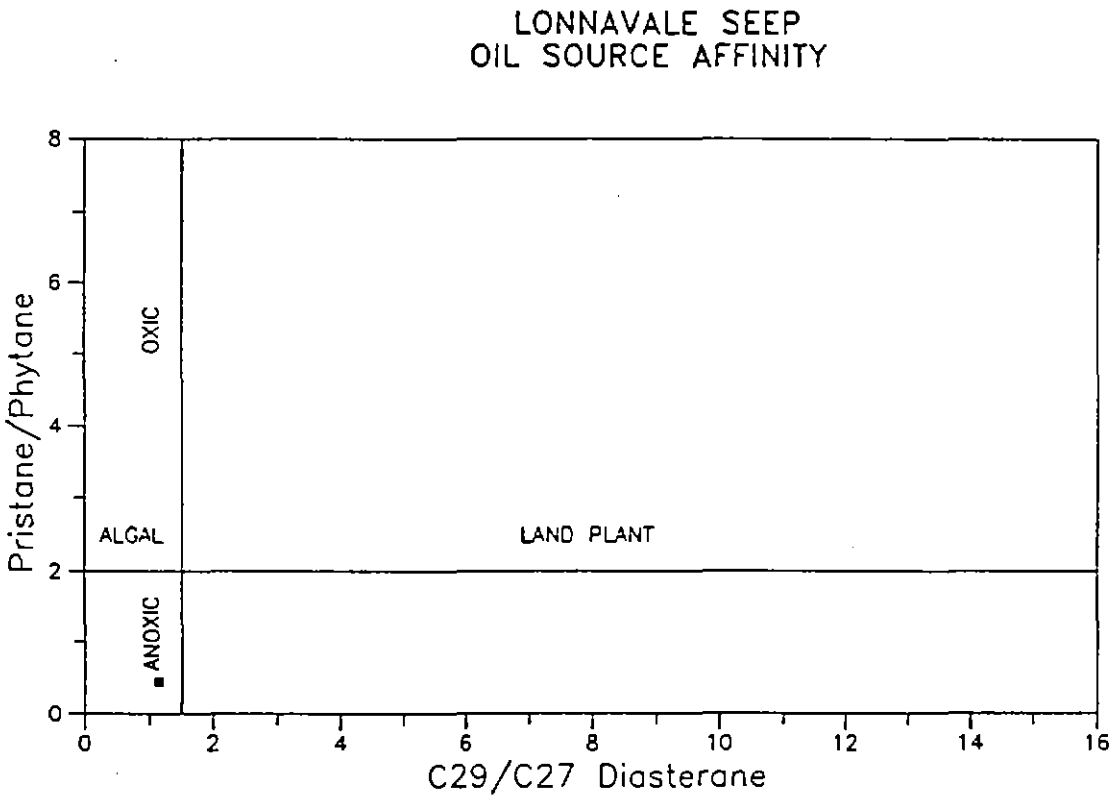

LONNAVALE SEEP
OIL SOURCE AFFINITY
Pristane/Phytane
C29/C27 Diasterane
OXIC
ANOXIC
ALGAL
LAND PLANT
0
2
4
6
8
10
12
14
16

FIGURE 8

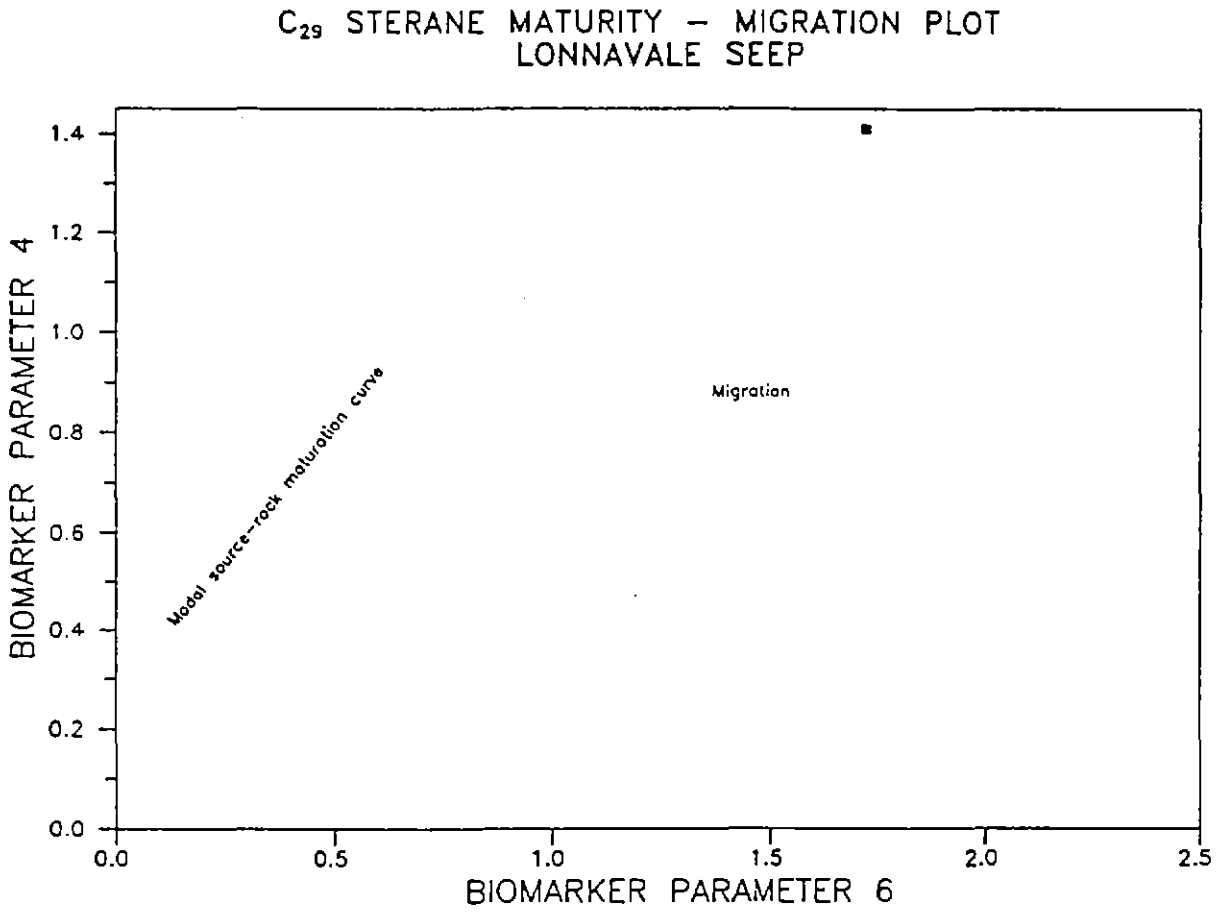
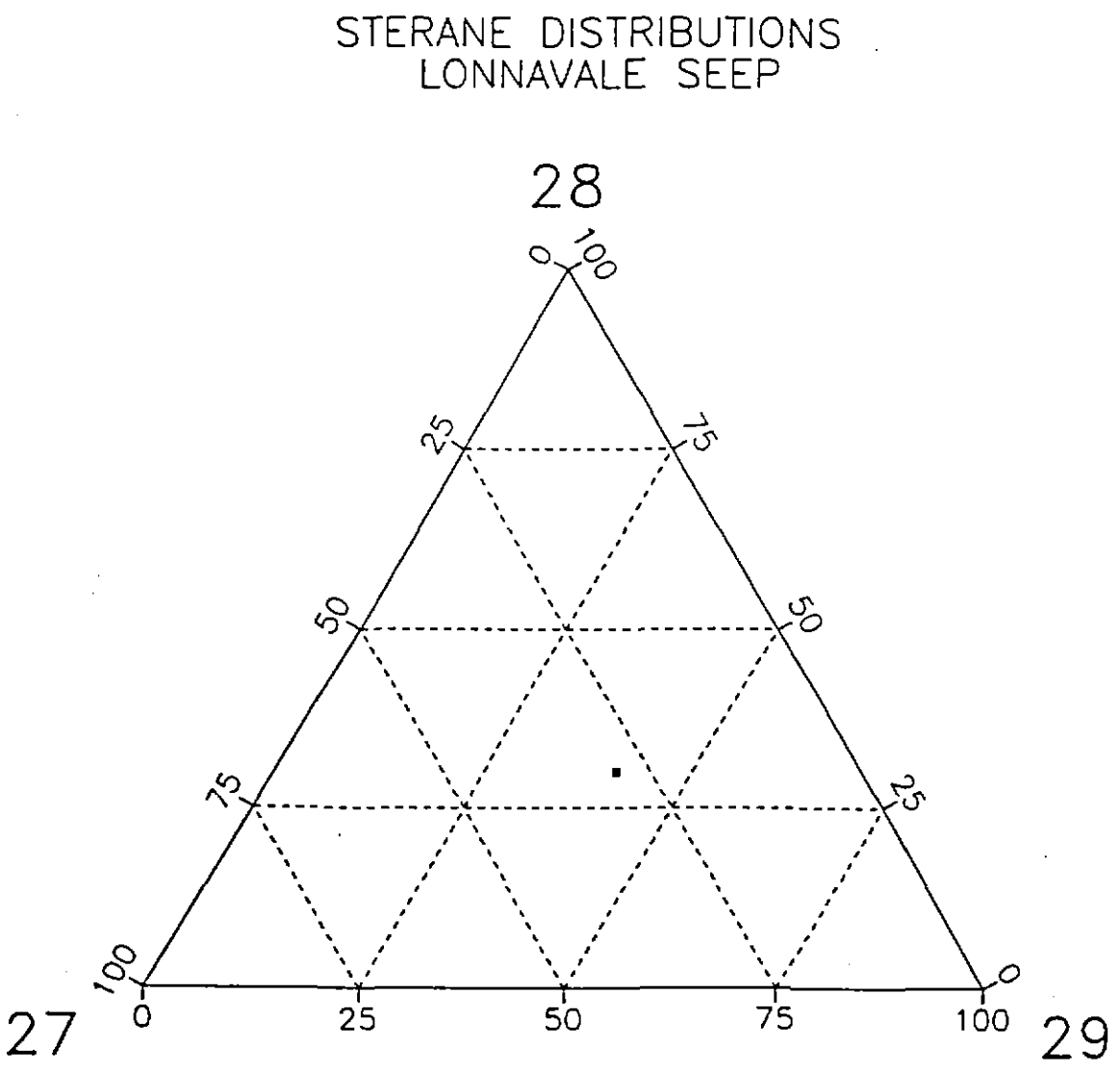

C_{29} STERANE MATURITY – MIGRATION PLOT
LONNAVALE SEEP
BIOMARKER PARAMETER 4
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Modal source-rock maturation curve
Migration
0.0
0.5
1.0
1.5
2.0
2.5
BIOMARKER PARAMETER 6

FIGURE 9



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APPENDIX 1

ANALYTICAL PROCEDURES

1. Isolation of Residual Oil

The seep sample was extracted with dichloromethane in a soxhlet apparatus until the solvent was clear. Removal of the solvent by careful rotary evaporation gave the oil (nominal C_{12+} fraction).

2. Liquid Chromatography

Asphaltenes were not precipitated from the condensate prior to liquid chromatography. The samples were separated into hydrocarbons (saturates and aromatics) and polar compounds (resins) by liquid chromatography on activated alumina and silica (sample:adsorbent ratio = 1:100). Saturated hydrocarbons were eluted with petroleum ether, aromatic hydrocarbons with petroleum ether/dichloromethane (50:50) and polar compounds with dichloromethane/methanol (35:65).

3. Gas Chromatography

Whole oils and saturated hydrocarbons (alkanes) were examined by gas chromatography using the following instrumental parameters:

Gas Chromatograph:	Perkin Elmer 8500 operated in the split injection mode
Column:	25 m x 0.3 mm fused silica, SGE QC3/BP1
Detector Temperature:	300°C
Column Temperature:	40°C for 1 minute, then 8° per minute to 300°C and held isothermal at 300°C until all peaks eluted
Quantification:	Relative concentrations of individual hydrocarbons were obtained by measurement of peak areas with a Perkin-Elmer LCI 100 integrator. The areas of peaks responding to aromatic hydrocarbons were multiplied by appropriate response factors

4. Thin Layer Chromatography (TLC)

Aromatic hydrocarbons were isolated from the extracted oil by preparative TLC using Merck GF_{254} silica plates and distilled AR grade n-pentane as eluent. Naphthalene and anthracene were employed as reference standards for the diaromatic and triaromatic hydrocarbons, respectively. These two bands, visualised under UV light, were scraped from the plate and the aromatic hydrocarbons redissolved in dichloromethane.

5. Gas Chromatography-Mass Spectrometry (GC-MS)

GC-MS analysis of the aromatic and naphthenic hydrocarbons was undertaken in the selected ion detection (SID) mode. The instrument and its operating parameters were as follows:

System:	HP 5890 Series II Plus GC coupled to HP 5972 MSD
Column:	60m x 0.25 mm i.d., DB-1 cross-linked methylsilicone phase fused silica, interfaced directly to source of mass spectrometer
Injector:	Splitless 2μL
Carrier Gas:	Helium at a linear velocity of 30cm/minute
Column Temperature:	50°C for 2 minutes then 50-290°C @ 7°/minute
Mass Spectrometer Conditions:	70 eV EI; 9-ion selected ion monitoring, 70 millisec dwell time for each ion

The di- and triaromatic hydrocarbons isolated from the extracted oil by thin layer chromatography were analysed by GC-MS.

The following mass fragmentograms were recorded:

m/z	Compound Type
156	dimethylnaphthalenes
170	trimethylnaphthalenes
178	phenanthrene
192	methylphenanthrene
206	dimethylphenanthrenes

The area of the phenanthrene peak was multiplied by a response factor of 0.667 when calculating the methylphenanthrene index (MPI).

Naphthenes (branched/cyclic alkanes) were isolated from the oil by molecular sieve separation of the saturates fraction.

GC-MS analysis of the naphthenes was undertaken in the multiple ion detection (MID) mode. Instrumental conditions are given below.

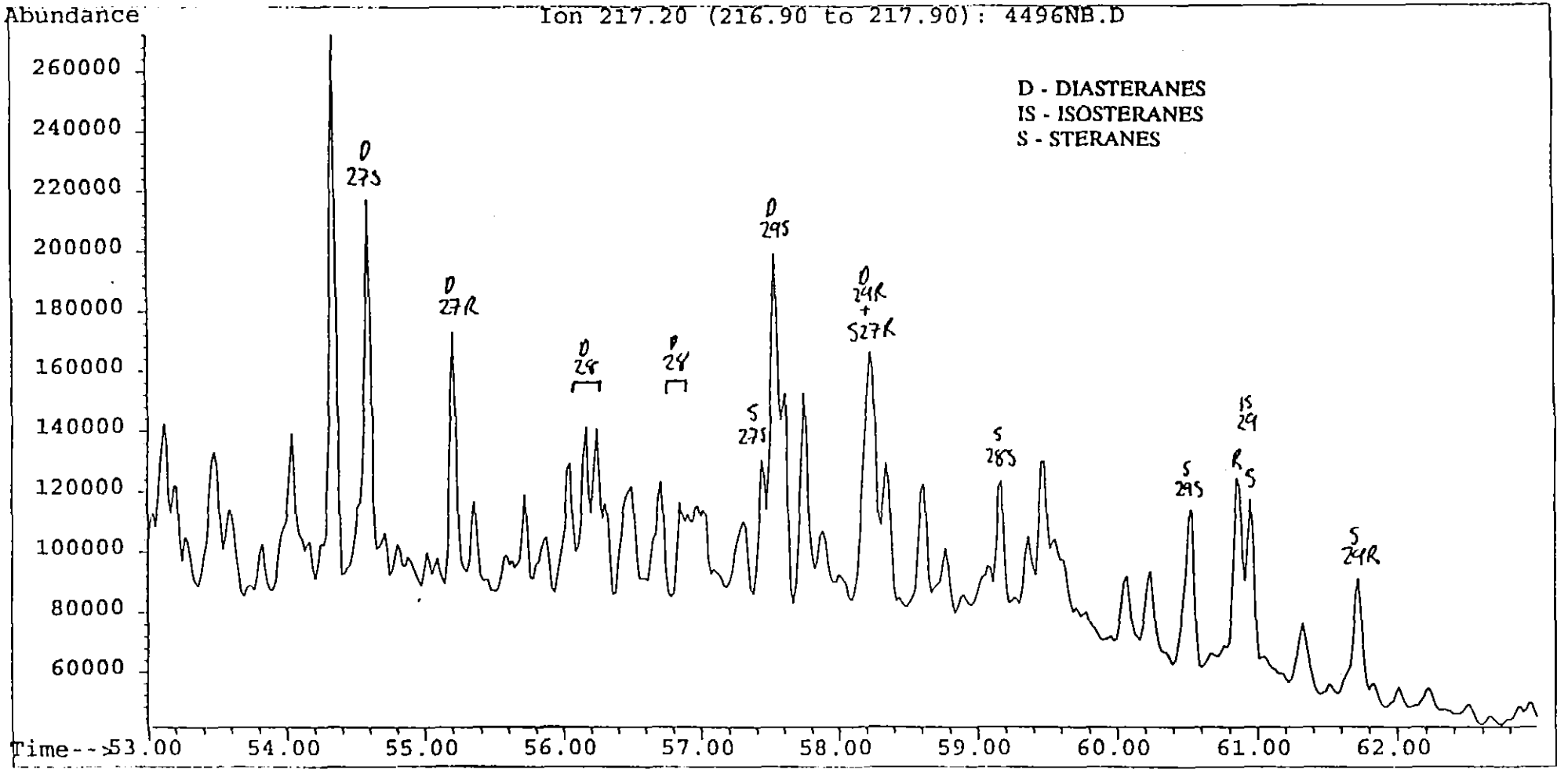
The following mass fragmentograms were recorded:

m/z	Compound Type
83	alkylcyclohexanes
123	drimanes, diterpanes
177	demethylated triterpanes
183	acyclic alkanes (incl isoprenoids, botryococcanes)
191	triterpanes (incl hopanes, moretanes)
205	methyltriterpanes
217	steranes
218	steranes
231	4-methylsteranes
259	diasteranes

APPENDIX 2

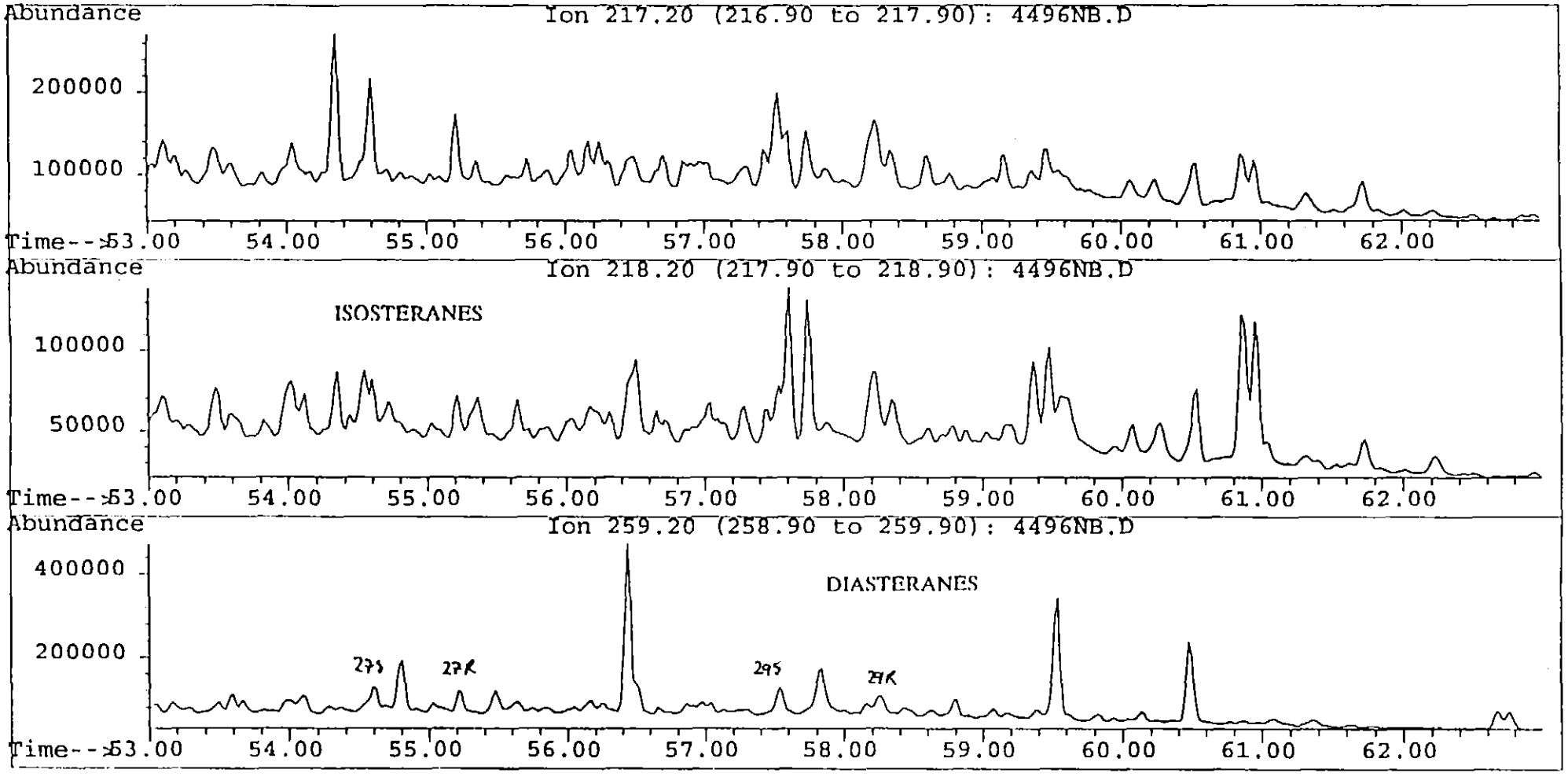
GC-MS OF BRANCHED/CYCLIC ALKANES

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Instrument : AMDEL-597
Sample Name: Lonavale Seep
Misc Info :
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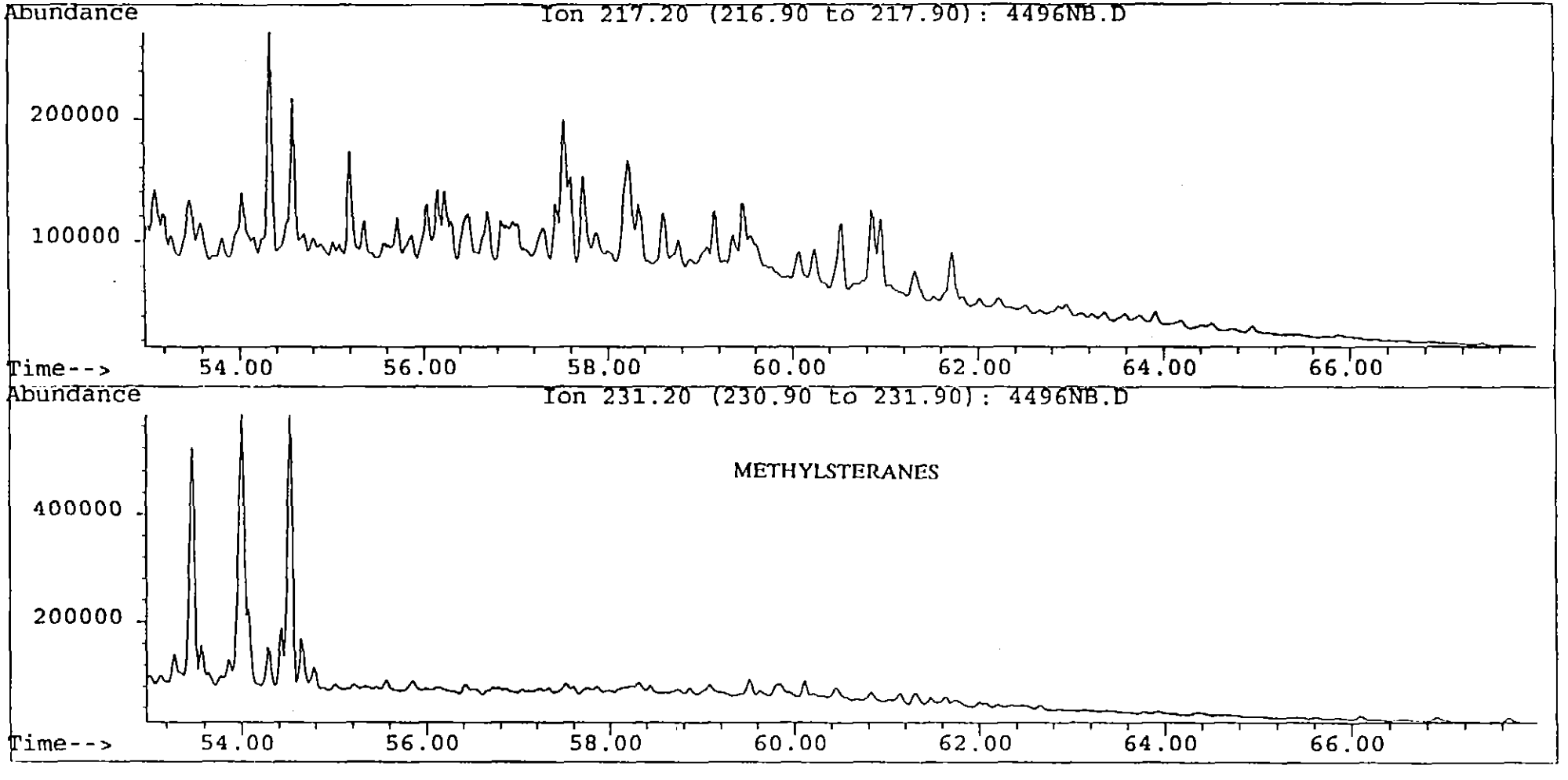
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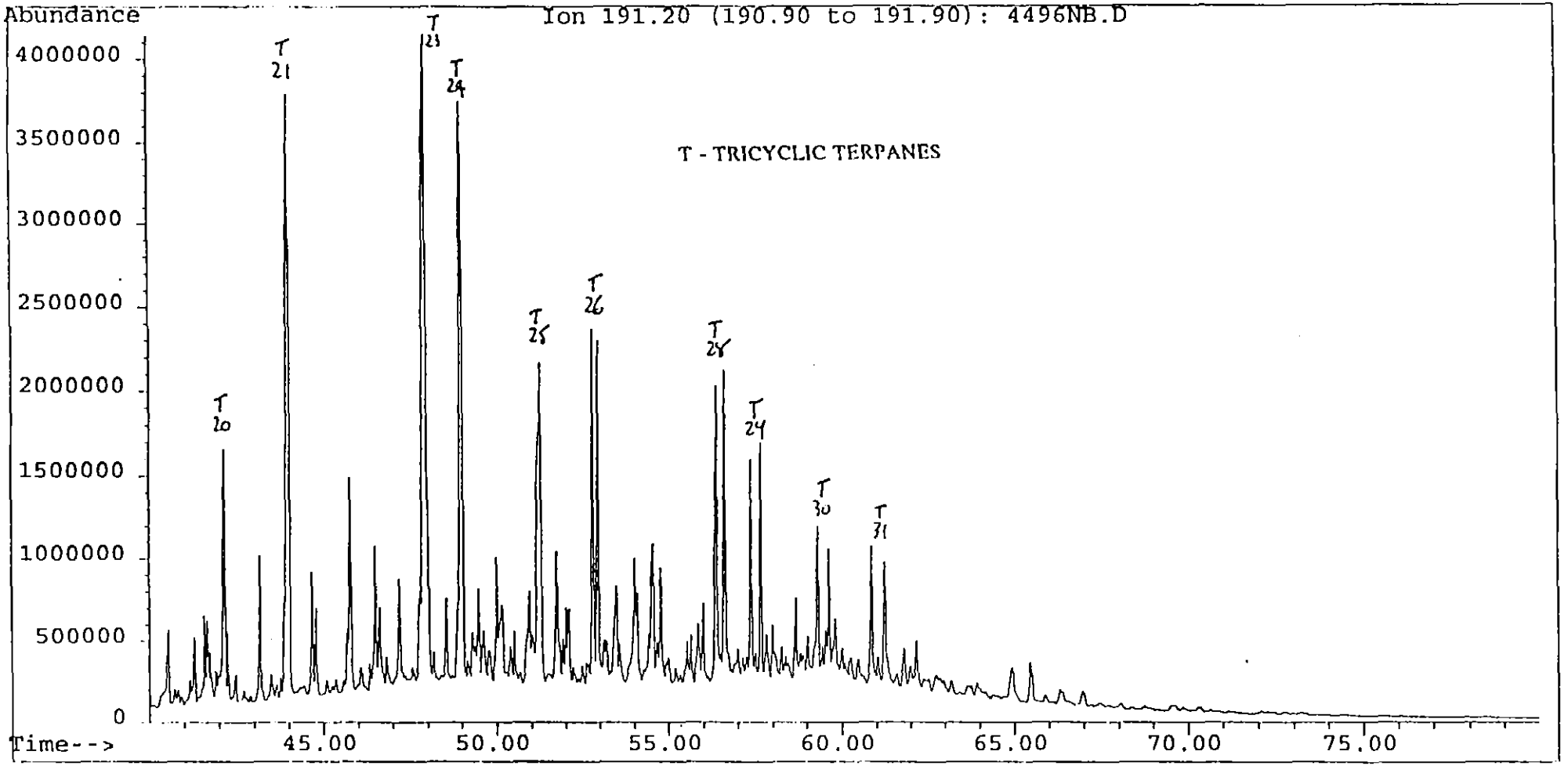
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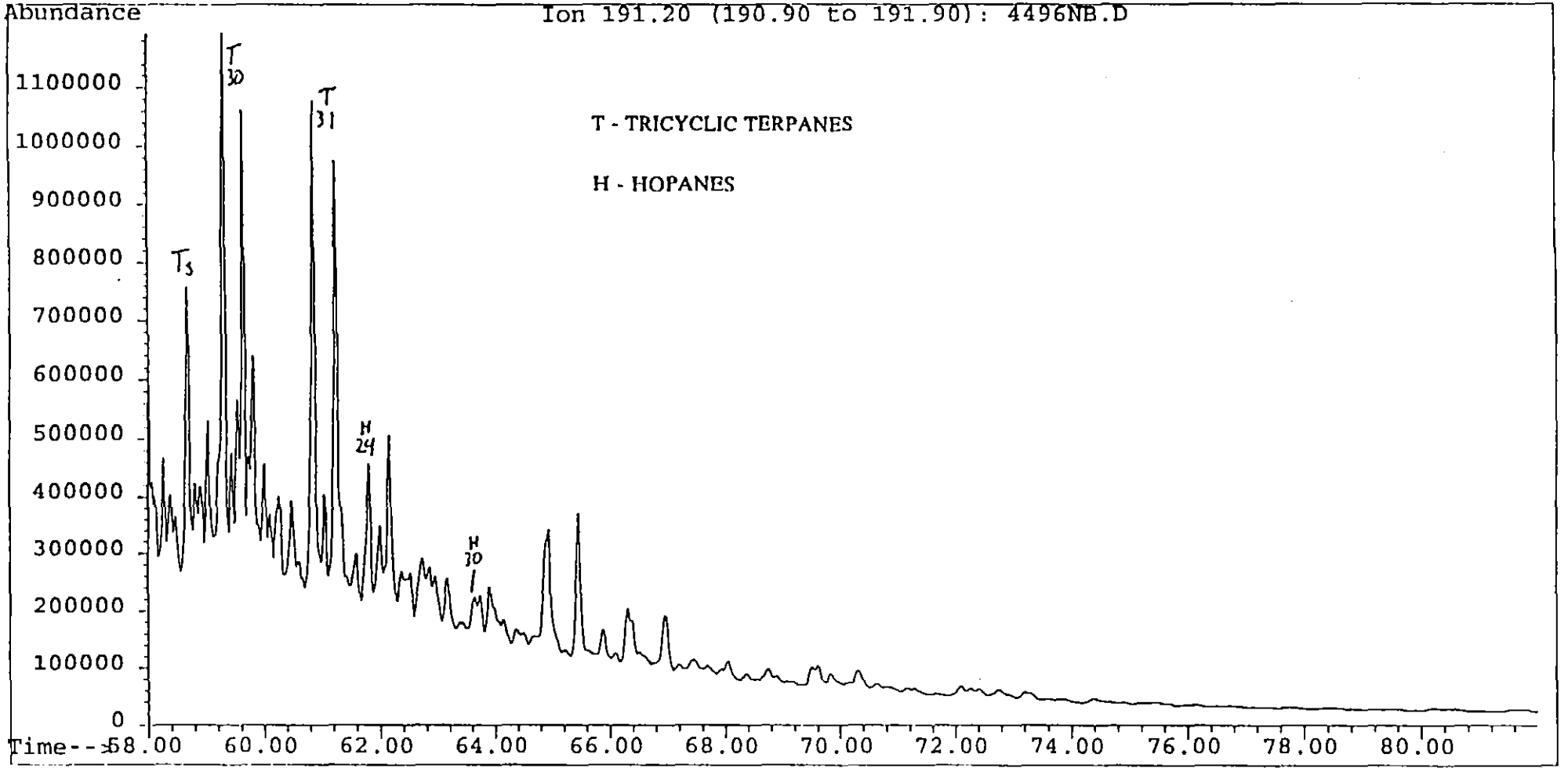
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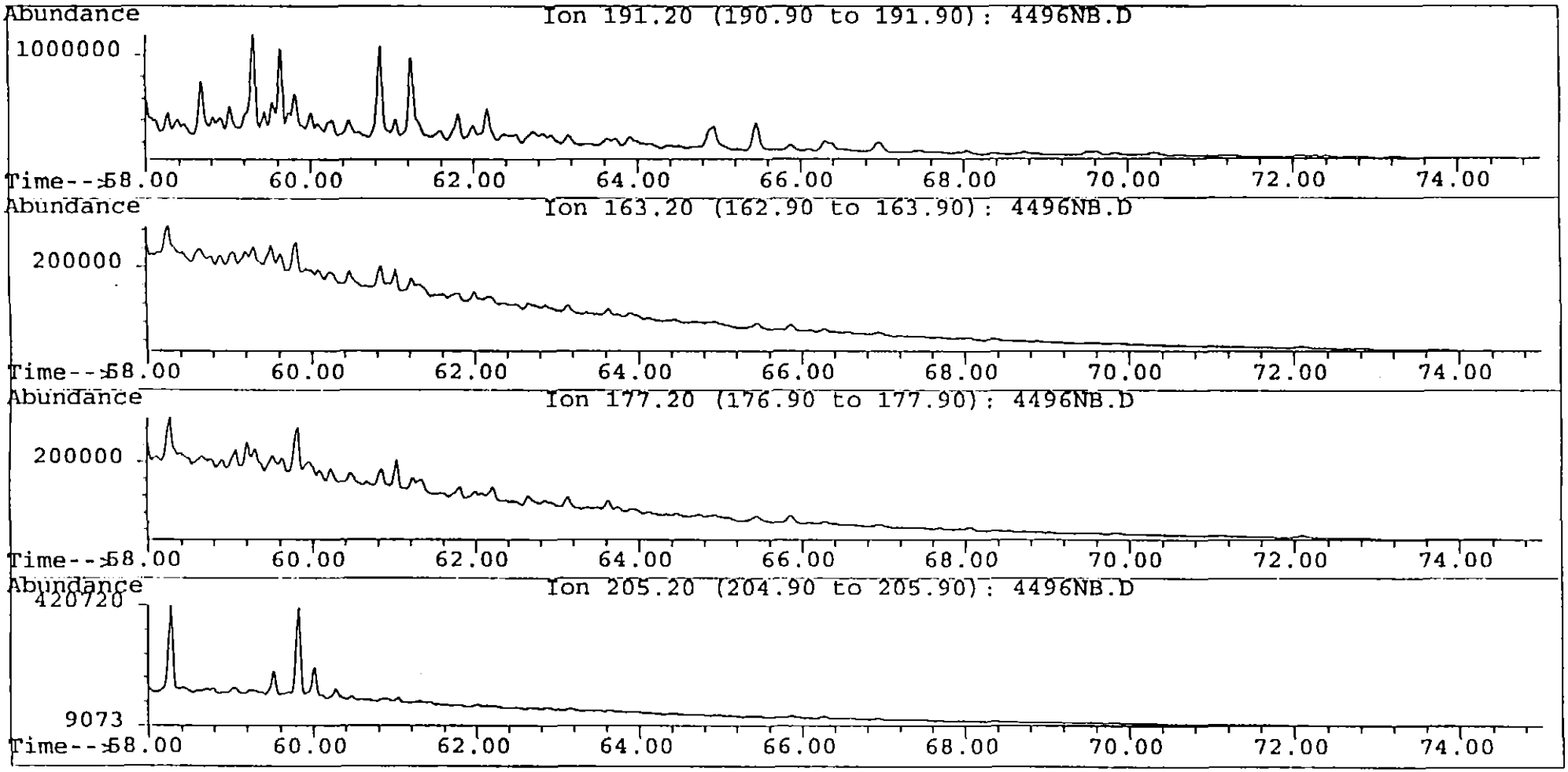
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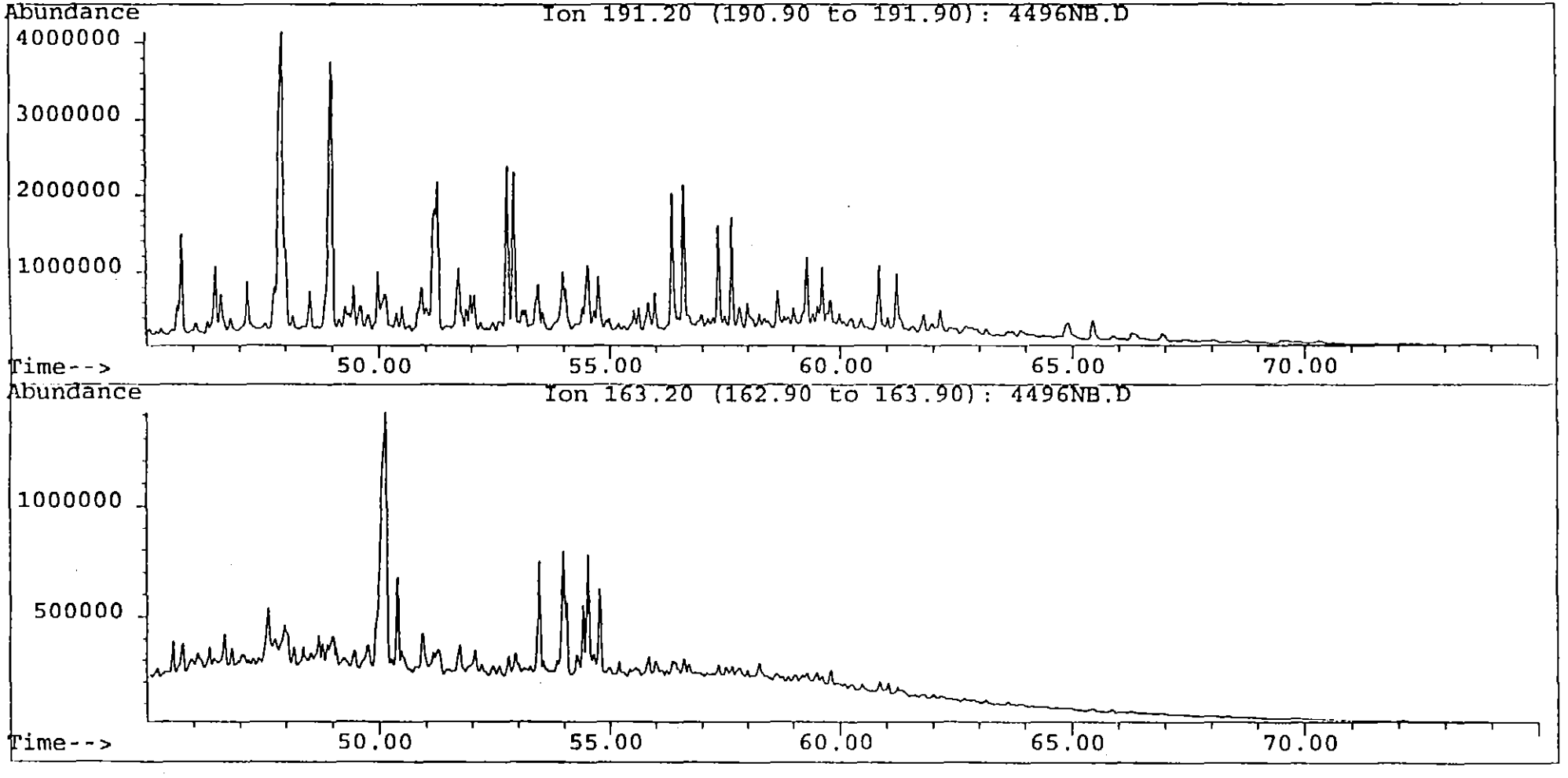
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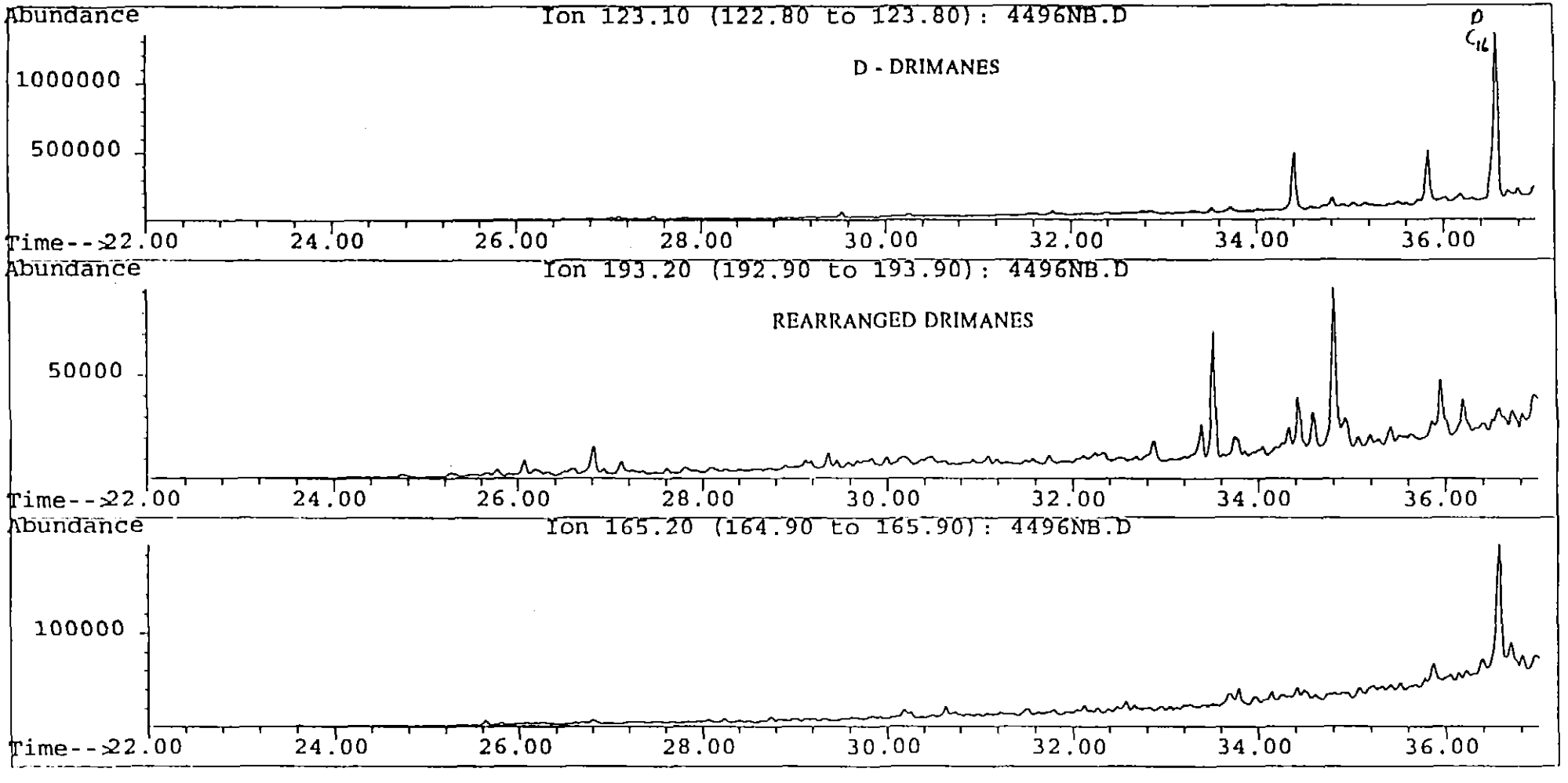
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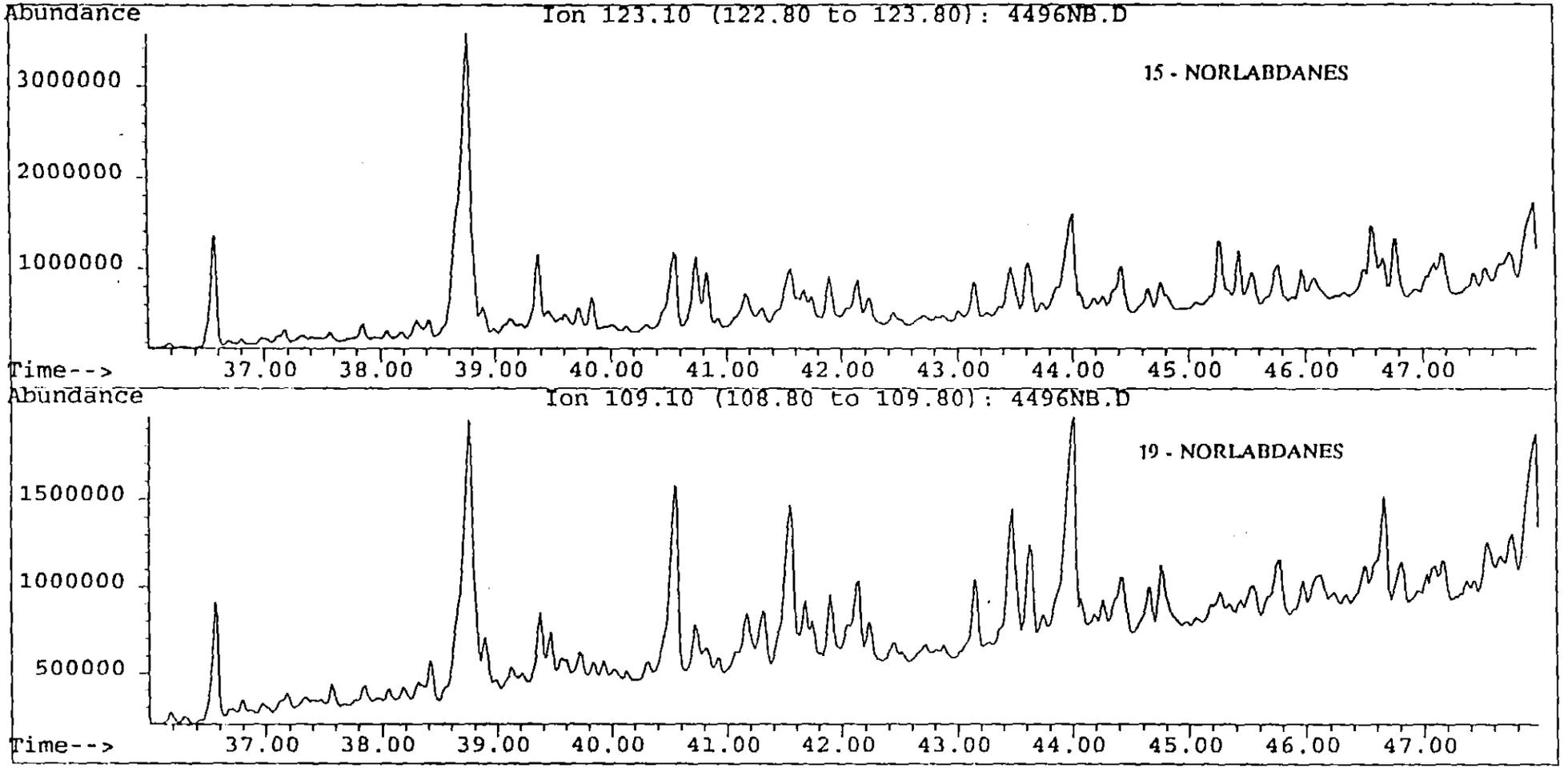
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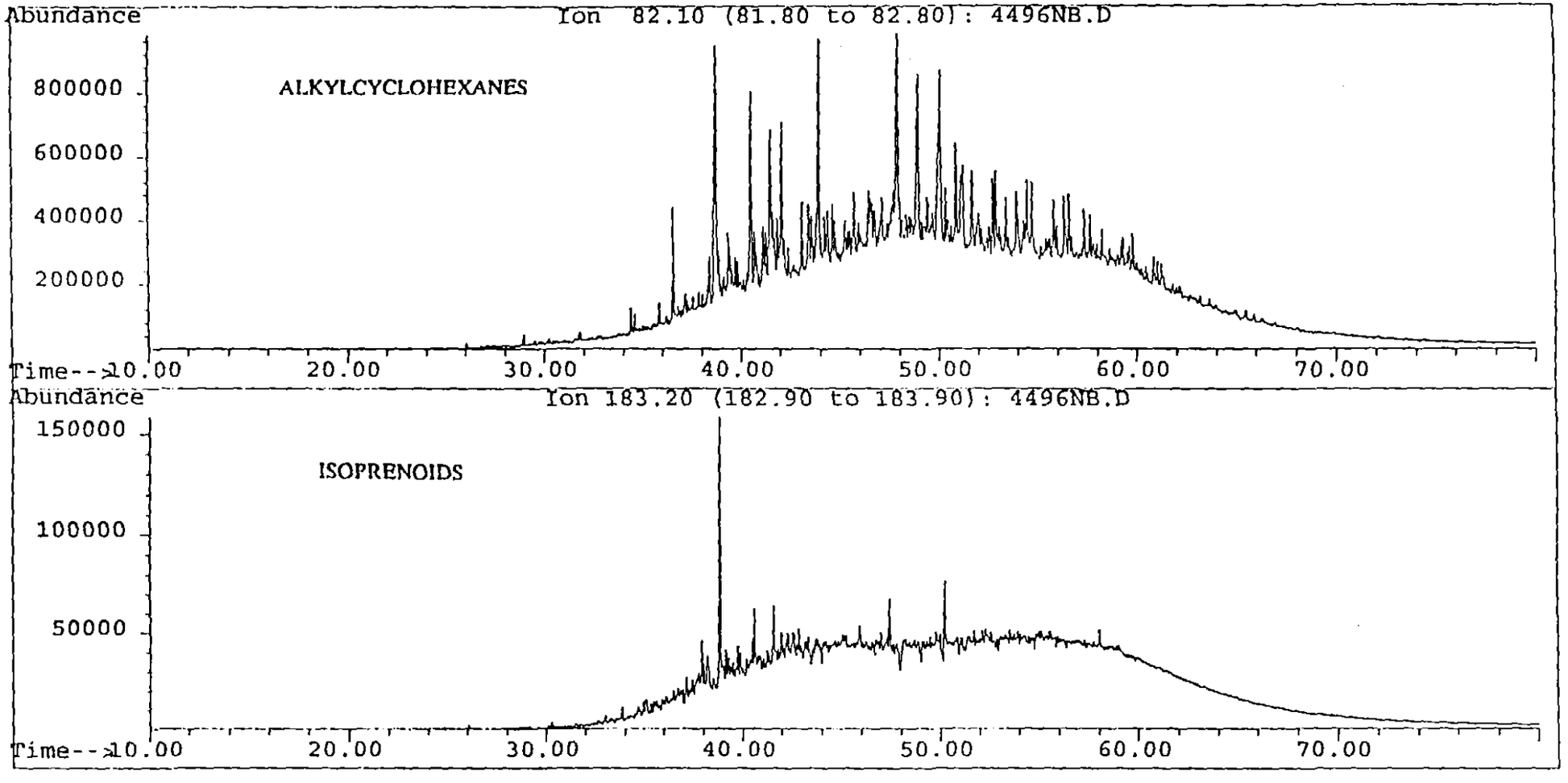
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Misc Info :
Vial Number: 1



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Instrument : AMDEL-597
Sample Name: Lonavale Seep
Misc Info :
Vial Number: 1



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Report TDR-1 **July 1996**

416531

Hydrocarbons Isolated from Lanna Vale Seep Swab and Bitumen Samples.

A. T. Revill

Client:
Carol Bacon, Tasmanian Development and Resources: Industry Safety and Mines

96-3900
REPORT-HYDROCARBONS ISOLATEDFROM LONNAVALE SEEP AND SWABAND BITUMEN SAMPLES-A.T.REVILLCSIRO

DEVELOPMENT & RESOURCES
30 JUL 1996
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OCEANOGRAPHY
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1 Introduction

1.1 Background

Reports of a possible hydrocarbon seep in a recently used quarry at Lanna Vale, south west of Hobart, led Tasmanian Development and Resources (TDR) to contract CSIRO Division of Oceanography to analyse two samples of possible hydrocarbons.

The quarry is based on a Jurassic dolerite deposit which has a possible contact with Permian mudstone (see Appendix 1), which are exposed in a nearby older quarry and are known in other areas of Tasmania to contain the tasmanite oil shale. Thus there is significant interest in assessing if the seep is in fact hydrocarbons and if so whether they are related to the tasmanite oil shale.

2 Methods

2.1 Samples

Two samples were collected from the quarry. One was a swab, using pre-extracted defatted cotton wool, to sample what appeared to be hydrocarbon staining. The second sample was a bitumen from within a fracture in the dolerite. The bitumen was solid but still pliable.

2.2 Analysis

The samples were placed in a small amount of hexane and the extract was then transferred to a silica gel chromatographic column. Aliphatic hydrocarbons were eluted with hexane and the aromatic hydrocarbons with 20% dichloromethane in hexane. The eluates were reduced under vacuum and transferred to vials. The aliphatic fractions were then analysed by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS) using a non-polar capillary column (HP-1, 50m x 0.32 mm 0.17 µm phase thickness and cool on-column injection. GC conditions were an initial temperature of 40 °C held for 1 minute and then increased at 30 °C/minute to 120 °C and then at 4 °C to 310 °C and held isothermally for 15 minutes with hydrogen as the carrier gas. Typical GC-MS conditions were as above except helium was the carrier gas. The MS was operated in either full scan or selected ion monitoring (SIM) mode, using electron impact (EI) ionisation at 70 eV.

3 Results

3.1 GC Analysis

Figure 3.1 shows the GC chromatograms of both samples. The swab sample exhibits a *n*-alkane profile from *n*-C_{14} to *n*-C_{32} maximising at *n*-C_{18}, which is similar to that of a light oil or refined fraction such as diesel. In contrast, the bitumen chromatogram is dominated by resolved compounds which are not *n*-alkanes.

3.2 GC-MS Analysis

Examination of the *m/z* 191 mass chromatogram to highlight cyclic triterpenoids for the samples (Figure 3.2) shows them both to exhibit the same profiles.

Both chromatograms are dominated by a pattern characteristic of tricyclic compounds and not the more usual hopanes. The *m/z* 217 mass chromatogram (Figure 3.3) shows that steranes are present in the samples, though at relatively low levels. Molecular data from these analyses are summarised along with data from previously analysed tasmanite samples in Table 3.1.

Table 3.1: Molecular data for Lanna Vale seep samples and previous tasmanite samples.

Sample	Parameter 1 Pr/Ph	2 Pr/*n*-C_{17}	3 20S/S+R	4 αββ/αββ+ααα
Lanna Vale Seep				
"Swab"	0.48	0.16	0.57	0.62
Bitumen	n.d.	n.d.	0.61	0.70
Latrobe	0.45	0.62	0.11	n.d.
Oonah				
Upper Seam				
Total	1.6	0.69	0.30	0.15
Fossil Concentrate	1.5	0.60	0.35	0.15
Lower Seam				
Total	1.4	0.48	0.31	n.m.
Siltstone	3.1	0.91	n.m.	n.m.
Douglas River	0.7	0.45	0.54	0.5

n.d. = not detected; n.m. = not measured

parameters:

1. Pristane/Phytane
2. Pristane/n-C_{17}
3. C_{29} ααα sterane 20S/(20S + 20R)
4. C_{29} αββ 20R sterane/C_{29} 20R (ααα + αββ) steranes

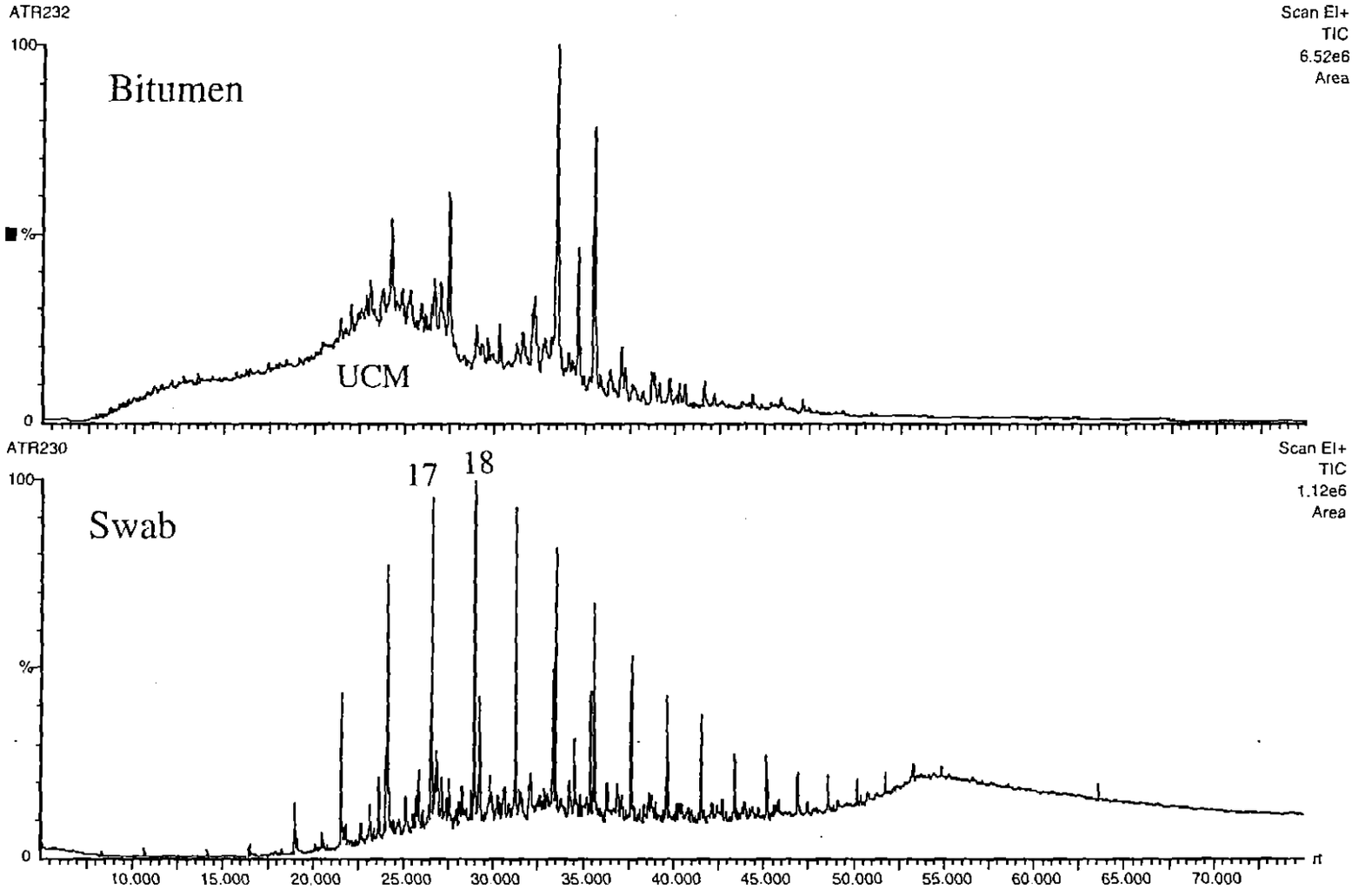


Figure 3.1: Chromatogram of the Lanna Vale Seep Aliphatic Fractions (numbers refer to carbon number; UCM = Unresolved Complex Mixture).

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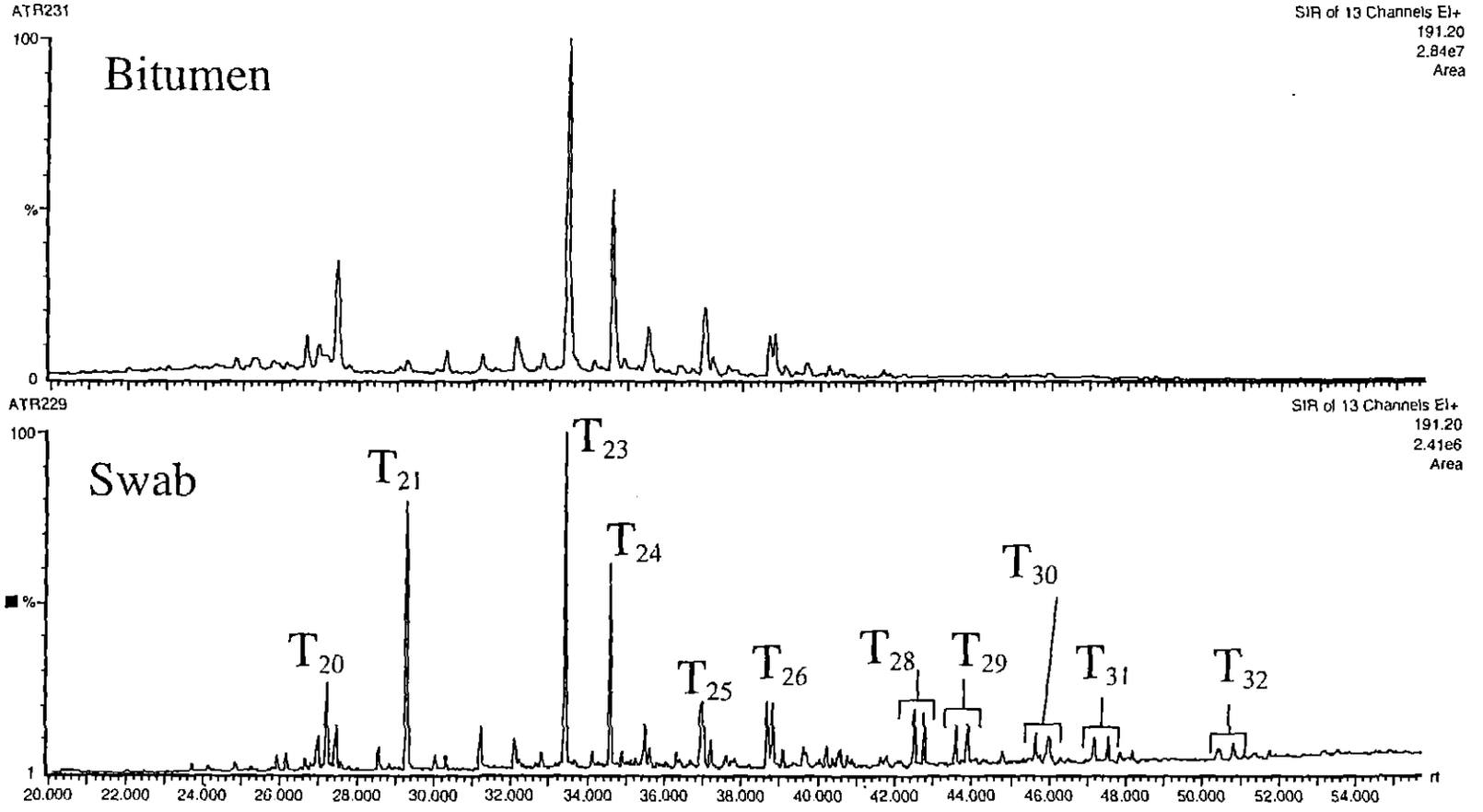


Figure 3.2: *m/z* 191 mass chromatogram showing the distribution of cyclic triterpanes in the Lanna Vale samples. (Note T_n = Tricyclic compounds where n = carbon number)

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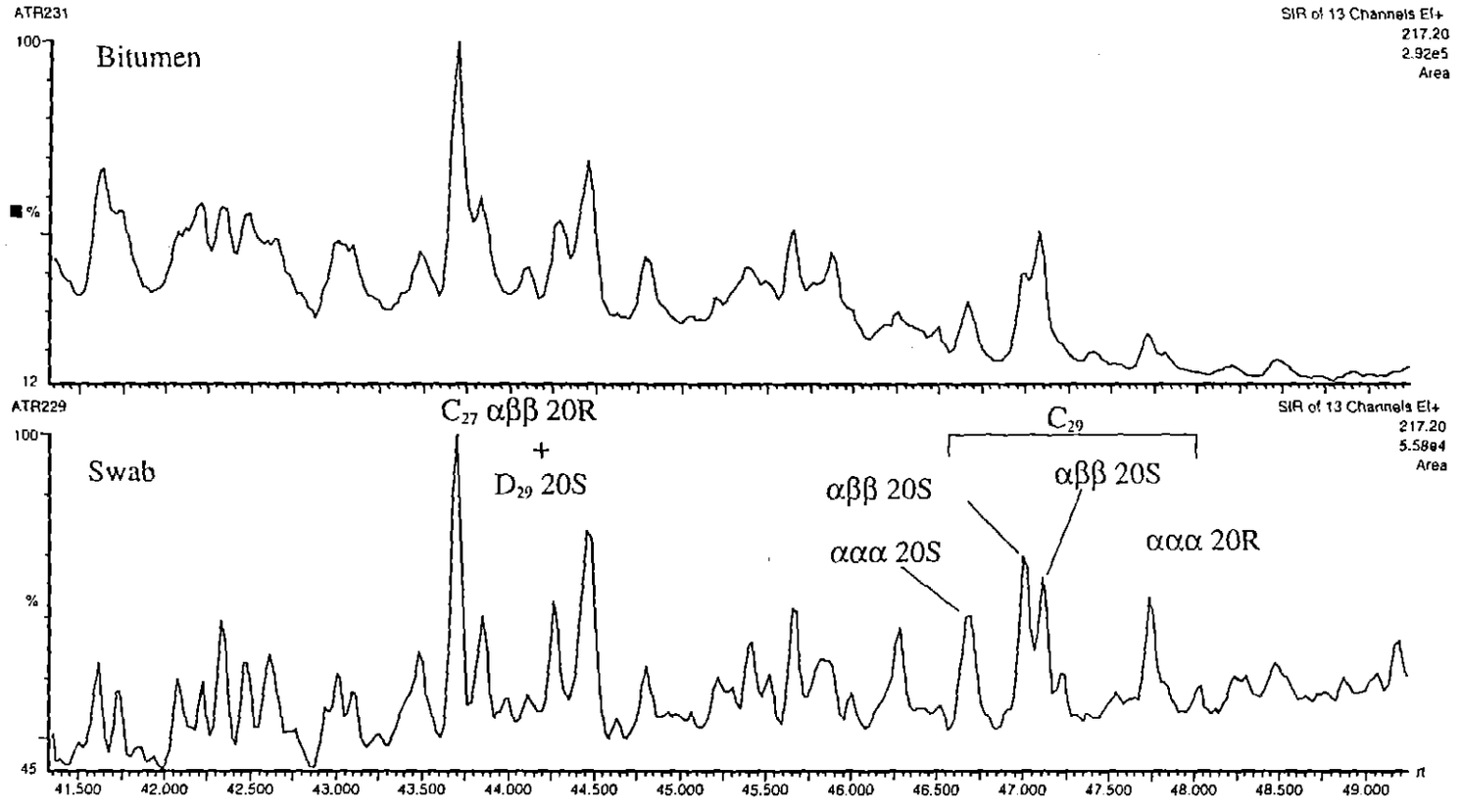


Figure 3.3: *m/z* 217 mass chromatogram showing the distribution of steranes in the Lanna Vale samples. (Note numbers refer to carbon number; D = diasterane; 20S and 20R refer to stereochemistry at carbon 20; α and β refer to stereochemistry at carbons 5, 14 and 17)

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4 Discussion

4.1 Aliphatics

The aliphatic fractions of the two samples exhibit some marked differences, most noticeably the presence of a *n*-alkane envelope in the swab sample which is absent in the bitumen. The *n*-alkane profile isolated from the swab sample (Figure 3.1) is characteristic of a light oil or petroleum fraction such as diesel. This is also in keeping with the visual observation made at the time of collection, that this sample was a "stain" and had a more liquid character than the bitumen. This *n*-alkane profile is similar to that expected for hydrocarbons generated from tasmanite. For example in a study of tasmanite samples of increasing maturity (Revill *et al.*, (1994), it is noticeable that there is an increase in these low molecular weight *n*-alkanes. The potential for this to be due to contamination of this sample is unlikely as there is a co-occurrence of abundant tricyclic alkanes (Figure 3.2). This type of profile is characteristic of tasmanite and any diesel contamination would be expected to be accompanied by at least a trace of regular hopanes. The lack of such a n-alkane profile in the bitumen sample could be due either to severe weathering/biodegradation or a different source material.

Interestingly, in none of the samples of tasmanite analysed to date has there been such a well developed *n*-alkane profile, suggesting that this may be the most thermally mature sample of tasmanite derived hydrocarbons analysed so far.

4.2 Maturity Parameters

The suggestion that these samples are thermally mature is further supported when comparing the molecular data for the swab sample with the previous tasmanite samples analysed (Table 3.1). Parameters 3 and 4, which are indicators of thermal maturity, clearly show a trend from the least mature sample (Latrobe 0.11 and n.d. respectively) through to the most mature (previously) from Douglas River (0.54 and 0.5) and this trend appears to be extended by the swab sample (0.57 and 0.62) and the Bitumen (0.61 and 0.70). Indeed, it would appear from this data that the bitumen may be an "over mature" sample and may have been generated at temperatures corresponding to the late oil window.

4.3 Tricyclic Hydrocarbons

The tricyclic profiles (Figure 3.2) again show significant differences between the two samples. The swab sample exhibits a distribution extending from C_{20} up to C_{32} compounds which is very similar to that seen previously in samples of tasmanite (Revill *et al.*, 1994). In contrast, however, the bitumen sample shows a much more restricted distribution, extending only to C_{26} compounds and with an apparent lack of C_{20} and C_{21} compounds. It is unclear as to why this may be the case, except that the loss may again be due to extra heating of the bitumen compared with the swab sample, which may have led to side chain cracking. Literature reports suggest that maturation

may lead to enhanced generation of the lower tricyclic homologues (Peters *et al.*, 1990) but there is no indication that this is due to cracking of the higher homologues. In addition, these compounds have been reported to be extremely resistant to biodegradation (Palacas *et al.*, 1986).

4.4 Source of the Hydrocarbons

From the analyses performed, it is clear that while the bitumen and swab sample may have been derived from similar source material, there is evidence that they may have undergone different heating events or some other alteration leading to the bitumen appearing to be thermally more mature, namely:

- A lack of *n*-alkanes in the aliphatic fraction (not necessarily maturity derived)
- A higher calculated thermal maturity from sterane data
- A restricted tricyclic profile.

It is unclear as to how this difference may have come about, but there are clearly at least three possibilities:

1. The source material, assumed at this point to be the Permian mudstone, was buried to a depth which caused some oil generation. There was then a period of time when burial was insufficient to mature the organic matter followed by a second burial, possibly deeper which led to further generation from previously unmatured material and the over-maturation of the hydrocarbons previously generated.
2. Hydrocarbons have been generated by a heating event and then have migrated into the dolerite. The rate of migration has been such that hydrocarbons which initially migrated have been severely biodegraded due to exposure to the atmosphere which in extreme cases can lead to an artificially high maturity assessment. Subsequent to this "fresh" hydrocarbons have migrated into the dolerite and so the two co-exist.
3. The intrusion of the dolerite into the Permian mudstone caused localised heating of the source material which is analogous to natural thermal maturation and therefore causes hydrocarbon generation. It is well known that where intrusions such as this have occurred, the organic matter closest to the contact will become more thermally mature than the material further away. The extent and degree of maturation will depend on the temperature of the intrusion and the distance away from the contact that the heat permeates.

The likelihood of point 1 can really only be assessed by an investigation of the local geology, but given what is know so far, this option appears unlikely. Options 2 and 3 are more difficult to assess. Indicators of severe biodegradation such as changes to hopane and sterane distributions, are present in only low concentrations in hydrocarbons generated from tasmanite. There is also little or no literature on the effects of over maturation or biodegradation on the tricyclic distribution, which makes

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it difficult to assess the likely effects of a dolerite intrusion or prolonged exposure to the atmosphere.

5 Conclusions

Analysis of the two samples from the Lanna Vale seep has shown the following:

- The hydrocarbons in both samples share a similar source
- The source is likely to be Permian mudstone containing tasmanite
- There appears to be maturity differences between the two samples. The reasons for this are unclear at present.

6 References

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Peters, K. E., Moldowan, J. M., and Sundararaman, P. (1990) Effects of hydrous pyrolysis on biomarker thermal maturity parameters: Monterey phosphatic and siliceous members. *Org. Geochem.* **15**, 249-265.

Revill, A. T., Volkman, J. K., O'leary, T., Summons, R. E., Boreham, C. J., Banks, M. R., and Denwer, K. (1994) Hydrocarbon biomarkers, thermal maturity, and depositional setting of tasmanite oil shales from Tasmania, Australia. *Geochim. Cosmochim. Acta* **58**, 3803-3822.

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Appendix 1

Geological setting of the Lanna Vale seep

(Prepared by TDR)

THE LONNAVALE OIL SEEP

This area was visited briefly late in 1996, following reports by bushwalkers of an unidentified mineral occurrence.

The location (~ 482700mE 5247800mN) is a recently-used quarry, presumably used by the Forestry Commission to supply road metal to recent logging roads in the area. It is on the Russell Road, about 6km NW of Lonnavale.

The quarry is located in fine grained Jurassic dolerite, close to a contact with fossiliferous Permian mudstones, which are well exposed in a small, older, quarry about 300m to the south east. The contact is probably faulted, and the Lonna Creek, striking NE, on the NW side of the quarry may be related to this fault.

The dolerite exhibits two generations of fractures and breccia veins, probably fault related: the earliest are approximately vertical, striking about NE, and the later veins dip ~45° and strike about NW. The earlier veins contain laumontite, calcite and (?)pumpellyite. The later veins are more complex and vuggy, containing coarsely crystalline calcite (to 10cm), with finer grained, partly crystallised pyrite, heulandite, laumontite, chabazite, and stilbite with montmorillonite and fine grained serpentine, prehnite and pumpellyite(?).

Bitumen also occurs in the later vein set, and is abundant in some samples. It is dark brown to black, vitreous, soft and sticky when fresh, but hardens and darkens to dull black on exposure to air. It leaves oil stains on paper readily, indicating a moderate content of moderate molecular-weight hydrocarbons. The bitumen exhibits an irregular to globular habit in some samples, up to 2cm in size, and is partly intergrown and partly veined and overgrown by calcite and zeolites, indicating contemporaneous formation and a natural origin.

Ralph Bottrill

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97-4088(B)

ANNUAL REPORT - 1997 VOL 6 of 6
EL'S 1.88, 9/95 & 21/95 - GREAT
SOUTHLAND MIN. BURRETT/TANNER

Palynology and Hydrocarbon Potential of the Lower Parmeener Supergroup in Tasmania

MICROFILMED
FICHE No.014529-39

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-2 DEC 1997
See fol 036

Cheryl-Lee J. Randall (BSc)



DEPARTMENT OF GEOLOGY

Center for Ore Deposit and Exploration Studies

University of Tasmania

A research thesis submitted in partial fulfilment of the requirements for the degree of Bachelor of Science with Honours

:h 1997

97-4088

ANNUAL REPORT - 1997 VOL 6 of 6
EL'S 1.88, 9/95 & 21/95 - GREAT
SOUTHLAND MIN. BURRETT/TANNER

Abstract

The Tasmania Basin developed along a north-south axis possibly co-incident with a zone of weakness developed some time during the Devonian. Deposition within this basin began, following Late Carboniferous glaciation. This sequence is known as the Parmeener Supergroup, and ranges up to Late Triassic.

Palynomorph data recovered from within sequences of the Lower Parmeener Supergroup has been used to date the sediments based on a palynological "scheme" first devised by Evans (1969). Based on the data obtained using this method, biostratigraphic ages have been determined for the sequences of the lower Lower Parmeener Supergroup, and a correlation made across the Tasmania Basin. Deposition within the Bonney's Plain region did not begin until the Early Permian, evidence for which had only been found further east of this location in the past. Palynomorph dating provides a finer division of the macrofauna stages defined by Clark and Farmer, (1976), and have allowed a more precise correlation of the lower Lower Parmeener Supergroup.

Total Organic Carbon (TOC) analysis indicate the sediments of the Parmeener Supergroup are host to potential oil and/or gas source rocks. Fission track data indicates regional palaeoburial temperatures for the sediments of the Tasmania Basin to be within the range of 110 ^{o}C - 120 ^{o}C until a Cretaceous cooling event (O`Sullivan, 1997). Support for a broad burial heating event of this nature is found in this study, where palynomorph content of the sediments has been totally carbonised due to heating, in areas where no igneous intrusion is indicated on seismic data as at Eagle Hawk Neck. This combined with the known heat produced during extensive Jurassic dolerite intrusion indicates the sediments as having been placed within the oil and gas window on more than one occasion.

A study of thermal alteration index (TAI) using the palynomorphs recovered showed the sediments studied from around the Tasmania Basin all to be within the oil and gas window, with values ranging from 2.5 - 4.0. An analysis of kerogen type from the Bonney's Plain, Ross 1, Eagle Hawk Neck Poatina and Shittim 1 DDH's shows the kerogen to be "type II/III", with the organic matter largely of a land plant origin, thus the sediments are prone to gas production. Vitrinite reflectance values (Ro) of the organic matter ranging from 0.5 to >2.5, in combination with the kerogen data, indicates the likelihood of oil and gas generation ranging from light oils through to dry gas.

The source of high gas readings encountered from within the pre-Parmeener metamorphics in the Shittim 1 DDH on Bruny Island is unknown. It is thought possible that a large thrust fault placed the potential source rocks of the Ordovician carbonates under the pre-Parmeener metamorphics, placing them within the hydrocarbon thermal window, hence generating gas.

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Acknowledgments

Firstly I would like to extend thankyou to my supervisors Clive Burrett and Andrew McMinn, for helping me get started with this project, and for all their help throughout the year. Also a thankyou to Great Southland Minerals, who provided this project for me.

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A huge debt of gratitude to Brett, for standing by me through all my years at university, and especially those last few days of panic completing my thesis.

Thanks to my parents and family, especially my father who's stubborn determination and refusal to let me back down ensured I made it to my honours year, and good luck to Cathy my sister, who started her first week of university in during my last week!

And last of all, thanks to all my friends, both near and far, who helped ensure the last few years have been memorable!

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Abbreviations and Acronyms

DDH	Diamond Drill Hole
ESEM	Environmental Scanning Electron Microscope
OM	Organic Matter
TAI	Thermal Alteration Index
WIF	Woody Island Formation

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Chapter 1: Introduction

The search for oil and gas in Tasmania has allowed the recognition of a number of sequences as potential source, reservoir and trap rocks. Total Organic Carbon (TOC) analysis of the Parmeener Supergroup shows parts are excellent possible oil and/or gas source rocks. Recent studies (Maynard, 1996) also demonstrate certain units to be potential reservoirs, with good porosity and permeability. It is therefore essential to have biostratigraphic control on these important source and reservoir rocks.

1.1 Aims

The main aim of this thesis is to provide additional information on Permian geology, palaeogeography and facies variation for selected areas of the Tasmania Basin (1.1b) by the study of palynomorphs recovered from drill core of the Lower Parmeener Supergroup.

Palynomorph data is used to date sediments based on a biostratigraphic scheme of palynological "stages" first proposed by Evans (1969) and refined by various authors since, such as Paten (1969), Price (1983) and Cooper (1991). This dating scheme involves the division of the Permian into 10 stages, with the base and age of each stage defined by the first appearance of key marker species.

Using the palynomorph data for the Lower Parmeener gained through this study, a biostratigraphic correlation of the Lower Parmeener sequences encountered in the drill cores is proposed. In addition, an idea of the thermal maturity of the sediments will be gained using palynomorph colour change or "thermal alteration index" (TAI). This indicates the temperature to which the sediments have been exposed, and thus the hydrocarbon potential

and type of hydrocarbons (i.e. oil, wet gas or dry gas) likely to have been yielded from the rocks involved.

In addition to the above work, a lithostratigraphic study of the newly completed DDH Shittim 1 on Bruny Island is presented. This involves a study of the tillite recovered from the Lower Parmeener sequences to determine provenance of the clasts and thus direction of ice movement in the Late Palaeozoic. As well as a detailed study of the metamorphosed pre Parmeener below the tillite to determine the relationship of these rocks to the Palaeozoic rock and Precambrian metamorphics found elsewhere in Tasmania (Banks, 1981).

1.2 Area and Method of Study

To get a broad representation of the Permian basin , diamond drill hole (DDH) sites were studied from varying locations around the Tasmania Basin, these locations are shown in figure 1.1a. The cores of the Tunbridge Tier , Bonney's Plain , Poatina , Eagle Hawk Neck, Quoin and Ross 1 DDH's were drilled by the Tasmanian Department of Mines and are housed in the Mineral Resources of Tasmania core library. The Shittim 1 DDH was drilled by Great Southland Minerals, and is also stored in the Mineral Resources of Tasmania core library.

For the palynological study, the sequences of the Quamby Formation and Woody Island Formation were focused upon, because these sediments play host to the beds of the tasmanite oil shale in the north of the Basin. The oil shale is an extremely rich potential oil source rock. Samples were selected from the top, middle and bottom of each sequence. More regular (i.e. 10 meter) spacing would have been ideal, but preparation costs prevented such sampling. A few samples were also selected from within shale/mudstone sequences interbedded within the underlying tillite, and the overlying Golden Valley Group and Liffey Group to allow a broader range of palynological dating.

These samples were sent to Western Australia for a commercial palynological preparation by Laola Pty. Ltd. (See 4.1) Samples were not taken from any rocks known to have been affected by dolerite, due to the heat from this source destroying any palynological residues.

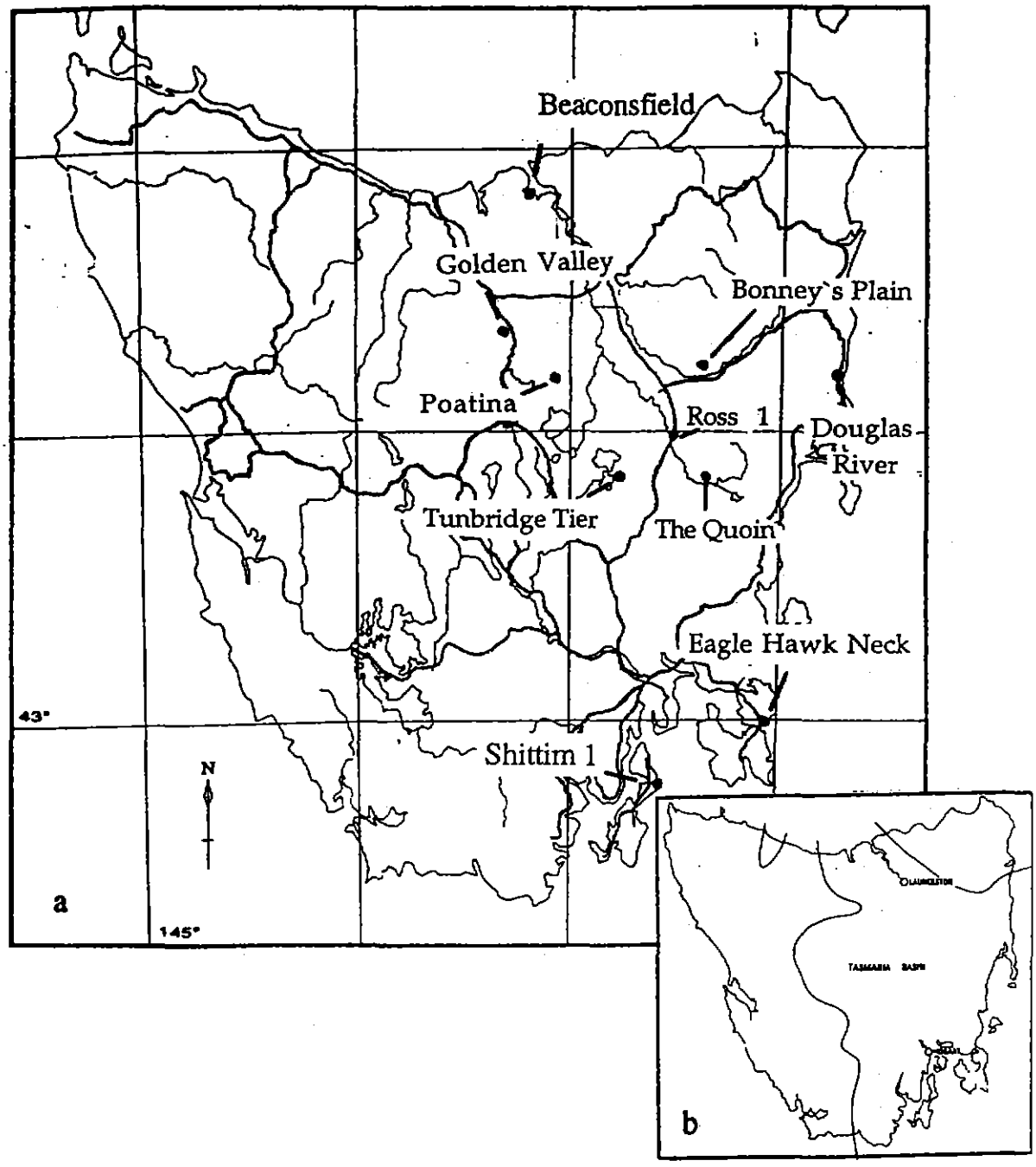


Fig 1.1 (a) Map of Tasmania showing locations mentioned in text.
(b) Outline of the Tasmania Basin (from Bacon, 1991).

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1.3 Previous Work

There has been relatively little work completed on the palynology of the Permian in Tasmania. An unpublished report by Helby (1972), describes the palynological content of twelve productive samples obtained from the Quamby Mudstone and Golden Valley Group from the Golden Valley Borehole. Calver *et al.*, (1984) looked at both marine macro-invertebrate and palynological data from a borehole section at Douglas River, Eastern Tasmania. Truswell (1978) published an interim report on the palynology of the Permo-Carboniferous in Tasmania, describing work completed up to that date.

Identification of palynomorphs in this thesis is based on comparisons to illustrations and descriptions in the "Permian Plant Microfossils of the Blair Athol Coal Measures, Baralaba Coal Measures, and Basal Rewan Formation of Queensland", by Foster (1979).

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Chapter 2: Permian Geology

2.1 Permian Australian Basins

2.1.1 Location

During the Late Carboniferous and Early Permian, a dramatic change took place in the pattern of sedimentation across Australia. Sedimentation during this time interval was widespread, and occurred in all states, and the "basins" which have been delineated today represent only thick remnants of the total accumulation (Cooper, 1983).

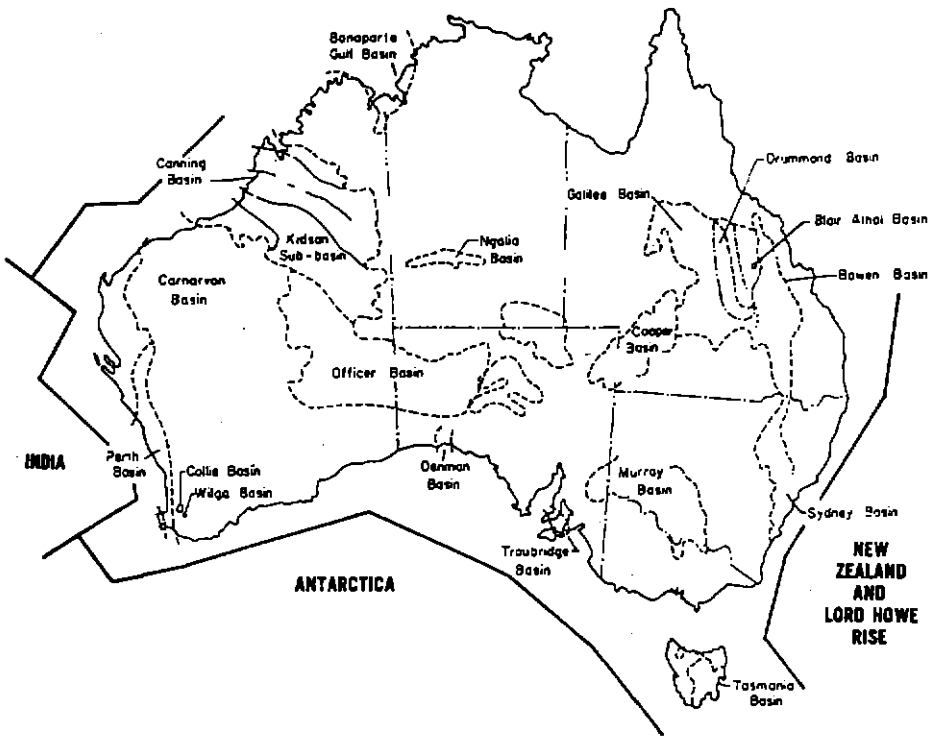


Fig 2.1 Diagram showing Upper Carboniferous and Permian basins in Australia, and also Late Palaeozoic continental positions (adapted from Cooper, 1983).

2.1.2 Palaeolatitude

During the Early Permian the continent of Australia was located at very high palaeolatitudes of around 75 - 85 degrees South, Tasmania was located at the southernmost point of Australia, at around 80 - 85 degrees South (pg. 73, Smith *et.al.*, 1981).

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2.1.3 Sea level history

A widespread transgression occurred in the Early Permian across not only Australia, but also Argentina, southern Africa, and India, due to a glacioeustatic sealevel rise following temperature change and the disappearance of the Australian ice sheet (Hallam, 1992). In the Permian of the eastern half of Australia, widespread transgressive - regressive phases led to major evolutionary changes in the flora and fauna which can be recognised throughout the region (Dickins, 1984).

A eustatic rise in sea level followed the retreat of the Early Permian (Sakmarian) glaciation. By the Lower Permian (late Artinskian), the seaway between Australia and Antarctica had disappeared, and marine conditions were restricted to the Tasmanian Basin. Transgressive marine phases continued along the western and northwestern margin of Australia, with marine and marginal marine conditions being established in the Sydney, Gunnedah and Bowen Basin (Langford, 1992).

Marine to brackish water conditions became widespread throughout many of the marginal Gondwana basins through the early Late Permian. These conditions continued until a global regressive phase began in the Late Permian (end of Kazanian) (Langford, 1992).

During the Late Permian, there occurred an accelerated fall in sea level to an exceptionally low stand. Sea level is predicted to have dropped by as much as 280 m worldwide, so that in very few places was there a continuation of marine deposition into the Triassic (Hallam, 1992; Langford, 1992). During this regression of the sea, the depositional basins became more and more isolated, which culminated in the Permian - Triassic boundary beds (Archbold and Dickins, 1991), and the widespread Permian/Triassic unconformity.

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2.1.4 Palaeoenvironment

In the Early Carboniferous, equable climatic conditions prevailed worldwide, and no authentic glaciation is known (Dickins, 1984). During the Late Carboniferous a marked difference in climate began to develop. Conditions became cooler, and by the Late Carboniferous/Early Permian, continental glaciation had become established (Fig 2.2) (Archbold and Dickins, 1991). With this change in climate, came a provincial faunal differentiation. In the Southern Hemisphere (Gondwana area) there evolved a distinctive *Eurydesma* and *Glossopteris* fauna and flora (Dickins, 1984).

Through the Early Permian, a gradual warming led to the breakdown of this provincial fauna, and the development of a more cosmopolitan array. The *Glossopteris* flora continued throughout the Permian, and provided much of the organic material infilling the sedimentary basins, whilst elements of the *Eurydesma* fauna disappeared with the warmer conditions (Dickens, 1984; Archbold and Dickens, 1991). Australia at this time experienced high rainfall conditions, which allowed for luxuriant plant growth. Climatic conditions also allowed large accumulations of plant debri to build up to form peat.

At the beginning of the Triassic, conditions changed dramatically once more. The main environmental factors in this time period were unusually low sea level, and a hot climate (Dickins, 1984). These conditions combined with ocean circulation and meteorological changes, led to the chemical evolution of the land and the ocean being significantly effected (Dickins, 1984).

2.2 Tasmania Basin

2.2.1 Tectonic development

The Tasmania Basin (Fig 1.1b) is a structural basin containing a thick sequence of relatively flat lying rocks dating from Late Carboniferous to Late Triassic in age; these

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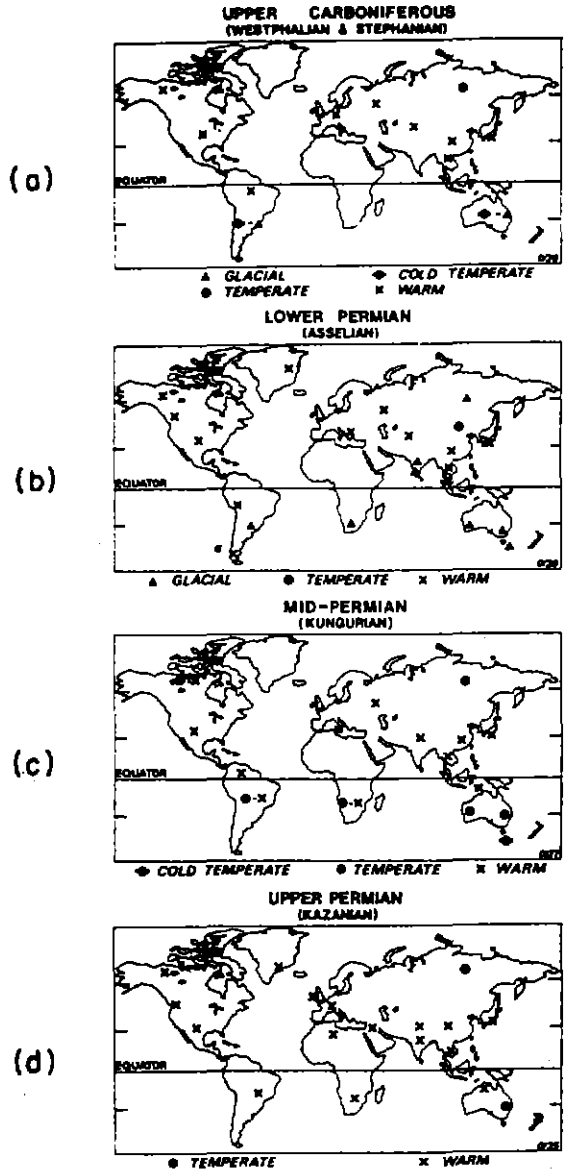


Fig 2.2 Figure showing climatic data from the Late Palaeozoic based on invertebrate faunas and other information: (a) from the Upper Carboniferous, (b) from the Lower Permian (Asselian), (c) from the mid-Permian (Kengurian), (d) from the Upper Permian (Kazanian).(from Dickins, 1984).

sediments are known as the Parmeener Supergroup (Forsyth *et al.*, 1973). Rocks of the Parmeener Supergroup rest with pronounced landscape unconformity on a basement of older metamorphosed Precambrian and Early Palaeozoic folded rocks intruded by granites which may be of Late Devonian - Early Carboniferous age (Clarke, 1992; Banks, 1989).

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The Tasmania Basin basement developed as the result of a mid-Palaeozoic juxtaposition of east and west Tasmania along a NNW trending dislocation, known as the "Tamar Fracture". Prolonged erosion and subsidence along this structure reduced the terrain to expose predominantly Precambrian and Cambrian metamorphic sequences to the west of the fracture, and folded Siluro-Devonian sequences to the east (Williams, 1989).

During the Early Permian, the Tasmania Basin was narrow (150 km), long (270 km) and occupied by a cold sea, and was situated at approximately 75^0 South (Martini and Banks, 1989). The Parmeener Supergroup was deposited in a tectonically stable environment, and it has been suggested that the sheet-like formation of the Lower Parmeener Supergroup is indicative of deposition in a shelf environment with a sedimentation rate ranging from ~0.2 mm - 3 mm per year (Domack *et al.*, 1993).

There has been some tectonic instability recorded in the Lower Parmeener Supergroup during Middle or Late Artinskian time. This coincides with a major orogenic movement in New South Wales (part of the Hunter-Bowen Orogeny) (Bacon, 1991).

Extensive doleritic intrusion occurred during the mid-Jurassic. More than 8000 km^3 of magma intruded through the Permian and Triassic sediments over most of Tasmania. From the cessation of Triassic sedimentation, until recent times Tasmania has been subject to normal faulting with a NNW trend. Post-Triassic faulting has led to steep dips and overturned beds in some parts of the Tasmania Basin (Banks, 1989).

The Tasmania Basin today exists as a broadly synclinal area plunging SSE which hosts the sub-horizontal rocks of the Parmeener Super-Group. These rocks generally dip away from the older rocks, and in places exhibit low amplitude folds which are not related to subsequent faulting.

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2.2.2 Antarctic relationship to Australia

Recent continental reconstructions of Tasmania place it close to northern Victoria Land during Gondwanan time, but the exact relationship between the two areas has been disputed (Fig 2.1) (Jago, 1980). There is a similarity in the Gondwanan sequence across the two regions due to the influence of tectonics, eustasy and climate along the Pacific margin of Gondwana (Collinson, 1990).

Palynological work in Antarctica is difficult due to the inaccessibility of the continent, but much work has recently been published (Larsson *et al*, 1990; Lindström, 1994, 1995 a, b). Within parts of Antarctica, the uppermost Palaeozoic sedimentary succession is broadly comparable to the uppermost Palaeozoic sequence of eastern Australia. Although thinner, the units consist of glacial beds overlain by continental, predominantly fluvial sediments, which, like eastern Australia, includes coal measures (Kemp *et al.*, 1977). Studies indicate that the Antarctic Permian palynological succession is similar to Australian successions, although Stage 1 or older Carboniferous palynofloras have not been found. The Late Palaeozoic glacial beds disconformably overlie Devonian sediments, therefore most of the Carboniferous is not preserved in the sedimentary record (Kemp *et al.*, 1977).

2.2.3 Lithology (Late Carboniferous - Early Triassic)

The Late Palaeozoic and Early Mesozoic rocks of the Parmeener Supergroup are subdivided on a lithostratigraphic basis, rather then in the time terms of the 'Permian' and 'Triassic'. The name Parmeener Supergroup is used to define a widespread sequence of Tasmanian rocks that are almost always sub-horizontal, and rest unconformably over a folded basement which includes rocks as young as Devonian or Early Carboniferous (Forsyth *et al.*, 1973).

Lithologically the sediments of the Parmeener Supergroup fall into two broad facies or associations, both of which are of approximately equal thickness. The lower half of the

sequence includes all glacial and glaciomarine beds, whilst the upper half is an essentially freshwater division (Fig 2.3) (Forsyth *et al.*, 1973)

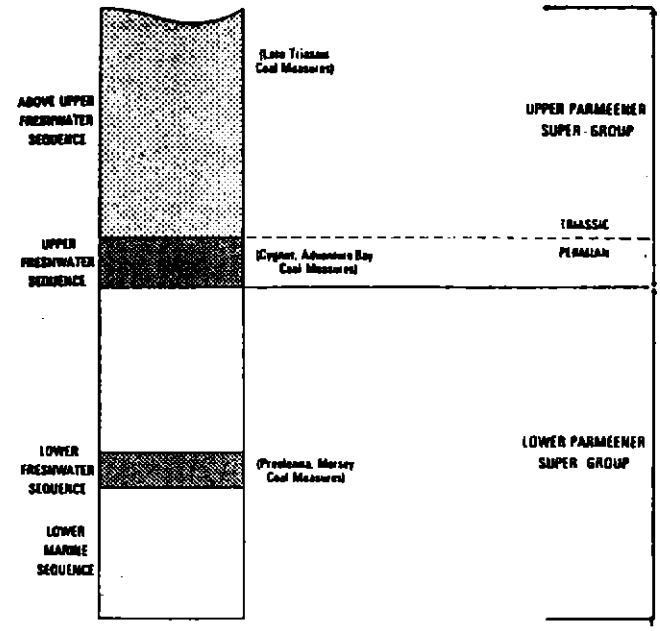


Fig 2.3 Subdivision of the Parmeener Supergroup (from Bacon, 1991).

The Lower Parmeener Supergroup is Late Carboniferous to Permian age, and often commences with a thick basal tillite (Bacon, 1991). The beds above the tillite (Woody Island Formation in southern Tasmania, and Quamby Formation in northern Tasmania) consist of very uniform, dark, massive-bedded pyritic, carbonaceous and glendonitic siltstone (Clarke, 1992) mostly of a glaciomarine origin. The Tasmanite Oil Shale is located within the Lower Marine Sequence. This oil shale is a 2m thick bed composed of the algae *Tasmanites* and occurs near the base of the sequence in northern Tasmania and at Douglas River, eastern Tasmania.

The Lower Parmeener Supergroup contains one freshwater interval (Liffey/Faulkner Gp.), known as the Lower Freshwater Sequence (LFS). This sequence includes the Early Permian coal-bearing strata (the Preolenna and Mersey Coal measures and equivalents). The marine sequences located directly below and above the LFS are termed informally the "Lower" and "Upper" Marine Sequences respectively (Fig 2.3) (Bacon, 1991).

The upper half of the Lower Parmeener Supergroup (composed of the Golden Valley Group, Bundella Formation, Darlington Limestone and correlative beds) consists of more variable, richly fossiliferous siltstone, calcareous siltstone and sandstone, with subordinate limestone and conglomerate. These sequences contain abundant ice-rafted debris, which, when combined with the low taxonomic diversity of the fauna and the presence of glendonites, indicate cold to very cold conditions of deposition following the main glacial retreat (Clark, 1992).

The Upper Parmeener Supergroup consists of clastic rocks of a fluvial origin, dating from Late Permian to Late Triassic in age. There is generally a conformable relationship between the Upper and Lower division of the Parmeener Supergroup, but in the north-east of Tasmania, the boundary is slightly disconformable, which coincides with a Late Permian to Middle Triassic hiatus (Bacon, 1991).

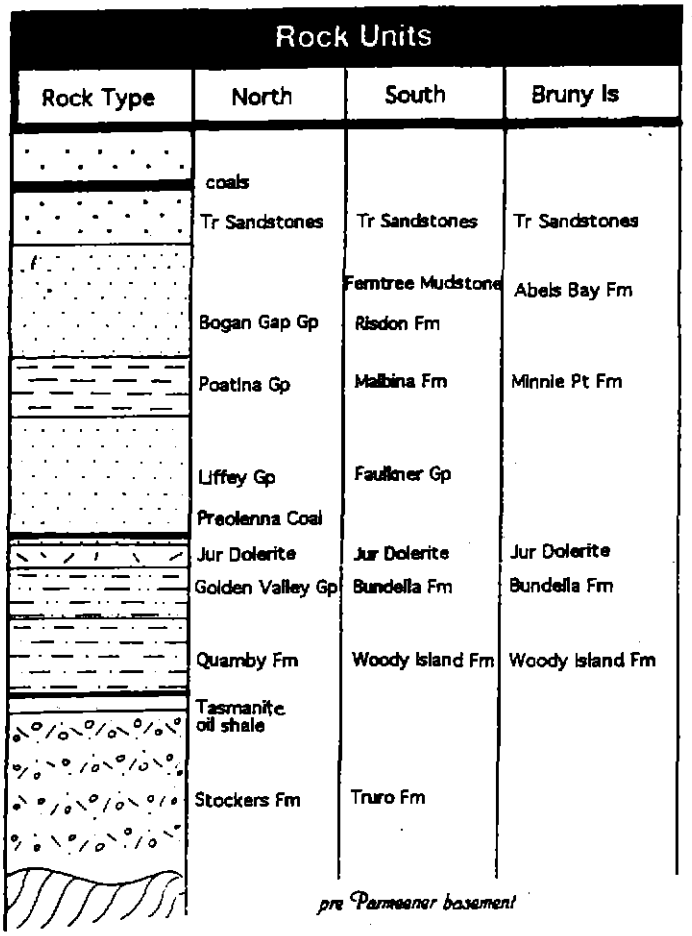


Fig. 2.4: Generalised lithological column for the Parmeener Supergroup showing correlates of the sequences in the North and South of the basin, and those found on Bruny Island (adapted from Maynard, 1996).

2.3 Shittim drill hole

The Shittim diamond drill hole (DDH) is located on North Bruny Island, on the southern side of Variety Bay, and was drilled in a series of stages; Shittim 1A -1D. Detailed logging of Shittim 1B -1D was carried out as a part of this thesis. The stratigraphy of this core can be seen summarised to the left of Fig 2.5 and shown in detail in Appendix 1.

A 30 metre shale bed was the first unit intercepted upon re-entry of the Shittim 1A drill hole, this was present as a dark grey/black, well laminated unit, fissile in nature. Rare lonestones of both limestone and quartzite break the bedding and can therefore be interpreted as dropstones and indicate floating ice at the time of deposition. The matrix was siliceous, with some thin, calcareous layers and rare bioturbation. This formation grades downward into a thin bed of tillite, and then into a 30 cm bed of unfossiliferous limestone.

Below this is a thick unit of tillite, interpreted as a correlate of the Truro Tillite. Typically the tillite contains a medium to dark grey matrix of fine siltstone to mudstone, and clast abundance is usually ~20-25 %. Clasts are of various compositions, including limestone, quartzite, metamorphics, igneous, mudstone and unknowns, from sand to pebble in size (Fig 5. 3). High angle fracturing at about 30 ° to perpendicular occurs throughout, often filled with calcite. Occasional thin (1 m - 3 m) shale beds occur through the tillite, as well as rare conglomerate beds, and zones of concentrated coarse (2 - 5 mm grain size) sediment accumulations.

A 260 m thick dolerite intrusion into the tillite occurs lower in the Shittim hole from 1308m, baking the sediments above and below. Below the intrusion, the tillite sequence has a thickness of approximately 30 centimetres, and rests with a sub-horizontal faulted contact on the metamorphosed sequences of the pre-Parmeener basement rock. For more detail on the stratigraphy of this hole, see Chapter 5.

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2.3.1 Cross-section of North Bruny Island

A cross-section of North Bruny Island was completed by Woods (1995) based on the data available from the drill holes Shittim 1 A and Jericho 1. This cross-section was reviewed and re-interpreted here based on further detail obtained from the re-entry of Shittim, and another shallow hole, Gilgal 1, and also surface data obtained from a traverse across North Bruny Island around these drill holes. The cross section (Figure 2.5) was drawn to scale, with no vertical exaggeration.

Outcrop of the sediments of the Lower Parmeener, as encountered in each of the drill holes is rare in the countryside between the drill holes. Outcrop is extensive in the cliffs along the shores of Bruny, and a dip of 10 - 15 ^{0} to the west south west is obtainable along the eastern (Variety Bay) side of Bruny Island, shallowing very slightly to 8 - 10 ^{0} on the western (Great Bay) side. Dip data between the two shores was not obtained due to the lack of in-situ outcrop in this area. Broken surface rock over most of the land surface indicates the Abels Bay Fm occurs below the surface in most of the area between the three drill holes.

The Risdon Sandstone is a distinctive marker bed in the region. A very coarse grained silicic sandstone, it is easily recognised in outcrop. The Risdon Sandstone is encountered at 79 meters in the Jericho hole, between the Abels Bay Formation, and Minnie Point Formation. The Risdon Sandstone crops out at the surface a few hundred meters East of the Jericho hole, suggesting a fault occurs somewhere between Jericho and the outcrop, as a projection of the shallow dip of the beds indicates outcrop should occur 600 m east of the hole. Risdon Sandstone crops out in a creek along the shore near the Shittim drill hole, and was interpreted to be faulted against a dolerite intrusion. The trend of the fault is impossible to determine due to a large amount of plant growth and loose soil covering the area. However the occurrence of the fault in a creek indicates the creek itself might have followed the line of the fault, and the fault may therefore trend west. When

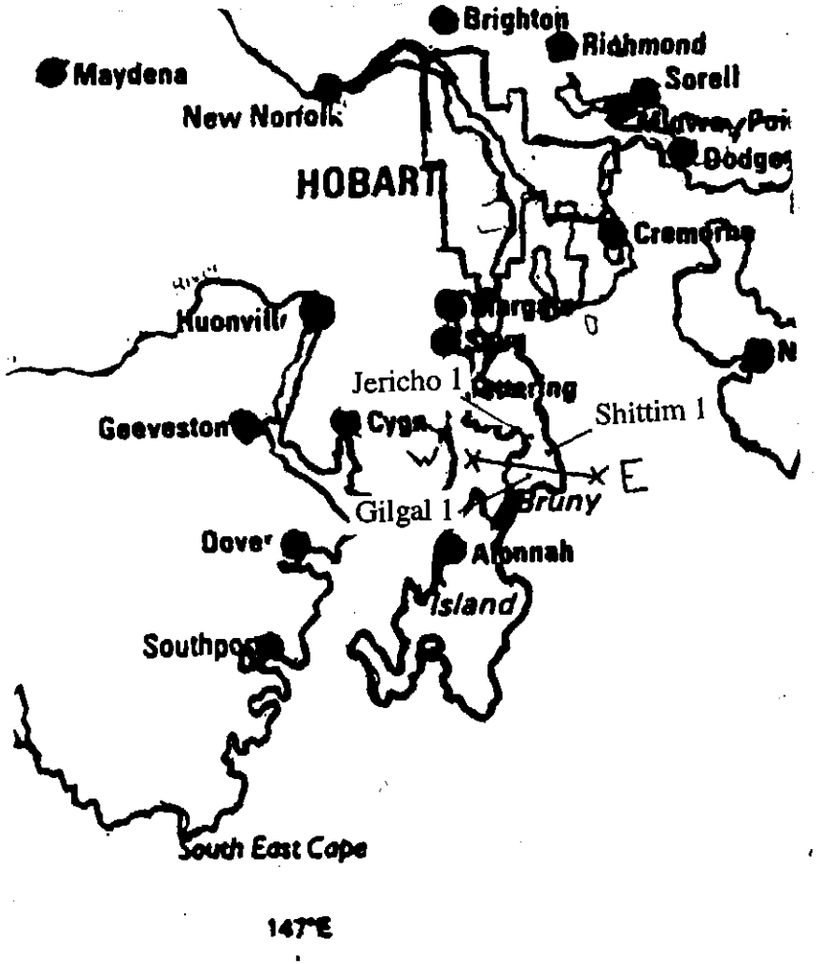


Fig 2.5 (a) Location of cross-section.

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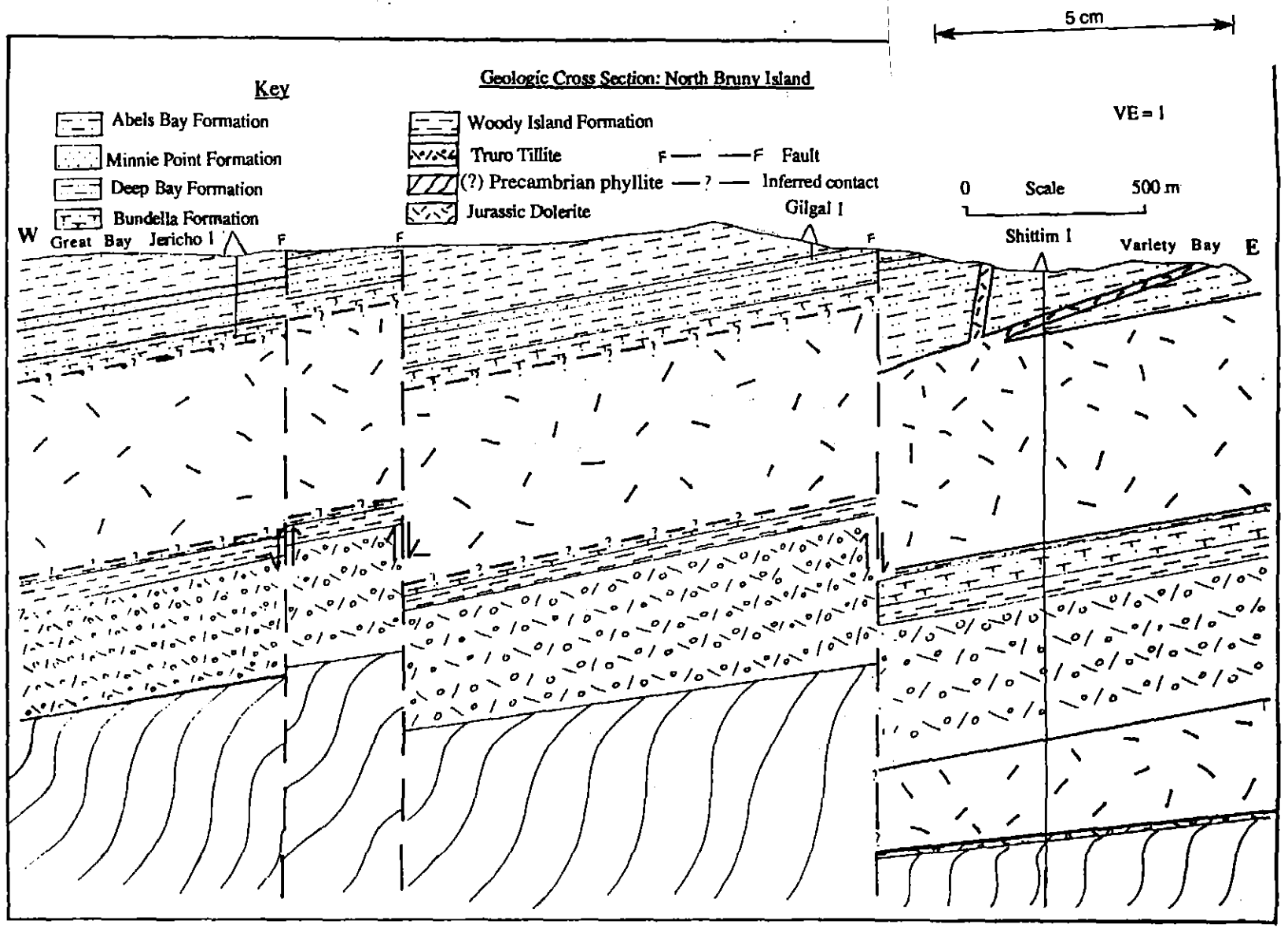


Fig 2.5 (b) Interpreted geologic cross-section of North Bruny Island, (see 2.5 (a) for cross-section location).

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projected onto the line of the cross section, the fault continues in a line that passes just east of Jericho. This is further support of a fault in this region.

A second fault is inferred somewhere between the first fault and the Gilgal hole, as the chips encountered in the first 50 meters of Gilgal appear to be similar to Abels Bay Formation. Boulder scree over the surface also belongs to Abels Bay Formation. A third fault is inferred between Gilgal and Shittim, as Deep Bay Formation is the first encountered in the Shittim Hole.

Dolerite sheets occur below the sedimentary rocks along the coast line, and appear to have intruded conformably with bedding. Dolerite that occurs at the surface in places between the drill holes is interpreted as dykes (see cross-section). Blue spotted hornfels at the base of the Jericho 1 core is interpreted as part of a contact aureole (Woods, 1995) and further drilling in this hole is expected to encounter an unknown thickness of dolerite.

2.4 Stratigraphic correlations

A number of DDH's from around the Tasmania Basin were examined and sampled for palynological dating. Due to baking of the sediments by igneous intrusion, not all of the beds sampled were productive for palynomorphs. In some cases, no intrusions were encountered in the holes, but samples were still baked, which indicates a significant heat source nearby. Fig 2.6 shows a graphical summary for each of the DDH's sampled and a litho-stratigraphic correlation of the formations between holes. See Fig. 1.1a for location of each of the holes.

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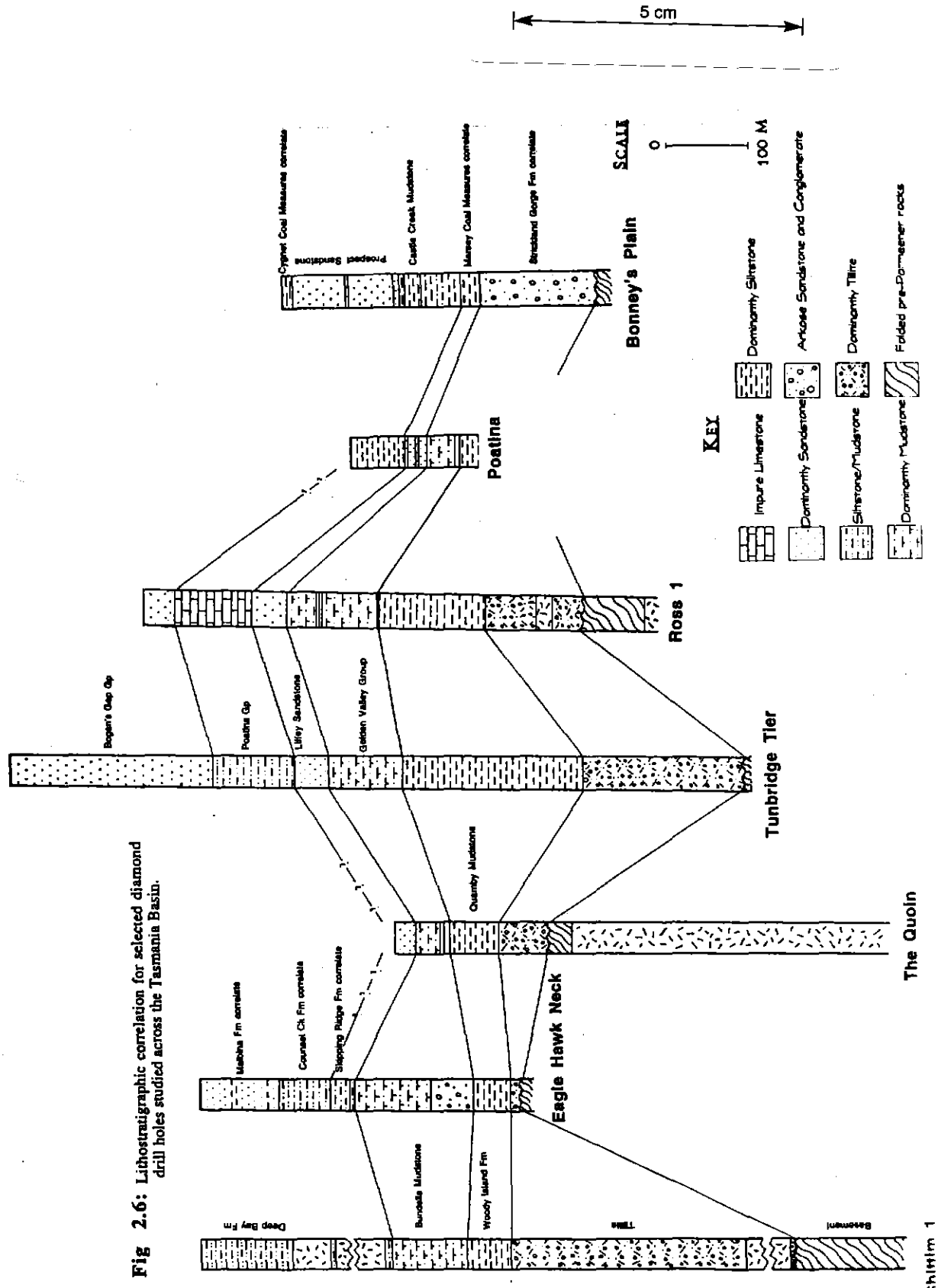


Fig 2.6: Lithostratigraphic correlation for selected diamond drill holes studied across the Tasmania Basin.

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Chapter 3: Palynostratigraphy

3.1 Introduction

Plant fossils have become increasingly important in solving problems of dating and correlation of sedimentary sequences. Especially significant in this field is the use of spore and pollen, (i.e. palynology) which is fast becoming one of the most widely used palaeontological tools in sedimentary studies.

Fossil spore and pollen assemblages from the Silurian to the present have been studied from around Australia, but the palynology of the Permian is known in great detail because of its application to fossil fuel exploration (Balme, 1964). There is a great diversity of Permian pollen morphotypes, which marks this period as a time of intense experimentation in the packaging of genetic material for successful dispersal (Foster, 1983). Adaptations through the Permian have led to the structural modification of spore and pollen grains, as well as changes in the physical appearance (Foster, 1983).

In general, the Permian spore and pollen assemblages of Gondwana appear to be characterised by a greater diversity of pteridophyte spores in the eastern part, (which includes Australia), whilst a greater morphological diversity of gymnosperms is more characteristic of the western part of the supercontinent (Trusswell, 1980). Subdivision of these palynomorphs into certain groups and/or associations forms a basis upon which the sediments of this period can be dated (Fig. 3.1).

3.2 Carboniferous/Permian boundary

Palynology has been employed in many regions of Australia to help locate the Permo-Carboniferous boundary in the Late Palaeozoic. This has become necessary, as the exact location of this boundary is not always clearly defined by stratigraphic changes.

The Lower Permian in Tasmania is a part of the Lower Parmeener Supergroup. The Lower Parmeener Supergroup includes rocks from the Upper Carboniferous to the Permian. As mentioned, the exact boundary between these periods is often difficult to define. This difficulty extends into most of eastern Australia. By using palynological techniques, the correlation of these units around Tasmania is possible for most areas. However correlation with sequences beyond Tasmania is difficult due to the different factors which are used to define the Permo-Carboniferous boundary in other states. These factors include the use of different marker species due to past provincialism of some of the marker species involved (Cooper, 1991), or, as is more often the case, the different times in which species first occur in areas separated by distance. Palynology often records climate-controlled vegetation zones that migrated polewards with the recession of the Permian ice cap (Brakel, 1982).

Within Tasmania, palynological subdivision of the Lower Parmeener Supergroup has been based on the first appearance of certain spore and pollen species within the sediments (Fig 3.1) (Truswell, 1980). These define a series of Microflora "stages" numbered 1 - 5 based on this system.

3.2.1 Faunal assemblages

Work in recent years has also revolved around establishing a local biostratigraphic framework of faunal assemblages in the Tasmanian sedimentary sequences. Four formal subdivisions of the Lower Parmeener Supergroup based on faunal assemblages have been erected by Clark and Farmer (1976). These are the Hellyerian, Tamarian, Bernacchian and Lymingtonian, and preliminary palynological studies by Truswell, (1978) have allowed a broad correlation of these faunal subdivisions with the "stages" of the palynological subdivision of eastern Australia (Fig 3.1). Correlation of the Tasmanian faunal stages with those based on a world wide standard are shown in Fig. 3.2 (Clarke, 1989).

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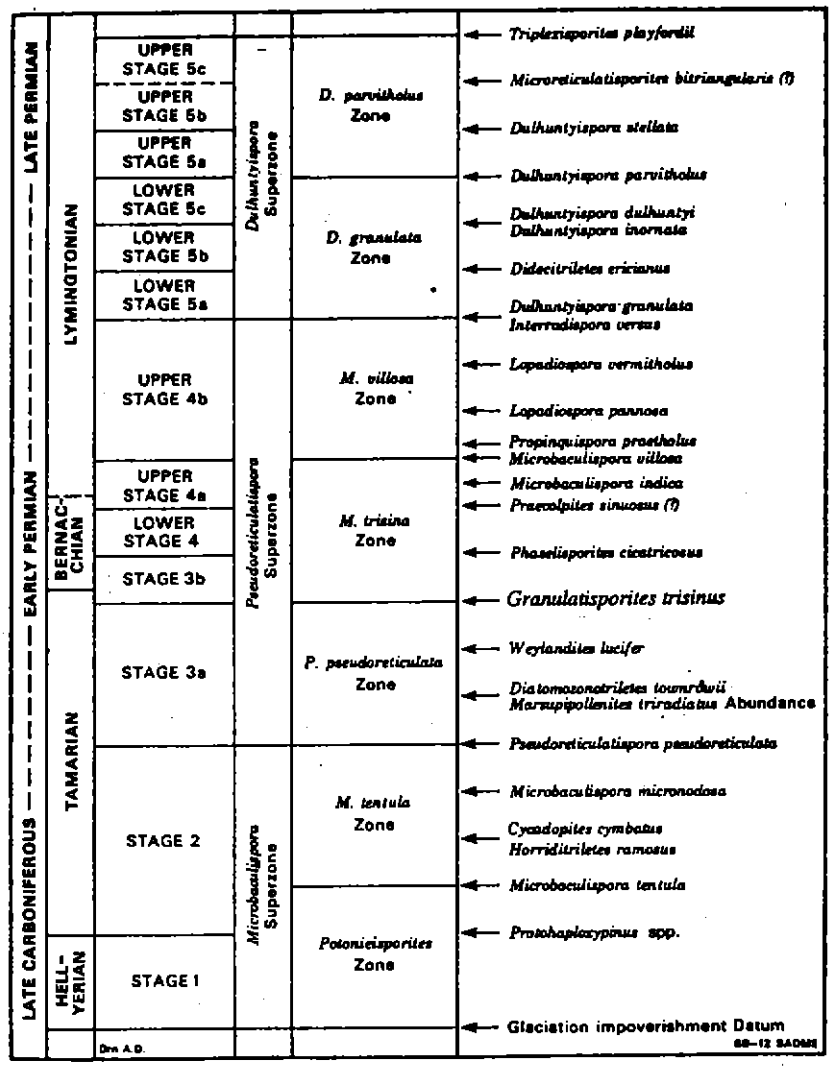


Fig 3. 1: Palynological sub-division of the Late Carboniferous and Permian of eastern Australia, showing the marker species defining the base of each zone, and comparing significant spore/pollen zonations and appearance datum's. The Tasmanian faunal subdivisions are indicated to the left (adapted from Cooper, 1991).

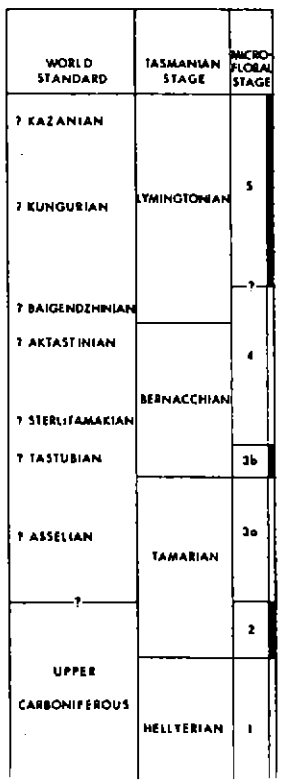


Fig. 3.2: Broad correlation of the faunal subdivisions of Tasmania with those based on a world wide standard (from Clarke, 1989).

3.3 Development of the Australian Permian Zonation

Numerous attempts have been made to divide Australian Late Palaeozoic spore/pollen microfloras into a series of zones, defining the age of sediments. Many of these schemes are applicable only in certain areas where they were developed, whilst others are applicable on a much broader scale. Due to past provincialism of species, an Australia wide scheme has not yet been developed, although many attempts at such a correlation have been made (Fig 3.3), (Cooper 1991).

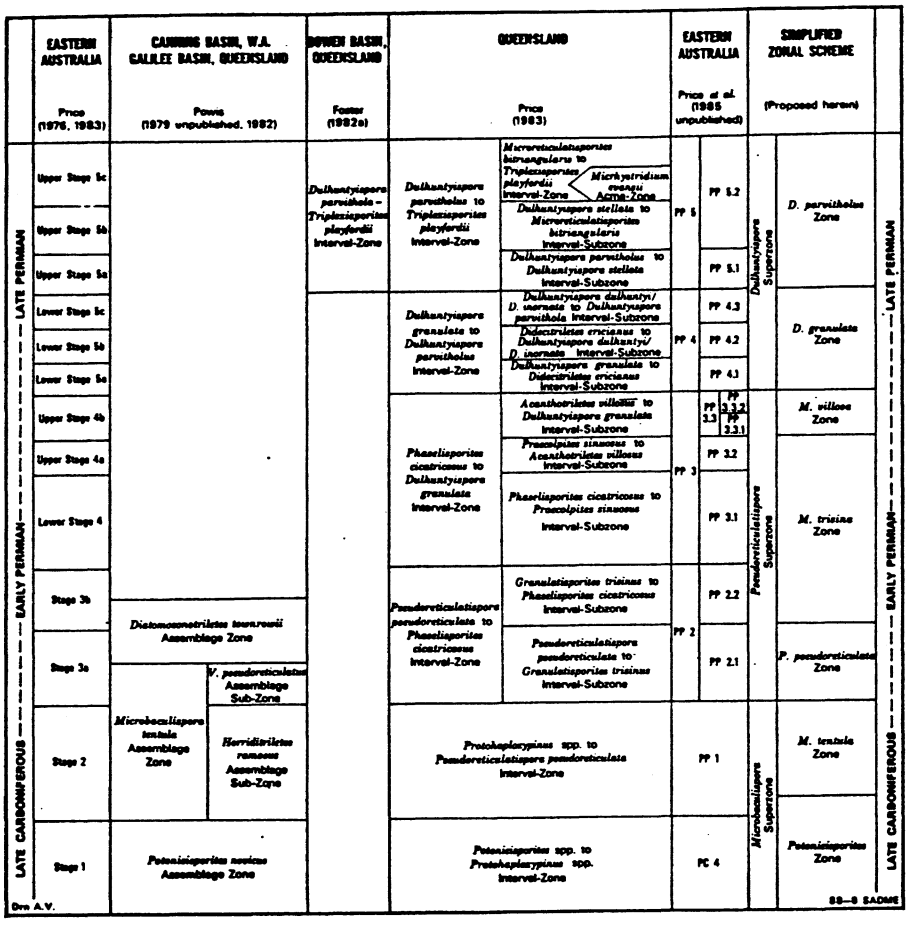


Fig 3.3 Biostratigraphic subdivision of the Late Palaeozoic across Australia, 1967 - 1987 as suggested by Cooper, 1991 (from Cooper, 1991)

The palynostratigraphic scheme used today in eastern Australia is based on the units first described by Evans (1969), which have undergone progressive revision from a zonation of local utility into one that has a much broader application (Cooper, 1991). Evans (1969) devised a scheme which divided the microflora into a series of stages, numbered 1 - 5, with subdivisions within these stages being based in most cases on the first

appearances of individual "form" or "marker" species (Kemp *et al.*, 1977). Stages 1 - 4 are used in this study, and the species defining these zones are as follows:

STAGE 4	*Phaselisporites cicatricosus* to *Dulhuntyispora granulata* Interval-subzone.
Upper stage 4b	*Acanthotriletes villosus* to *Dulhuntyispora granulata* Interval -subzone
Upper stage 4a	*Praecolpatites sinuosus* to *Acanthotriletes villosus* Interval-subzone
Lower stage 4a	*Phaselisporites cicatricosus* to *Praecolpatites sinuosus* Interval-subzone
STAGE 3	*Pseudoreticulatispora pseudoreticulata* to *Phaselisporites cicatricosus* Interval-zone
Stage 3b	*Granulatisporites trisinus* to *Phaselisporites cicatricosus* Interval-subzone
Stage 3a	*Pseudoreticulatispora pseudoreticulata* to *Granulatisporites trisinus*
STAGE 2	*Pseudoreticulatispora pseudoreticulata* to *Protohaploxypinus* spp. Interval-zone
STAGE 1	*Protohaploxypinus* spp. to *Potonieisporites* spp. Interval-zone.

Table 3.1 Interval zones from eastern Australia, depicting key species marking each of the zones (from Price, 1983).

Palynological subdivision of microfloras from Western Australia have also been developed, however correlation between East and West Australia is only tentative at the moment (Price, 1983; Cooper, 1991). Various attempts have been made to correlate the two schemes developed (Fig. 3.3).

3.4 Tasmanian Permian Palynology

Very little work has been published on the palynology of the Permian in Tasmania. An unpublished palynological report by Helby, (1972) describes the palynological content of twelve productive samples obtained from the Quamby Mudstone and Golden Valley Group from the Golden Valley Borehole. Other papers include work completed by Calver *et al.*, (1984) on a borehole section at Douglas River, Eastern Tasmania, which looked at both Marine macro-invertebrate and palynological data, and finally an interim report on the palynology of the Permo-Carboniferous in Tasmania by Truswell, (1978).

3.5 Tasmanian Permian Macroflora

Plant macrofossils can also be used in the dating of sediments, but are of a more limited use than microflora such as spores and pollen, as quite often macrofloral features are harder to identify with any certainty, due to convergent evolution of parts. Plant macrofossils have been found preserved within the mudstone sequence, at a number of localities around Tasmania (Domack *et al.*, 1993), but are not studied here.

3.6 Pollen affinities of the Permian

Large numbers of morphologically diverse spores and pollen grains have been isolated from the coals and sediments of the Permian. These can be divided up into a variety of types. The most common of these include bisaccate, trilete, monolete, monocolpate and alete sporomorphs.

Bisaccate sporomorphs are bilaterally symmetrical microspores, equipped with bladder-like extensions of the exoexine and are structurally similar to the pollens of certain present-day conifers. This pollen type made its first appearance in the fossil record during the Late Carboniferous or Early Permian age (Balme and Hennelly, 1955). Pollen grains of this type are assignable to the Coniferaceae family, as pollen grains with inflated

airsacs of this type are produced today by only two coniferalean families, the Abietineae and Podocarpineae (Balme and Hennelly, 1955).

Trilete sporomorphs have either a simple or complex structure, and possess a triradiate tetrad marking with a lack of any obvious germinal mechanism. These sporomorphs are thought to have been recognised from sediments as old as Cambrian in age (Balme and Hennelly, 1956a). Trilete spores are widespread today among the lower plant groups, especially in the Lycopodiaceae and Selaginellaceae. Many bryophytes and fern species also posses trilete spores, however some higher plant spores are known to have similar markings (Balme and Hennelly, 1956a). Therefore, while it is reasonable to assume that the majority of sporomorphs from ancient sediments are derived from the lower plant groups, some may have arisen from higher plants.

Monolete sporomorphs are distinguished by a single, more or less straight proximal tetral scar, which serves as a germinal exit, and became most common from the Late Carboniferous onward. The majority of Late Palaeozoic monolete sporomorphs closely resemble the spores of modern bryophytes and pteridophytes, and their origin is generally thought to be from members of these divisions (Balme and Hennelly, 1956b).

Monocolpate pollen grains possess a single longitudinal germinal furrow on the distal face and are sometimes regarded as the most primitive of all pollen, and hence the likely evolutionary progenitor of more elaborate and modern types. Today they are widespread among the gymnosperms, particularly the Cycadales, and also occur in a number of angiosperm families (Balme and Hennelly, 1956b). No definite relationship has been defined for the origin of monocolpate pollen grains

Alete sporomorphs are without clearly defined germinal apparatus and have been recorded from sediments of all geological ages from the Carboniferous onwards. In the absence of any germinal apparatus, few criteria exist on which to classify sporomorphs of this type

(Balme and Hennelly, 1956b). Alete grains are common today among gymnosperms and angiosperms, and spores of similar morphology can be found amongst the Pteridophyta and Bryophyta. Therefore very little has been inferred as to the relationships of isolated Palaeozoic alete sporomophs (Balme and Hennelly, 1956b).

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Chapter 4: Results

4.1 Materials and Methods

Twenty eight samples from six cores from the Tasmania Basin were selected for palynological investigation (see Fig 1.1 for locations). These were processed using standard palynological methods by Laola Ltd in Western Australia. Palynological preparation involves; (1) the removal of the outer surface of the rock to prevent contamination, (2) disaggregation and dispersal of the rock matrix to free the palynomorphs, (3) chemical extraction to dissolve unwanted carbonate and silicate components, and finally (4) density separation to separate the palynomorphs from any left over unwanted sediment. Two strew slides were prepared from each residue and examined by light microscopy and a kerogen slide was prepared for some samples.

The sample material is deposited in the Department of Geology at the University of Tasmania.

4.2 Palynomorph content

From the twenty eight samples, twenty four productive samples yielded 49 palynomorph taxa. The species composition and the holes and depths at which they occur are shown in Table 4.1. Due to heating events, which may include regional heating, the extensive intrusion of Jurassic dolerite and Tertiary Basalt within the Tasmania Basin, state of preservation was quite variable, with some samples being completely carbonised. Due to this, a rating system has been drawn up to categorise the degree of confidence with which an age has been assigned to each sample:

Rating 1: Good preservation, complete confidence in age.

Rating 2: Reasonable preservation, confident with maximum age, but not minimum.

Rating 3: Reasonable to poor preservation, little confidence in age assigned

Rating 4: Poor to nil preservation, no definite age assignable.

Samples close to a dolerite intrusion show very poor to nil preservation, preservation increases in quality moving away from the heat source. In some cases poor to nil preservation is found at depths with no dolerite encountered within the drill hole, and in these it is assumed a dolerite intrusion is seated nearby. Samples were chosen in most instances from within the beds of the Woody Island Formation, and Quamby Formation and correlates, occasionally extending up into the beds of the Liffey/Faulkner Group, and into the underlying tillite.

4.3 Most common species and environment

The following is an outline of the most common species encountered in each of the drill holes, including a brief description, where possible, on environmental inferences based on the preserved associations of microfossils. The most common species encountered overall are *Protohaploxypinus limpidus*, followed by *Marsupipollenites triradiatus* and *Plicatipollenites sp.* (Plate 4.1 and 4.2).

4.3.1 Bonney's Plain

The drill hole at Bonney's Plain is thought to represent an area of unique environmental conditions due to the lack of the algae *Tasmanites* within this section. (see 5.3.1). The most common species at this location is the bisaccate *Protohaploxypinus sp.*, followed closely by the monosaccates *Plicatipollenites sp.* and *Cannanoropollis sp.*, and the trilete sporomorph *Marsupipollenites triradiatus.* Other common bisaccates are *Scheuringipollenites sp.* and *Striatoabietes multistriatus.*

A sample collected from deeper within this hole (656 m) yielded a high percentage of megaspores, which are not found at any other locations. Also common throughout this core was a high percentage of acritarch spores (up to 5 %), indicative of marine conditions at time of deposition.

4.3.2 Poatina

The most common species in samples collected from this location are the monosaccates *Plicatipollenites sp.* and *Cannanoropollis sp.* Less common are *Protohaploxypinus sp.* and *Marsupipollenites triradiatus.* The high percentage of monosaccate species at this location is characteristic of Late Carboniferous assemblages in other parts of Australia (McMinn, pers. comm.), and may indicate conditions were slow to change moving into the Permian in this part of Tasmania.

4.3.3 Ross

Common species at this location are *Protohaploxypinus sp.*, *Plicatipollenites sp.* and *Cannanoropollis sp.*, and from greater depth the species *Apiculatisporites cornutus.* No inferences regarding environmental conditions at time of deposition can be made at this location.

4.3.4 Tunbridge Tier

Unfortunately preservation at this location is very poor, due to a series of thin Tertiary Basalt sills (3 cm - 1.3 m) found within the core. It is unlikely that the heat from these sills alone caused the extensive carbonisation of the palynomorphs, therefore a dolerite intrusion may be located nearby. No list of common species could be determined.

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Plate 4.1

Photomicrographs of palynomorph species from Bonney's Plain DDH (516.8 m).

Fig. A: *Scheuringipollenites maximus* (Size 48.3 µm).

Fig. B: *Pseudoreticulatispora pseudoreticulata* (Size 40 µm).

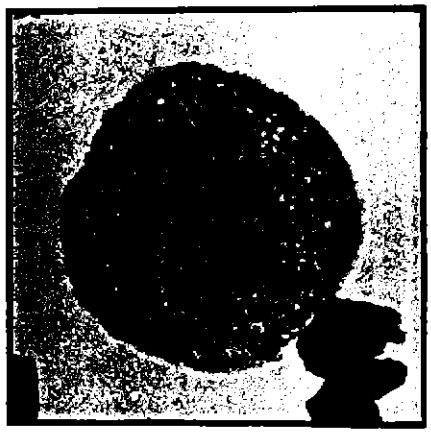
Fig. C: *Pilasporites sp. (?)* (Size 20.7 µm).

Fig. D: *Apiculatisporis cornutus* (Size 18 µm).

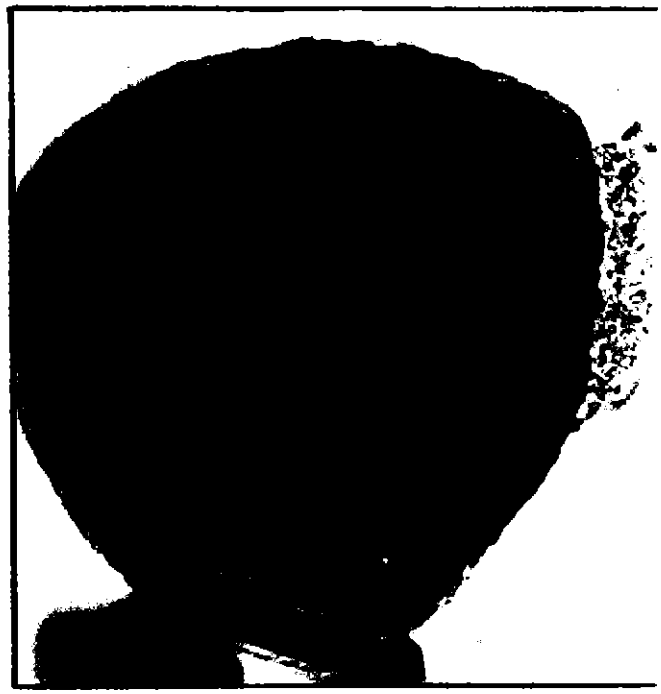
Fig. E: *Interradispora sp.* (Size 28.9 µm).

Fig. F: *Granulatisporites sp.* (31.5 µm).

A



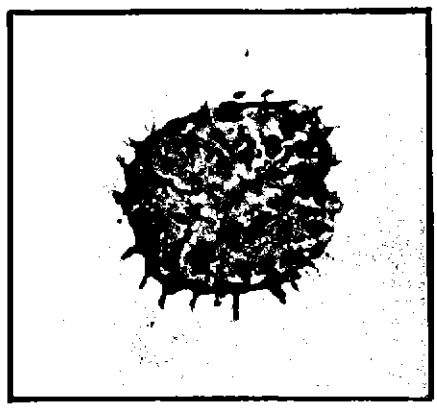
B



C



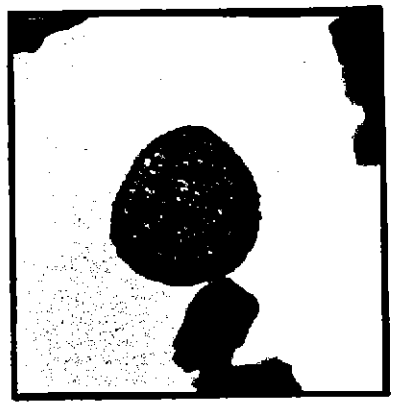
D



E



F



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Plate 4.2

Photomicrographs of palynomorph species from Bonney's Plain DDH (516.8 m).

Fig. A: *Plicatipollenites densus* proximal focus (Size 79.4 µm).

Fig. B: *Plicatipollenites densus* distal focus (Size 70 µm).

Fig. C: *Protohaploxypinus sp.* (Size 37.9 µm).

Fig. D: *Neoraistrickia gracilus* (Size 48.3 µm).

Fig. E: *Chordasporites sp.* (Size 41.4 µm).

Fig. F: *Scheuringipollenites maximus*. (Size 55.2 µm).

Fig. G: *Dictyophyllidites mortonii* (31.5 µm).

Fig. H. *Bipartitisporis sp.* (34.5 µm).

A

B

C

D

E

F

G

H

| | Depth (m) | Acanthotrileles illiformis | Acanthotrileles sp. | Acanthotrileles superbus | Acanthotrileles tereteangulatus | Alisporites australis | Alisporites splendens | Aplculatisporis comutus | Balcanisporites undosus | Barakarites rotatus | Biperdilisporis sp. | Brazilea sp. | Brevitrileles sp. | Camptotrileles warchianus | Cannanoropollis janakii | Cannanoropollis sp. | Chordasporites sp. | Concavissimisporites grumulus | Cruciaccites monoletus | Cyclogranisporites frustulentus | Cyclogranisporites gondwanensis | Cyclogranisporites sp. | Densipollenites indicus | Densipollenites sp. | Densoisporites playfordii | Dictyophyllidites mortonii | Dictyophyllidites sp. | Gondisporites bharadwajii | Grandispora segrovesii | Granulatisporites aboonus | Granulatisporites sp. | Granulatisporites trustulentus | Granulatisporites trilsinus | Horriditrileles sp. | Indotradites splendens | Intermadispora daedala | Interradispora sp | Interradispora versus | Leiotrileles bialrotholensis | Leiotrileles directus | Limatulasporites fossulatus | Limatulasporites rectus | Limatulasporites sp. | Lophotrileles novicus | Lophotrileles sp. | Lundbladispora iphilegna | Lundbladispora sp. | Lundbladispora springaurensis | Maculatasporites amplus | Maculatasporites gondwanensis | Maculatasporites malaberensis | Manumpollenites sp. | Marsupipollenites triradiatus | Michystridium sp. | Microbaculispora tentula | Neoraistrickia gracilis | Perotrileles sp | Phidiaesporites fosteri | Phidiaesporites sp. | Plicatipollenites calculus | Playfordiaspora cancellata | Playfordiaspora sp. | Plicatipollenites denaus | Plicatipollenites gondwanensis | Plicatipollenites sp. | Polypodisporites leopardus | Polonielsporites balmei | Protohaploxypinus limpidus | Pseudoreticulatispora pseudoreticulata | Ptenuchipollenites indarraensis | Ptenuchipollenites sp. | Punctatisporites gretensis | Punctatisporites sp. | Punctatisporites priscus | Retusotrileles nigritellus | Scheuringipollenites maximus | Scheuringipollenites ovatus | Striatoabieites multistriatus | Striatopodocarpites cancellatus | Striatopodocarpites phaleratus | Striatopodocarpites sp. | Tiradispora sp. | Vitreisporites signatus |
|---|---|---

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Chapter 5: Palaeogeography and Geology

5.1 Introduction

At some time in the mid-Palaeozoic, east and west Tasmania were juxtaposed along a NNW trending dislocation, known as the "Tamar Fracture" (Williams, 1989). Prolonged erosion exposed metamorphic Precambrian sequences to the west of this fracture, and folded Siluro-Devonian sequences to the east. Sedimentary deposition began in the Late Palaeozoic, after glaciation (Williams, 1989).

5.1.1 Basement rock

In the Tasmania Basin, the rocks of the Parmeener Supergroup rest with pronounced landscape unconformity on a folded basement composed of Pre-Cambrian to Lower Palaeozoic strata. A brief overview of the pre-Parmeener lithology is given here, in order to understand the sequences underlying the Tasmania Basin.

The oldest rocks in Tasmania are of Proterozoic age, and include quartzites, phyllites and dolomites, overlain by late Proterozoic - Cambrian sedimentary sequences and volcanics. Following a period of faulting and folding, an accumulation of up to 2.5 km of siliciclastics and shallow marine units are concordantly followed by dominantly Ordovician carbonates, and then siliciclastics and carbonates of Late Ordovician - Middle Devonian age, and sediments of the Eldon Group and correlates. (Williams, 1989). Following this period of almost continuous marine sedimentation over much of Tasmania, there was a period of mountain building associated with folding and allied deformation, termed the Tabberabberan Orogeny. Toward the end of the main period of Tabberabberan deformation, deep seated granite intruded resulting in metamorphism of some of the lower Palaeozoic rocks (Clarke *et al.*, 1972).

At some time during the post-Devonian granitoid to pre-Parmeener Supergroup period, east and west Tasmania were juxtaposed along a NNW trending dislocation, known as the Tamar Fracture System. Prolonged erosion and subsidence along older structural zones within the basin, followed by glaciation reduced the terrain to expose the metamorphosed Precambrian sequences to the west, and the folded Siluro-Devonian sequences and granites to the east. Subsidence continued throughout most of the upper Carboniferous to Permian, resulting in the deposition of the glacimarine and marine sequences, which initiated the Tasmania Basin. Up to 1.3 km of sediments accumulated in this sequence, known as the Parmeener Supergroup (Williams, 1989).

5.1.2 Glacigenic Sediments

Glaciation was widespread in the Gondwanan region in the Late Palaeozoic (Dickins, 1985). Ice covered much of Tasmania in the Late Carboniferous (Clarke, 1989), but began to retreat as conditions changed during the Early Permian. The glacial sediments left after this retreat include a number of lithotypes and fossils which can be used to interpret the environment of deposition. The high proportion of diamictites have been interpreted as glacial tillite in many instances (Farmer, 1985), but can also be interpreted as debris flow deposits associated with abundant meltwater (Powell, 1984).

Based on both lithological and fossil indicators a marine environment of deposition has been suggested for most of Tasmania's Permo-Carboniferous glacigenic sediments (Hand, 1993). The rest being deposited in one or more large open bodies of water, probably the sea.

The thickest known sequence of tillite occurs in the Wynyard area, where it reaches 600 m in thickness. Thick sequences also occur in other areas of the state, for example in the Woodbridge-Cygnet area (~300 m), Maydena (~175 m) and at Poatina (~110 m). These thicker sequences are thought to be associated with basement troughs (Banks and Clarke, 1987). There is no tillite in the Glenorchy Borehole in the Hobart area, and when

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coupled with a much greater thickness of the Woody Island Siltstone, it may indicate that the Hobart area beyond the limits of tillite deposition.

Evidence based on the distribution of the tillites around the state, direction of striations, scour and pluck features and clast provenance suggest that grounded ice entered Tasmania from the west (Banks, 1981; Banks and Clarke, 1987). Hand (1993) claims it is possible that ice entered Tasmania from three areas, see Fig 5.1.

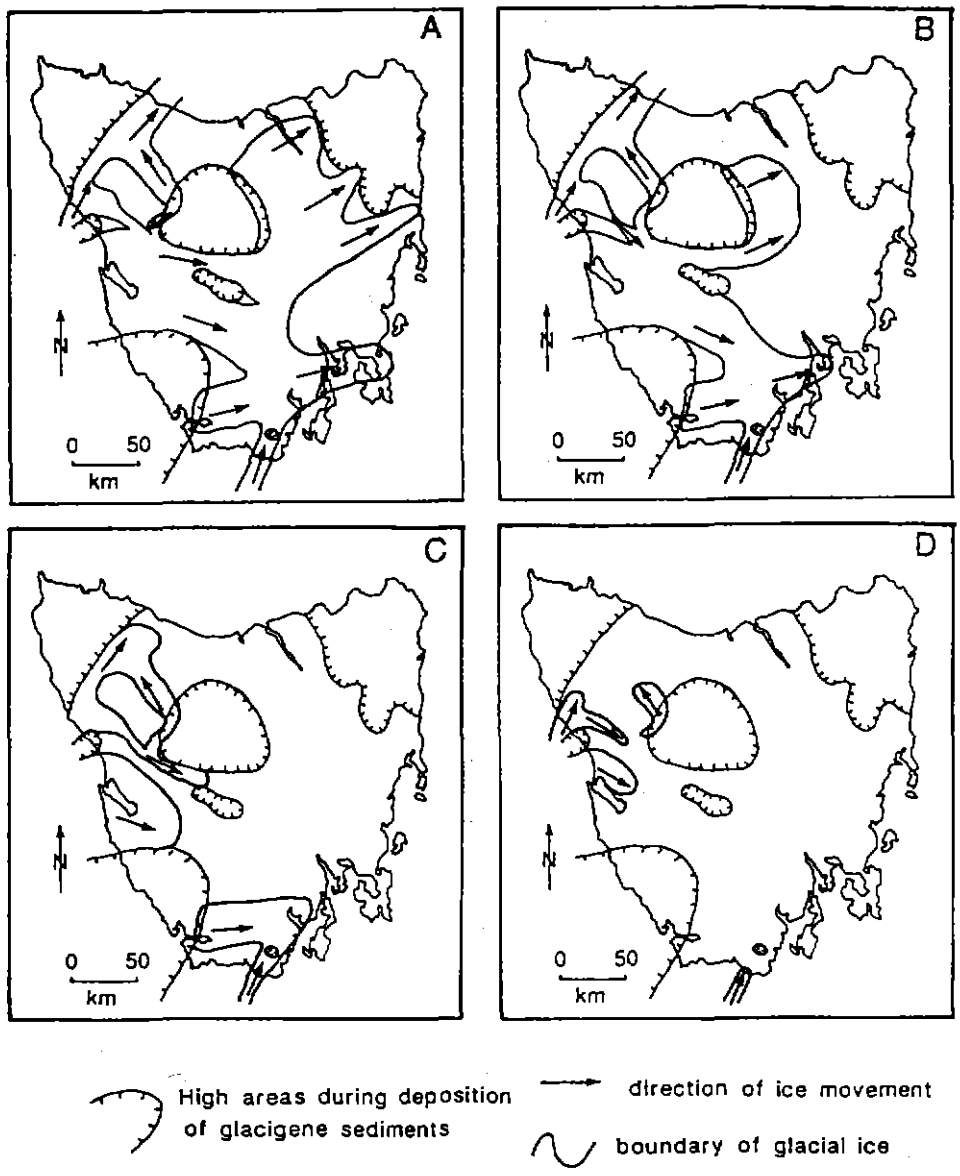


Fig 5.1 Palaeogeographic reconstruction of Tasmania showing direction of ice movement at four separate times during the deposition of the glacigenic sediments, (A) shows the palaeogeography at the glacial maximum, with the three suggested areas of entry indicated, while (B), (C) and (D) show the palaeogeographies at successive stages during glacial retreat. No attempt at an absolute time scale is indicated due to paucity of biostratigraphic control (Hand, 1993).

5.1.3 Woody Island Formation and Quamby Formation

The glacigenic sediments of the Late Carboniferous/Early Permian pass abruptly into the overlying marine rocks of the Woody Island Formation (south) and Quamby Formation (north). The lower facies of the succeeding marine section is generally an organic-rich mudstone containing a variable ice-rafted component of sand - cobble size particles decreasing in abundance upwards. The basal units of this formation contain the Tasmanite Oil Shale, which records a basin wide period of increased primary productivity combined with the ice rafting (Domack *et al.*, 1993). These formations are overlain by the glaciomarine Golden Valley Group and correlates. The long term evolution of the Lower Parmeener supergroup is summarised in Fig 5.2.

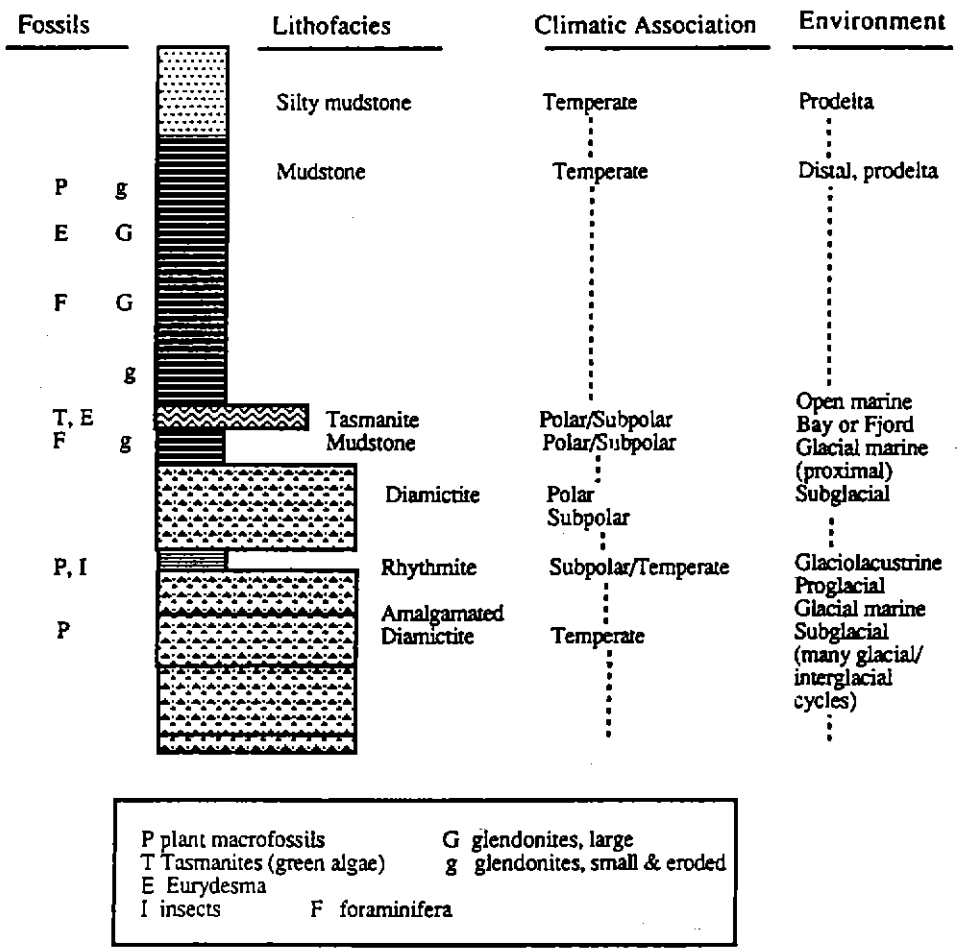


Fig. 5.2: Overall palaeoclimatic and environmental evolution of the glacigenic portion of the Parmeener Supergroup (from Domack et al., 1993).

5.2 Bruny Island

5.2.1 Truro Tillite

The glacigenic sediments from the Shittim 1 drill hole are comprised of a mixture of poorly sorted sand to cobble size clasts in a finer siltstone groundmass. The occasional occurrence of rounded clasts with a flat base throughout the sequence suggest glacial transport at some time before deposition. Intervals of well sorted interbedded fine to coarse grained sandstones and conglomerates, occur throughout this sequence (see Appendix 1), often with a high angle bedding plane (Plate 5.1 a). This could be interpreted as glacial outwash, indicative of abundant meltwater (Hand, 1993).

A series of shale beds also occurs throughout the tillite sequence (see Appendix 1). These are black, unfossiliferous, with little bioturbation, and in places contain a high amount (~5-10%) of disseminated pyrite, which if primary, is indicative of deposition in a reducing environment (Plate 5.1 b). Lonestones occur throughout the shale beds, and can be interpreted as dropstones as they break the bedding plane. This is indicative of floating ice at time of deposition. Dropstone muds are present in the majority of Tasmania's Permo-Carboniferous glacigenic sediments and require a relatively large, open body of water, either lacustrine or marine, before deposition can take place (Hand, 1993).

A thin limestone bed was intercepted at 1055.6 m - 1055.8 m. This is an unfossiliferous bed, conformable with the shale above, and the tillite below. XRD analysis revealed this to be 15% - 25% dolomite in composition (plate 5.1c), which is very unusual for Early Permian limestone in Tasmania (Rao, pers. comm.). The high dolomite composition may be related to the underlying dolerite intrusion, the heat from which may have led to replacement of some of the calcite by dolomite. The limestone has been highly silicified, which may also be related to the underlying dolerite. Part of this bed was dissolved in acetic acid in a search for conodonts. None were found, however a single echinoid

cidaroid spine was located, dating this bed as post Early Ordovician and indicating marine conditions at the time of deposition.

Clast provenance for the tillite located in the Shittim 1 hole appears to be largely from a metamorphic province. The majority of clasts are of a metamorphic composition, including slates, phyllites and quartzites. Some clasts show a strong foliation, with a schistose texture. This composition is similar to the lithology of pre-Carboniferous rocks found in western Tasmania (Farmer, 1985). Some clasts are dolomite, occasionally containing abundant molluscan fragments (Plate 5.1 d), suggesting derivation from a nearshore marine environment. One clast contains a reworked "bryozoan" fossil. Other clasts are of an igneous composition, and some sedimentary sandstones, mudstones and claystones (Fig 5.3).

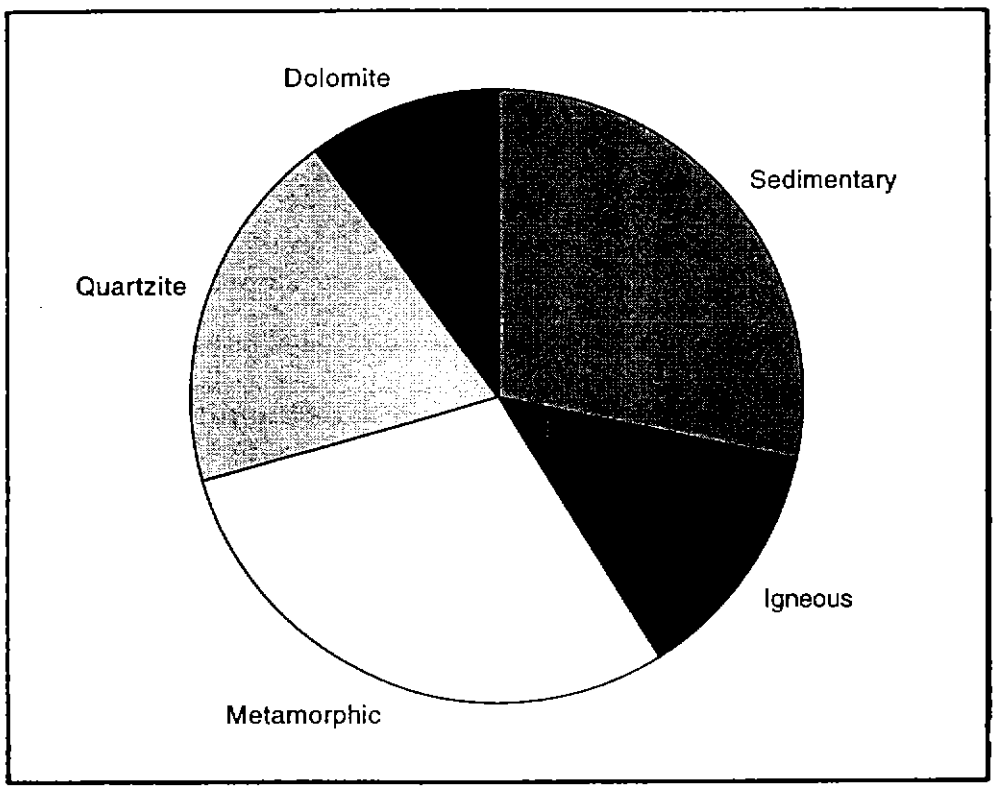


Fig. 5.3: Relative clast composition of the tillite, measurements based on > 3 mm clast size.

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A large (~260 m) dolerite dyke intrudes into the tillite at 1021 m, metamorphosing the layers above and below. This contact metamorphism is visible as reaction halos around many of the clasts closer to the dolerite, as well as the alteration of many of the minerals, (visible in thin section).

The contact between the tillite and the underlying Precambrian metamorphics in the Shittim 1 hole is faulted (Plate 5.1 e & f). In the nearby Woodbridge hole, at Little Peppermint Bay, the contact between the tillite and basement is a sharp angular contact along an unconformity surface at 15 ^{0}, parallel to the prominent cleavage in the phyllite (Farmer and Clarke, 1985). Close inspection of the fault plane in the Shittim hole leads to the conclusion that it is only a small scale fault with little movement (~<10 m). The fault surface is smooth with < 1 mm fault striations, little fault breccia, and less than 1 cm of fault gouge. A 10 cm broken zone occurs below the fault plane. The fault is interpreted to be post-dolerite intrusion, and post-veining, as the fault cuts through a series of thin veins, and there is no sign of hornfels in the fault gouge from the dolerite which has its lower contact about 30 cm above the fault.

5.2.2 Pre-Parmeener metamorphics

The Precambrian metamorphics forming the basement to the Parmeener Supergroup in the Shittim 1 drill hole bear a number of resemblances to the rocks of the Jubilee region. The Jubilee region is an area of Late Precambrian rocks with a generally lower grade of metamorphism than rocks of the Tyennan region, and outcrops in central southern Tasmania (Calver, 1990) (Fig 5.4). These low grade, and in places, unmetamorphosed sequences consist of two broad stratigraphic divisions. The older Mt. Anne, Pandani and Clarke Groups, and the younger Weld River Group. Older rocks consist of thick sedimentary sequences dominated by orthoquartzite, pelite and carbonate. The younger Clark Group is composed of dolomite-dominated sequences (Calver, 1989).

Weld R

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A gravity/magnetic interpretation of southeast Tasmania by Leaman (1990) (in Seymour and Calver, 1995) (Fig 5.4) shows rocks of the Jubilee Block outcropping in central southern Tasmania, and predicts rocks of this type to occur under the Tasmania Basin in a broad north-south strip through Bruny Island to the east and west of Hobart (Seymour and Calver, 1995).

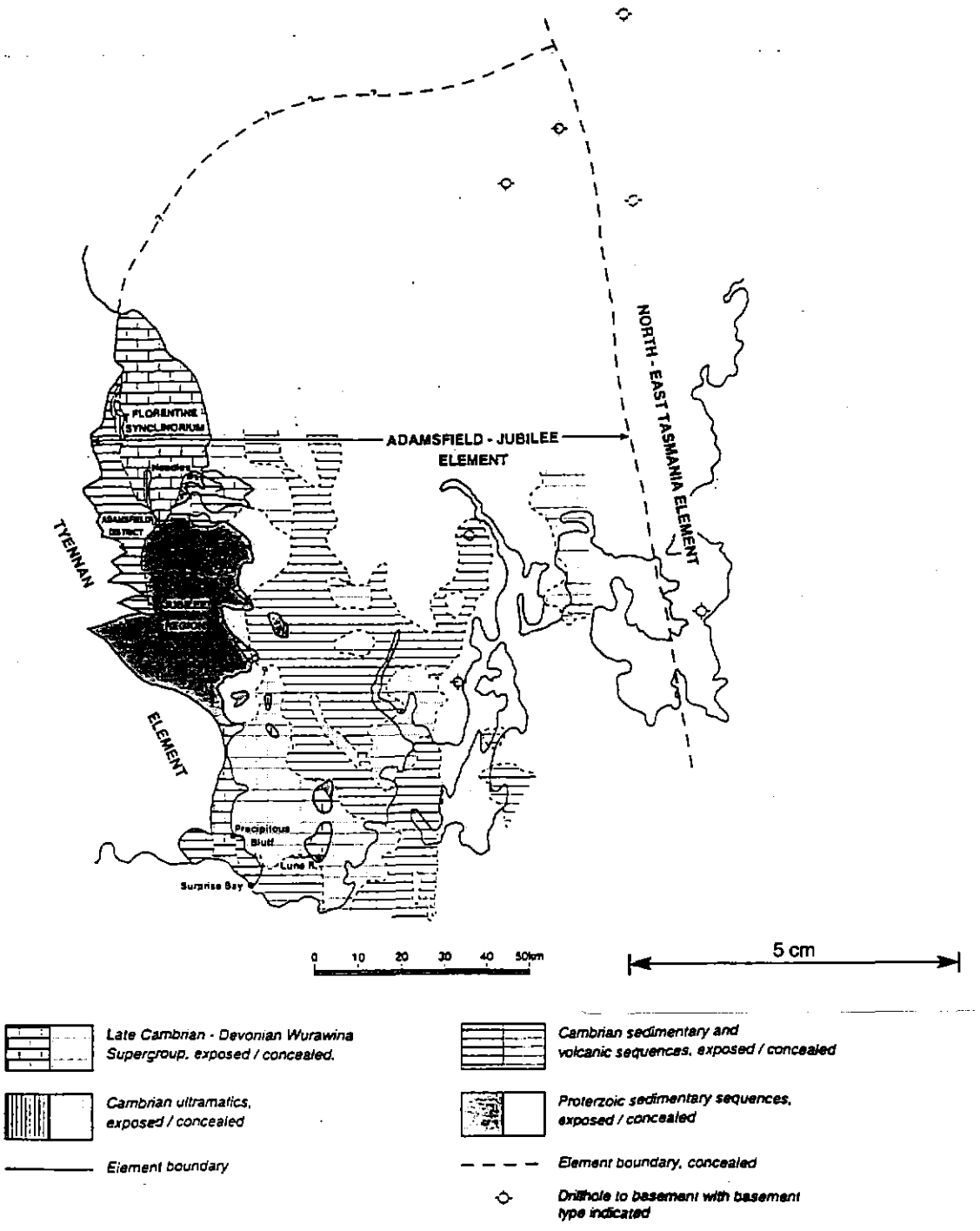


Fig 5.4: Map showing outcrop of the Jubilee Region in southeast Tasmania, and prediction by Leaman (1990) of extension of the Jubilee Region under Bruny Island (taken from Seymour and Calver, 1995).

The basement rocks in the Shittim 1 hole consist of medium to dark, grey phyllites with a strong, closely spaced, high angle cleavage. Bedding is clearly visible near the top of the sequence below the tillite contact, and occurs at a shallow angle (10 - 15 degrees) (Plate 5.2 a, b and 5.4 b). Bedding becomes harder to distinguish down the core as it becomes stretched into the dominant high angle cleavage . Below 1660 m the degree of cleavage increases (Plate 5.2 c & d).

Metamorphic spotting, associated with the overlying dolerite, is consistently present through the core down to 1639 m, below which it is no longer visible. This spotting is associated with an opaque mineral visible only in thin section (Plate 5.2 a & b). Analysis using an ESEM 2020 with a Link Pentafact EDS detector did not indicate the presence of any unusual composition which might account for the opaque phase visible in the spots.

A thin marble bed with a possible stromatolitic texture occurs at 1609.5 m (Plate 5.3 a). This sequence has been highly deformed, and silicified (Plate 5.3 b & c). A sample of this bed was dissolved in acetic acid for possible conodonts, but none were found. A thin vein (approximately 3 mm) of tremolite and a crystal of grossular garnet in a matrix of quartz and what appears to be chabazite (Plate 5.3 d & e) (Bottrill, pers.comm.) occurs at the upper marble/phyllite contact. This last mineral was not identified using XRD. This is thought to be a late stage vein related to the dolerite intrusion.

A number of ellipsoidal blebs are visible throughout the core. These can be interpreted as either siltstone laminae which have been disrupted by the strong cleavage development (Plate 5.4 a), or they may be clastic dykes (Plate 5.4 b) (Clive Calver, pers. comm.). Other sedimentary structures visible are grading in some of the coarser laminae, and mudstone intraclasts which have been pulled up and redeposited by current action (Plate 5.4 c). Each of these sedimentary structures are also common throughout the 'sequences' of the Jubilee block.

Intermittently developed throughout the phyllite, is a serious of parallel sub-vertical joints (Plate 5.4 c). Fluid movement along the joints is visible in thin section as a dark staining moving into the rock on either side of the joint plane (Plate 5.4 d). It was thought these joints may have provided a path along which the hydrocarbons detected in the core moved. Analysis of this staining using the ESEM 2020 with Link Pentafact EDS detector shows this staining does not contain any sulphides or metals. A slight trace of carbon showed in this analysis, however the peak was very small, and may also be interpreted as background "noise".

A number of dark spots with a diameter of approximately 1 mm appeared intermittently along cleavage fractures below 1700 meters. Analysis of these spots, using the ESEM as above, showed these to have a similar composition as the surrounding rock, and can therefore be interpreted as staining, possibly due to fluid movement.

5.3 Tasmania Basin

The sequences concentrated on in this study are those occurring stratigraphically above the glacigenic sediments of the Late Carboniferous/Early Permian. These are the Woody Island Siltstone (southern Tasmania) and the Quamby Mudstone (northern Tasmania) and correlates (see 4.1.3). These sequences were chosen as they host the beds of the Tasmanite oil shale, which is a very rich potential oil source rock with TOC in excess of 8% (Domack, 1988). A litho-stratigraphic correlation of these formations, and others of the Lower Parmeener Supergroup between the drill cores sampled is shown in Fig 2.6. Following the result of these studies, a bio-stratigraphic correlation has been completed (Fig 5.5).

5.3.1 Eagle Hawk Neck

The Eagle Hawk Neck drill hole, encountered a thick sequence of the Lower Parmeener Super-Group, resting unconformably on the metamorphosed Siluro-Devonian Mathinna beds. Many features of the sediments in this location are unique to this area. The first of

these is the basal beds, which are present as poorly sorted siltstone interbedded with thin intervals of flow till. Although it remains to be proved, these appear to have been deposited at the same time as the basal tillite elsewhere in the Tasmania Basin (Gulline and Clarke, 1984).

The correlates of the Woody Island Siltstone and Bundella Mudstone immediately overlie the tillite in southeast Tasmania. A considerable proportion of the lower part of the sequence here is comparable to the Woody Island and Bundella Formations from elsewhere in south east Tasmania. However, the occurrence of a thick sequence of sandstone and conglomerate between the two formations at this location is unique.

Three samples were selected from within the Woody Island correlate, from the top, middle and bottom and prepared for palynological study. However, palynomorph preservation in each of the three samples was extremely poor, having been carbonised by a nearby heat source. This was not encountered in the drill hole, and is probably a nearby Jurassic dolerite intrusion. A palynological age was therefore not assigned to any of the beds in this sequence. A kerogen analysis was completed on the sediments (see 6.3.4).

5.3.2 Poatina

The Poatina drill hole penetrated eight meters into the Quamby Mudstone. Outcrop exposure show this unit to be approximately 90 m thick in this area, where it overlies a thickness in excess of 105 m of Stockers tillite (Clarke *et al.*, 1972).

The Quamby Mudstone in the Poatina region is a uniform sequence of dark, monotonous, poorly-bedded, pyritic siltstone and mudstone. Other characteristic features are an extreme rarity of fossils, the presence of glendonites and a crumbly nature in outcrop (Clarke *et al.*, 1972). Erratics, which are generally rare in the Quamby Mudstone are commoner than usual in this region.

The 8 m of Quamby Mudstone which was encountered in the Poatina drill hole was sampled for palynological dating, along with a sample from near the base of the Liffey Group, and near the base of the Poatina Group. A palynological age of stage 3a has been assigned to each of these units, with a certainty rating of 2.

5.3.3 The Quoin

The Quoin, which is located approximately 15 km south-east of Ross, penetrated 186.3 m of the Lower Parmeener Supergroup (Liffey Sandstone, Golden Valley Group, Quamby Formation and Stockers Tillite), which rests unconformably on folded and cleaved Mathinna Beds (Clarke and Farmer, 1983).

This location represents one of the few areas where pre-Parmeener Supergroup rocks can be expected at reasonably shallow depths, and is of significant interest, as the drilled section of the Lower Parmeener Supergroup closely resembles the disparate pre-Liffey Sandstone sequence at Poatina (Clarke and Farmer, 1983). The Quamby Mudstone was sampled for palynological study at a depth of 73.34 m. Unfortunately, a thick dolerite sheet intrudes into the Mathinna Group at a depth of 213 m, and the heat from this intrusion has destroyed most palynomorphs present in the mudstone. No further samples were collected for palynological investigation.

5.3.4 Tunbridge Tier

The Tunbridge Tier bore hole intersects the Lower Parmeener Supergroup, which rests unconformably on Precambrian strata. Beds of the Quamby Mudstone overlie 200 m of Stockers Tillite and deposition in this area is interpreted as having occurred just beyond the furthest extent of glacial ice (Hand, 1993) as the thickness of sediment preserved shows a thinning to the east.

A transitional base to the Quamby Mudstone correlate occurs in this hole, with pebbles and granules extending up into the mudstone from the top of the underlying tillite. The

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occurrence of glendonites through this core is typical. The beds of the Quamby Mudstone correlate here have been multiply intruded by a series of thin sills/dykes (3 cm-1.3 m) of Tertiary Basalt. Samples were collected at regular 50 m - 100 m intervals from 350 m to 900 m and prepared for palynological study. Most of the palynomorphs had been completely carbonised, possibly from the Tertiary Basalt sills, or from a nearby Jurassic dolerite intrusion which was not encountered in the hole. A palynological age of 3a has been assigned to the top of the Liffey Sandstone at 300 m, with a certainty of rating 2. No age has been assigned to any samples below this, each of which would have a certainty rating of 4.

5.3.5 Ross

The Ross drill hole encountered a significantly thicker overall sequence of the lower Parmeener Supergroup than the nearby drill hole at The Quoin. The thickness of the Quamby Mudstone correlate near Ross (~135 m) is less than that at Tunbridge Tier, although this difference may be related to uncertainties in assigning an upper boundary to the sequence at Ross, due to difficulties in defining the top of the correlate. Glendonites are not conspicuous in the Quamby mudstone in this core, but are persistent through the equivalent bed at Tunbridge Tier (Forsyth, 1989). Unfortunately palynological samples taken from depth in this hole were carbonised due to an underlying dolerite intrusion. An age of 3a was assigned to the top of the Golden Valley Group in this borehole, with a certainty of type 2, and an age of 3b to the base of the Liffey sandstone with a certainty of 2 - 1.

5.3.1 Bonney's Plain

The section at Bonney's Plain is distinctly different to all other drill cores and outcrops within the Tasmania Basin, and is thought to represent an area of unique environmental conditions (Domack *et al.*, 1993). Within the Bonney's Plain drill core, marine units directly overlying the glacigenic interval are characterised by thin bedded to interlaminated

sandstone and mudstone beds, with primary bedding well preserved. Dropstones and macrofossils are rare (Domack *et al.*, 1993).

A high abundance of acritarchs occur throughout all depths sampled from this bore hole (up to ~5 %). The green algae *Tasmanites* occupy a consistent stratigraphic level above the basal beds across the northern section of the Tasmania Basin, but are absent from within this section. This suggests differing environmental conditions in this region, or maybe a separation of the depositional environment in this region from the rest of the Tasmania Basin.

A palynological age of stage 3a (with a certainty of rating 2) was given to even the deepest sample collected from this location at depth 689 m. This lowest sample was collected from the sediments immediately above the rocks of the Mathinna basement, showing that deposition in this region began in the early Permian. A palynological age of stage 3b (with a certainty of rating 2) is assigned from a depth of 516.8 in the beds of the upper marine mudstones and siltstones, extending into the Castle Carey Mudstone.

5.4 Biostratigraphic correlation

Using the data obtained from this study, as well as information drawn from past studies around Tasmania by Trusswell (1978) and *Calver et al.*, (1984), a biostratigraphic correlation of the lower units of the Tasmania Basin has been constructed (Fig 5.5).

As can be seen, the lowest sequences of the Parmeener Supergroup have been assigned a palynological age of stage 2, whilst the base of stage 3a occurs somewhere within the basal beds of the Lower Marine Sequence. The base of the Lower Freshwater Sequence correlates with a palynological age of stage 3b. No older palynological ages were encountered in this study. The base of the Lower Parmeener Supergroup in the Bonney's Plain region is assigned a palynological age of stage 3a. This is in support of other

studies and mapping in this region which show Early Permian sediments as directly overlying basement rock further east (Ben Lomond 1:50 000 map sheet, 1988).

5.4.1 Australian Permian Basins

Using the data from Fig 5.5, a correlation, using palynological dating, between sequences of the Tasmania Basin, and Permian Basins around Australia was constructed. This compares how deposition within the Tasmania Basin relates to deposition in other parts of Australia at this time.

5.4.2 Antarctica

Domack (1988) has suggested significant correlations between the Permian sequences of Tasmania and that of modern Antarctica. He draws many inferences regarding the polar glacimarine setting of Tasmania during the Early Permian by comparing modern sequences in the Antarctic with those of the Permian in Tasmania (Fig 5.6). Extending on from this, and with the knowledge that Antarctica was located next to Tasmania in Gondwanan times (see 2.2.2) a biostratigraphic correlation between the Permian of Tasmania and the Permian of Antarctica has been added to Fig 5.5. to show the relationship between these two locations during Permian times.

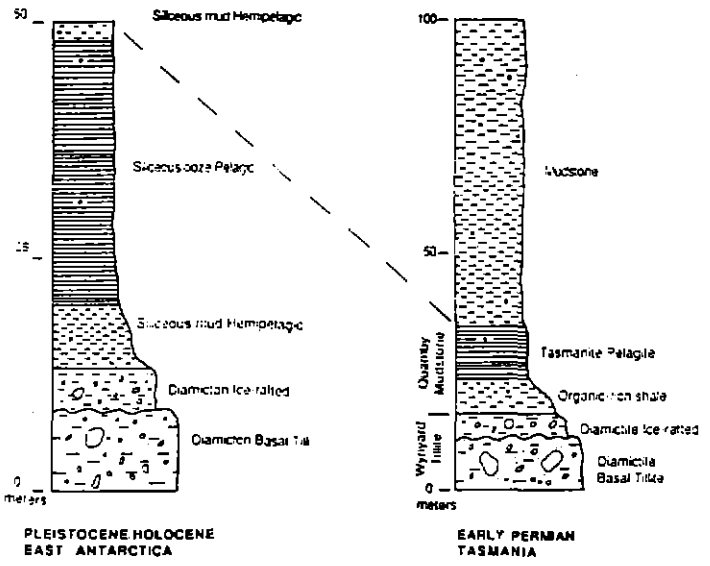


Fig. 5.6: Correlation of recent vs. ancient polar glacial marine sequences between Antarctica and Tasmania (from Domack, 1988).

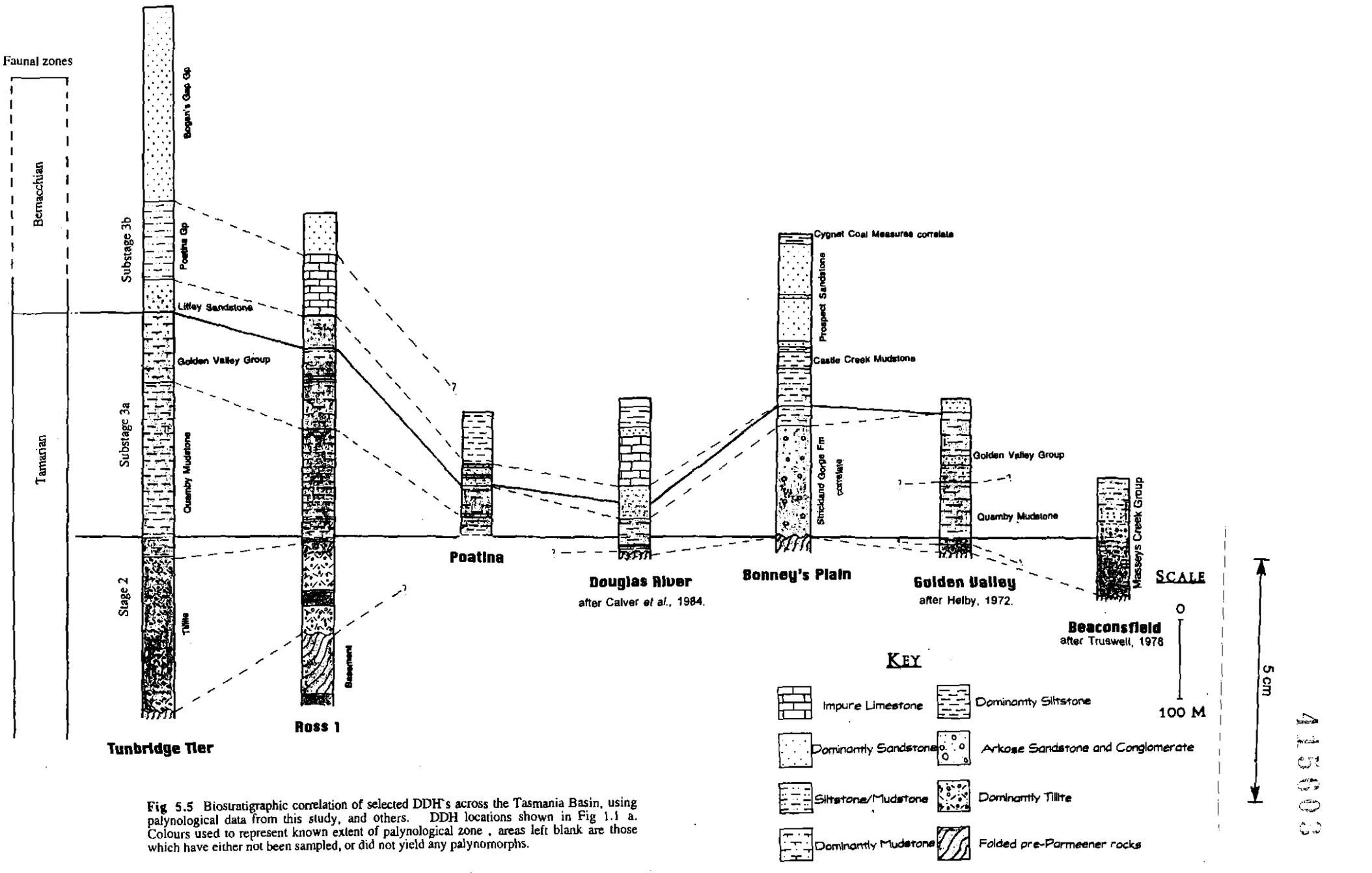


Fig 5.5 Biostratigraphic correlation of selected DDH's across the Tasmania Basin, using palynological data from this study, and others. DDH locations shown in Fig 1.1 a. Colours used to represent known extent of palynological zone , areas left blank are those which have either not been sampled, or did not yield any palynomorphs.

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Plate 5.1

(a) Glacial out wash zone from within the Truro Tillite in the Shittim 1 DDH (1121 m), high angle bedding plane indicative of abundant meltwater.

Arrow pointing down core.

(b) Black shale occuring within the Truro Tillite in the Shittim 1 DDH (1046 m), high amount of disseminated pyrite (if primary) indicative of a reducing environment.

Arrow pointing down core.

(c) Photomicrograph of limestone bed from within the Truro Tillite in the Shittim 1 DDH (1055.6 m), pink stain is calcite, blue stain is dolomite. The high amount of dolomite is unusual for Tasmanian Permian Limestone composition.

Taken in PPL (x 100).

(d) Clast from the Truro Tillite within the Shittim 1 DDH, showing abundant molluscan fragments (1130.4 m).

Taken in PPL (x 100)

(e) Faulted contact between the Truro Tillite and the underlying (?)Precambrian metamorphics. Fault is inferred as small scale (< 10 m movement - see 5.2.1).

Fault at 1568.3 m.

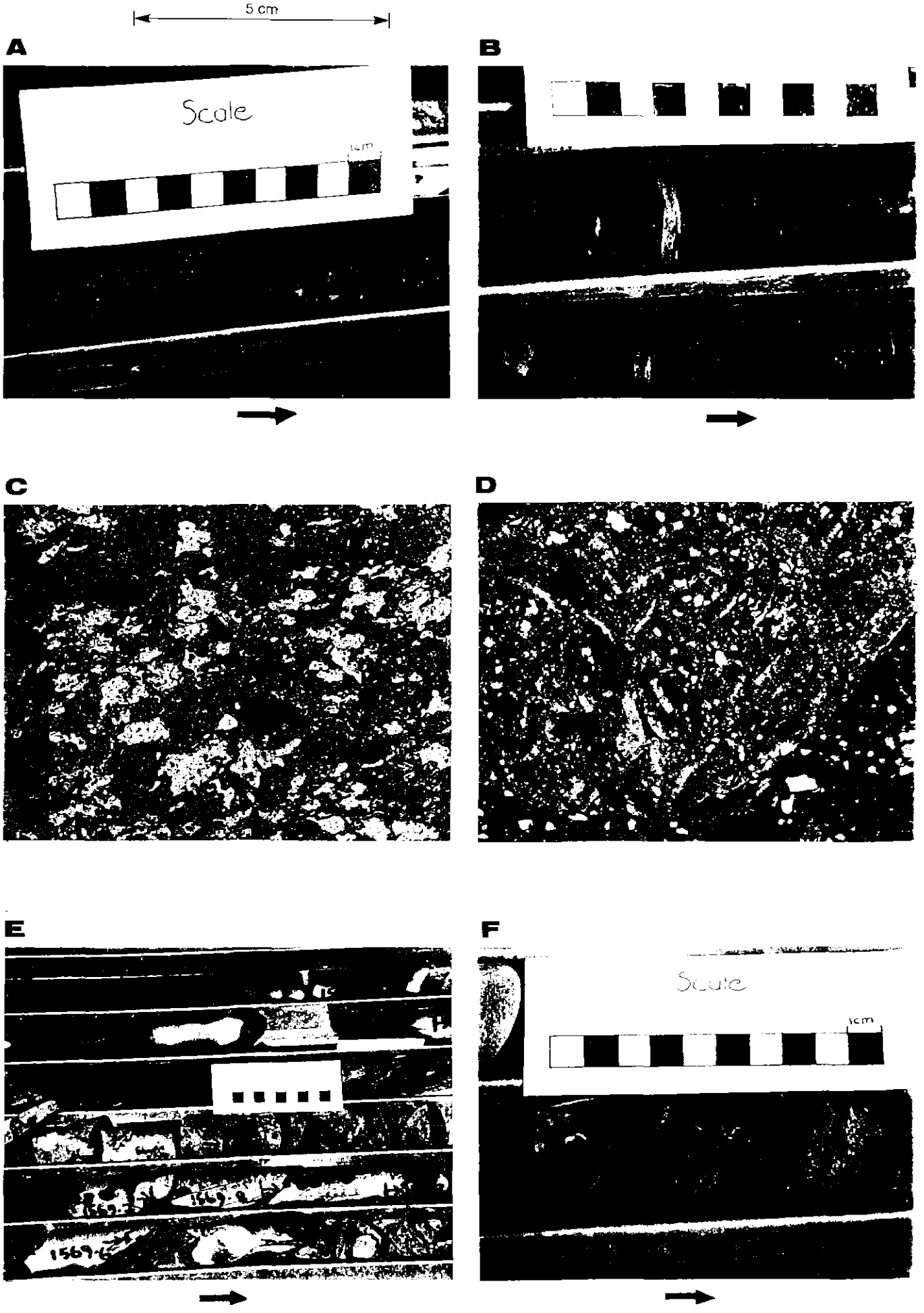
Arrow pointing down core.

(f) Close up of faulted contact between the Truro Tillite and the underlying (?)Precambrian metamorphics, showing fault surface and broken zone.

Fault at 1568.3 m

Arrow pointing down core.

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Plate 5.2

(a) Photomicrograph showing low level cleavage development in the (?)Precambrian metamorphics below the contact with the Truro Tillite (1569.65 m). Bedding easy to distinguish. Also visible is an opaque mineral associated with the metamorphic spotting related to the heat from the overlying dolerite intrusion. Composition of the black mineral unknown.

Photo taken in PPL.

(x 100)

(b) Photomicrograph showing increase in cleavage development moving down core, bedding still easy to distinguish (1589.65 m) opaque mineral associated with metamorphic spotting still visible.

Photo taken in PPL

(x 100)

(c) Photomicrograph showing cleavage strongly developed, bedding no longer distinguishable as it has been stretched into the dominant cleavage (1671 m). Black mineral associated with metamorphic spotting no longer visible.

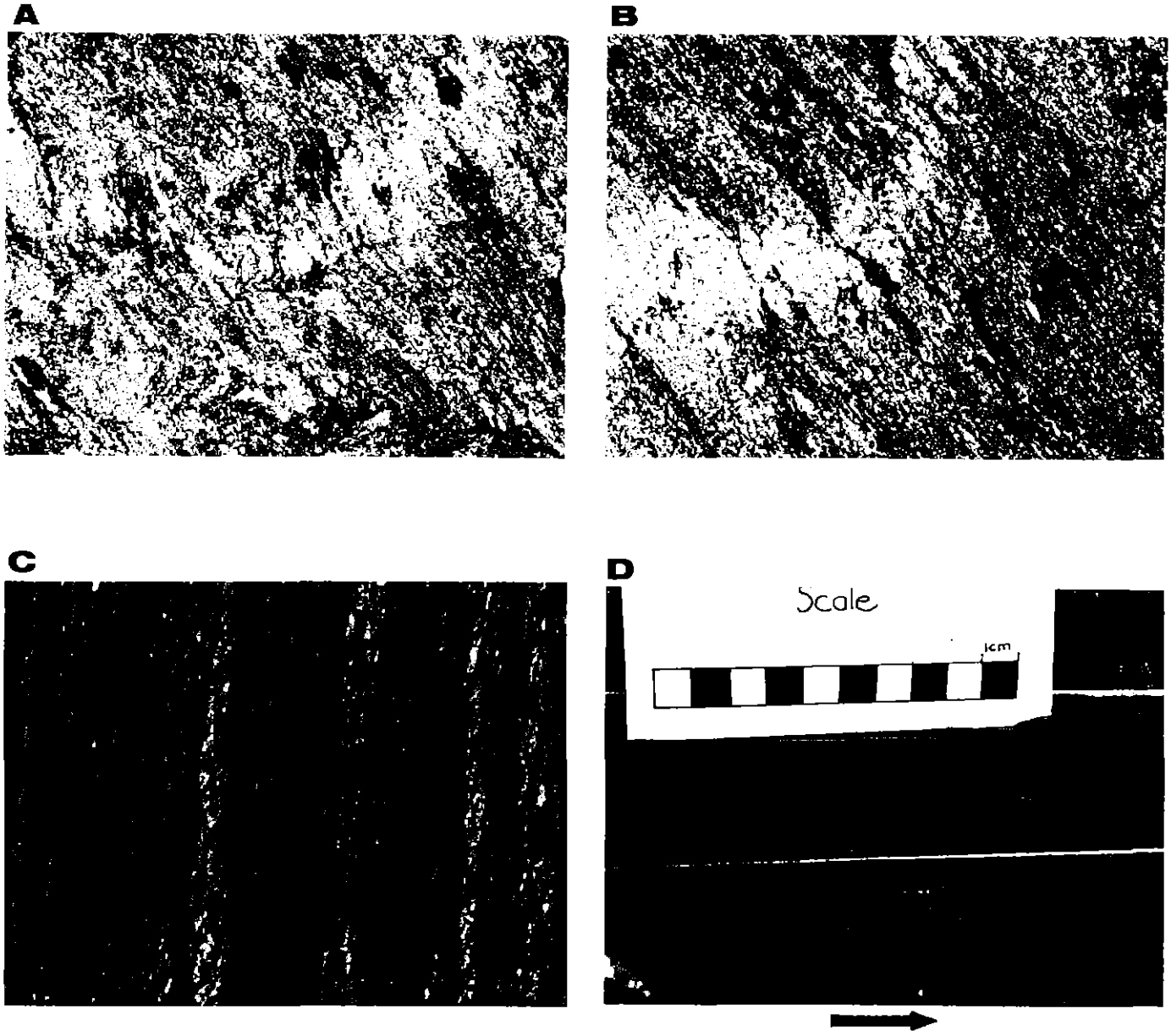
Photo taken in PPL

(x 100)

(d) Photo of strong cleavage developed moving down the core in the (?)Precambrian phyllites in the Shittim 1 DDH (1735.4 m). Bedding no longer visible.

Arrow pointing down core.

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Plate 5.3

(a) Marble bed from within the (?)Precambrian metamorphics (1609.5 m) showing stromatolitic(?) texture.

Arrow pointing down core.

(b) Photomicrograph of marble within the (?)Precambrian metamorphics, taken in PPL (1609.5 m).

(x 100)

(c) Photomicrograph of marble within the (?)Precambrian metamorphics, taken under XN, showing high degree of silicification of the carbonate (1609.5 m).

(x 100)

(d) Thin vein of tremolite, quartz and a crystal of grossular garnet located just above the marble bed within the Jubilee Block (1609.45 m).

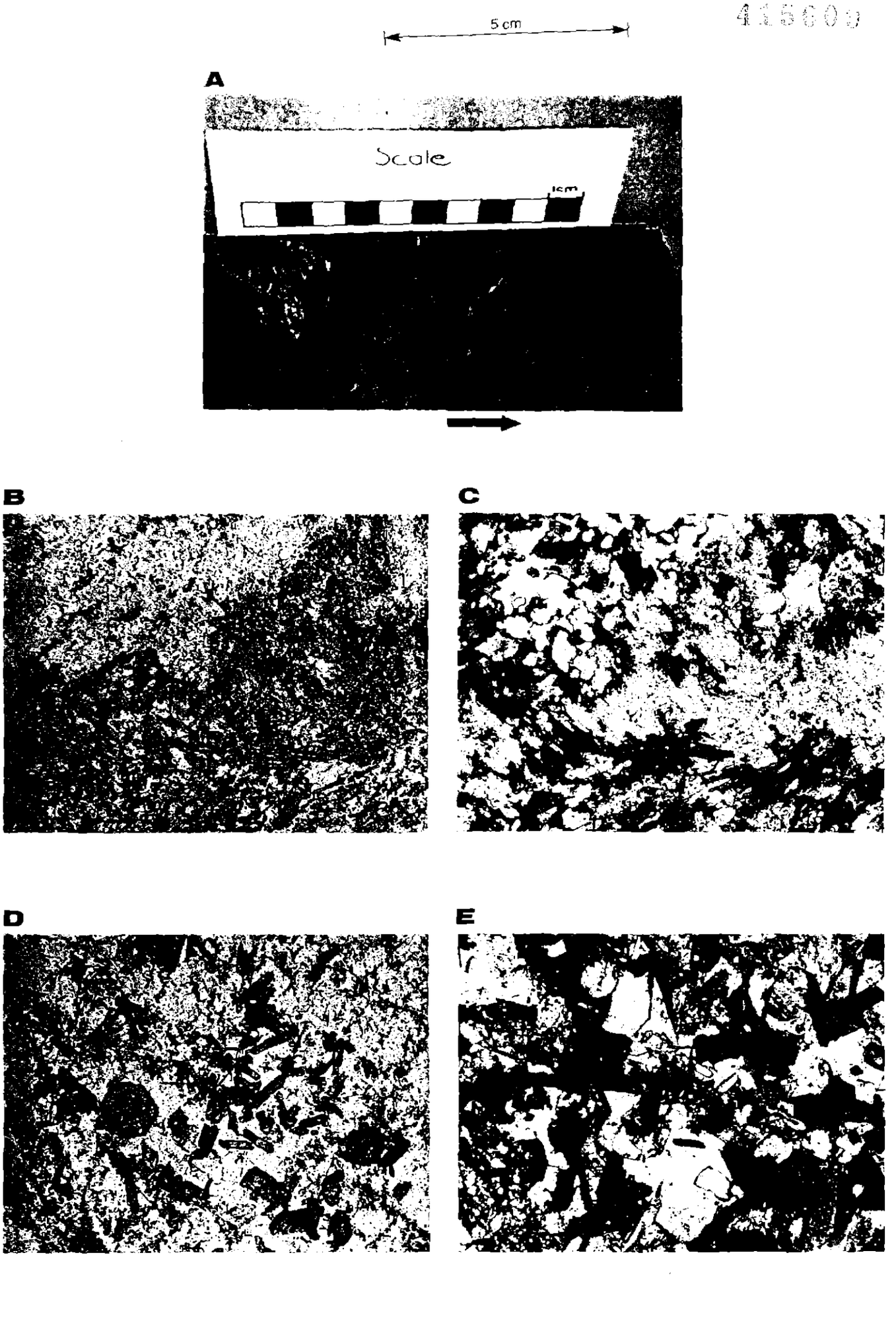
Taken in PPL.

(x 200)

(e) as above (d), taken with XN.

(x 200)

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Plate 5.4

(a) Siltstone laminae disrupted by strong cleavage development within the phyllite, appearing as elongate blebs within the core (1569.1 m).

Arrow pointing down core.

(b) Bedding visible at a shallow angle to the core , and showing elongate structure pulled into the cleavage, interpreted as a clastic dyke (1575 m)

Arrow pointing down core.

(c) Ellipsoidal bleb stretched into the cleavage, interpreted as a mudstone intraclast, pulled up by current action and redeposited. Also visible is a serious of intermittently developed parallel joints, with staining along the joint planes due to fluid movement through the rock. (1586 m).

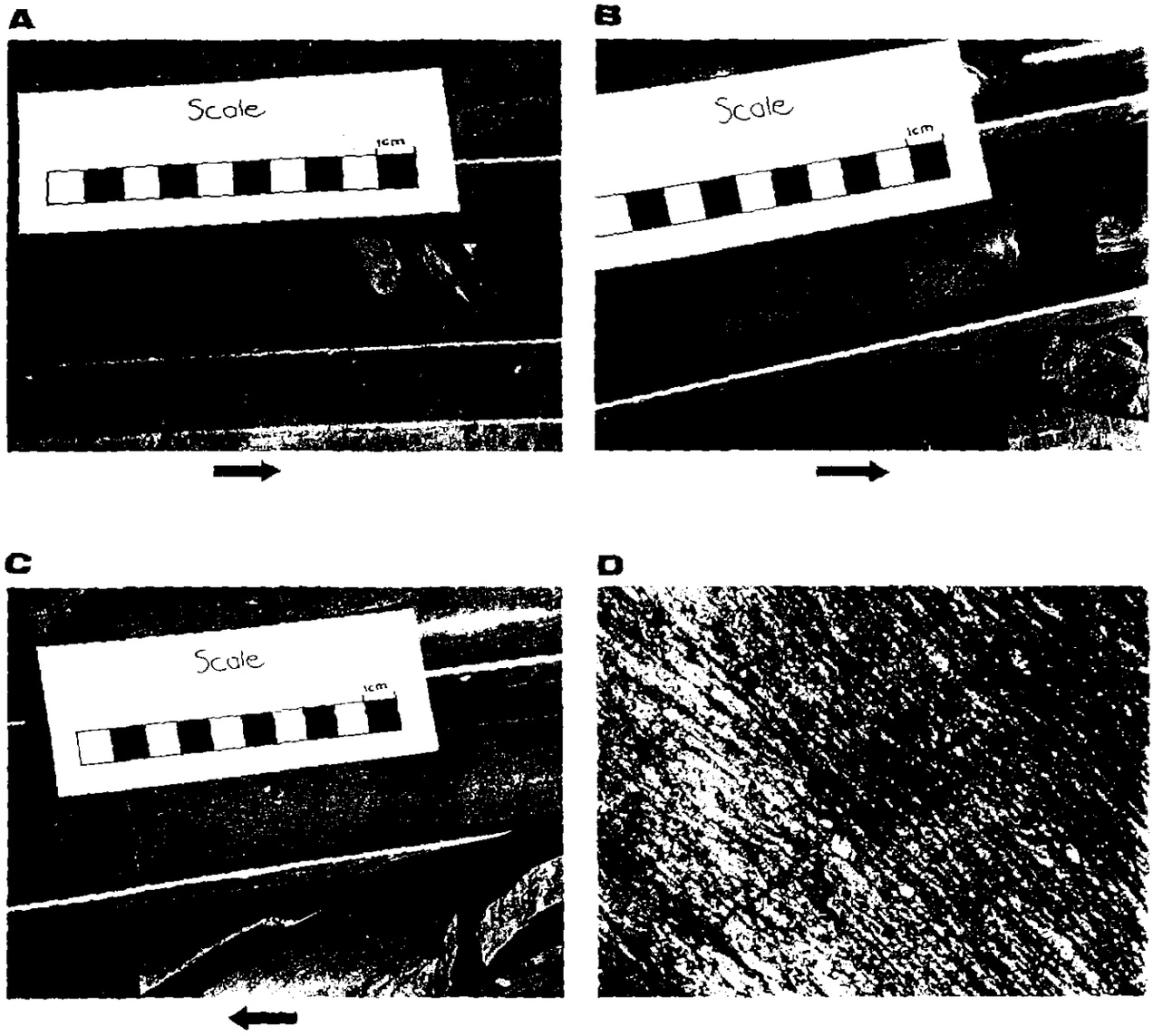
Arrow pointing down core.

(d) Photomicrograph of joint plane referred to in (c), showing black staining moving away from the joint to either side. Staining interpreted as fluid movement through the rock, no mineralisation was detected within the joint(1634.8 m).

(x 100)

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5 cm



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Chapter 6: Hydrocarbon Potential

6.1 Introduction

In petroleum exploration, optical methods are regularly employed to identify the type of organic material (OM) in a rock, and hence the hydrocarbons likely to be yielded from this source. The organic content of a sediment is a complex and heterogeneous substance, which is in continuous biochemical evolution. Sedimentary OM originates from living organic matter and can be broadly classified into two categories. Organic products incorporated into sediment from organisms living in the sedimentation basin are termed "autochthonous", whilst material which comes from organisms living outside of the sedimentation basin such as that introduced by wind action etc. is termed "allochthonous" (Durand, 1980). Optical methods can aid in the distinction between the origin of the OM in sediments, by the study of the OM collected after destruction of minerals by hydrochloric and hydrofluoric acid.

The OM in the sediments which are of interest in petroleum exploration is termed "kerogen". Kerogen is defined by Durand (1980), as the fraction of sedimentary OM which is insoluble in the usual organic solvents, in more general terms, it can be defined as the organic material which yields petroleum-type hydrocarbons upon heating and distillation.

The ability of sedimentary OM to yield hydrocarbons once thermal maturity is reached, is largely a function of the hydrogen content of the OM. This is because hydrocarbon generation operates on a hydrogen deficit. The hydrocarbons that are formed contain a higher Hydrogen:Carbon ratio than the original material (Powell, 1985). Thus the richer the hydrogen content in OM, the greater the amount of hydrocarbon yielded on maturation.

Knowledge of this H/C relationship has led to the classification of kerogen based on the H/C and O/C atomic ratio. Kerogen in sediments is classified into different types (I - III) depending on these atomic ratios within the chemical composition of the OM (Fig 6.1) (Powell, 1985).

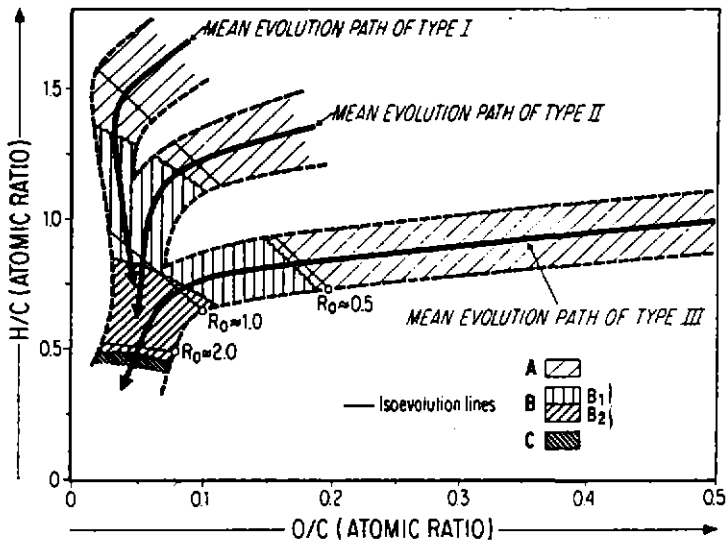


Fig. 6.1: Differences in the kinetics of petroleum formation for types I - III OM: A. Immature zone, B. Principle zone of oil formation, B1 - B2 Maximum of oil formation, C. Structural reorganisation of the carbon skeleton (from Durand and Monin, 1980).

Petrography allows the distinction between recognisable and amorphous OM. Recognisable OM can be observed as fragments of plant tissue, cuticle, spores/pollen and algae etc. Amorphous OM consists of flakes, powder and agglomerates of organic material without definite shapes (Durand, 1980) (Plate 6.1 a). The proportion and type of these constituents making up the OM content of a sediment can be used to estimate the type of hydrocarbons (oil/gas) likely to be yielded from the sediments (Vandenbroucke, 1980). The three main maceral types making up the OM in sediments are (1) exinite - hydrogen rich and have the potential to generate liquid hydrocarbons (2) vitrinite - lower hydrogen content and more likely to generate gas (3) inertinite - hydrogen poor, and believed to have little potential for hydrocarbon generation. Studies have shown that different OM types respond differently to maturation. This difference includes both the timing of hydrocarbon generation, and the nature of the hydrocarbons generated.

6.2 Thermal Alteration Index (TAI)

Before hydrocarbons can be yielded from a rock, they need to be heated to within the oil/gas window. In order to determine the temperature to which sediments have been heated, palynological techniques may be employed. The use of particulate organic matter in sediments as a measure of thermal maturity depends on heat induced chemical changes to the organic walled palynomorphs with rising temperature. As rocks increase in thermal maturity, the kerogen in the sediments becomes depleted in both oxygen and hydrogen, which results in an increased carbon percentage, and thus a darkening in colour (Staplin, 1977). The degree of colour change can be related to the temperature to which sediments have been exposed. Measurements of thermal maturity are carried out by a simple correlation of results with a reference table (Robert, 1980). (Fig 6.2 Staplin).

Inherent in the idea of hydrocarbon generation, is the idea that sediments can generally be placed within one of three categories relating to the attainment of thermal maturity. These are; an immature zone of no hydrocarbon generation, followed by a mature zone representing the main phase of oil generation, and an over mature zone of primarily gas generation (Fig. 6.1) (Powell, 1985).

Graph 6.1 Represents the degree of thermal alteration against present depth for the sediments sampled in this study, and shows none of the OM contained within the sediments to be within the immature zone of no hydrocarbon generation. It can clearly be seen that the sediments from the Poatina DDH are all within the oil window, whilst the sediments from within the Bonney's Plain DDH and Ross 1 DDH are within the oil window at shallower depths. The Ross 1 DDH encountered dolerite at depth, which explains the high TAI moving down the core. The Bonney's Plain DDH hole did not intersect any dolerite which might explain the high TAI at depth, however this does not rule out the occurrence of either a heat source nearby, or the effects of palaeoburial, *and/or regional heating.* The Tunbridge Tier DDH and Eagle Hawk Neck DDH have both been heated beyond the oil window, and are fully within the gas window.

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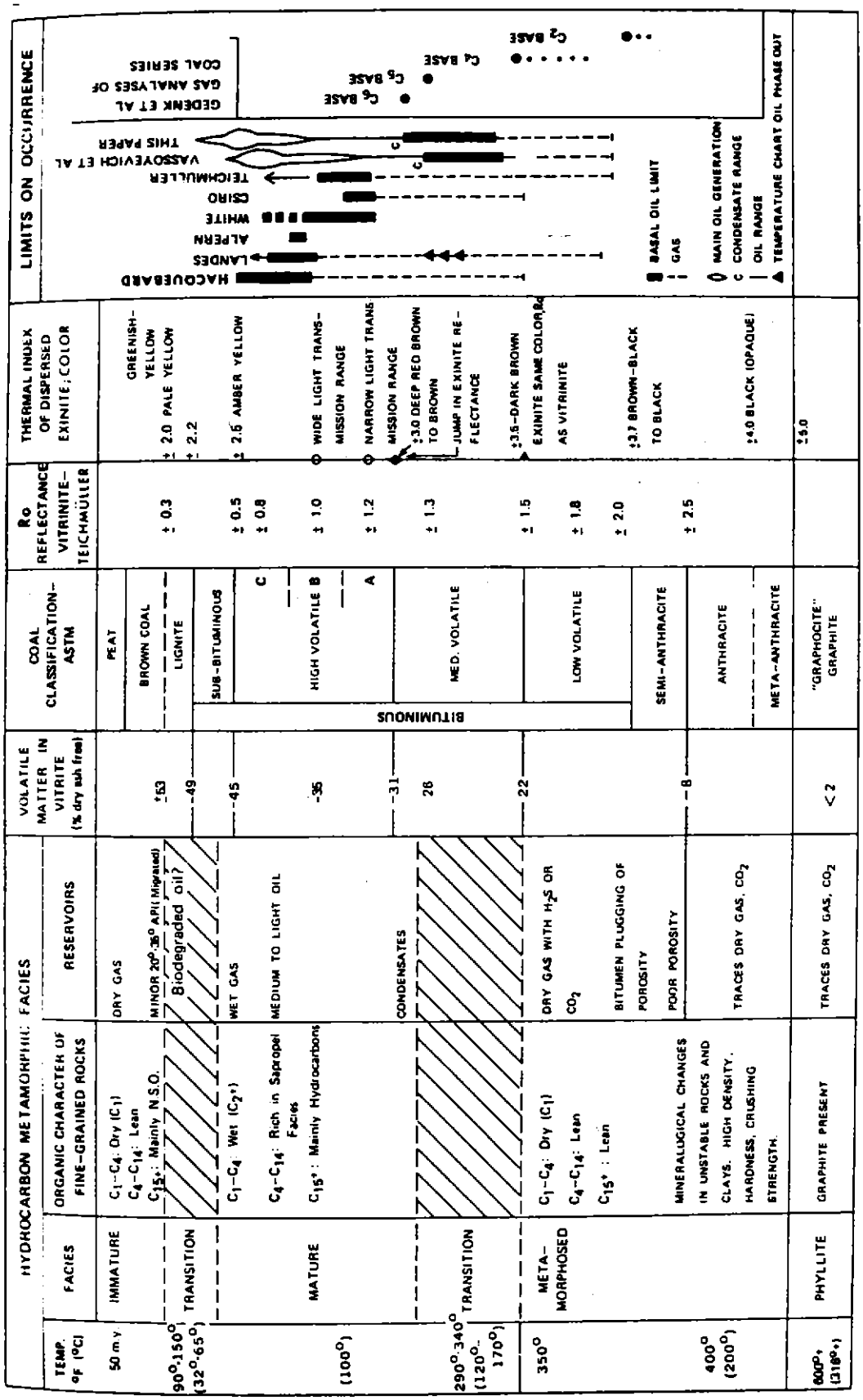
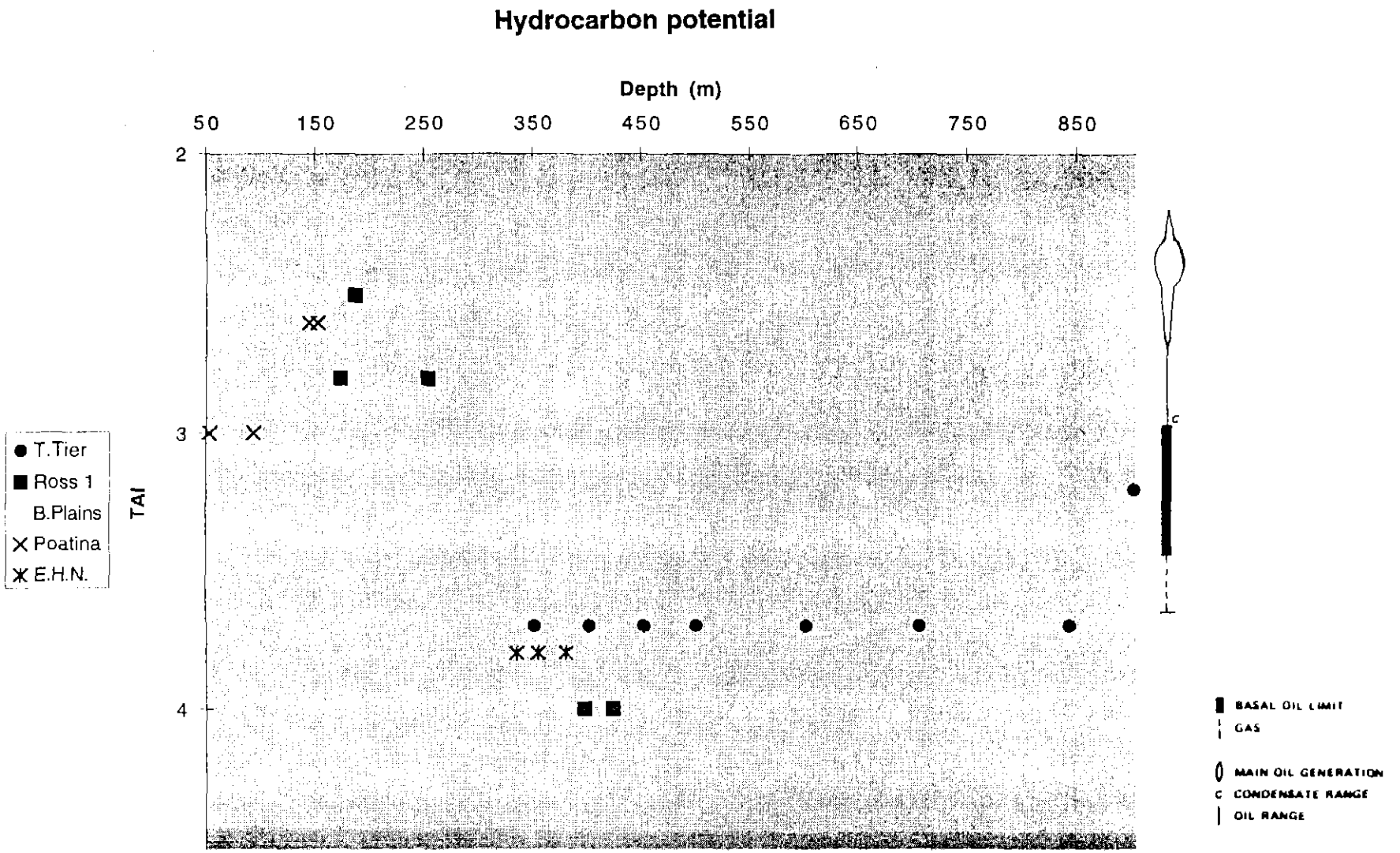


Fig 6.2: Chart showing temperature, vitrinite reflectance and limits on oil and gas occurrence, as related to thermal maturity of the sediments (from Staplin, 1977).



Graph 6.1: Thermal Alteration Index against depth for palynomorphs studied within selected DDH's. Limits on oil and gas occurrence shown to the right of graph, based on information in Staplin, (1977).

6.3 Kerogen Analysis

Kerogen, as already discussed, is defined as the organic content of a sediment which yields petroleum-type hydrocarbons on heating and distillation. The study of the kerogen component of the sediments carried out here comprised a determination of the relative fraction of cuticle, spores/pollen, algae/acritarch, percentage degraded organic matter and the amount of charcoal per sample.

The cuticle fraction of the OM contributes little if any to overall hydrocarbon generation, and a high percentage of cuticle can detract from hydrocarbon potential. Secondly, a measure of the amount of charcoal in sediments is important as organic matter which has attained this state has passed beyond any potential to yield oil or gas. The combination of any organic material contributing to the organic fraction of a sediment after these two amounts have been removed, gives the overall hydrocarbon potential of a sediment.

The study of kerogen can therefore be used to obtain useful information on:

(a) The type of fluid generated from kerogen during the course of its thermal evolution, eg. dry gas, wet gas or condensates.

(b) Their generation history, and thus possible migration characteristics.

(c) Overall thermal history of a region as an aid in exploring for favourable zones in petroleum generation on a regional basis (Robert, 1980; Staplin, 1977).

In general, sediments rich in autochthonous OM, for example algae and planktonic material have a higher potential for oil generation than do allochthonous (or land derived plant) OM. This is directly related to the hydrogen content of the original OM, as mentioned in 6.1. Organic material derived from the former source are enriched in lipids which are hydrogen rich, whereas the structural parts of land plants are hydrogen poor

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(Powell, 1985). OM of this latter derivation has a higher potential for gas generation. Organic matter derived from sediments rich in algae/acritarchs gives rise to a kerogen type known as "sapropel". Sapropel is a light yellow to brownish gel, with abundant round "yellow bodies", which is derived directly from the algae (Durand, 1980). The kerogen identified in this study did not yield any such bodies, but in fact appears to have originated largely from an allochthonous, or land derived source. The large amount of cuticle (up to 25 % in the Ross 1 DDH) supports this supposition, and indicates the OM from these areas to be more gas prone than oil prone.

Graphs 6.2 - 6.6 show the percentage of material combining to form the kerogen component of the sediments involved in this study. Unfortunately kerogen slides were not prepared for all drill holes and depths due to a misunderstanding of the preparation requirements regarding the first set of sediments sent away to Laola Ltd. No kerogen analysis has been completed on the Tunbridge Tier hole, and some of the middle depths which had a TAI assessment completed on them, are missing from the other drill holes.

As a further aid in determining the hydrocarbon potential of a sediment, a study of vitrinite reflectance can be combined with the knowledge of the organic source and environment as determined from the kerogen study, to further constrain the type of hydrocarbons likely to be yielded. Fig 6.3 summarises the type of hydrocarbon likely to be yielded based on vitrinite reflectance data, and is used in the following sections as an aid in predicting hydrocarbon type yielded from the sediments studied. Fig 6.4 shows vitrinite reflectance data for sediments in this study.

6.3.1 Bonney's Plain

A study of the kerogen content in the Bonney's Plain DDH shows it to be a combination of a number of organic materials (graph 6.2). The high percent of degraded OM, low in both cuticle and charcoal, the spore/pollen content, and the acritarch content classify the kerogen as type II (see fig 6.3), and thus likely to yield both oil and gas.

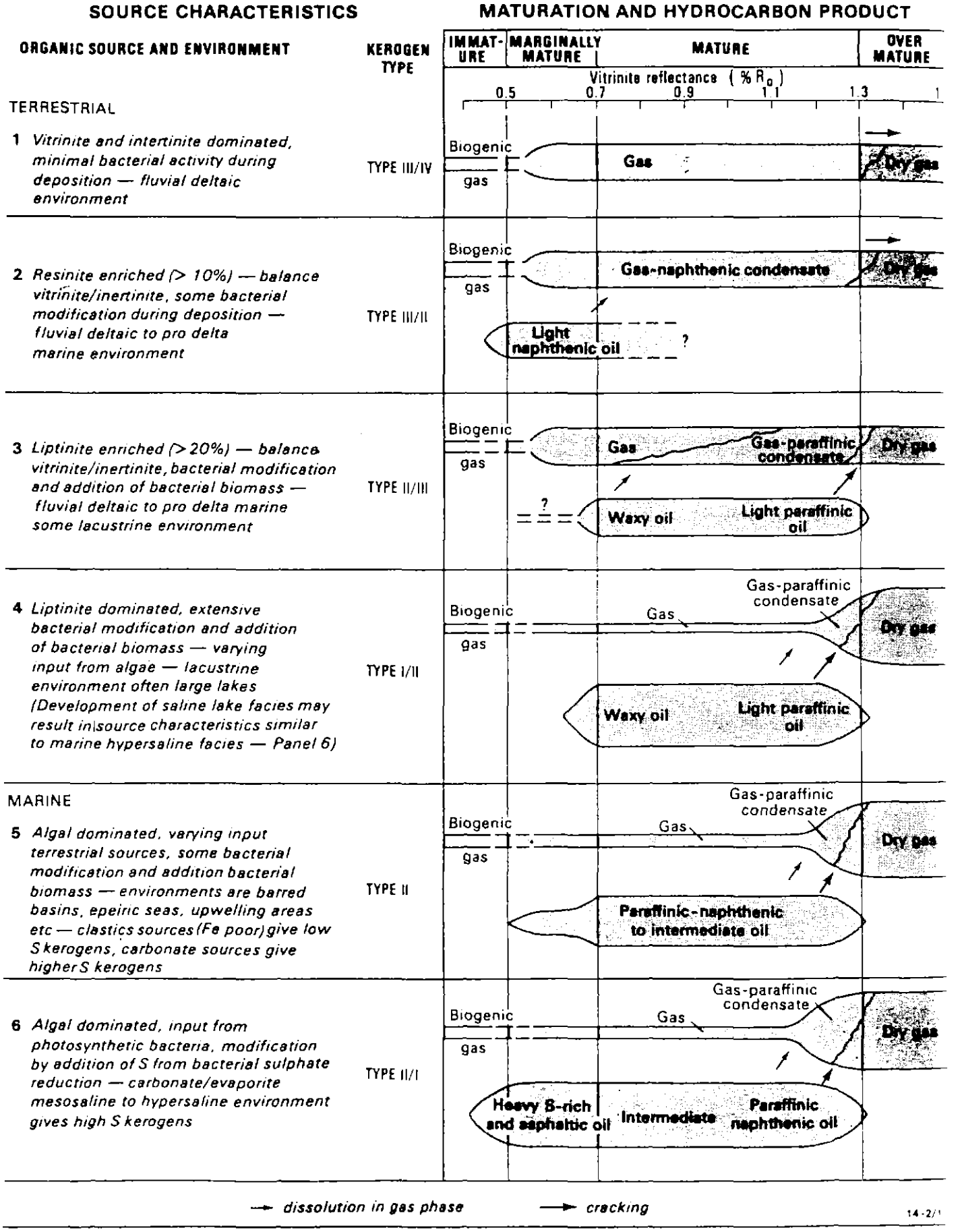


Figure 6.3: Composite hydrocarbon generation model, relating source characteristics to maturation and hydrocarbon product (from Powell, 1985).

Sediments enriched in acritarchs such as that for the Bonney's Plain DDH usually yield the oil prone kerogen type sapropel. There was no sapropel visible in a study of the kerogen from this region, however if the sediments from this DDH have been within the oil window for a long period of time, the sapropel may have been converted to oil, and thus is no longer visible.

A study of vitrinite reflectance combined with a classification of type II kerogen (as shown in fig 6.3) indicates the likely generation of hydrocarbon products range from paraffinic - napthenic to intermediate oil, ranging up to dry gas.

6.3.2 Ross 1

Sediments from the Ross 1 DDH contain a mixture of degraded organic matter, rich in cuticle and charcoal content. Kerogen of this description can be classified as type II/III. Graph 6.3 shows the overall kerogen percentage of the sediment. The high charcoal content at 424.1 m is related to the underlying dolerite, however the high charcoal content at 187.4 m is unexpected, and may be related to the sandier lithology of this sample, as compared to the other samples. The high cuticle content in these sediments (up to 25 % at 173.9 m) indicates these sediments are more gas prone than oil prone.

A study of vitrinite reflectance combined with a kerogen type of II/III shows the OM in these sediments is most likely to give rise to biogenic gas - paraffinic condensate, and light paraffinic oil.

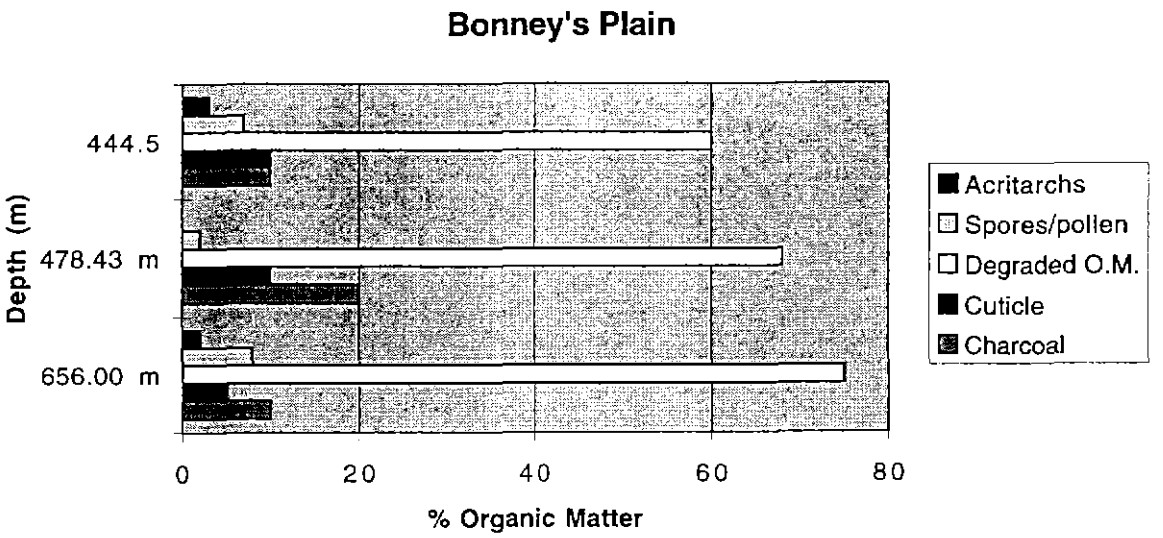
6.3.3 Poatina

The kerogen from the Poatina DDH contains a high amount of charcoal, decreasing down core, whilst degraded OM increases down core. The cuticle content of these sediments stays the same through all samples (Graph 6.4). Kerogen in this sample can be classified as type II/III, and therefore more likely to yield gas. The high charcoal content at 53.3 m may be related to the sandier lithology at this horizon, when compared to other samples.

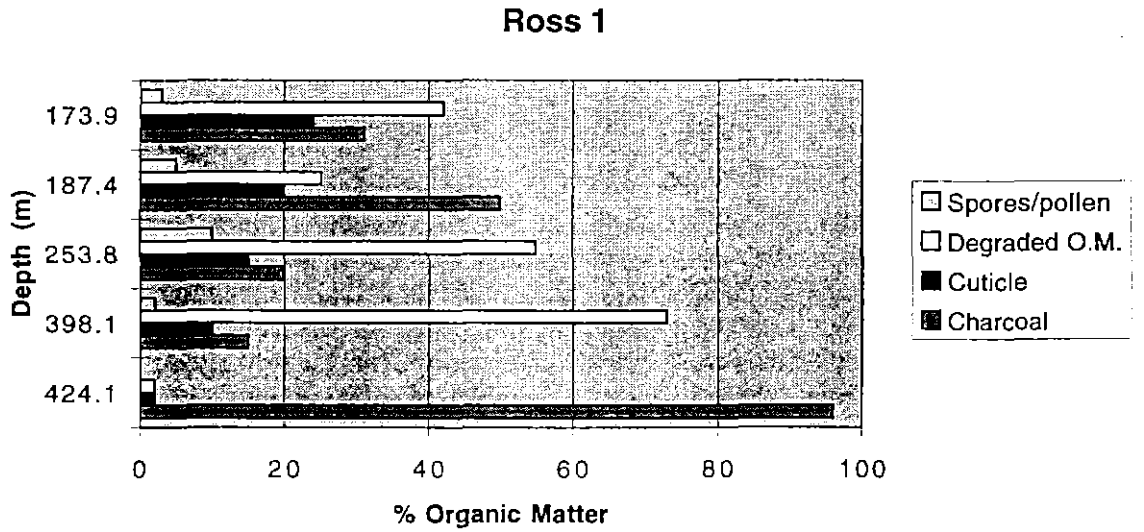
	Depth	Ro
Tunbridge Tier	350.9	± 2
	401.78	± 2
	451.7	± 2
	500.02	± 2
	601.2	± 2
	705.3	± 2
	842.5	± 2
	902.25	± 1.4
Poatina	53.3	1.3
	93.6	1.3
	145.1	.8
	153	.8

	Depth	Ro
Ross 1	173.9	1.2
	187.4	0.5
	253.8	1.2
	398.1	> 2.5
	424.1	> 2.5
Bonney's Plain	444.5	1.2
	478.43	1.4
	516.8	0.5
	537.2	>2.5
	656	1.4
	689	>2.5

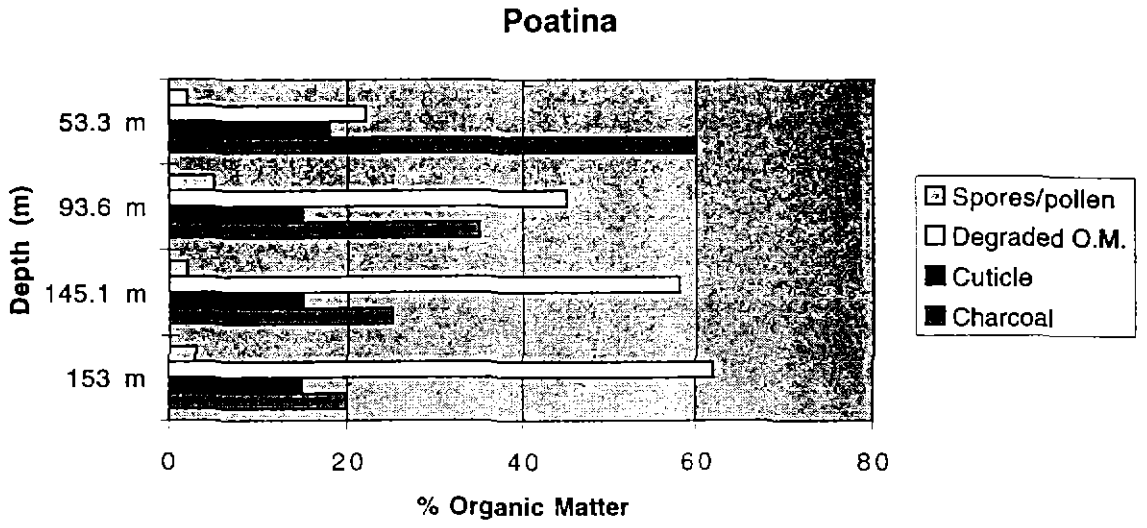
Fig 6.4: Vitrinite reflectance (Ro) for sediments in this study.



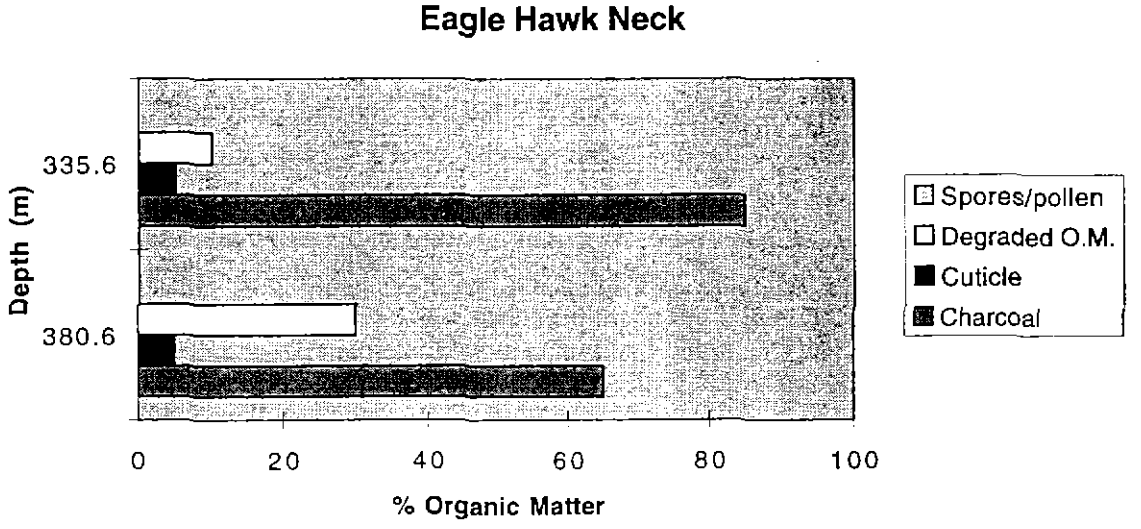
Graph 6.2: Kerogen content against depth for Bonney's Plain DDH.



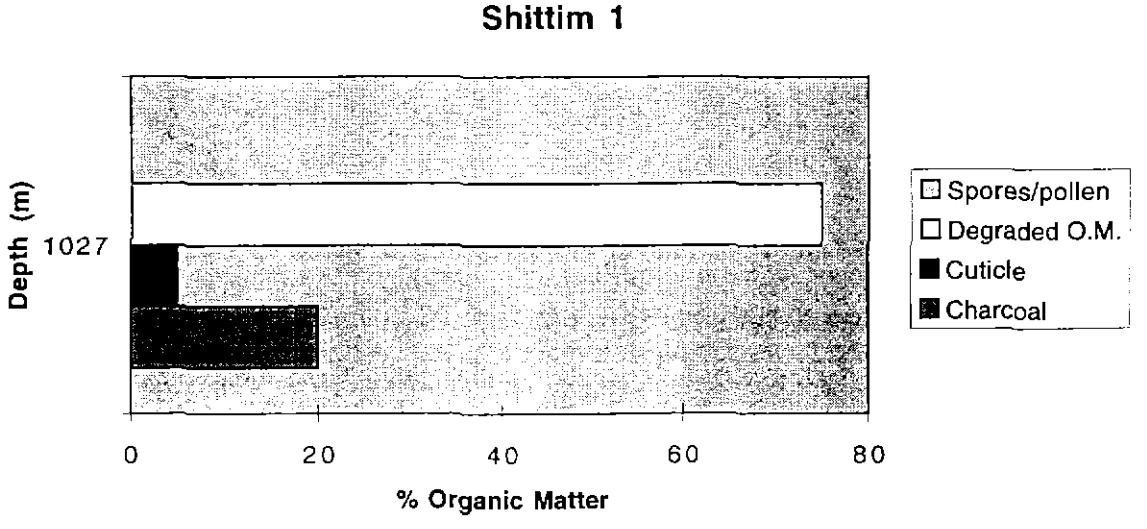
Graph 6.3: Kerogen content against depth for Ross 1 DDH.



Graph 6.4: Kerogen content against depth for Poatina DDH.



Graph 6.5: Kerogen content against depth for Eagle Hawk Neck DDH.



Graph 6.6: Kerogen content against depth for Shittim 1 DDH.

Vitrinite reflectance at this location is low, and when combined with a kerogen type of II/III indicates OM in this region is likely to yield paraffinic condensate gas, and waxy - light paraffinic oil.

6.3.4 Eagle Hawk Neck

The sediments from the Eagle Hawk Neck DDH contain a large percentage of charcoal, and can be classified as overmature (Graph 6.5). The degraded OM which is present, is very dispersed and dark in colour. Kerogen from this location can be classified as type III, and likely to give rise to dry gas.

Vitrinite reflectance is very high (Ro > 2.5), and indicates a dry gas hydrocarbon potential.

6.3.5 Bruny Island

The shale from within the tillite in the Shittim 1 DDH yielded a high amount of degraded OM (graph 6.6), with a small percentage of charcoal and cuticle. The degraded OM here is over mature and very dark in colour. Kerogen can be classified as type III, and likely to yield gas.

An extremely high vitrinite reflectance (Ro > 2.5) supports the dry gas yield predicted by TAI and kerogen type.

6.3.6 Summary

Kerogen analysis shows that the sediments contain abundant degraded organic material, which has a mixed oil/gas potential (Fig. 6.5). The cuticular percentage in most samples suggests an allochthonous derivation, which makes these sediments more gas than oil prone. The acritarch abundance in the Bonney's Plain DDH suggests an oil prone source rock, the lack of sapropel in the kerogen slide may indicate the sediments have been in the oil window for a period of time, and the sapropel may have been turned into oil.

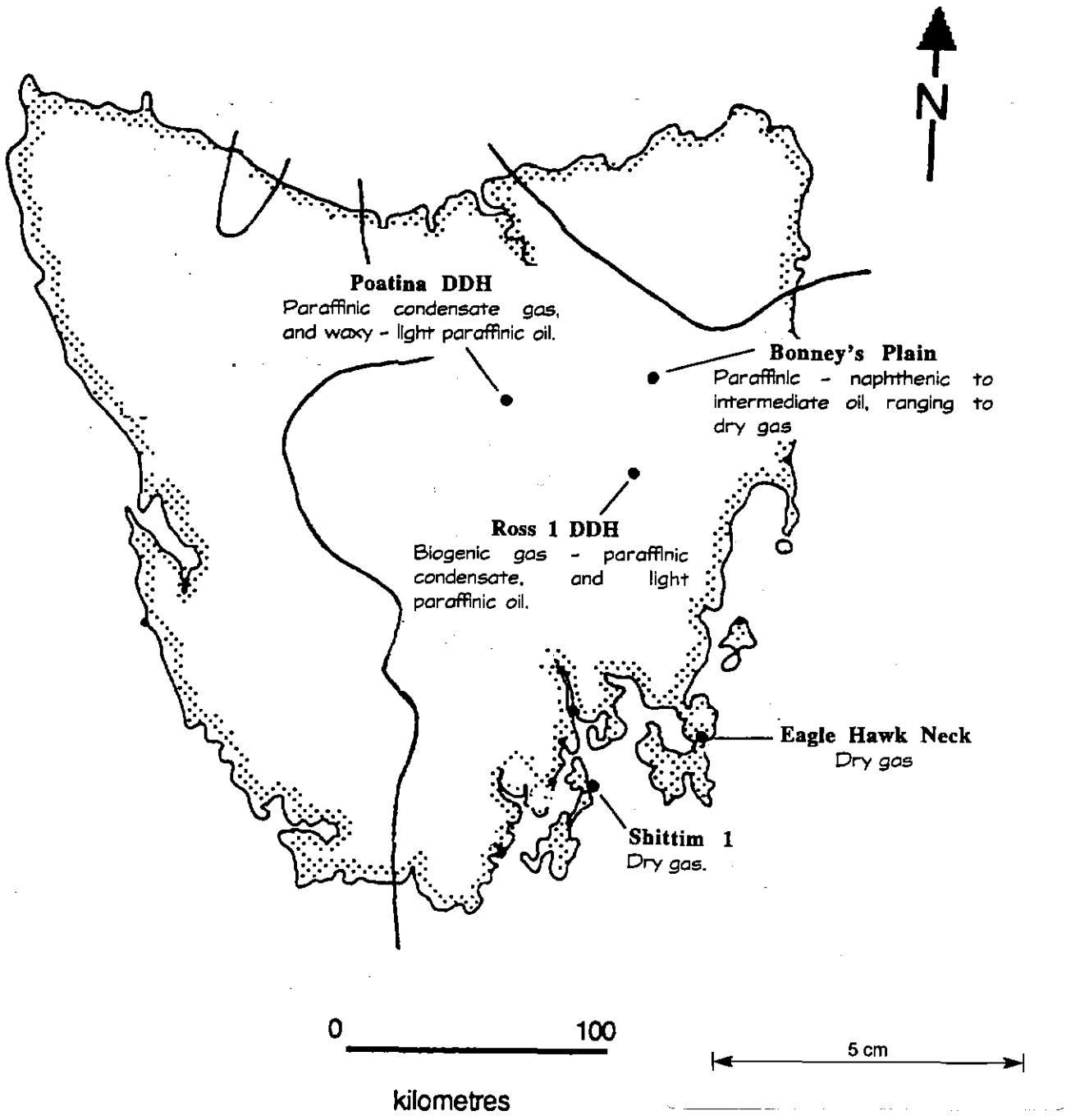


Figure 6.5: Potential hydrocarbon types generated from around the Tasmania Basin. Hydrocarbon yield based on kerogen analysis, TAI and vitrinite reflectance of the organic matter recovered from within the sediments, and compared to the composite hydrocarbon model of Powell, (1985) (Fig. 6.3).

6.4 Total Organic Carbon

The total organic carbon content, or TOC can be defined as the total biogenic content of the sediments, thus the higher the TOC of a sediment, the higher the potential for oil or gas generation once thermal maturity of the sediments is reached.

6.4.1 Shittim 1

The drill hole Shittim 1, located on Bruny Island (Fig 1.1a) was initially drilled as a stratigraphic hole to test structures identified on nearby marine seismic lines across Storm Bay (Burrett, 1997). The gas encountered at shallow depths within this hole was not unexpected, as oil had been encountered at shallow depths in a nearby shallow hole known as Johnson's Well in 1929 (Burrett, 1997). Drilling was temporarily halted at 1021 m, within the Truro Tillite of the Late Carboniferous. Upon re-entry of this hole, a 30 m shale bed within the tillite was encountered above the more typical layers of the Truro Tillite. A further three, much thinner (1 - 3 m) shale beds were encountered lower in the formation.

It was thought possible that the source of the gas encountered in the core may have been these shale beds, so analysis of TOC by Amdel Ltd was performed on a sample from each of these shale beds. The results are given in Table 6.1:

Depth (m)	%TOC
1034	0.57
1046.4	0.30
1056.5	0.34
1147	0.11
1179.5	0.19
1215.9	0.04

Table 6.1 Total Organic Carbon content of shale beds located within the Truro Tillite in the Shittim 1 DDH.

As can be seen, except for at 1034 m, the TOC of these shales is extremely low, it is therefore unlikely the gas originated from this source.

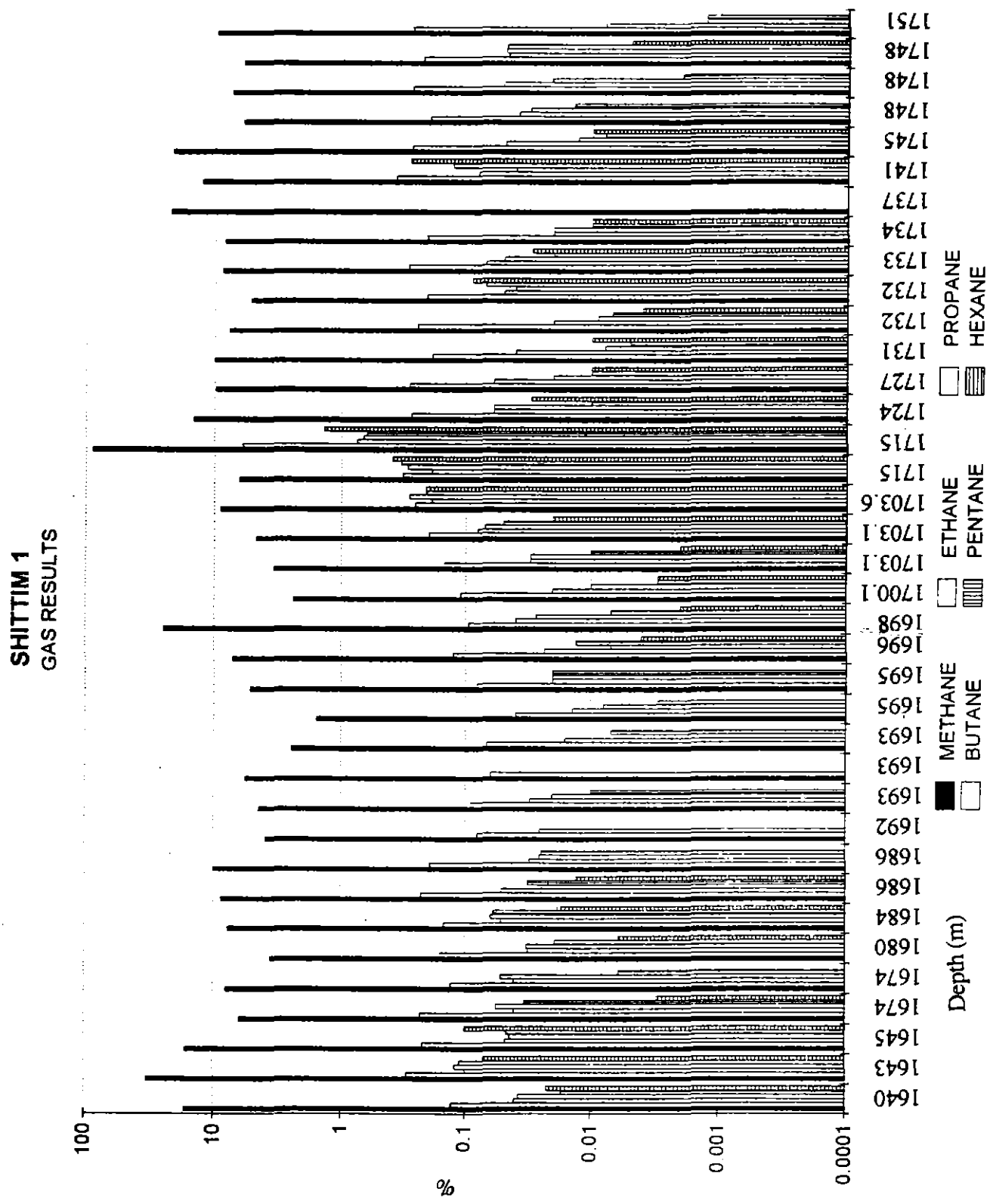
Further to the analysis of TOC, a Rock-Eval pyrolysis and kerogen typing was completed on the shale samples. These results suggest a TAI of 3.00 on these samples due to the occurrence of three leiospheres of light brown colour. It is suggested by Amdel that these leiospheres might be contamination, and the absence of any other palynomorphs except some black cuticle fragments suggests a TAI of 4.00. Palynological study for this project in addition to that completed by Amdel supports the latter (see Graph 6.1).

6.5 Hydrocarbon source rock

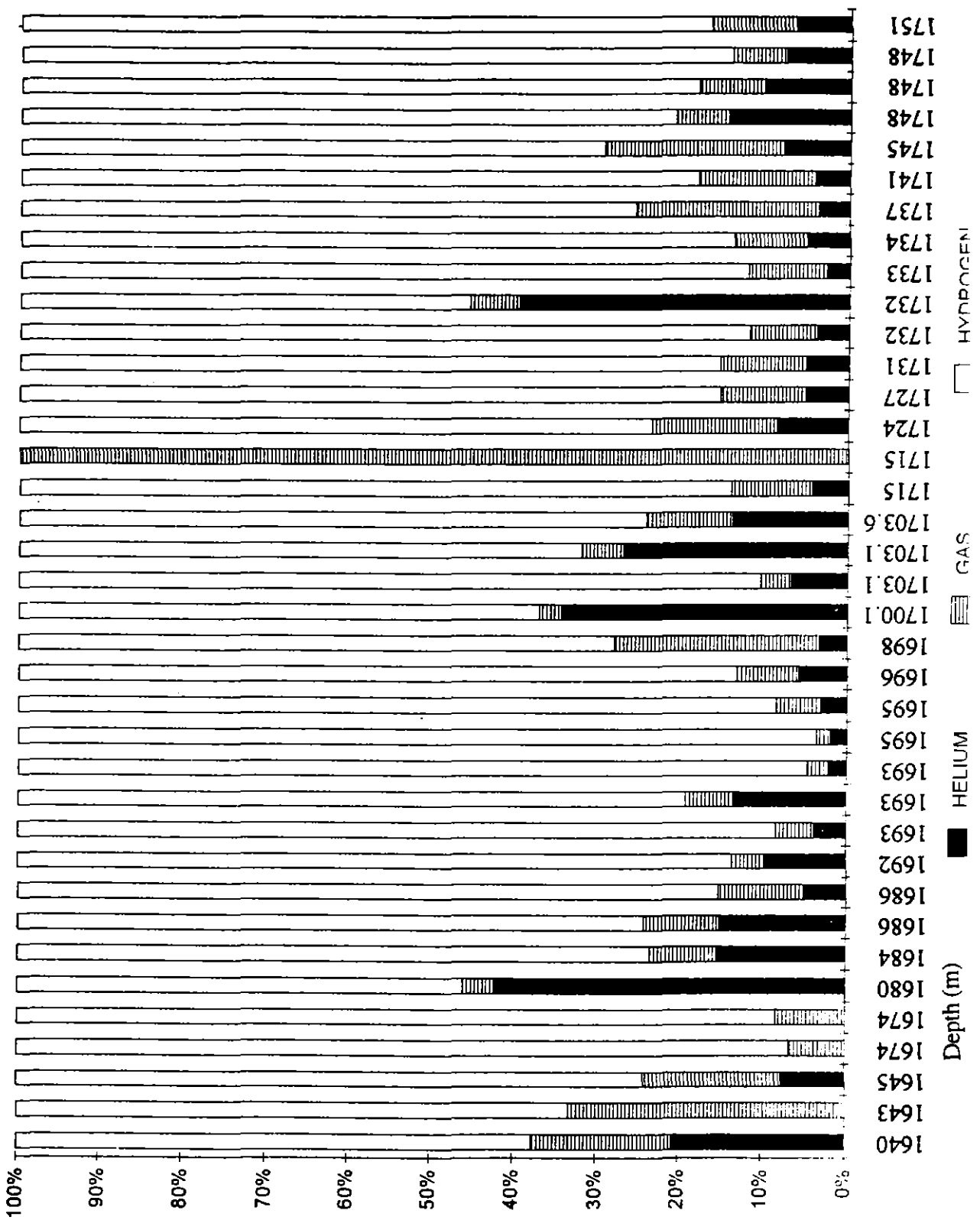
Drilling in the Shittim 1 hole was continued through the tillite, and into metamorphosed basement rock (see Chapter 4). Instead of declining, as would have been expected, the gas from within the metamorphics increased in both overall level, type of gas (methane-hexane) and type (hydrogen and helium). Graph 6.7 shows the relative percentage of hydrocarbons recovered, moving deeper. Graph 6.8 outlines the relative percentage of Helium and Hydrogen recovered from within these same samples. Gas analysis was completed by Amdel Ltd.

The increase in gas levels with depth is intriguing. Several explanations are possible. Precambrian source rocks are possible, and are the source rocks for other oil/gas fields in the world, e.g. Oman (Potter *et al.*, 1995). However, in Oman, the Precambrian source rock is an unmetamorphosed, marine, algal-rich carbonate, which does not appear to be the case within this part of the Tasmania Basin. A possible theory, and one that can only be proven by further drilling is that a large thrust fault occurs in this part of the basin, and has thrust a source rock beneath the Precambrian metamorphics. The most likely member for this source would be the Ordovician Gordon Group carbonates. Organic geochemistry of minor hydrocarbon occurrences from other parts of the Tasmania Basin have a similar geochemical signature to the hydrocarbons from the Gordon Group

limestone (Bendall *et al.*, 1991). Further to this, modelling has shown they would fall within the oil and gas window if present beneath the Parmeener Supergroup in south-east Tasmania (Woods, 1995). Although this model was designed for a stratigraphic occurrence directly below the Parmeener Supergroup. A second possibility is that hydrocarbons have migrated in laterally along structure, from a source an unknown distance away.



Graph 6.7: Relative percentage of hydrocarbon types recovered from depth in the Shittim 1 DDH, Air, Nitrogen and CO_2 corrected (data supplied by Great Southland Minerals).



Graph 6.8: Relative percentage Helium and Hydrogen recovered from depth in the Shittim 1 DDH. Air, Nitrogen and CO_2 corrected. (data supplied by Great Southland Minerals).

Plate 6.1

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(a) Photomicrograph of kerogen content from the Bonney's Plain DDH (444.5 m), showing large proportion of degraded organic matter, with minor amounts of cuticle and charcoal.

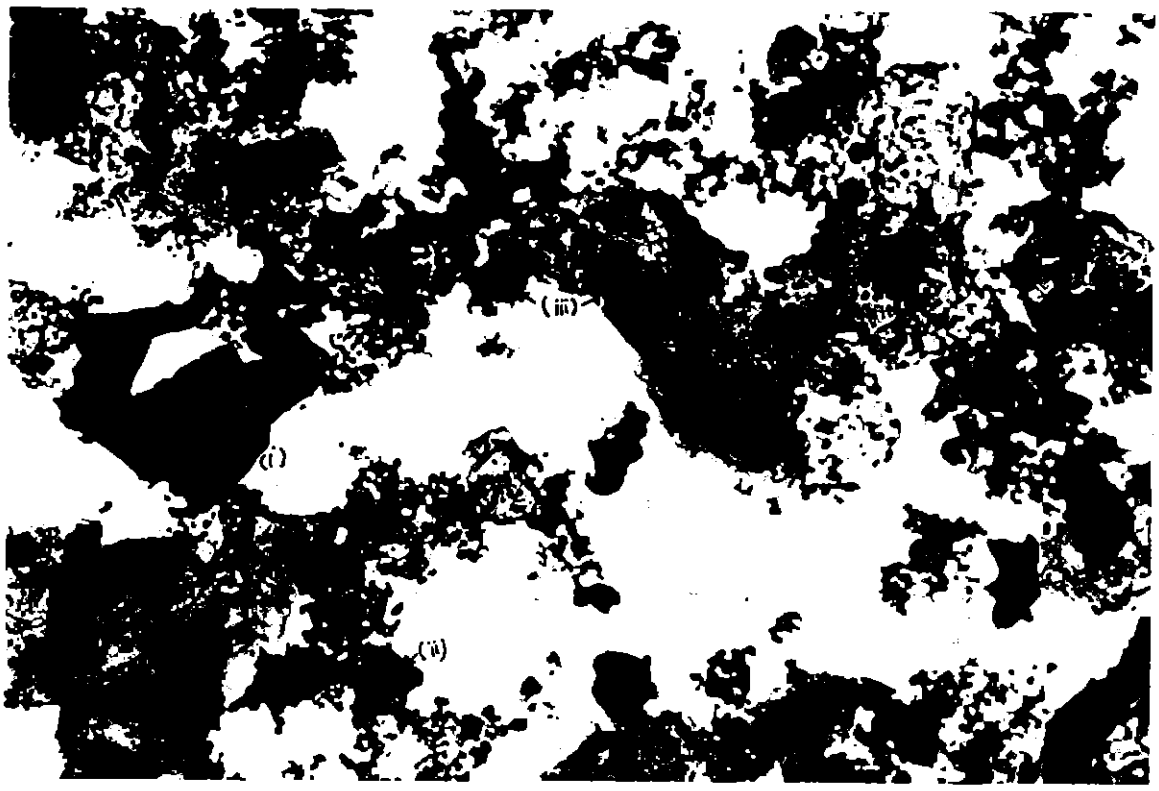
(i) Cuticle

(ii) Charcoal

(iii) Degraded Organic Matter

(x 100)

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Chapter 7: Discussion

The Tasmania Basin is host to the sediments of the Parmeener Supergroup which range from Late Carboniferous to Triassic in age. Certain sequences within the Parmeener have been demonstrated as rich potential oil and/or gas source rocks, provided thermal maturity has been attained. Certain sequences have also been shown to have good reservoir potential. It is therefore essential to have biostratigraphic control on these important source and/or reservoir rocks.

Basement relief has played a dominant role in controlling the palaeogeography and stratigraphy of the Tasmania Basin, and has affected the development and thickness of many sequences throughout the basin. Palynomorph data has helped to define palaeogeography and biostratigraphic correlation of the Lower Parmeener Supergroup in Tasmania. The use of this medium for dating has been of particular use in areas where macro fossil data is not sufficient, or non-existent. Palynology provides an extra correlation line within the Tamarian and Bernacchian Faunizones of Banks and Clarke (1976).

The results of palynological dating shows the base of the Quamby Formation and Woody Island Formation corresponds to a microfloral age of stage 2 (upper Carboniferous), grading into stage 3a (Asselian) a few 10`s of meters above the base. The palynological age of stage 3a just above the base of the mudstones overlying the glacigenic sediments dates the recession of the Late Palaeozoic ice sheet as beginning in the Late Carboniferous, and continuing into the Early Permian; a time frame for this glacial recession which is supported by macro fossil data in other parts of Australia.

Palynological dating has allowed stricter correlation of sequences which was based previously only on broad lithological characteristics. An Early Permian age of stage 3a is

assigned to the glacigenic sediments immediately overlying basement in the Bonney's Plain drill hole, which is consistent with mapping results in the region further east which show that due to a topographical high, sedimentation did not start here until Permian times. Furthermore, the glacigenic nature of these Early Permian sediments indicate the continuation of ice within this region after glacial retreat from elsewhere in the Tasmania Basin, possibly as a fjord glacier.

The base of the Liffey Sandstone, has yielded microfloral assemblages referrable to substage 3b (Tastubian). This is in agreement with studies completed by Helby (1972) and Calver *et al.*, (1984) on other drill core within the Tasmania Basin, which indicate a similar age for this unit and correlates.

A study of the geography of the Tasmania Basin by Banks and Clarke (1987) provided a series of diagrams showing the distribution of rock types, and a perspective reconstruction of the palaeogeography of the Tasmania Basin at various stages throughout the depositional period of the Parmeener Supergroup, based on lithological, macrofossil and palynological evidence. Results of this study support these reconstructions, with the exception of the Early Tamarian time frame. Data from the Bonney's Plain area, as defined in this study, indicates land surface further to the west than previously indicated.

Extensive Jurassic dolerite intrusion throughout the Tasmania Basin have baked the sediments to varying degrees, often destroying palynomorph assemblages. Regional heating events may also have affected the Parmeener Supergroup, which makes selection of sediments for palynological study difficult.

Palynological dating has allowed a correlation of the Permian sequences of the Tasmania Basin to be made with other Permian Basins around eastern Australia, and Antarctica. A broader correlation with Permian Basins of Western Australia is at this stage difficult due

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to past provincialism of species, and the differing zone species used to correlate the sediments.

Recent studies (O'Sullivan, 1997) using fission track data indicates that a lot more surface material has been removed from Tasmania than previously thought. If true, this indicates the sediments of the Tasmania Basin have been subject to regional palaeoburial temperatures of around 110 °C - 120 °C, and stayed at these temperatures for extended time, until a Cretaceous unroofing event. This in combination with known heat generated during the Jurassic dolerite intrusion of Tasmania indicates extensive heating of the sediments may have taken place. Thermal Alteration Index of the palynomorphs places those sedimentary rocks studied (where they have not been in close proximity to a dolerite intrusion) well within the oil and gas window. In some cases, such as at Eagle Hawk Neck where geophysical interpretation indicates no dolerite to occur in the area, palynomorphs had been totally carbonised. Occurrences such as this may be explained by the possibility of a broad scale burial heating event, as suggested by O'Sullivan (1997), and this may be considered support for his theory.

Kerogen analysis indicates organic matter to be of a dominantly land plant origin, categorising the organic matter within the sediments as type II/III. The use of kerogen data when combined with a study of vitrinite reflectance shows the rocks have a mixed oil/gas potential With the exception of Bonney's Plain, those sediments with a lower TAI are characterised as having the potential to generate biogenic gas to a waxy oil, whilst the sediments with a higher TAI have a dry gas potential. The high acritarch abundance in the Bonney's Plain hole combined with the TAI and Ro data indicates a hydrocarbon potential of paraffinic - naphthenic to intermediate oil.

A lithological study of the newly completed DDH Shittim 1 on Bruny Island, shows the tillite to be an extension of the Truro Tillite located in the southern part of the Tasmania Basin, with clast provenance most likely from the west. Lithological comparisons

indicate the pre-Parmeener metamorphics below the unconformity in this part of the basin belong to the Precambrian Jubilee Region, which outcrops in central southern Tasmania.

Unexpectedly high gas readings recovered from depth in the Shittim 1 hole do not appear at this stage to be generated from the Precambrian metamorphics. Hydrocarbons may be leaking in from the side along structure, or they may be originating from a large thrust fault under the Tasmania Basin in this region, placing the Ordovician carbonates, which have already been proved as potential source rocks, within the oil and gas window at depth.

Further research along similar lines to that completed here, incorporating a larger number of drill cores, and extending study into the beds of the 'Upper Marine' section of the Parmeener Supergroup can be used to further constrain palaeogeographic reconstructions of the Tasmania Basin. Work of this nature will also allow a broader correlation of the sediments of the Parmeener Supergroup with sequences from other Permian Australian Basins and Antarctica. This will allow possible inferences to be made regarding a relationship between the major oil and gas fields in other Permian Australian Basins, and the as yet unproven oil and gas potential of the Tasmania Basin.

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Appendix 1

Shittim 1A

Date logged: 15 August -6 September, 1996

Logged by: Cheryl-Lee Randall

Remarks: Re- entry reached TD 1020.5 @ 1300 hours on 15/8/96

All core checked for flouresence, none encountered.

LEGEND

LITHOLOGY

Shale/Mudstone; Silty Shale; grain supported; Washout zone; Tillite; Interbedded tillite/shale; Limestone

CONTACTS

Undulating; Faulted

PHYSICAL STRUCTURES

Current Ripples; Cross-bedding; -Dropstone; Wispy laminae; Bioturbation

LITHOLOGIC ACCESSORIES

Calcareous; Py - Pyrite

FRACTURES

/ - fracture, general; /=/ - fracture with brecciation; % - fracture with slickensides

GRAIN SIZE: cobble, pebble, granule, sand, silt, clay (v f m c v)

METRES | SORTING | FRACTURES | REMARKS

1030

Dark gry/blck in colour, well laminated, fissile, rare dropstones (well rounded; granule to pebble size; limestone and quartzite in composition), pyrite spotting, siliceous matrix with some thin calcareous layers, bioturbation. Brittle high angle fractures.

Becoming very fissile, pyrite spotting becoming more pervasive replacing bedding in places, bedding disturbed by currents, siliceous matrix with occasional calcareous layers.

1040

Dark gry/blck in colour, less fissile, hard, siliceous matrix, calcareous layers increasing with depth, increase in number of dropstones (<5%, granular, qtzite comp.) abundant py. spotting.

High angle fracture (~30 degrees to perpendicular) filled with calcite and pyrite.

1050

Dark gry/blck in colour, hard, increase in fissility, grades into a calcareous matrix, no more pyrite spotting, dropstones rare (granular, sub rounded, qtzite comp.)

1050.7 - 1052.7 Core loss

Becoming less fissile.

1060

Grades into a dark gry tillite, silt size matrix with ~20% clasts. Clasts composed of qtzite, lmst and unknowns, rounded to sub-angular granule to pebble size, wispy laminations through matrix.

Light grey, off white limestone, silt/sand matrix, calcareous, hard, fossiferous, conformable with tillite and shale.

Zone of interbedded tillite/shale. Tillite is drk gry, silty matrix, granule to pebble size clasts aligned with bedding, clasts composed of qtzite, metamorphics, lmst and unknowns, (~ 20% of matrix). Shale is black, well laminated, granule size dropstones (<5%) qtzite and lmst, rounded to sub-angular shape, siliceous matrix. Meltout till?

Dark-med grey, cly/slt matrix, mixture of clasts (~20%), angular to rounded in shape, varying composition- qtzite, lmst, metamorphics, some reworked clasts, siltsone, unknowns, sand to pebble size, calcareous matrix, minor pyrite present - reworked?

high angle (30 deg to perpendicular) fracture filled with calcite.

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1070

Drk gry, slst to mudst matrix, increase in clasts from ~20% to ~30%, sand - cobble size, rounded - subangular, larger clasts of albite (?) to schist (?), lmst, qtzite and mudstone.

Larger igneous clast (?), 25 cm diameter.

1080

High angle fracture (30 deg to perpendicular) filled with calcite

1090

Light gry tillite, siltstone matrix, clasts (~30%) rounded to sub-angular, granule to pebble, qtzite, metamorphics, lmst, mudstone.

Fractured zone, brecciated matrix with many small vitreous quartz crystals through matrix.

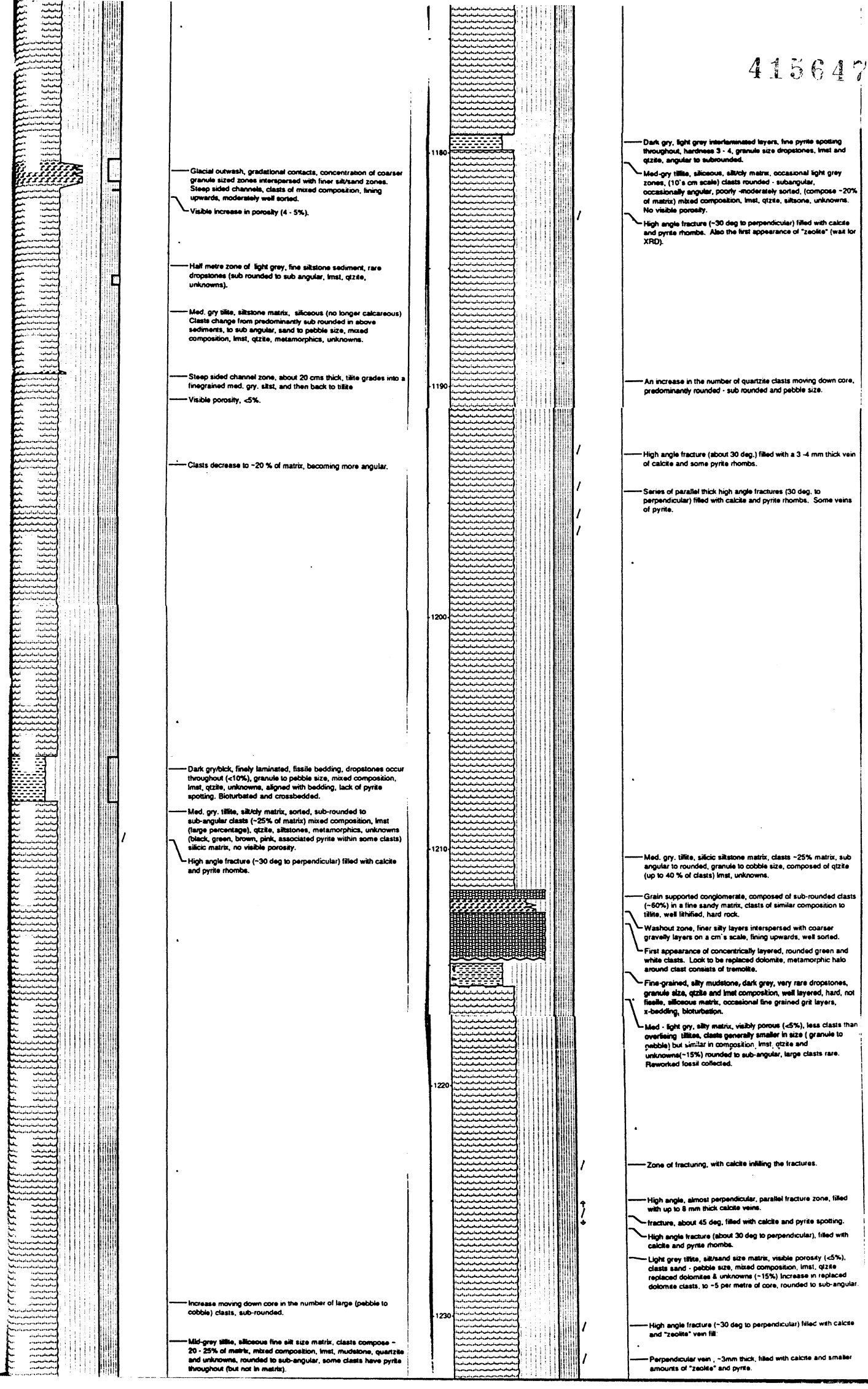
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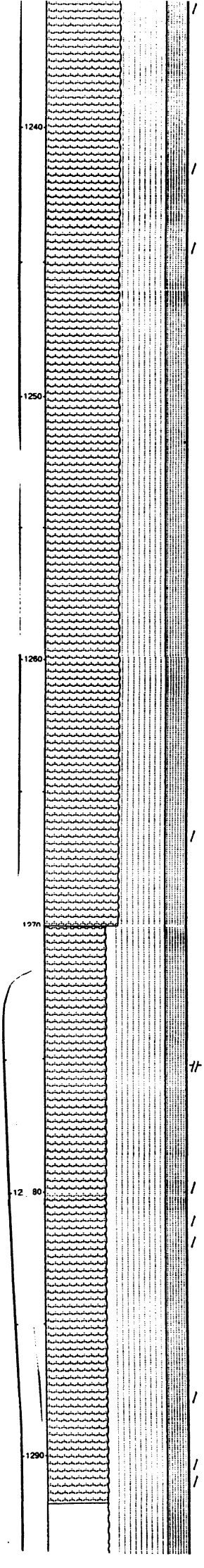
Small calcite fracture with slickensides (30 deg to perpendicular) - dextral ?

1110

High angle fracture (30 deg to perpendicular) filled with calcite.

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Glacial outwash, gradational contacts, concentration of coarser granule sized zones interspersed with finer silt/sand zones. Steep sided channels, clasts of mixed composition, fining upwards, moderately well sorted.
Visible increase in porosity (4 - 5%).
Half metre zone of light grey, fine siltstone sediment, rare dropstones (sub rounded to sub angular, lmst, qtzite, unknowns).
Med. gry tillite, siltstone matrix, siliceous (no longer calcareous) Clasts change from predominantly sub rounded in above sediments, to sub angular, sand to pebble size, mixed composition, lmst, qtzite, metamorphics, unknowns.
Steep sided channel zone, about 20 cms thick, tillite grades into a finegrained med. gry. siltst, and then back to tillite
Visible porosity, <5%.
Clasts decrease to ~20 % of matrix, becoming more angular.
Dark gry/blck, finely laminated, fissile bedding, dropstones occur throughout (<10%), granule to pebble size, mixed composition, lmst, qtzite, unknowns, aligned with bedding, lack of pyrite spotting. Bioturbated and crossbedded.
Med. gry. tillite, silt/cly matrix, sorted, sub-rounded to sub-angular clasts (~25% of matrix) mixed composition, lmst (large percentage), qtzite, siltstones, metamorphics, unknowns (black, green, brown, pink, associated pyrite within some clasts) silicic matrix, no visible porosity.
High angle fracture (~30 deg to perpendicular) filled with calcite and pyrite rhombs.
Increase moving down core in the number of large (pebble to cobble) clasts, sub-rounded.
Mid-grey tillite, siliceous fine silt size matrix, clasts compose ~ 20 - 25% of matrix, mixed composition, lmst, mudstone, quartzite and unknowns, rounded to sub-angular, some clasts have pyrite throughout (but not in matrix).
Dark grey, light grey interlaminated layers, fine pyrite spotting throughout, hardness 3 - 4, granule size dropstones, lmst and qtzite, angular to subrounded.
Med-gry tillite, siliceous, silt/cly matrix, occasional light grey zones, (10's cm scale) clasts rounded - subangular, occasionally angular, poorly -moderately sorted, (compose ~20% of matrix) mixed composition, lmst, qtzite, siltsone, unknowns. No visible porosity.
High angle fracture (~30 deg to perpendicular) filled with calcite and pyrite rhombs. Also the first appearance of "zeolite" (wait for XRD).
An increase in the number of quartzite clasts moving down core, predominantly rounded - sub rounded and pebble size.
High angle fracture (about 30 deg.) filled with a 3 -4 mm thick vein of calcite and some pyrite rhombs.
Series of parallel thick high angle fractures (30 deg. to perpendicular) filled with calcite and pyrite rhombs. Some veins of pyrite.
Med. gry. tillite, silicic siltstone matrix, clasts ~25% matrix, sub angular to rounded, granule to cobble size, composed of qtzite (up to 40 % of clasts) lmst, unknowns.
Grain supported conglomerate, composed of sub-rounded clasts (~60%) in a fine sandy matrix, clasts of similar composition to tillite, well lithified, hard rock.
Washout zone, finer silty layers interspersed with coarser gravelly layers on a cm's scale, fining upwards, well sorted.
First appearance of concentrically layered, rounded green and white clasts. Look to be replaced dolomite, metamorphic halo around clast consists of tremolite.
Fine-grained, silty mudstone, dark grey, very rare dropstones, granule size, qtzite and lmst composition, well layered, hard, not fissile, siliceous matrix, occasional fine grained grit layers, x-bedding, bioturbation.
Med - light gry, silty matrix, visibly porous (<5%), less clasts than overlying tillites, clasts generally smaller in size (granule to pebble) but similar in composition, lmst, qtzite and unknowns(~15%) rounded to sub-angular, large clasts rare. Reworked fossil collected.
Zone of fracturing, with calcite infilling the fractures.
High angle, almost perpendicular, parallel fracture zone, filled with up to 8 mm thick calcite veins.
fracture, about 45 deg, filled with calcite and pyrite spotting.
High angle fracture (about 30 deg to perpendicular), filled with calcite and pyrite rhombs.
Light grey tillite, silt/sand size matrix, visible porosity (<5%), clasts sand - pebble size, mixed composition, lmst, qtzite replaced dolomites & unknowns (~15%) increase in replaced dolomite clasts, to ~5 per metre of core, rounded to sub-angular.
High angle fracture (~30 deg to perpendicular) filled with calcite and "zeolite" vein fill.
Perpendicular vein , ~3mm thick, filled with calcite and smaller amounts of "zeolite" and pyrite.



High angle fracture, (about 30 deg to perp.) filled with calcite, "zeolite" and small amount of pyrite.

Med-gry, silt/cly matrix, no visible porosity, clasts (10 - 15%), rounded to sub-angular, sand to pebble size, mixed composition, qtzite, lmst, replaced dolomite, unknowns, rare pyrite spotting through matrix - reworked? Poorly sorted.

High angle fracture, (30 deg to perp) filled with calcite, "zeolite" and finely disseminated pyrite.

Perpendicular fracture, filled with "zeolite?" and rare pyrite spotting.

Increasing occurence of replaced dolomite clasts (~ 7 - 8 per metre of core), with visible reaction rim around some clasts.

Medium gry tillite, silicic matrix, no visible porosity, clasts (~10% - 15%) rounded to subangular, mixed composition, lmst, qtzite, replaced dolomites, unknowns (occurence of "pink" and "green" clasts), sand to pebble, many clasts with a reaction rim around the outside.

Meta-tillite: Med. - light grey siltstone matrix, siliceous, clasts (~10%) sand - pebble size, (predominantly granule size), mixed composition, lmst, qtzite, replaced dolomite, unknowns, sub-rounded to sub-angular, reaction rim around some clasts.

Vein filled with quartz, high angle (~ 30 deg to perpendicular) associated with a series of finer offshoot and sub-parallel veins.

Veining through core, cm`s alteration halo visible around vein. Many offshoots extending into surrounding rock.

20 cm lighter grey, altered zone, soft, crumbly, easily broken.

Extension fracture filled with a thick vein of dolomite. Dolomite is white to yellow in colour, crystsalline texture, hardness of about 4 with a vuggy porosity. Fracture is perpendicular and uneven, reaction rim occurs around the outside of the vein, with a pink mineral crystallised along the edges of the vein. Vein extends 1275.3 - 1276.4, with the core broken up and crisscrossed by offshoots of the dolomitic veins.

Many small mm size spots throughout the matrix, metamorphic alteration spots.

Series of fractures filled with a clear quartz. Reaction rims from vein fill extend out into the core in all directions, some zones very strongly altered. Concentration of all white alteration spots increasing down core, alteration rim around clasts. Matrix tested to see if it is dolomite - tested negative.

Med. - light grey tillite, silt size matrix, siliceous, clasts (~10 - 15%) rounded to sub-angular, mixed composition, lmst, qtzite, siltstones, unknowns, sand to cobble size, visible reaction rim around most clasts

Series of sub-parallel fractures/veins, filled with pink rose quartz (?). Also what looks to be some of the "zeolite" found further up the core.?

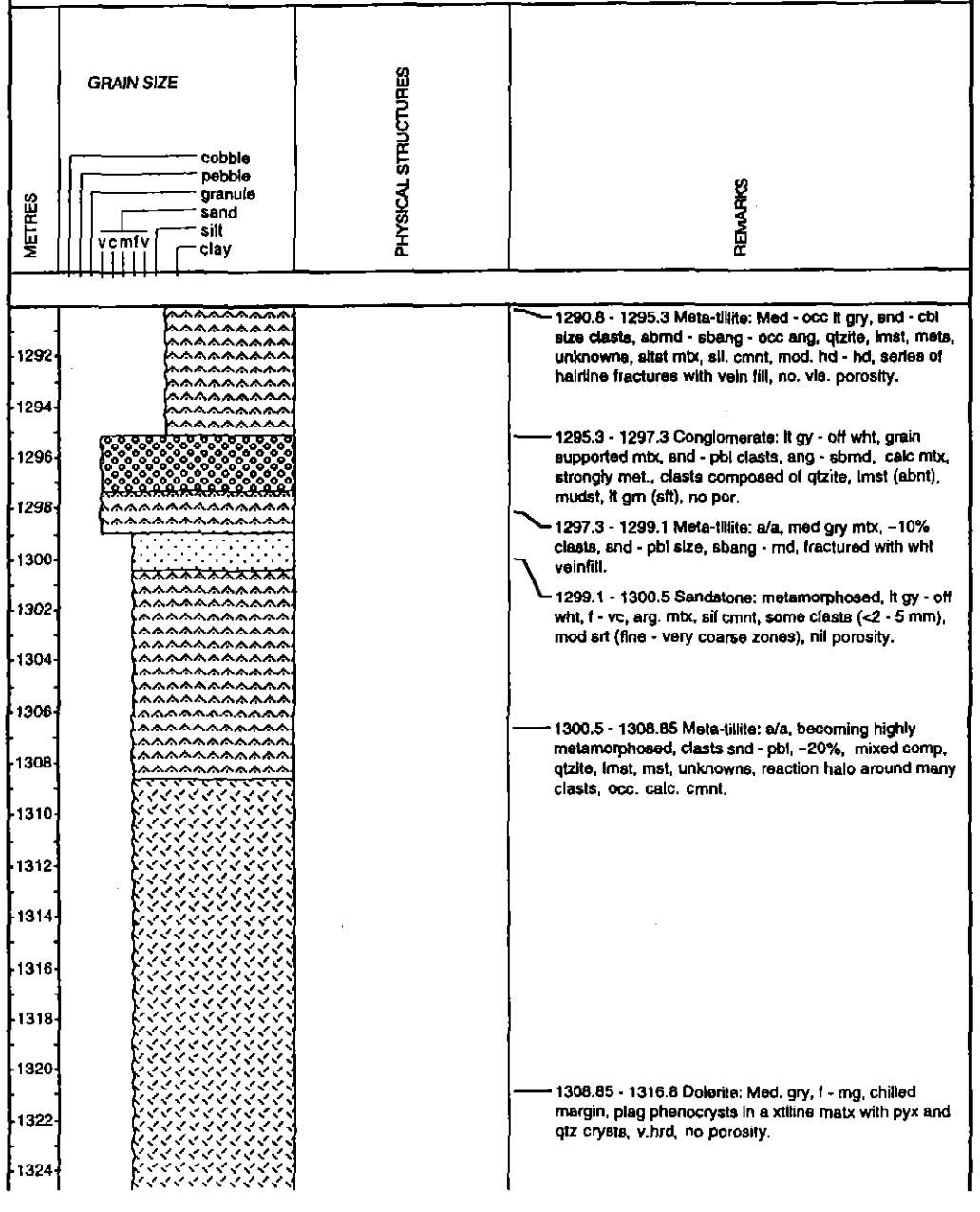
Vein passing through core, filled with rose quartz, very strong alteration halo around clasts, much more concentrated spotting through this region, especially surrounding some clasts.

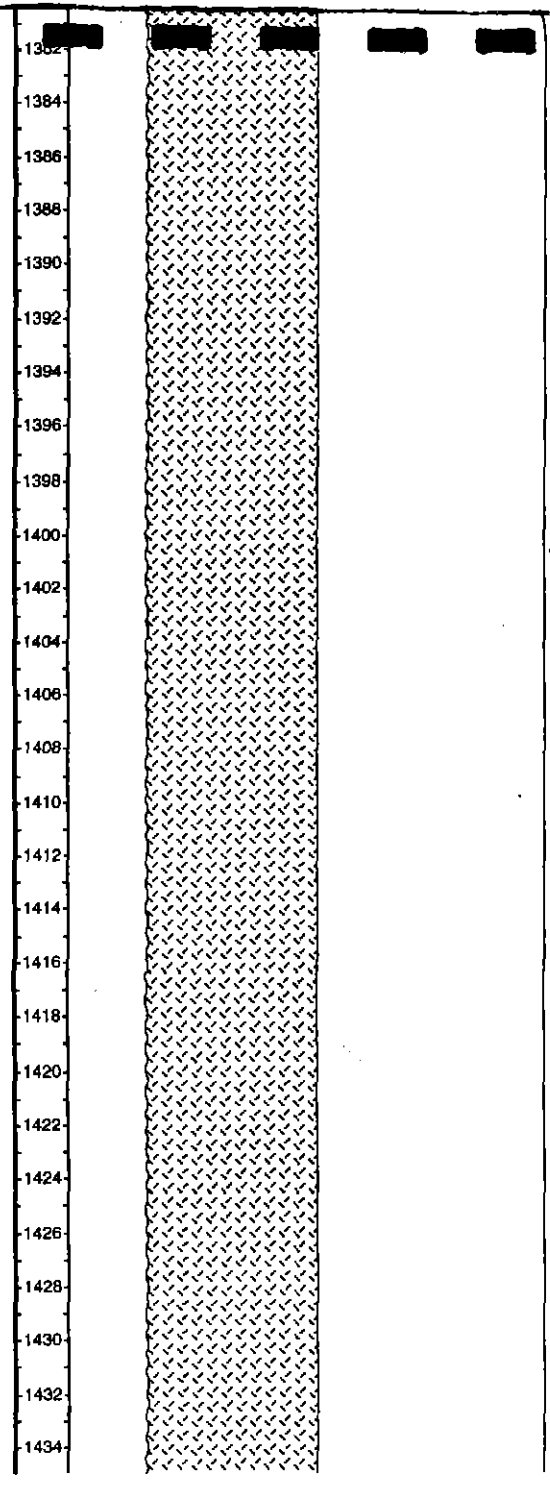
Series of vertical and sub-vertical fractures filled with a soft pink veinfill, no reaction with acid - zeolite(?).

Light grey tillite, silty matrix, siliceous, clasts (~10 %) mixed composition, lmst, qtzite, unknowns, all with reaction haloe, sand to pebble size, subrounded - subangular.

Shittim 18

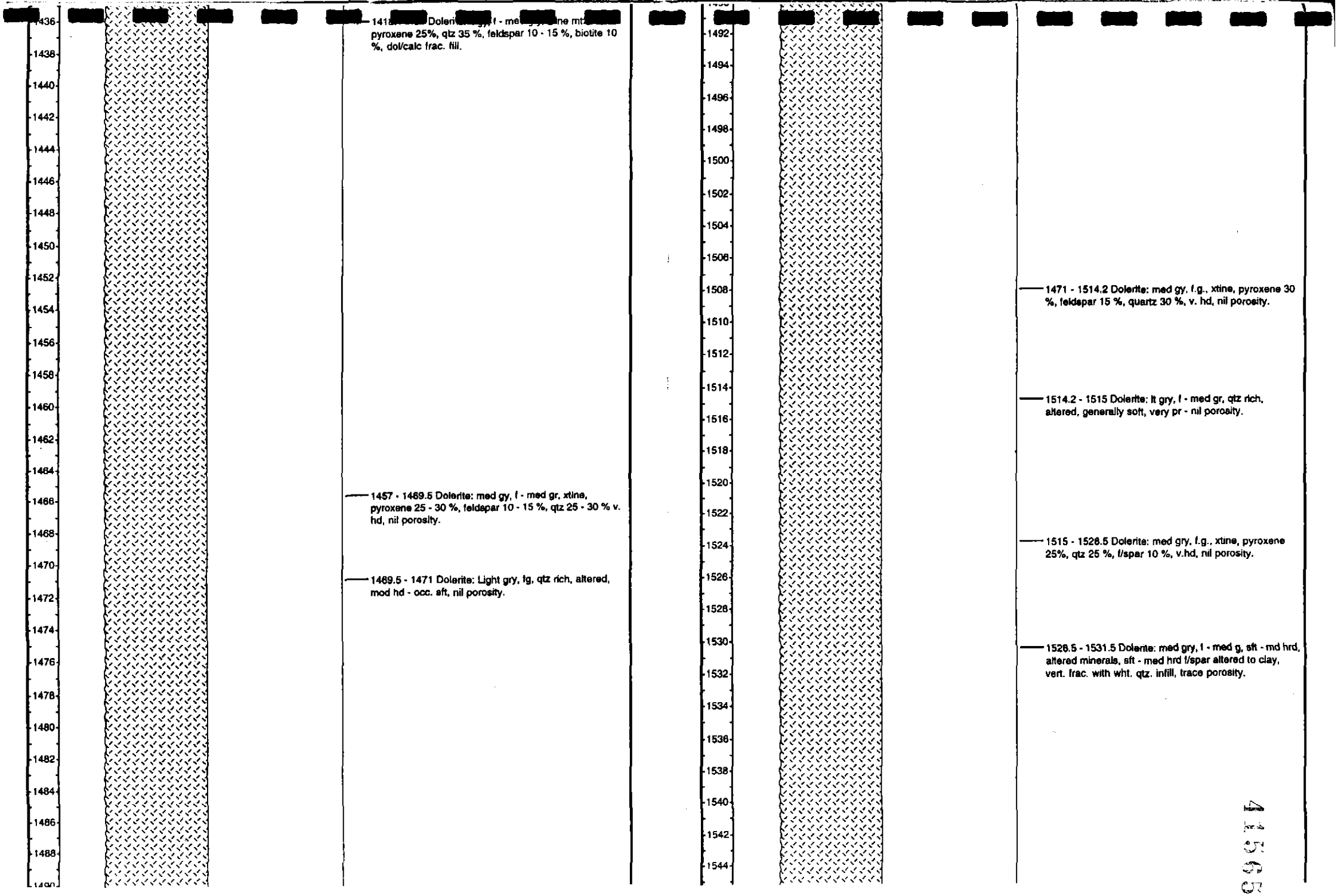
Remarks:



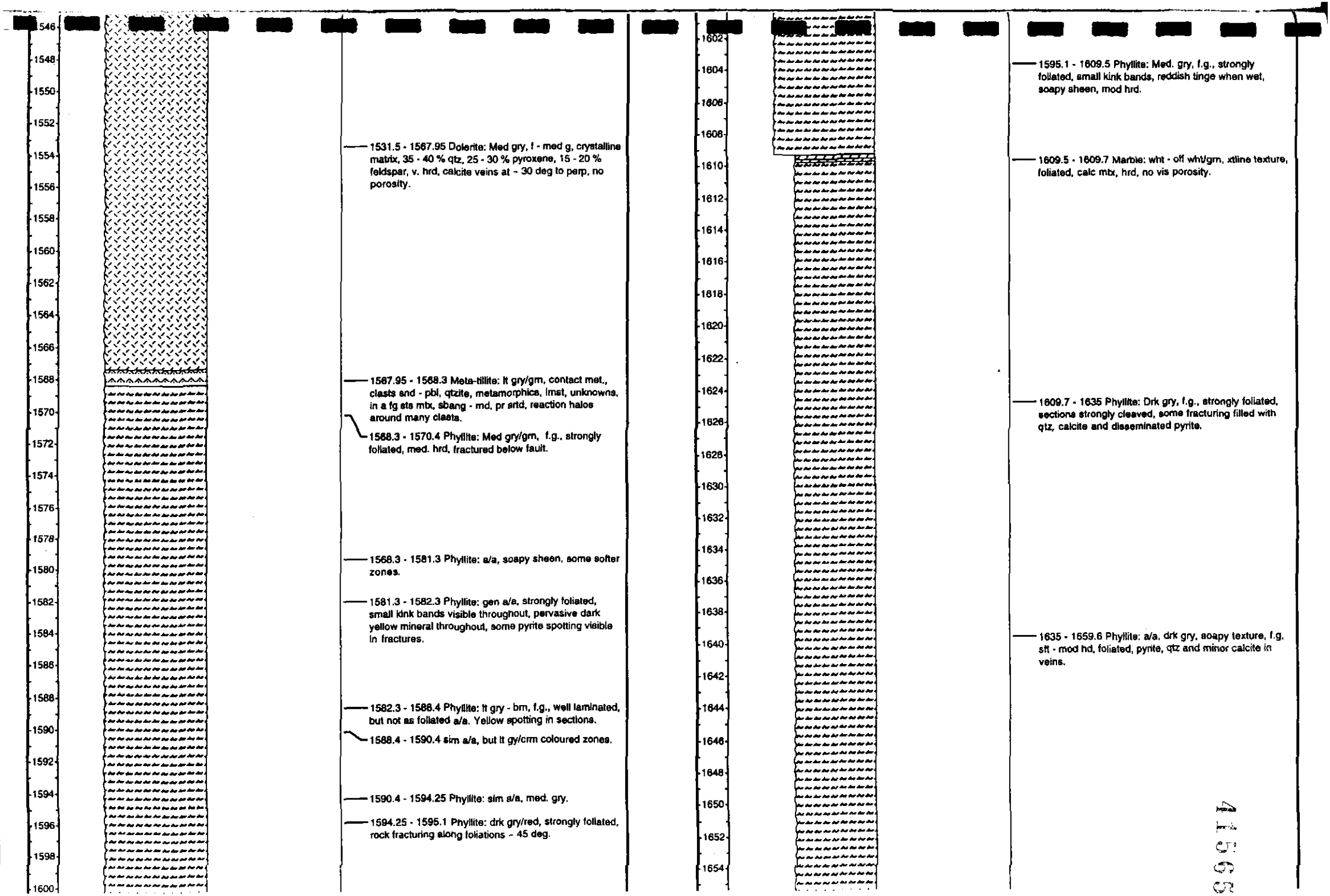


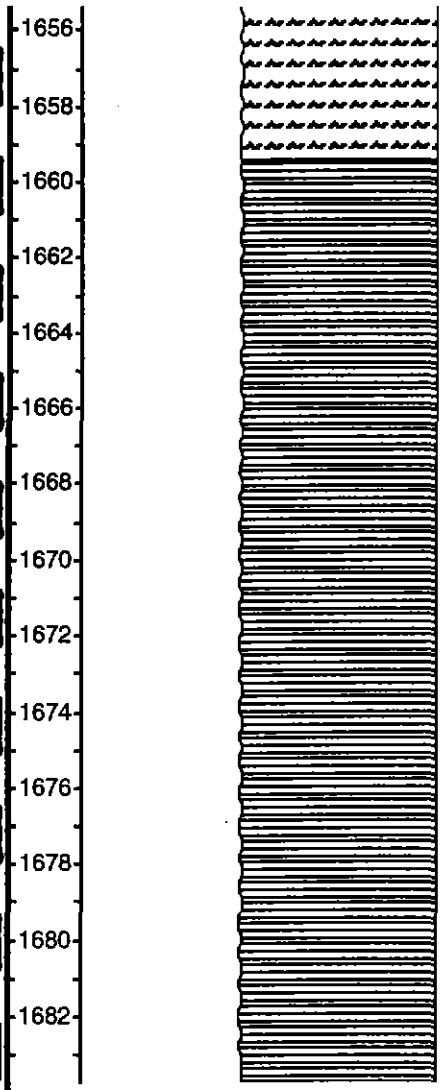
1394.1 - 1418 Dolerite: med-lt gry, interlocking xtlne mtx, qtz rich, v hd, occ subvert frac. (30 deg to perp.) nil porosity.

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pyroxene 25%, qtz 35 %, feldspar 10 - 15 %, biotite 10 %, dol/calc frac. fill.
1457 - 1469.5 Dolerite: med gy, f - med gr, xtine, pyroxene 25 - 30 %, feldspar 10 - 15 %, qtz 25 - 30 % v. hd, nil porosity.
1469.5 - 1471 Dolerite: Light gry, fg, qtz rich, altered, mod hd - occ. sft, nil porosity.
1471 - 1514.2 Dolerite: med gy, f.g., xtine, pyroxene 30 %, feldspar 15 %, quartz 30 %, v. hd, nil porosity.
1514.2 - 1515 Dolerite: lt gry, f - med gr, qtz rich, altered, generally soft, very pr - nil porosity.
1515 - 1526.5 Dolerite: med gry, f.g., xtine, pyroxene 25%, qtz 25 %, f/spar 10 %, v.hd, nil porosity.
1526.5 - 1531.5 Dolerite: med gry, f - med g, sft - md hrd, altered minerals, sft - med hrd f/spar altered to clay, vert. frac. with wht. qtz. infill, trace porosity.

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1531.5 - 1567.95 Dolerite: Med gry, f - med g, crystalline matrix, 35 - 40 % qtz, 25 - 30 % pyroxene, 15 - 20 % feldspar, v. hrd, calcite veins at ~ 30 deg to perp, no porosity.
1567.95 - 1568.3 Meta-tillite: lt gry/gm, contact met., clasts and - pbl, qtzite, metamorphics, lmst, unknowns, in a fg sts mtx, sbang - md, pr srtd, reaction halos around many clasts.
1568.3 - 1570.4 Phyllite: Med gry/gm, f.g., strongly foliated, med. hrd, fractured below fault.
1568.3 - 1581.3 Phyllite: a/a, soapy sheen, some softer zones.
1581.3 - 1582.3 Phyllite: gen a/a, strongly foliated, small kink bands visible throughout, pervasive dark yellow mineral throughout, some pyrite spotting visible in fractures.
1582.3 - 1588.4 Phyllite: lt gry - bm, f.g., well laminated, but not as foliated a/a. Yellow spotting in sections.
1588.4 - 1590.4 sim a/a, but lt gy/crm coloured zones.
1590.4 - 1594.25 Phyllite: sim a/a, med. gry.
1594.25 - 1595.1 Phyllite: drk gry/red, strongly foliated, rock fracturing along foliations ~ 45 deg.
1595.1 - 1609.5 Phyllite: Med. gry, f.g., strongly foliated, small kink bands, reddish tinge when wet, soapy sheen, mod hrd.
1609.5 - 1609.7 Marble: wht - off wht/gm, xtline texture, foliated, calc mtx, hrd, no vis porosity.
1609.7 - 1635 Phyllite: Drk gry, f.g., strongly foliated, sections strongly cleaved, some fracturing filled with qtz, calcite and disseminated pyrite.
1635 - 1659.6 Phyllite: a/a, drk gry, soapy texture, f.g, sft - mod hd, foliated, pyrite, qtz and minor calcite in veins.



1659.6 - 1683.7 Slate: lt - med gry, f.g., strongly foliated (~45 deg), lt gy - med gy laminations, strongly fissile to not fissile sections, occ. thin qtz and calc. veins xcutting, dissem. pyrite along fractures (minor), mod. hrd - sft.

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Appendix 2

Catalog #	Field #	Rock name	Rock description	AMG grid	Depth (m)	Group	Formation	Preps
134282	1	limestone	f.g., lt gry., xtline, no. foss.	EN338159*	1055.7	Parmeener	Truro	R,TS
134283	2	limestone	f.g., lt gry., xtline, no. foss.	EN338159*	1055.6	Parmeener	Truro	R,TS
134284	3	shale	dk. gy, f.g., fiss.	EN338159*	1022.6	Parmeener	Truro	R,TS
134285	4	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1073.8	Parmeener	Truro	R,TS
134286	5	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1073.6	Parmeener	Truro	R,TS
134287	6	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1110.9	Parmeener	Truro	R,TS
134288	7	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1092.45	Parmeener	Truro	R,TS
134289	8	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1106.2	Parmeener	Truro	R,TS
134290	9	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1130.4	Parmeener	Truro	R,TS
134291	10	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1140	Parmeener	Truro	R,TS
134292	11	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1061.6	Parmeener	Truro	R,TS
134293	12	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1080.4	Parmeener	Truro	R,TS
134294	13	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1120.1	Parmeener	Truro	R,TS
134295	14	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1100.4	Parmeener	Truro	R,TS
134296	15	tillite	f.g., gy mtx, clasts snd - cbl, sbang - rnd.	EN338159*	1130.1	Parmeener	Truro	R,TS
134297	23	conglomera	mtx. sprtd, snd - cbl, sbrnd-rnd, mxd comp	EN338159*	1212.1	Parmeener	Truro	R,TS
134298	24	tillite	desc. as for tillite above, w. reworked foss	EN338159*	1216.1	Parmeener	Truro	R,TS
134299	35	phyllite	gy, low grd, clvg hi angle to bed.	EN338159*	1569.65			R,TS
134300	39	phyllite	gy, low grd, clvg hi angle to bed.	EN338159*	1589.65			R,TS
134301	40	phyllite/marb	a/a and wht, xtn, c.g., high sil.	EN338159*	1609.5			TS
134302	41	marble	why, xtn, c.g., hi sil.	EN338159*	1609.6			R,TS
134303	42	phyllite	dk gy, strng clvg, bed not vis.	EN338159*	1634.8			R,TS
134304	45	phyllite	dk gy, strng clvg, bed not vis.	EN338159*	1671			R,TS

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Catalog#	Field #	Fossil name	Status	AMG grid	DDH, Locality	Depth-m	Formation	Stage	Preps
126855	119	Granulatisporites trisinus***	Zone species	550174 5375100*	Bonney's Plain	444.5	Castle Ck	Substage 3b	R,PP,KS
126856	120	Granulatisporites trisinus***	Zone species	550174 5375100*	Bonney's Plain	478.43	Upper marine unit?	Substage 3b	R,PP,KS
126857	106	Granulatisporites trisinus***	Zone species	550174 5375100*	Bonney's Plain	516.8	Aberfoyle	Substage 3b	R,PP
126858	104	Pseudoreticulatispora pseudoreticula	Zone species	550174 5375100*	Bonney's Plain	537.2	Strickland Gorge	Substage 3a	R,PP
126859	121	Strew slide	unidentified	550174 5375100*	Bonney's Plain	656	Strickland Gorge	Substage 3a	R,PP,KS
126860	107	Pseudoreticulatispora pseudoreticula	Zone species	550174 5375100*	Bonney's Plain	689	Strickland Gorge	Substage 3a	R,PP
126861	124	Pseudoreticulatispora pseudoreticula	Zone species	493160 5370959 *	Poatina	53.3	Poatina	Substage 3a	R,PP,KS
126862	125	Pseudoreticulatispora pseudoreticula	Zone species	493160 5370959 *	Poatina	93.6	Liffey	Substage 3a	R,PP,KS
126863	120	Pseudoreticulatispora pseudoreticula	Zone species	493160 5370959 *	Poatina	145.1	Quamby	Substage 3a	R,PP,KS
126864	119	Strew slide	unidentified	493160 5370959 *	Poatina	153	Quamby	Substage 3a	R,PP,KS
126865	126	Granulatisporites trisinus***	Zone species	536282 5347165*	Ross 1	173.9	Liffey	Substage 3b	R,PP,KS
126866	116	Pseudoreticulatispora pseudoreticula	Zone species	536282 5347165*	Ross 1	187.4	Golden Valley	Substage 3a	R,PP,KS
126867	127	Pseudoreticulatispora pseudoreticula	Zone species	536282 5347165*	Ross 1	253.8	Golden Valley	Substage 3a	R,PP,KS
126868	117	Strew slide	unidentified	536282 5347165*	Ross 1	398.1	Quamby	Substage 3a	R,PP,KS
126869	118	Strew slide	unidentified	536282 5347165*	Ross 1	424.1	Stockers Tillite	Substage 3a	R,PP,KS
126870	108	Pseudoreticulatispora pseudoreticula	Zone species	524510 5334870*	Tunbridge Tier	350.9	Liffey	Substage 3a	R,PP
126871	109	Strew slide	unidentified	524510 5334870*	Tunbridge Tier	401.78	Golden Valley		R,PP
126872	110	Strew slide	unidentified	524510 5334870*	Tunbridge Tier	451.7	Golden Valley		R,PP
126873	111	Strew slide	unidentified	524510 5334870*	Tunbridge Tier	500.02	Quamby		R,PP
126874	103	Strew slide	unidentified	524510 5334870*	Tunbridge Tier	553.6	Quamby		R,PP
126875	112	Strew slide	unidentified	524510 5334870*	Tunbridge Tier	601.2	Quamby		R,PP
126876	113	Strew slide	unidentified	524510 5334870*	Tunbridge Tier	705.3	Stockers Tillite		R,PP
126877	114	Strew slide	unidentified	524510 5334870*	Tunbridge Tier	842.5	Stockers Tillite		R,PP
126878	115	Strew slide	unidentified	524510 5334870*	Tunbridge Tier	902.25	Stockers Tillite		R,PP
126879	100	Strew slide	unidentified	554738 5331162*	Quoin	73.34	Quamby		R,PP
126880	SH1027	Strew slide	unidentified	EN338159*	Shittim 1	1027	Truro Tillite		R,PP
126881	122	Strew slide and kerogen slide	unidentified	EN760382*	Eagle Hawk Neck	335.6	Woody Island		R,PP,KS
126882	102	Strew slide	unidentified	EN760382*	Eagle Hawk Neck	355.2	Woody Island		R,PP
126883	123	Strew slide and kerogen slide	unidentified	EN760382*	Eagle Hawk Neck	380.6	Woody Island		R,PP,KS
	(1) Grid co-ordinates given for microscope located in Dr. Andrew McMinn's office, IASOS, University of Tasmania								
	(2) Grid co-ordinates given for microscope located in 3rd year Botany Lab, university of Tasmania, distinguishing features a printed "Z" and the letters								

** zones as used by Cooper 1991: Geol. Soc. India Mem. 20:109-129

*** co-ordinates of specimen on slide

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Catalog#	Comments
126855	* snow hill map sheet, *** NS 5/ EW 94, slide 2(1)
126856	* snow hill map sheet, ***NS 9/ EW 114.9, slide 3 (1)
126857	* snow hill map sheet, *** NS 88.4/ EW 60.1, slide A, (2)
126858	* snow hill map sheet, *** NS 91.5/ EW 60.1, slide B, (2)
126859	* snow hill map sheet
126860	* snow hill map sheet, *** NS 91.5/ EW 60.1, slide B, (2)
126861	*HEC grid co-ords map 82142, *** NS 12/ EW 94.1, slide 2 (1)
126862	*HEC grid co-ords map 82143, *** NS 1.5/ EW 101.9, slide 2 (1)
126863	*HEC grid co-ords map 82144, *** NS 96.2/ EW 66.1, slide 2 (1)
126864	*HEC grid co-ords map 82145
126865	*Co-ords from Interlaken Explanatory Report, 1989, *** NS 5.1/ EW 98.2, slide 2 (1)
126866	*Co-ords from Interlaken Explanatory Report, 1990, *** NS 94.8/EW 48.8, slide 2, (1)
126867	*Co-ords from Interlaken Explanatory Report, 1991, *** NS 8.6/ EW 102.2, slide 2, (1)
126868	*Co-ords from Interlaken Explanatory Report, 1992
126869	*Co-ords from Interlaken Explanatory Report, 1993
126870	*Co-ords from Interlaken Explanatory Report, 1994, *** NS 12/ EW 109.8, slide B, (1)
126871	*Co-ords from Interlaken Explanatory Report, 1995
126872	*Co-ords from Interlaken Explanatory Report, 1996
126873	*Co-ords from Interlaken Explanatory Report, 1997
126874	*Co-ords from Interlaken Explanatory Report, 1998
126875	*Co-ords from Interlaken Explanatory Report, 1999
126876	*Co-ords from Interlaken Explanatory Report, 2000
126877	*Co-ords from Interlaken Explanatory Report, 2001
126878	*Co-ords from Interlaken Explanatory Report, 2002
126879	*Mines dep Report no. UPR 1983/18
126880	*Co-ords quoted from Tas. Geo. Survey Record 1995/08
126881	*Co-ords quoted from Mines Dept report no. 1984/76
126882	*Co-ords quoted from Mines Dept report no. 1984/77
126883	*Co-ords quoted from Mines Dept report no. 1984/78
"momma" on microscope stand.	

** zones as used by Cooper 1991: Geol. Soc. India Mem. 20:109-129

*** co-ordinates of specimen on slide

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