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ALLIANCE OIL DEVELOPMENT AUSTRALIA N. L.

WELL COMPLETION REPORT ALLIANCE TARVIN MEADOWS NO. 1.

P.E.P.53. VICTORIA

BY: A. C. M. LAING

ALLIANCE TARWIN MEADOWS NO, 1 WELL

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I, SUMMARY

The Tarwin Meadows No. 1 Well was drilled to a total depth of 3,948 feet in the Tarwin Embayment of the Gippsland Basin. Drilling commenced on 7 June and terminated on 26 July, 1965. The site was near the coast of Bass Strait, 14 mile from the township of Lower Tarwin. Lower Tarwin is in Gippsland about 130 miles southeast of Melbourne. The well was drilled for Alliance Oil Development Australia N.L., Alliance Petroleum Australia N.L. and Westralian Oil Limited by W.L. Sides & Son. using a Failing 2500 rig. The well was susmended on 26 July, 1965, pump capacity having been reached.

The well passed through Quaternary sands with marine shell horizons to 140 feet and then continued in sediments of the Strzelecki Group of Mesozoic age to total depth. The thickness of Strzelecki Group is much greater than expected considering that Ordovician basement outcrops only 42 miles from the wellsite.

Ninor gas shows were obtained from cores at 1,600 and 2,580 feet. A stronger gas show causing gas cutting of the mud was noted at 3,100. However, electric logs and the one successful formation test conducted indicates that the Strzelecki Group contains no effective porosity in the section penetrated.

II. INTRODUCTION

The main objective of the Tarwin Meadows No. I Well, which was drilled at a location on the coast of Bass Strait and within P.E.P.53, Victoria, was to try to prove the presence of porosity in the Strzelecki Group of Hesozoic age. It was hoped that the arkosic sandstones of the Strzelecki Group would become porous and permeable close to their inferred source area, the Wilsons Promontory and Cape Woolamai Granites. For this reason the well was located close to the coast of Bass Strait and in the Tarwin Embayment. It was also hoped that in an off-structure position a porous sandstone, similar to the Pretty Hill Sandstone in the Otway Basin to the west, might be developed at the base of the Strzelecki Group even though it is not present at outcrop in the surrounding area.

It was also considered that a well located close to the coast near Tarwin would assist in evaluating the Alliance Group's offshore Permit, P.E.P.36. Unfortunately, the section was considerably thicker than expected and the well was suspended at rig capacity at a depth of 3,948 feet without reaching basement and it, therefore, failed to achieve all its objectives.

The Wellsite Geologist from surface to 3,710 feet was Mr. G.C. Campe of Cundill, Meyers & Associates and from 3,710 to total depth, Mr. J.R. Cundill of the same firm.

III. WELL HISTORY

1. GENERAL DATA:

Well Name and Number: Alliance Tarvin Meadows No. 1.

Location: The well was located beside the road from Lover Tarwin to Tarvin Mondows Homestead, about 1½ miles from Lover Tarvin village.

The wellsite is on Block 70A, Parish of Tarvin, owned by Mr. J.G.M. Black of Tarvin Park. The co-ordinates of the vellsite are:-

Latitude 38° 43' 26.5" South Longitude 145° 51' 36" East

Name and Address of Tonement Helder:

Alliance Oil Development Australia N.L. 100 Collins Street, MELBOURNE ... C.1, VICTORIA.

Details of Petroloum Tenement: P.D.P.53, which covers an area of 637 square miles was formed by smalgameting P.E.P.28, P.P.L. 199 and P.P.L. 210. The companies holding an interest in the tenement are:

Company Ainterest Alliance Oil Development Australia N.L. Alliance Petroleum Australia N.L. 2156 Westralian Oil Limited 1226

District: The area where the well is leacted is in Vest Gippeland mear the ecat at Venus Bay. The lecation is within the Ventbaggi i mile Army sheet area. Geologically, it is part of the Toroin Echapsent of the Gippeland Basim.

Rotal Benth: 3.948 feet (Schlumberger). 3.945 feet (Driller).

Date Drilling Commenced: 7 June, 1965.

Date Drilling Complered: 26 July, 1965.

Date Well Abandoned: 27 July, 1965.

Date Ric Released: 28 July, 1965.

Drilling time in days to total douth: 50.

<u>Dievations:</u> Ground lovel: - 25 feet
Rotary Table: - 36 feet (Datum
used for all depths given in this report.

Status: The well was filled with viscous mud and plugs were set at surface and at the casing thee; therefore, the well has been supported only and may be despend to besoment using a larger drilling rig, enould this be desirable at a later date.

2. DRILLING DATA:

Name and Address of Drilling Contractor:

W.L. Sides & Son Pty. Ltd.. Gay Street, MORWELL ... GIPPSLAND.

Drilling Plant:

Make:

Failing 2500

Rated Capacity:

5,000 feet with 2% inch

drillpipe

Motor:

One GM 471 diesel, 110 H.P.

Mast:

Make:

Failing Tubular

Rated Capacity: 60,000 lbs.

Pumos:

Make:

One Gardner Denver FXO

One Wheatley 5x10

Blowout Preventer:

Baash Ross, Autolock, 6 inch werking pressure 1,000 psi.

Hole sime and depois:

- (i) 75 inch to 225 feet.
- (ii) 55 inch to total depth.

Casing details:

- (i) Conductor Pipe size 95 inch set at 14 feet.
- (ii) Surface casing size $6\frac{3}{5}$ inch OD set at 223 feet.

Casing Cement Details:

- (i) Conductor Pipe.
- (ii) Surface casing used 30 bags cement.

Drilling Fluids: The mud programme was designed for the contractors by Numro Hud Sales Pty. Ltd. A bentemitic fresh water mud was used from below the surface casing to total depth.

Some caving problems were encountered at 974 feet causing the pipe to become stuck in the bole for about 10 hours.

At 2,940 the driller reported mud was being lost at about 75 gallons per hour. This loss was remedied by increasing the viscosity of the mud by the addition of bentonite.

At 3,113 feet the driller reported gas cut mud. Barytes was added while conditioning mud to increase the weight.

The following figures give the average properties of the mud throughout the drilling of the well:-

Veek Ending	Theoretical	Mud veight ib/ US gal.	Vis- cosity sec/qt.	Vator loss cc/30 min	12	Filter oake thick- moss (inches)	Sand J
13 Jui	610	9.1	d no entre a resistant resista transitation de successivo	7.00	8	1/32	¥
20 Ju	e 1607	9.7	54	6.3	8	1/32	0.75
27 Ju	e 2305	10.7	53		9	1/32	1.0
i Jei	y 2560	lo.2	2.7	5.6	9	1/32	1.5
u il Jul	y 3145	10.5	52	5.0	9	1/32	* **
le Jul	x 3523	10,4	<u> 49</u>	5.4	9	1/32	1
25 Jul	y 3945	10,6	50	5.4	9	1/32	L
in the second contraction of the second		ed account to 15 million to age at tasks with millions	Control carries secretary reportions respect	Busin mangaphananan menangan dan mangapa m	E D D D D D D D D D D D D D D D D D D D		principle and resident series their resident parties and spiritual

The well was making a certain amount of mudduring drilling and the additives used were for the treatment of this natural mud.

The total quantities of mud materials used during the drilling of the well are listed below :-

Bentomite	(Supercol (Gel		sacks
Unical		58	sacks
Milcon		371	ezose
Myrtan		2	sacks
Caustic Sc	ಾರ್ಡೆ.	435	lbs.
Banyties		83	ez io .ee

Water Sumply: The well was situated beside a water hele excavated by the property cumer, Mr. Black. This waterhole gave a plentiful supply of fresh water.

Plugging back and abandomment: As the well was only suspended at total depth the bottom part of the hole was filled with a thick viscous mud before running cement plugs at the casing shoe and at surface. Details of these plugs are as follows:-

Cenent Plug No. 1

Date 27 July, 1965

Depth 175 to 275 feet

Hole sine 64 inch Cement 18 sacks

Coment Plug No. 2

Date 27 July, 1965

Depth 0 to 50 feet

Hele size 6\frac{2}{3} inch Cement 8 sacks

Pishing Operations: No fishing operations were needed. The drill pipe was stuck at 97% feet while running in to core at 1,145 on 16 June. No retation or circulation could be obtained for 10 hours. However, the pipe was finally worked free after 10 hours and the core barrel was found to be plugged with cavings.

The drill pipe also became named at 3,945 for \$ hour on 25 July. On fracing the pipe the well was stopped as it was considered that the annular velocity had dropped too let to ocutions drilling with safety.

3. LOGGING AND TESTING:

Cuttings: Samples representative of sach 10 feet interval were collected, examined and described under the binecular viero-scope. Samples were also examined under ultraviolet light for the presence of traces of cil.

Cores: Cores were out in the following intervals :-

Core No.	Entorval	VII O CO C
Core I	304 - 314 feet	6 feet
Core Z	600 - 610 feet	4½ inches
Core 3	610 - 620 feet	10 feet
Core 4	1597 - 1607 feet	9 inches
Core 5	1607 - 1610 feet	1 foot 6 inches
Core 6	2565 - 2574 feet	7 feet 8 inches
Core 7	3113 - 3123 feet	10 feet
Core 8	3123 - 3128 feet	2 feet 6 inches

Logs: The following logs were run in the hole at total depth by Schlumberger Scace;-

Electric log (SP, 16 inch and 64 inch normal 18 feet 8 inch lateral)

223 - 3948 feet

Microlog Caliper

223 - 3948 feet

Pormation Testing: Two fermation tests were conducted in open hole during the drilling of the well. These tests were conducted over a zone from which gas had been observed when it was penetrated by the drill. The second test was partly successful and seemed to indicate the zone was tight as only 200 feet of mud was recovered in the pipe. This is confirmed by the electric logs which show no peresity ever this interval.

Details of the tests are given below. No pressure recorders were available so there are no down hole pressure records.

S. COLOR POR SERVICE S	Interval	Time Open	Recovery	Remarks
Services to the second section of the second section of the second section of the second section of the second	D.S.T. 1 3101 - 3128,	Unable to cpen tool	430 feet of drill- ing mud	Test unsuccessful. Leak in drill pipe. Me prevented go-dovil breaking disc valve and opening tool.

	ন্ত্ৰালে কৰে। স্বাহাৰ প্ৰস্তাহাৰ মাধ্যৰ পৰা কালোৱাৰ কৰে। কৈলোক কৰি সাহত কৰি সামৰ কৰি শীলা সাহিত্যক কৰি । সাহ ক সংগ্ৰহ	ranneliste v länn om uttaken men vid kontränn sånde vid konträn sääres.	naces decemberations is an order of a superior of terms of the contract of the	and the state of t
the control of the co	Interval	Time Cpen	TO A CO CONTY	ROIDE XIE S
والمراجعة والمرا	D.S.T. 2 3093 ~ 3160,	30 mins.	200 foet drilling mud.	Weak puff for 15 minutes on opening disc valve. Annulu dropped 4 feet and remained ateady throughout test.

Deviation Surveys:

Depth	<u>Deviation</u> (degrees)
4 3 0:	3. O
9401	I o
1250,	1 0
1680'	Ŧ o
1775	<u>1</u> 0
21551	230
23001	1 O
27351	20
32007	7. C
36501	<u>8</u> 0

IV. GEOLOGY

1. REGIONAL GEOLOGY:

Previous Work in P.E.P.53:

(i) Geological: Ferguson (1906, 1909, 1902—1927) geologically mapped an area including the whole of P.E.P.53. The results of his work are published on coloured geological parish plans and quarter sheets and even today represent the best geological maps available of the area, although his topographic base maps (parish plans on which the work is plotted), are distorted and cannot be fitted together.

Edwards and Baker (1943) petrologically examined and described the sandstone in the Strzelecki Group in Gippsland.

Edwards, Baker and Knight (1944) described the geology of the Wonthaggi Coalfield, 25 miles west of the Tarwin Meadows No. 1 Well.

Boutakoff (1956) discussed the petroloum possibilities of Gippsland, dealing particularly with the Tertiary of Eastern Gippsland.

Rade (1956) described the geology of the eastern part of P.E.P.53 (old P.P.Ls 199 and 210).

Cundill and Meyers (1963) drew a regional cross-section from Lakes Entrance to Mornington Peninsula crossing the Tarwin Embayment. This cross-section admirably illustrates the subsurface goology.

Ceophoto Resources Consultants Inc. (Brundall 1964) made a photogeological study of the area now covered by P.E.P.53 producing a map and a memorandum report following a field check.

Stephens (1964) summarised the work done on P.P.L.s 199 and 210 and P.E.P.s 28 and 36 in his evaluation report on the areas held by the Alliance Group in Gippsland.

(ii) Geophysical: Only aeromagnetic and gravity work have been carried out over P.E.P.53.

Aeroservice (Bahamas) Ltd. (Reford 1962, Stach 1962) flew the Andersons Inlet aeromagnetic survey over the adjoining offshore area (P.E.P.36), also held by Alliance Oil Development Australia N.L. This survey, which was conducted in conjunction with one flown for Hematite Exploration Pty. Ltd. over Bass Strait (Bass Strait Aeromagnetic Survey (see Hopkins 1965)), extended over part of P.E.P.53 including the Tarwin Meadows No. 1 wellsite.

The Gippsland Basin aeromagnetic survey was flown over Bastern Gippsland (Quilty 1962) including a part of P.E.P.53.

The Gormandale Gravity Survey covers P.E.P.53. although it is over the Tarwin Embayment only on a broad regional scale. (Dooley & Mulder 19:

(iii) <u>Drillings</u> Four shallow wells to about 900 feet have been drilled for coal in the Tarwin Embayment by the Victorian Mines Department. Details are listed below :-

Well Mane	Year Drilled	Total Depth	Formation Tops
Tarvin No. I	1913	8781	Recept & Tertiary O' Streelecki 70'
Tarvin No. 2	1913	942 (Recent & Tertiary 0° Strzelecki 76°
Tarvin South No. 2	L914	9021	Recent & Tertiary O' Streelecki 124°
Drundle- bara No. I	1913	CO	Rocent & Tertiary O' Strzelecki 45°

2, REGIONAL GEOLOGICAL STRUCTURE:

The Tarvin Meaders No. 1 Well is located within the Tarvin Embayment near the junction of the Gippsland and Bass Bosins (see Ficte 1).

The Tervin Embayment is an area of outeropping Recent marine sands, alluvial sands and sand dunes forming an alluvial plain at the mouth of the Tervin River. The Tervin Embayment is bounded to the southeast by the Varatah Foster basement high, to the northwest by the Wonthaggi Korrumburra High, a ridge of Mesozoic rocks along which there are some basement inliers outcropping and to the north by an extension of the Beech Hill High. The Beech Hill High is a structurally and topographically high area where the Strzelecki Group outcrops.

The following is an outline of the stratigraphy of the Gippsland Basin :-

m II w

TABLE I.

AGE	PORMATION MARK	LETTOLOGY	THICKNESS (fost)
QUATERNARY Recent & Pleistocene	Tarrin Beds	Possiliforous, calcareous querts, sandy minor coal beds	. 130
TERTIARY Plioceme	Nusiny Park Neds	Clayey, silty and sands with carbonaceous material	125- 770°
and the control of th	Jennys Foint Formation	Shelly sands, gravels, maris with Slaucomite	25 190°
	Tambe River Farmation	Mainly groy Limostono	80- 130'
And the state of t	Gippsland Limestone	Dryozen, Limestene, sandy Line- stome, cal- careous sand	250-
Oligopone	lekes Natrance Fermation	Foreminiferal morle and glomeoutice sondy manle	3254 510°
E000320	Upper Latrobe Valley Coal Measures	Coals and sonds	405
Palescens	Lower Latrobe Valley Coal Measures	Basalt and minor sediments	450
MESOZOTO	- Regional Un Streetecki Group	Arkosic sand- stone, shale, minor ccal	10,000
PALECZOIC	Regional Un Basement	oonformity	The spine this total scale scale

BASEMENT: Cambrian volcanics are exposed on the coast of Waratah Peninsula.

Ordovician and Silurian beds outcrop around the southern edge of a Lower Cretaceous basin to the east of the Tarwin Embayment near Foster and in an inlier at Turtone Creek. They consist predominantly of phyllite.

The Devonian section includes the fossiliferous limestones and dolomites of Waratah Bay. These beds appear to be partly recrystallised at outcrop and so could probably be included as part of basement for petroleum search purposes. The Devonian section also includes highly contorted, indurated sandstone and mudstone of the Liptrap Formation which is exposed at Cape Liptrap and can also be regarded as basement. The Wilson's Promontory Granite was probably intruded into these beds in late Devonian time.

Definite Permian beds were penetrated in Duck Bay No. 1 well in the eastern part of the Gippsland Basin. These beds consist of interbedded siltstones and lava flows, and are effective basement.

Beds of Permian age may occur elsewhere; however, the Chitt Creek Conglomerate, poorly exposed at the base of the Strzelecki Group, a few miles east of Foster, is regarded as being Mesozoic in age despite reports of striated boulders being collected in the neighbourhood.

STRZELECKI GROUP: The Strzelecki Group is well exposed, dipping 20-40 degrees in the hilly country north of Fish Creek, Foster, Toora and Welshpool, on the flanks of the Balook and Kays Hill Anticline, Fish Crook Dome and other minor structures. At Foster, Fish Creek and around the edge of the Turtons Greak Inlier, the base of the Strzelecki Group is exposed. The beds are similar to those in the upper part of the section consisting of tight, arkosic sandstones and green shales with plant fragments. However, there appears to be a slight increase in the quartz percentage in the basal sandstones. There is a general increase in the percentage of sandstone eastward in the Strzelecki Group as a whole,

The base of the Strzelecki Group is not exposed east of Chitts Creek, a few miles east of Foster. Part of the unexposed lower section of the Strzelecki Group was penetrated in Woodside Hedley No. 1, which was located 18 miles east of Foster and which penetrated nearly 4,000 feet of tight, arkosic sandstones and shales below a thin Tertiary section.

The base of the Strzelecki Group is also exposed in a structural high at Wonthaggi on the western side of the Tarwin Embayment. Wells drilled in the coal mine area at Wonthaggi have penetrated basement about 1,000 feet below the top coal seam, Edwards, Baker and Knight (1944) considered that the svidence them available indicated that the Strzelecki Group had transgreesed onto a preexisting basement high and that, therefore, there would be basal beds of the Straelecki Group developed off the Wonthaggi High that were not exposed at outcrop. The results of the Tarwin Meadows No, 1 Well have confirmed this supposition. There is more than 2,300 feet of Strzelecki Group below the top coal seam which was penetrated in the well at 1,460 feet, that is 1,300 feet below the basal section exposed at Wonthaggi.

Since the well was located only 14 miles west of the nearest basement outcrop and the sediments of the Strzelecki Group penetrated in the well are flatlying, it follows that the eastern boundary of the Tarwin Embayment must either be a fault against, or an onlap onto the Waratah Basement High.

TERTIARY: The complete Tertiary sequence as outlined in Table I is present only in Eastern Gippsland to the east of P.E.P.53.

In the eastern part of P.E.P.53, in wells around Yarram and Alberton, the Jemmy's Point Formation rests directly on the Lower Latrobe Valley Coal Measures and the intervening prospective part of the Tertiary section is absent.

Similarly, offshore seismic work carried out for Hematite Exploration Pty, Ltd. (Hopkins personm) indicates that the Tertiary section is thinning into the Tarwin Embayment. In fact, the Tertiary has now been proved by the Tarwin Meadows No. 1 Well to be entirely absent from this side of P.E.P.53.

QUATERNARY: There are extensive sand dumes developed along the coast of Venus Bay and the Tarwin Meadows No. 1 Well was located on the edge of these sand dumes.

3. DETAILED STRATIGRAPHY OF TARVIN MEADOWS NO. 1 VELL:

The well stratigraphy is summarised below in Table II:-

TABLE II.

	white the street section and the street secti		Character of the state of the s	Secretarion and an accompanies
Ago	Name	Lithology	Fmt.Top (feet from R.T.)	Thick- ness (feet)
RECENT	Unnamed	Quartz sand, slightly cal- careous at base	ey t	150
F PLEIST- F OCENE	Tarwin Beds	Calcareous quartz sand with fossils and minor coal	20 t	120 %
MES OZ OIC	Stree- lecki Group	Green, grey, arkosic sand- stone, green grey shale and minor coal from 1610-1895 feet	140°	3805*+

A detailed description of the well cuttings is given in Appendix 1 and of the cores in Appendix 3. A generalised description of the beds penetrated is given below :-

RECENT:

UNNAMED UNIT: 5 (ground level) - 20 feet.
This unit consists of quartz sand, dark grey to black, very fine to coarse grained, with rounded to angular quartz grains and abundant humic material. The unit is slightly calcareous towards the base, with some fessil fragments of lamellibranche (including Cardium) and gastropods.

The lower part of these beds were probably deposited in an estuarine or shallow water marine environment, but the upper part was deposited in a terrestrial environment, probably similar to the sand dune peat swamp environment existing in the area today.

PLEISTOCENE TO RECENT:

TARWIN BEDS: 20 - 140 feet.

This is a new name used informally for a section of sands with marine fessile penetrated from 20 - 140 feet in the Tarwin Meadows No. 1 Vell.

One sample from 30 feet was examined for foraminifera by Taylor (Appendix 3) and has been shown to contain similar fauna to those now existing offshore. The percentage of planktonic forms present was 5%; high enough to indicate a direct

connection to the open sea. The Tarwin Beds are considered on the above evidence to be Pleistocene to Recent in age. They fall maturally into several lithologic units as described below:

UNIT 1: 20 - 40 feet - Quartz sand, dark greenish-grey to black, fine grained with rounded to sub-rounded quartz grains, well sorted, with calcareous cement. The Unit includes abundant shell and fossil fragments up to 1 cm in size of lamelli-branchs and gastropods, including Bulla?

Turritella? Comus? Chione? Cucullaea Cardium.

A few bands of plastic black clay are interbedded with the sands.

UNIT 2: 40 - 138 feet - Quartu sund, gray, some parts slightly graenish, very fine to very coalles grained, mainly poorly sorted, but in part well sorted with calcareous cement. There is some black to dark brown, fibrous coal, soft when wet. Dark green (glauconite?) grains are common in the basal 28 feet. Unit contains fossil fragments, lamellibranchs, gastropods, bryezeas.

UNIT 3: 138 - 140 feet - Quartz conglomerate, gray, with granules and pebbles of quartz in a calcareous sandstone matrix.

MESOZOIC:

STRZELECKI GROUP: 140 - 3945 feet.
This group consists of tight green-grey, arkosic sandstone and green-grey siltstone and shale.
There are minor pebbles and granules of quartz.

The group has been subdivided in the well into five informal units. The units have been differentiated on the basis of electric logs, for instance, an E log change at 675 and 3.095 feet and on the basis of lithology, for instance the presence of coal nears between 1,460 and 2.000 feet.

UNIT 1: 140 - 675 feet - Arkosic sandstone and siltstone with minor shale interbedded. The unit consists predominantly of sandstone. The base of the unit is placed at an E log break co-inciding with a lithological change to a shale unit.

UNIT 2: 675 - 1460 feet - Intorbedded shale, siltstone and arkould sandstone. The unit consists predominantly of shale. The base of the unit is placed at the top of the first coal seam.

UNIT 3: 1460 - 2000 feet - Interbedded shale, arkosic sandstone, siltstone and coal. This unit is differentiated by the presence of coal and may be equivalent to the upper part of the Wonthaggi Coal Measures.

UNIT 4: 2000 - 3095 feet - Shale, with interbedded arkosic sandstone and siltstone. This unit consists predominantly of shale. The base of this unit is an E log change corresponding to a lithological change to a unit consisting mainly of sandstone.

UNIT 5: 3095 - 3945 feet - Arkosic sandstone, siltstone and shale interbedded.

The lowest sample so far examined for spores (see Dettmann - Appendix 5 of this report) is from Core No. 6 (2606 feet). This sample yielded a lower <u>speciosus</u> assemblage indicating it is slightly younger than the basal coal seam of the Kirrak Coal Basin which contains spores of the <u>Stylosus</u> assemblage (see Dettmann 1963)

Samples from earlier cores also contain the speciosus assemblage.

4, STRUCTURE:

Tarwin Meadows No. 1 was drilled as a stratigraphic test and there is little geological or geophysical evidence on which to infer geological structure around the well. However, it is possible that the well was located on the southeast flank of a north-northeast trending anticline, the presence of which is inferred from aeromagnetic and geological evidence (see Plate 1).

5. RELEVANCE OF OCCURRENCE OF PETROLEUM;

The sediments of Econe to Miccone age, from which the flows of gas have been obtained to the east in the Gippsland Shelf Nos. 1 and 2 Wells, are not present in the Tarwin Meadows No. 1 and are likely to be absent from the whole Tarwin Embayment.

Minor gas shows were obtained from Coros at 1,600 and 2,580 feet in the Mesoscie Strzelecki Group. A slightly stronger gas show, which caused gas cutting of the mud was noted at 3,100 feet, but mud only was obtained when the zone was drill stem tested in open hole.

Although a thicker section of Mesozoic sediments than anticipated has been encountered, this has not revealed any porous potential reservoir beds and to this extent the section so far penetrated has poor petroleum prospects.

6. POROSITY AND PERHEABILITY OF SEDIMENTS PENETRATED:

The Quaternary sediments are perous and permeable and contain freshwater. The Mesoscie sediments are uniformly tight; except possibly the intervals from 472 to 478 feet, 577 to 550 feet and from 1696 to 1718 feet, all of which show positive separation of the microlog. The two higher intervals were regarded as too thin to be worth testing, while the microlog separation in the interval 1696 to 1718 was considered spurious as no perosity was evident in the cuttings.

7. CONTRIBUTION TO GEOLOGICAL CONCEPTS RESULTING FROM DELLLING:

Tertiary sediments are absent from the Tarwin Embayment, but more than 3,800 feat of Nesscie sediments has been found to be present. As the results of the Andersons Inlet Asromagnetic Survey suggested, there were less than 500 feat of sediments present in the Tarwin Needows area, the results of the asromagnetic surveys in Bass Strait cannot be relied upon entirely. In particular the Bass Strait and Gippoland Basins are now thought to be connected through the Tarwin Broagnest and the Structacki Group is thought to exhaut under Fass Strait to Tasmania.

Unfortunately, the Tarvin Meadows No. I Well was unable to penetrate deep enough to establish or disprove the presence of a porous sandstone at the base of the Straelecki Group in this area. The well did, however, establish that the unperpart of the Straelecki Group has as cleavers in the Gippsland Basin, no effective peresity or permeability.

The presence of gas shows in the Streelecki Group, however, suggests that either they are potential source rocks or there are potential source rocks deeper in the basin.

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APPENDIX NO. 1.

ALLIANCE TARWIN MEADOWS NO. 1. WELL LITHOLOGICAL DESCRIPTION

0° - 10°	100%	QUARTZ GRAINS, fine grained, white and clear, some light brown, sub-rounded to angular, non-calcareous. Common trace HUMUS.
10° - 20°	5%	QUARTZ GRAINS, fine to very coarse grained, mainly fine, white, clear, some light brown, rounded to sub-angular. Yellow CLAY, and red-brown, ferruginous material. CALCAREOUS GRAINS, rare trace black CLAY; a lamellibranch valve (Cardium?), fragments of gastroped and lamellibranch.
201 - 301	50% 5%	QUARTZ GRAINS, fine grained, white and clear, common light to dark brown, rounded to sub- rounded. Fine grained CALCAREOUS FRAGMENTS. Black CLAY, trace yellow CLAY and trace ferruginous red material. Large shell fragments of lamelli- branches, gastropods and echinoids, including whole specimens of e.g. common Bulla?, Turritella?. Cardium?, etc., etc.
30' - 40'	40%	QUARTZ GRAINS, as above. Calcareous FOSSIL FRAGMENTS, as above. Large FOSSIL FRAGMENTS, as above, also including Neptunea?, Conus?, Chione?, Cucullaea. Trace coarse, rounded, clear QUARTZ GRAINS. Trace black CLAY.
40° - 50°	30%	QUARTZ GRAINS, very fine to very coarse, mainly medium grained, clear, with some white, very coarse is rounded, medium grains are sub-rounded to sub-angular. Fine grained FOSSIL FRAGMENTS. Large FOSSIL FRAGMENTS. Trace COAL, black, fibrous, soft.
50° ~ 60°	which Sampl 100%	80% of this interval was SILT. was lost through the Shaker. e - QUARTZ GRAINS, 60% coarse to very coarse, clear to white, frosted, rounded to sub-rounded, 40% fine to medium, clear to white, rare trace pink, sub-rounded to sub-angular.

FRAGMENTS.

pink, sub-rounded to sub-angular. Common trace fine grained SHELL

Trace COAL, black, soft, fibrous.

Trace large SHELL FRAGMENTS.

60" - 70"

100% Calcareous QUARTZ SAND, 70% grey, coarse to very coarse grained, clear, cloudy and white, rounded to subrounded, fair to well sorted, 30% fine grained, occasionally medium grained, subangular to subrounded, fair sorted. Common fine shells and SHELL FRAGMENTS, large (to 1cm) fragments of PELECYPODS, GASTROPODS and BRYTOANS.

Trace COAL, black, brittle, in part shiny.

Trace WOOD FRAGMENTS.

701 - 801

100% Calcareous QUARTZ SAND, as above, but with ratio coarse to fine (to silt size): 20 to 80.

Numerous very fine to coarse SHELL FRACHENTS of PELECYPODS, GASTROPODS.

800 - 900

- 90% Calcareous QUARTZ SAND, as above, fine to medium grained, occasionally coarse grained. Common SHELL FRAGHENTS of pelecypods, gastropods, etc.
- 10% COAL, black, dull, shiny on fresh surfaces, fibrous, slightly brittle but soft when wet.

000 - 100°

90% Calcareous QUARTZ SAND, as above, medium to fine and coarse grained, fair sorted; common SHELL FRAGMENTS, as above.

10% COAL, as above.

100' - 110'

90% Calcareous QUARTZ SAND, as above, grey, very fine to occasionally coarse grained. Common SHELL FRAGMENTS, as above.

10% COAL, as above, Trace CLAY, yellow, green, slightly silty, non-plastic, non-calcareous.

110' - 120'

100% Calcareous QUARTZ SAND, fine grained, occasionally very fine to medium grained, well sorted, subrounded to subangular, clear, cloudy and some white QUARTZ, common calcareous fragments, trace light to dark green, well rounded, fine grains of ?GLAUCONITE.

Trace COAL, dark brown, dull, soft, fibrous.

Trace CLAY, yellow-green, non-plastic, non-calcareous, hard when dry.

Trace orange, sandy CLAY.

1201 - 1301

100% Calcareous QUARTZ SAND, fine to medium grained, occasionally very fine to coarse grains, as above. Trace coloured QUARTZ and QUARTZITE GRAINS, Trace COAL, as above. Trace CLAY, yellow, green, as above.

130° - 140°	100%	Calcareous QUARTZ SAND, as above, with common coarse to very coarse, angular to rounded QUARTZ GRAINS, possibly pebble fragments. Trace COAL, as above.
140° - 150°		MUDSTONE, light greenish-grey, light green, in part slightly sandy, soft, blocky, with occasional red, white and black specks. CAVES BADLY. QUARTZ GRAINS, light grey, medium grained, occasionally fine to coarse grained, subrounded to subangular, with occasional angular, broken grains, clear and cloudy, occasional orange QUARTZ GRAINS.
150° - 160°		MUDSTONE, as above, in part very silty, also commonly orange, slightly silty. QUARTZ GRAINS, as above.
160' - 170'	90% 10%	MUDSTONE, as above, more silty. QUARTZ GRAINS, as above.
170' ~ 180'	1.0%	MUDSTONE, grey, greenish-grey, as above, grading to argillaceous SILTSTONE. SILTSTONE, dark brown, in part sandy, grades to very fine grained SANDSTONE, argillaceous, yellow, red and black specks, soft, blocky. SILTSTONE, yellow-brown, soft, blocky, slightly argillaceous.
	10%	QUARTZ GRAINS, as above.
180' - 190'	60%	MUDSTONE, light grey, very slightly silty, with white and black, silty specks, soft, blocky, well bedded.
	20%	SILTSTONE, light grey, argillaceous, black, white, red and yellow specks, soft, blocky. Still caving.
	10%	MUDSTONE, reddish, dark brown, orange brown, very slightly
	10%	silty, soft, blocky, well bedded. QUARTZ SAND, light grey, medium to fine grained, subrounded to angular and broken QUARTZ GRAINS, clear, occasionally reddish or milky, well sorted.

190' - 200'

70% MUDSTONE, light grey to grey, as above, with traces of

above.

carbonaceous matter.

30% SILTSTONE, light grey, as above, in part slightly sandy.

Trace sand, orange, brown (burnt grey MUDSTONE) MUDSTONE, as

200' - 210'

70% MUDSTONE, as above, in part silty. Still caving.

30% SILTSTONE, as above, in part slightly sandy.

210' - 220'

90% MUDSTONE, as above, with traces of carbonaceous matter, as above.

10% SILTSTONE, as above.

2201 - 2251

60% MUDSTONE, as above, light to dark grey, occasional QUARTZ GRANULES, well bedded, blocky.

30% SILTSTONE, as above, grading to very fine grained SANDSTONE, argillaceous, possibly feldspathic.

10% QUARTZ GRANULES, ROCK FRAGMENTS. Trace dar't brown COAL.

$6\frac{3}{8}$ " casing to 223'

2251 - 2301

10% MUDSTONE, as above.

90% SILTSTONE, to very fine grained, arkosic SANDSTONE, grey to blueish grey, with greater than 25% white grains, feldspar as specks, less than 50% dark grey and blueish grey minerals as specks, soft to firm, blocky.

Trace QUARTZ GRANULES, no shows.

230' - 240'

in part with up to 20% QUARTZ GRAINS, subrounded, cloudy, fine to medium grained. Rock has a speckled appearance, is firm in part, appears to have a feldspathic cement, is arenaceous and indicates quick deposition close to the source area. No shows.

240' - 250'

90% SANDSTONE, arkosic, light grey, occasionally slightly greenish, very fine to fine grained, composed of white FELDSPAR, occasionally enhedral, QUARTZ in part, well rounded, grey mineral and/or ROCK GRAINS, occasional green and red grains in a tight, sometimes feldspathic, sometimes argillaceous matrix. No shows; hard to firm. In part slightly calcareous.

10% MUDSTONE, light grey, firm to soft, blocky, well bedded, occasionally slightly silty.

250: - 260:

100% SANDSTONE, as above, mainly fine grained, occasionally very fine grained, arkosic, in part feldspathic (FELDSPAR greater than 25%), tight, no shows.

260' - 270"

100% SANDSTONE, as above, very fine to fine grained. Possibly a lithic SANDSTONE, feldspathic, in part arkosic.

2701 - 2801

100% SANDSTONE, as above, fine to very fine grained with numerous well rounded QUARTZ GRAINS, tight, no shows.

Trace MUDSTONE, light browngrey, slightly silty, firm, blocky.

280' - 290'

90% SANDSTONE, as above, with several granules and pebbles of QUARTZ and QUARTZITE (with amber QUARTZ GRAINS) SANDSTONE, calcareous in part, tight.

10% LIMESTONE, light grey, dense with numerous silty inclusions with vein? CALCITE cutting across.

Trace COAL, black, firm, detrital, occurs occasionally with inclusions of SANDSTONE, as above.

Trace MUDSTONE, as above.

2901 - 3001

100% SANDSTONE, as above, fine grained, no shows, tight, with numerous inclusions of dark grey rock, non-calcareous, possibly SHALE, LIMESTONE, QUARTZ, several apparent CALCITE VEINS, black COAL FRAGMENTS up to 2 cms. Rock is a lithic SANDSTONE, grading to a GREYWACKE.

Trace MUDSTONE, as above.

3001 - 304

95% SANDSTONE, as above, occasionally yellowish, lithic fragments to 30%, no shows, tight.
5% MUDSTONE, as above.

304' Circ. sample

GREYWACKE, grey, occasionally grey, yellow, composed of fine to very fine grained QUARTZ, occasionally well rounded, FELDSPAR and accessory mineral, rare MICA, and rock fragments of black COAL, dull SHALE, grey, blocky, hard, occasionally slightly silty, QUARTZ GRANULES, trace grey LIMESTONE. SANDSTONE is occasionally slightly calcareous, tight, no shows.

CORE NO. 1 - SEE CORE DESCRIPTION

304 - 314 Cut 10 Recovered 6 (60%)

3141 - 3201

- 70% MUDSTONE, light grey, occasionally greenish, occasionally slightly reddish, in part silty, firm, well bedded, thinly bedded, blocky, in part flaggy.

 Trace light grey-yellow, silty, blocky, firm to soft, with numerous plant fossil remains.
- 30% SILTSTONE, light gray, argillaceous, in part grading to very fine grained SANDSTONE, firm, blocky, occasionally well and thinly bedded.

 Trace SANDSTONE, fine to very fine grained, light green-gray, feldspathic.

3204 - 3304

- 60% MUDSTONE, as above, in part very silty, abundant plant remains, common black COAL inclusions.
- 40% SILTSTONE, trace very fine grained SANDSTONE, as above, with inclusions MUDSTONE, Overall finely interbedded MUDSTONE and SIITSTONE.

330" - 340"

- 50% MUDSTONE, light grey, occasionally yellowish, as above, occasional plant remains, blocky to slightly fissile.
- 50% STLTSTONE, as above, argillaceous. in part very sandy, often with abundant plant remains. Fragments green band, very fine grained, bard, non-calcareous, rock, possibly a MUDSTONE??

3401 - 3501

- 70% SILTSTONE, light grey, argillaceous, rarely sandy, firm, occasionally well bedded, carbonaceous, with white, orange black (carbon?) green and red specks.
- 30% MUDSTONE, light grey, slightly silty, firm, blocky, occasionally well bedded, carbonaceous, no shows.

 Trace lithic SANDSTONE (cavings).

350" - 360"

- 60% MUDSTONE, as above, carbonaceous, with numerous plant fossil remains, occasionally slightly greenish.
- 40% SILTSTONE, as above.
 Trace COAL, black, fair cleat, firm.

360" - 370"

- 30% MUDSTONE, as above.
- 40% SILTSTONE, as above.
- 30% SAVDSTONE, light grey, silty, very fine grained, gradation from SILTSTONE, possibly arkosic, firm, tight, no shows.

370° - 380°	40% MUDSTONE to SHALE, as above. 50% SILTSTONE, as above. 10% SANDSTONE, as above, carbonaceous, tight, no shows.
380' - 390'	30% MUDSTONE to SHALE, as above. 70% SILTSTONE, as above, in part sandy, carbonaceous. Trace white, calcareous, SILTSTONE - CHALK? - soft.
390° - 400°	20% MUDSTONE, as above. 70% SILTSTONE, as above, in part well bedded. 10% SANDSTONE, very fine grained, light grey, arkosic, as above, tight, no shows.
400 % - 410 %	20% MUDSTONE to SHALE, light grey, silty, firm, blocky, well bedded, carbonaceous. 60% SILTSTONE, light grey, in part sandy, firm, blocky, well bedded, carbonaceous, with orange, green, white and black (carb.) specks. 20% SANDSTONE, light grey, very fine grained, arkosic, well sorted, slightly carbonaceous, tight, no shows.
410° = 420°	10% MUDSTONE to SHALE, as above. 40% SILTSTONE, as above. 50% SANDSTONE, as above, with orange, red, green, black and white specks, in part lithic, otherwise arkosic, tight, no shows.
420° 430°	10% MUDSTONE to SHALE, as above. 30% SILTSTONE, as above. 60% SANDSTONE, as above, argillaceous, in part arkosic, in part light yellow, calcareous, tight, no shows.
#301 - ##01	20% MUDSTONE, as above. 60% SILTSTONE, as above, in part very argillaceous. 20% SANDSTONE, as above, tight, no shows.
440° - 450°	10% MUDSTONE to SHALE, as above. 40% SILTSTONE, as above. 50% SANDSTONE, as above, with well rounded fine QUARTZ GRAINS. Plant remains, tight, no shows. Trace COAL, black.
450° - 460°	20% MUDSTONE, SHALE, as above. 30% SILTSTONE, as above. 50% SANDSTONE, as above, argillaceous, tight, no shows.

4600 - 4700

10% MUDSTONE to SHALE, as above. 30% SILTSTONE, as above,

argillaceous, carbonaceous.

60% SANDSTONE, as above, very light grey to slightly whitish, in part with medium to fine QUARTZ GRAINS, slightly to very carbonaceous; tight, no shows.

470' - 480'

- 20% MUDSTONE to SHALE, light grey, slightly greenish in part, carbonaceous, slightly silty, firm, blocky, well bedded.
- 40% SILTSTONE, light grey, sandy in part, argillaceous, firm, blocky, carbonaceous, well bedded, occasional interbeds with MUDSTONE, numerous specks of orange, green, red and black minerals.
- 40% SANDSTONE, light grey, in part slightly greenish, very fine to fine grained, fair sorted, in part arkosic, argillaceous, with numerous specks of orange green, red, black mineral, slightly carbonaceous, tight, no shows, in part lithic.

4800 - 4900

- 10% MUDSTONE, as above.
- 20% SILTSTONE, as above.
- 70% SANDSTONE, as above, in part lithic with ROCK GRAINS, medium grained, in very fine to silty matrix; tight, no . awords

4901 - 5001

- 20% MUDSTONE to SHALE, as above.
- 20% SILTSTONE, as above.
- 60% SANDSTONE, as above, mainly arkosic, very fine to fine grained, tight, no shows.

5001 - 5101

- 30% MUDSTONE to SHALE, light grey, blocky, as above.
- 40% SILTSTONE.
- 30% SANDSTONE, very fine grained, fair sorted, arkosic in part, slightly carbonaceous, slightly friable, occasionally round grained, black mineral, as above, tight, no shows.

510' - 520'

- 10% MUDSTONE to SHALE, light grey, some brown-grey, blocky, as above.
- 40% SILTSTONE, light grey, browngrey, as above. Sandy in part.
- 50% SANDSTONE, very fine to fine grained, argillaceous, slightly friable, common white FELDSPAR, grains rounded and black mineral, tight, no show.

•	
520' - 530'	10% MUDSTONE to SHALE, light grey, brown-grey, common carbon laminations.
	80% SILISTONE, as above, grades
	10% SANDSTONE, as above, all fine grained, tight, no shows.
530' - 540'	10% MUDSTONE, as above. 70% SILTSTONE, as above. 20% SANDSTONE, as above, tight, no shows.
540° ~ 550°	10% MUDSTONE to SHALE, light grey and brown grey, slightly carbonaceous, silty, blocky, occasionally well laminated.
	10% SILTSTONE, light grey, slightly carbonaceous, rare trace FELDSPAR, occasionally
	interbedded with MUDSTONE. 80% SANDSTONE, light green-grey, fine to medium grained, slightly carbonaceous, argillaceous, arkosic, firm, consists of green and grey QUARTZ with white FELDSPAR, rounded grains and black mineral, in an argillaceous matrix, tight, no shows.
550° - 560°	10% MUDSTONE to SHALE, grey and brown-grey, as above, laminated.
	10% SILTSTONE, as above. 80% SANDSTONE, as above, fine grained, arkosic, tight, no shows, green-grey.
560° - 570°	10% MUDSTONE to SHALE, as above, commonly laminated, blocky with some carbonaceous flecks.
	Trace black, carbonaceous SHALE, 20% SILTSTONE, grey, sandy, slightly carbonaceous, firm,
	occasionally laminated. 70% SANDSTONE, grey-green, as above, argillaceous, tight, no shows.
570' - 580'	10% MUDSTONE, as above, silty. 10% SILTSTONE, as above. 80% SANDSTONE, as above, fine grained.
580° - 590°	20% MUDSTONE, as above. 10% SILTSTONE, as above. 70% SANDSTONE, as above. fine grained, tight, no shows, carbonaceous.

590" - 600"

20% MUDSTONE, as above, silty, carbonaceous.

20% SILTSTONE, as above, occasionally sandy.

60% SANDSTONE, as above, fine grained, tight, no shows.
Trace QUARTZ GRANULES, sub rounded, cloudy QUARTZ.

600' - 610'

SEE CORE DESCRIPTION CORE NO. 2.

620" - 630"

80% SANDSTONE, light greygreenish, fine to occasionally medium grained, in part arkosic, consists of clear and grey QUARTZ, white FELDSPAR (occasionally weathered) black, red and orange mineral grains, in an argillaceous, gray matrix; approx. 20% of sample, yellow, grey, constituents as above, with a yellowish, calcareous

matrix; tight, no shows.

20% SHALE, light grey to mid grey,
silty, firm, blocky, occasionally
slightly fissile, occasionally
slightly carbonaceous, well

bedded.

630' - 640"

80% SANDSTONE, as above, with 20% yellow-grey, which has a greater amount of matrix to grains; approx. 60:40, with light grey having approx. 30:70. Yellow-grey variety is harder, more siliceous. Tight, no shows.

10% SILTSTONE, light grey, sandy, argillaceous, with red, orange, black and white mineral specks, carbonaceous, firm, blocky,

well bedded.

10% SHALE, as above.

Trace COAL, black, dull,
brittle, fair cleat.

Trace QUARTZ GRANULE, cloudy,
rounded - associated with
SANDSTONE.

640" - 650"

80% SANDSTONE, as above, approx. 20% yellow-grey; occasionally with COAL FRAGMENTS (to 1cm) and SHALE FRAGMENTS; tight, no show.

10% SILTSTONE, as above.

10% SHALE, as above. Trace COAL, as above.

90% SANDSTONE, as above.

10% SHALE, silty, carbonaceous, as above, well bedded.
Tight, no shows.

650' - 660'

6600 - 6700

70% SANDSTONE, as above, tight, no shows, light grey, arkosic; yellow-grey, slightly calcareous.

10% SILTSTONE, as above.

20% SHALE, as above, in part silty, firm, light grey, clightly greenish, slightly rissile.
Trace COAL, as above.

6701 - 6801

70% SANDSTONE, as above, tight, no shove.

5% SILTSTONE, as above.

25% SHALE, as above, in part silty.
Trace COAL, as above.

680: - 690:

90% SHALE, light grey to mid grey, firm, fissile, in part slightly silty, well bedded, possibly fractured, in part clightly carbonaceous.

10% SILTSTONE, argillaceous, light grey, firm, slightly blocky, or slightly fissile, well bedded, no shows.
Trace COAL, black, dull, brittle; SANDSTONE, as above.

690' - 700' Trip 60% SHALE, as above, in part silty.

30% SILTSTONE, as above, argillaceous.

10% SANDSTONE, arkosic, light grey, fine grained, tight, no shows.

700' - 710'

70% SHALE, as above, occasionally dark grey to black, well bedded, slightly fissile, firm.

30% SILTSTONE, as above, argillaceous.
Trace COAL, black, as above;
SANDSTONE, as above, no shows.

710' - 720'

80% SHALE, as above, mid grey and dark grey, darker variety more carbonaceous, well bedded, firm, fissile.

20% SILTSTONE, light grey, as above.
Trace SANDSTONE, as above; tight, no shows.

720' - 730'

70% SHALE, as above, mid and dark grey, as above.

30% SILTSTONE, light gray, argillaceous, in part grades to very fine SANDSTONE. Trace SANDSTONE, as above, fine grained, with occasional granule.

Trace QUARTZ GRANULE, white, angular.

730' - 740'

40% SHALE, mid to dark grey, as above.

60% SILTSTONE, light gray, sandy, grades almost to very fine grained SANDSTONE, argillaceous, firm to medium soft, massive with mineral specks, white, black, red, slightly carbenaceous; tight, no shows.

740' - 750'

60% SHALE, as above, in part silty.

40% SILTSTONE, as above.
Trace SANDSTONE, as above, slightly calcareous, arkesic.

750' - 760'

30% SHALE, mid to dark grey, slightly silty, firm, slightly fissile, well bedded, thinly bedded, in part calcareous.

50% SILTSTONE, light to mid gray, slightly graenish, argillaceous, in part grades to very fine grained SANDSTONE, firm, blocky, in part slightly carbonaceous, occasionally well bedded.

20% SANDSTONE, light grey, slightly greenish, arkosic, fine grained, with occasional medium to coarse QUARTZ GRAINS, fairly sorted, composed of clear to cloudy grey QUARTZ, white FELDSPAR, red, orange and black mineral specks, in an argillaceous matrix, with occasional lithic, black COAL FRACHENTS, tight, no shows.

760' - 770'

50% SHALE, as above, in part silty.

10% SILTSTONE, as above.

40% SANDSTONE, arkosic, fine grained, as above, tight, no shows.

7700 - 7800

7801 - 7901

20% SMALE, as above.

10% SILTSTONE, as above, in part carbonaceous.

70% SANDSTONE, arkosic, as above, tight, no shows. Trace COAL.

70% SHALE, as above, mid to dark grey, in part silty, with carbonaceous PLANT REHAINS.

10% SILTSTONE, es above.

20% SANDSTONE, arkosic, as above, tight, no shows.
Trace COAL, as above.

790' - 800'

70% SHALE, as above, in part very carbonaceous, firm, fissile, well bedded.

20% SILTSTONE, as above,

argillaceous. 10% SANDSTOME, as above, tight, no shows. Trace COAL.

80% SHALE, as above, in part 8000 - 8100 slightly silty. 10% SILTSTONE, as above. 10% SANDSTONE, as above, arkosic, tight, no chows, Trace COAL, as above. 90% SHALD, mid to dark grey, 8101 - 8201 occasionally light grey, in part slightly silty, firm, fissile, occasionally blocky, in part carbonaceous with plant fossil remains, well bedded, in part massive. Occasionally carbonaceous SHALE. 10% SILTSTONE, light to mid grey, argillaceous, firm, blocky,

820' - 830'

830" - 840"

840' - 850'

850' - 860'

860' - 870'

80% SHALE, as above and carbonaceous SHALE.

occasionally well bedded, carbonaceous, crange, red, black and white mineral

Trace SANDSTONE, arkosic, light groy, fine grained, tight, ne shows; COAL.

specks.

20% SILTSTOND, as above, in part slightly candy with rare QUARTY CRANTE, trace medium grained.
Trace SANDSTONE, no shows.

80% SHALE, as above, and carbonaceous SHALE. 20% SILTSTONE, as above, in part

slightly groundsh.
Trace SANDSTONE, no shows.

70% SHALE, as above and carbonaceous SHALE, etc.

10% SILTSTONE, as above.

20% SANDSTONE, light groy-greenish, arkeste, fine to very fine grained, argillaceous matrix, composed of QUARTZ, FELDSPAR and coloured mineral specks, tight, so shows.

80% SHALE, as above, in part slightly silty.

20% SANDSTONE, as above, in part sality; tight, no shows.

70% SHALT, as above.

10% SILTSTONE, light grey, slightly carbonaceous, firm, blocky.

20% SANDSTONE, as above, fine grained, occasionally very fine grained, tight, no shows, in part with plant fossil remains.

8701 - 8801

80% SHALE as above. 10% SILTSTONE, as above.

870 6	653	880	Ĵ
	oni	t)	

10% SANDSTONE, as above, very fine grained, part very slightly calcareous, tight, no shows. Trace COAL, black, dull, brittle.

8801 - 8901

70% SHALE, medium to dark grey, occasionally greenish, firm, fissile, in part silty, slightly carbonaceous, well bedded, occasionally massive; occasionally dark grey, carbonaceous SHALE, with slight fracture.

30% SILTSTONE, light to mid greygreenish, in part very finely
sandy, argillaceous, in part
slightly carbonaceous,
occasionally well bedded, firm,
blocky, occasionally fissile.
Trace SANDSTONE, arkosic, fine
to very fine grained, tight,
no shows.

890" - 900"

70% SHALE, as above, in part purplegrey.

20% SILISTONE, as above.

10% SANDSTONE, arkosic, fine grained, light grey and green-grey, fairly sorted, massive, tight, no shows, occasionally slightly carbonacecus.

9001 - 9101

40% SHALE, as above.

40% SILISTONE, as above, commonly siliceous, bard, slightly sandy.

20% SANDSTONE, arkosic, fine to very fine grained, as above, in part slightly calcareous, slightly carbonaceous, tight, no shows.

Trace PYRITE, massive.

910' - 920'

70% SHALE, as above, in part well bedded.

25% SILISTONE, as above.

5% SANDSTONE, arkosic, as above, tight, no shows.

920' - 930'

70% SHALE, as above.

30% SILTSTONE, grading to very fine grained SANDSTONE, as above, no shows.

Trace COAL, black.

930' - 940'

30% SHALE, as above, in part very carbonaceous.

40% SILASTONE, as above, argillaceous and slightly sandy.

30% SANDSTONE, very fine grained, fair scrted QUARTZ, FELDSPAR, green, red, black mineral opecks, in fine, argiliaceous matrix; tight, no shows.

940' - 950'

10% SHALE, as above.

70% SILTSTONE, as above, light grey and mid grey-greenish, carbonaceous, in part slightly sandy.

20% SANDSTONE, as above, but arkosic, with more FELDSPAR, tight, no shows.

950' - 960'

60% SANDSTONE, arkosic, light grey-greenish, fine grained, occasionally medium grained, fair sorted, argillaceous, consists of QUARTZ, FELDSPAR, and green, red, orange, black and white mineral specks, in an argillaceous matrix, occasionally slightly carbonaceous, massive, tight, no shows.

30% SILTSTONE, light to mid grey, slightly greenish, in part sandy, argillaceous, firm, blocky, occasionally well bedded, carbonaceous, with white, red, green and black mineral specks.

10% SHALE, mid to dark grey, occasionally greenish, slightly silty, firm, fissile, occasionally blocky, slightly carbonaceous, well bedded, occasionally massive.

960" - 970"

30% SANDSTONE, as above, tight, no shows.

20% SILTSTONE, as above.

50% SHALE, as above, in part very carbonaceous.

9701 - 9801

5% SANDSTONE, as above.

5% SILTSTONE, as above. 90% SHALE, as above, in part slightly brownish, slightly silty, no shows.

980' - 990'

30% SILTSTONE, as above, occasionally slightly sandy, carbonaceous:

70% SHALE, as above, no shows. Trace SANDSTONE, as above.

990' - 1000'

40% SILTSTONE, as above. rarely grades to very fine grained SANDSTONE.

60% SHALE, as above, in part very silty; no shows.
Trace SANDSTONE, as above, fine to very fine grained.

1000' - 1010'

40% SHALE, as above.

60% SILISTONE, as above, in part sandy, in part siliceous, no shows.

Trace SANDSTONE, as above, tight.

1010, - 1050,

40% SHALE, as above, in part silty to very silty.

60% SILTSTONE, as above, in part grades to very fine grained SANDSTONE. Trace SAMDSTONE, as above, tight, no shows.

1020' - 1030'

60% SHALE, as above, in part silty.

40% SILTSTONE, as above, argillaceous, in part sandy, as above. Trace SANDSTONE, as above, tight, no shows.

1030° - 1000°

50% SHALE, mid to dark groy, olightly greenish, slightly silty, flrm, fissile, occasionally blocky, in part slightly carbonaceous, well bodded, in part massive.

40% SILISTONE, light to mid grey, ergillaceous, slightly sandy in past, fire, blocky, occasionally fissile, eccasionally siliceous and hard, in part grades to very fine grained arkosic SANDSTOND, in part carbonaceous.

16% SAMDSTOWN, arkosic, very fine to fino grained, firm, composed of QUARTZ, FELDSPAR, red, block, green and white mineral specks in an argillaceous matrix, massive, tight, no shows. Speckled white and grey appearance.

1040' - 1050'

20% SHALE, as above.

80% SILTSTONE, as above, mainly grading to very fine grained arkosic SANDSTONE. Trace SANDSTONE, as above, no shows.

1050' - 1060'

30% SHALE, as above, slightly silty, slightly carbonaceous.

50% SILTSTONE, as above. 20% SANDSTONE, light gray, arkasic, very fine to fine grained, as above, tight, no shows.

1060' - 1070'

20% SHALE, as above.

30% SILTSTONE, as above. 50% SANDSTONE, arkosic, very fine to fine grained, occasionally medium grained, firm, in part very slightly calcareous, as above; tight, no shows.

10700 - 10800 10% SHALE, as above. 20% SILTSTONE, as above, in part well bedded. 70% SANDSTONE, arkosic, as above, fine grained, occasionally very fine or medium grained, tight, no shows. 20% SHALE, as above, silty, in 1080° - 1090° part very carbonaceous. 20% SILTSTONE, as above. 60% SANDSTONE, arkosic, fine to medium grained, as above, tight, no shows. 10% SHALE, as above. 1090' - 1100' 20% SILTSTONE, as above. 70% SANDSTONE, arkosic, as above, in part more a feldspathic QUARTZ SANDSTONE; tight mo . awors 30% SHALE, as above, in part 1100' - 1110' very silty. 10% SILTSTONE, as above, argillaceous, in part slightly sandy. 60% SANDSTONE, arkosic, as above, fine to medium grained, in part very argillaceous; tight, me shows. 20% SHALE, mid to dark grey, firm, 1110' - 1120' olightly silty, slightly carbonaceous, fissile, occasionally blocky, in part well bedded. 30% SILISTONE, light to mid grey, in part slightly sandy, argillaceous, coloured mineral specks, in part slightly carbonaceous, firm, blocky. 50% SANDSTONE, arkosic, light grey, greenish, fine to medium grained, occasionally very fine grained, consists of QUARTZ FELDSPAR, red, white, black, green mineral specks, massive, in part slightly carbonaceous with occasional carbonaceous lenses; tight, sewode on 30% SHALE, as above. 1120' - 1130' 40% SILTSTONE, as above. 30% SANDSTONE, as above, commonly very fine to fine grained; tight, no shows.

1130' - 1140'

40% SHALE, as above, in part very silty.

50% SILTSTONE, as above, in part sandy and grading to very fine grained SANDSTONE.

10% SANDSTONE, as above, tight, no shows.

11400 - 11459 (Cavings consist " of SANDSTONE, arkosic, SILTSTONE and SHALE)

Circ. Sample. 60% SHALE, as above.

20% SILTSTONE, as above.

20% SANDSTONE, as above, tight, no shows; speckled appearance due to white FELDSPAR and grey QUARTZ, in part slightly greenish. caving on trip in. stuck. Hole cleaned.

1145 - 1150

Trip Sample, 30% Cavings.

30% SHALE, as above, in part silty, firm, blocky, occasionally fissile, mainly massive.

40% SILTSTONE, as above.

30% SANDSTONE, as above, very fine to medium grained, well sorted, tight, no shows.

1150' - 1160'

50% SHALE, as above, fissile.

50% SILTSTONE, as above, sandy, rarely slightly carbonaceous. Trace SANDSTONE, as above, no shows.

1160' - 1170'

40% SHALE, as above, bard, fissile.

50% SILTSTONE, as above, sandy.

10% SANDSTONE, arkosic with lithic fragments of SILTSTONE; tight, no shows.

1170' - 1180'

60% SHALE, mid to dark grey, slightly brownish or greenish, very rarely slightly silty, bard, fissile, in part slightly carbonaceous.

30% SILMSTONE, light to mid grey, occasionally slightly greenish, argillaceous, in part slightly sandy, with black and white occasionally coloured mineral

specks, firm, blocky.

10% SANDSTONE, light grey, arkosic, fine to medium grained, rarely very fine grained, fair sorted, composed of clear to grey QUARTZ, white FELDSPAR and coloured mineral grains in an arglilaceous, slightly greenish matrix; massive, tight, mo .awona

1180' - 1190'

30% SHALE, as above, fissile, hard.

50% SILTSTONE, as above, grades to very fine grained SANDSTONE.

20% SANDSTONE, as above, very fine grained to occasionally fine grained, tight, no shows, slightly siliceous, in part very slightly calcareous.

•	
	50% SHALE, as above, trace light brown, slightly yellowish, firm, massive. 40% SILTSTONE, as above. 10% SANDSTONE, as above, very fine grained; tight, no show. Trace COAL, black, dull.
:	50% SHALE, as above, and slightly brownish, carbonaceous. 30% SILTSTONE, as above, in part slightly sandy. 10% SANDSTONE, as above, very fine to occasionally fine grained, tight, no shows. One large, 1 cm, CALCITE CRYSTAL. Trace COAL, as above.
	to% SHALE, as above and buff, slightly calcareous, slightly silty, firm. 40% SILTSTONE, as above, argillaceous in part sandy. 20% SANDSTONE, as above, very fine to fine grained, tight, no shows. Trace CALCITE VEINS in SHALE.
•	60% SHALE, as above, in part very silty. 40% SILTSTONE, as above, very argillaceous, in part slightly sandy. Trace SANDSTONE, fine grained, as above.
	30% SHALE, as above, in part with CALCITE VEINS. 50% SILTSTONE, as above, argillaceous in part sandy, firm, massive. 20% SANDSTONE, as above, very fine to fine grained, tight, no showe.
	30% SHALE, as above, trace buff to light brown, in part very silty. 50% SILTSTONE, as above, argillaceous. 20% SANDSTONE, as above, very fine to fine grained, tight, no shows.
	60% SHALE, dark to mid grey and light yellow-brown, firm, in part slightly silty, fiestle, massive, rarely slightly carbonaceous. 30% SILTSTONE, light to mid grey, occasionally light yellow-brown, in part very slightly sandy, firm, blooky, argillaceous.

12509		12601
(0	JEC	• }

1.0% SANDSTONE, light grey,
slightly greenish, arkosic
and cocasionally brown-grey,
calcareous, siliccous, very
fine grained, firm to hard,
argillaccous, composed of
QUARTZ FELDSPAR, coloured
mineral specks in an argillaccous matrix, tight, massive,
no chows.

1260' - 1270'

- 40% SHALE, as above, in part very carbonaccous.
- 30% SILASTONE, as above, argiliacoous, firm, in part with carbonacoous glocks.
- 30% SANDSTONM, erkosic, very fine grained, silty, erkosic, tight, an shows.

1270' - 1280'

- 20% SHALE, as above.
- 40% SILTSTONE, as above, very sandy in part.
- 40% SANDSTONE, as above, arkosic, speckled light grey, very fine to occasionally fine grained, argillaceous matrix, slightly calcareous in part, rare trace INCA, tight, no shows.

1280' - 1290'

- 20% SHALE,
- 50% SILTSTONE, as above, in pert very sandy, commonly with carbonacous flecks.
- 30% SANDSTONE, as above, very fine grained, occasionally fine grained, in part very silty; gradation from SILTSTONE to very fine SANDSTONE, tight, no show.

1290' - 1300'

- 20% SHALE, as above, commonly very carbonaceous.
- 40% SILISTONE, as above.
- 40% SANDSTONE, as above, tight,

13000 - 13100

- 30% SHALE, as above.
- Los STLISTONE, as above, very argillaceous.
- 30% SANDSTONE, as above, very fine to occasionally fine grained, tight, no shows.
- 1310, 1350,
- 20% SHALE, as above, in part very carbonaceous.
- 60% SILTSTONE, as above, argillacous, firm.
- 20% SANDSTONE, as above, fine grained to very fine grained, in part very silty, tight, no shows.

1320' - 1330'

10% SHALE, as above. 40% SILTSTONE, as above, argillacoous, sandy in part.

50% SANDSTONE, arkosic, as above, very fine to fine grained, occasionally very silty, calcareous, carbonaceous, tight, no shows.

1330' - 1340'

20% SHALE, as above, with common traces yellow-brown SHALE, slightly silty.

50% SILTSTONE, as above, slightly sandy, grades to very fine grained, arkosic SANDSTONE.

30% SANDSTONE, as above, arkosic and FELDSPAR QUARTZ, fine to very fine grained with rare granules, tight, ne shows.

13400 - 13500

50% SHALE, mid to dark grey, occasionally slightly brownish, yellow or brown, in part slightly silty, firm, fissile, occasionally blocky,

40% SILESTONE, light to mid grey, occasionally slightly brown or green, argillaceous, in part very finely sendy, firm, blocky, rarely slightly carbenaceous.

10% SANDSTONE, light grey, greenish, arkosic and sub-arkosic, very fine to fine grained, massive, tight, no shows. Trace COAL, black, dull.

1350' - 1360'

30% SHALE, as above, in part very carbonaceous SHALE.

20% SILTSTONE, as above. 50% SANDSTONE, light grey, greenish, fine to very fine grained, fair sorted, arkosic, massive, firm, in part slightly calcareous, tight no shows, in part slightly carbonaceous, trace MICA.

1360' - 1370'

20% SHALE, as above.

30% SILTSTONE, as above, in part slightly carbonaceous.

30% SANDSTONE, as above, tight. 20% SANDSTONE, buff to pink, fine to occasionally fine grained, fairly sorted, hard, massive, tight, arkosic, with clear to cloudy quartz, pink to buff FELDSPAR, grey, white and green mineral specks in a (?) feldspathic matrix, slightly calcareous, no shows,

1370' - 1380'

- 20% SHALE, as above, with some carbonaceous SHALE.
- 20% SILTSTONE, as above, slightly carbonaceous.
- 40% SANDSTONE, light groy, as above, fine to very fine grained, tight.
- 20% SANDSTONE, buff. as above, in part with common green mineral grains, rarely medium grained, tight, no shows.

1380' - 1390'

40% SHALE, as above, mid to dark grey, slightly greenish, occasionally slightly brownish and carbonaceous SHALE, fissile.

30% SILTSTONE, as above.

30% SAMDSTONE, as above, light grey, fine to very fine grained, fair sorted with approx. 3% buff, as above; tight, no shows.

1390 - 1400

- 40% SHALE, as above, silty in part; eccasional plant fossil.
- 30% SILTSTONE, as above, argillaceous, in part very slightly sandy.
- 30% SANDSTONE, as abovo, light grey with trace buff; tight, no shows.

14000 - 14100

- 40% SHALE, mid to dark grey, in part slightly greenish, grey, black, carbonaceous, buff to dark yellow-brown, firm, fissile, in part slightly slivy, occasionally well bedded, mainly blocks.
- 40% STLTSTONE, light to mid grey, slightly greenish in part, in part slightly sandy, argiliaceous, firm, blocky, occasionally well and thinkly bedded, mainly blocky, slightly carbonaceous, slightly micaceous.
- 20% SANDSTONE, arkosic, light groygreenish and buff, very fine to
 fine grained, fair to well
 sorted quartz, feldspar and
 coloured mineral grains, trace
 NICA, in an argillaceous,
 feldspathic matrix, massive,
 firm, tight, no shows. Trace
 COAL.

1410 - 1420

- 30% SHALE, as above, and purplebrown, slightly carbonaceous.
- 40% SILTSTONE, as above, in part very finely sandy, in part well and thinly bedded.
- 30% SANDSTONE, as above, arkosic, fine to very fine grained, tight, no shows.

30% SHALE, as above.

20% SILTSTONE, as above, argillaceous, in part slightly sandy.

50% SANDSTONE, as above, arkesic, very fine to fine grained, fair serted, tight, no shows.

Trace COAL, black dull.

1430 - 1440

1440° - 1450°

20% SHALE, as above.

50% SILTSTONE, as above, firm, massive, occasionally well and thinnly bedded, blightly carbonaceous.

30% SANDSTONE, as above, light gray and buff; slightly calcareou tight, no shows.

Trace COAL.

30% SHALE, as above, with common carbanaceous SHALE and purple-brown SHALE.

40% SILTSTONE, as above, sandy in part, argillaceous, firm, massive

30% SANDSTONE, as above, very fine grained, occasionally fine grained.
Trace CALCITE in crystals to \$ em.
Trace COAL.

1450' - 1453'

CIRU. SAMPLE FOR BIT CHANGE

40% SHALE, as above.

30% SIL/ISTONE, as above,

30% SANDSTONE, as above, light grey and buff, fine to very fine grained, tight, no shows,

14531 - 14601

20% SHALE, mid to dark grey and brown-purple, slightly silty, firm, fissile, occasionally blocky, massive, in part very slightly carbonaceous, rare trace MCA.

30% SILTSTONE, light groy, slightly sandy, argillacous, firm. massive, in part well bedded, slightly carbonacecus.

50% SAIDSTOND, a rhoade, light grey speckled minerals and buff, very fine to fine grained, massive, firm, well sorted, composed of QUARTZ, FELDSPAR, coloured mineral grains in an argillace and matrix, tight, no shows,

1460 - 1470

10% SHALE, as above.

20% SILISTONE, as above, in part very finely sandy.

65% SANDSTONE, as above, mainly fine grained, well rounded QUARTZ, tight, no shows.

5% COME, black, dull, subconcholdal fractures.

20%	SHALE, as above. SILTSTONE, as above. SANDSTONE, as above, mainly very fine grained to SILTSTONE, occasionally fine grained, occasionally buff to dark brown, fine to very fine grained, tight, no shows,
30%	SHALE, as above. SILTSTONE, as above. SANDSTONE, as above. fine grained and very fine grained - silt. No shows. Trace COAL, as above.
10%	SHALE, as above, very silty in part. SILTSTONE, very sandy, light grey, slightly greenish in part, argillaceous with coloured mineral specks, slightly carbonaceous, in part well bedded, firm, blocky. SANDSTONE, as above, arkosic, mainly very fine grained to silty, some fine grained, tight, no shows.
50%	SHALE, as above. SILTSTONE, as above, very sandy in part. SANDSTONE, as above, arkosic, silty, trace very fine grained, some fine grained, tight, no shows. Trace COAL, black, in part slightly carbonaceous with plant fossils.
60%	SHALE, as above. SILTSTONE, as above. SANDSTONE, as above, fine grained, occasionally very fine grained, tight, no shows.
40%	SHALE, as above, in part carbonaceous. SILTSTONE, as above, argillaceous, slightly sandy. SANDSTONE, as above, fine and very fine grained, tight, no shows. Trace COAL.
	SHALE, mid to dark grey, grey- black, carbonaceous, slightly silty, firm, blocky or fissile (50/50), in part well bedded, slightly carbonaceous. SILTSTONE, light to mid grey, occasionally slightly greenish, argillaceous, slightly sandy in part, firm, blocky, occasionally well and thinly bedded.

20% SANDSTONE, arkosic, light groy, 1530" - 1540" speckled, slightly greenish, fine (cont) to very fine grained, fair sorted, massive, firm, slightly calcareous, in part slightly carbonaceous, consists of quartz feldspar and coloured mineral specks in an argiliaceous matrix; tight, no shows. Trace COAL, black, some dull, subchoidal fracturing. Trace QUARTZ PEBBLE, angular. 40% SHALE, as above, in part very 15400 - 15500 carbonaceous. 50% SILISTONE, as above, in part sandy, 10% SANDSTONE, as above, very fine grained, tight, no shows. Trace COAL, as above. 20% SHALE, as above, 1550' - 1560' 40% SILTSTONE, as above, grades to very fine SANDSTONE, trace MICA. 40% SANDSTONE, as above, arkosic, very fine grained to silty, occasionally fine grained, tight, no shows. Trace MICA. 20% SHALE, as above. 15601 - 15701 40% SILTSTONE, as above. 40% SANDSTONE, as above, very fine to silty, occasionally fine grained; tight, no shows. 20% SHALE, as above. 1570' - 1580' 50% SILTSTONE, as above. 30% SANDSTONE, as above, arkosic, very fine grained to silty, occasionally fine grained, tight, no shows. Trace COAL, as above.

1580' - 1590'

30% SHALE, as above, in part very silty.

30% SILTSTONE, as above.

40% SANOSTONE, as above, arkosic, very fine grained to silty, slightly carbonaceous, tight, no shows.

Trace COAL, black, as above.

1590' - 1597'

CIRC. SAMPLE - FOR CORE NO. 4. 20% SHALE, as above.

60% SILTSTONE, as above.

20% SANDSTONE, as above, arkosic, very fine to silty; tight, no shows.

Trace COAL, as above.

1597°	Led	16070	
1610;		16201	
٠		<i>.</i>	
1620"	fac 3	16301	
1630'	i kuw	16401	
		-	
ŤQ#0 s	ث .	16501	

CORE NO. 4 Recovered 0'9" 7.5%

- 60% SHALE, mid to dark grey, occasionally greenish, minor purple, buff-yollow (soft), in part very silty, firm, fissile, occasionally blocky, slightly carbonaceous and carbonaceous SHALE, grey-black in part purplish, well and thinly bedded.
- 20% SILTSTONE, light gray, sandy, argillaceous, with mineral specks, firm, blocky, occasionally well bedded.
- 10% SAMDSTONE, very fine to fine grained, article, fair sorted, light grey, chightly argillaceous, tight, no chows and buff, very fine grained, argillaceous.
- 10% COAL, black, shiny and plant fossil remains.
- 30% SWALE, as shove and carbonaceous, cliquitly purplish.
- 10% STLUSTONE, as above, sandy.
 30% SAMUSTONE, astesic, light grey,
 very fine, occasionally fine
 grained, well seried, tight,
- mo shows. 30% CCAD, black, as above; **grades to** carbomaceous SMADD.
- 20% SHAIR, as above.
- 50% SILTSTONE, as above, in part very sandy, grades to very fine grained SANDSTONE, argillaceous.
- 20% SANDSTONE, as above, very fine grained to silty, occasionally fine grained, tight, no shows.
- 10% COAL, as above.
- 30% SHALE, as above. 20% SILTSTONE, as above.
- 50% SAMDSTONE, as above, very fine to silty, occasionally fine grained, tight, no shows. Wrace COAL, as above.
- 16500 16600
- 20% STAIR, as above, in part slightly carbonaceous,
- 40% SHLISTONE, as above, grading to very fine SARDSTONE, argiliacous.
- 40% SANDSTONE, as above, mainly very fine to silty, some fine grained (40%), tight, no shows.

 Trace COAL; QUARTZ FRAGMENTS to 1 cm.

1660' - 1670'

20% SHALE, as above.

20% SILTSTONE, as above, slightly

sandy,

60% SANDSTONE, as above, arkosic, light grey and yellow-brown, very fine to silty, occasionally fine grained, tight, no show, with rare CALCITE VEIN.

Trace COAL, as above.

1670' - 1680'

50% SHALE, as above, and carbonaceous, in part silty.

30% SILTSTONE, as above, argillaceous,

slightly sandy.

20% SANDSTONE, as above, tight, no show, fine to very fine grained, in part carbonaceous.

Trace COAL, black, as above.

1680 - 1690

50% SHALE, mid to dark grey, slightly silty, firm, fissile, occasionally blocky, slightly carbonaceous.

20% SILTSTONE, mid to light grey, argillaceous, slightly sandy, firm, blocky, very slightly calcareous.

30% SANDSTONE, light gray, arkosic, very fine to fine grained, well sorted, firm, massive, in part slightly carbonaceous, very slightly calcareous, with QUARTZ FELDSPAR, occasionally decomposed coloured mineral specks; tight, no shows.

Trace COAL, black, shiny, clean

fracture. Trace CALCITE, vein material.

20

50% SHALE, as above, mid to dark grey, occasionally brown-grey.

10% SILTSTONE, as above, light grey,

slightly greenish. 20% SANDSTONE, as above, very fine, occasionally fine grained, tight,

no shows. 20% COAL, black, shiny, poor fracture.

1700' - 1710'

1690' - 1700'

60% SHALE, as above, in part greenish, some light green, firm, blocky.

20% SILTSTONE, as above, in part slightly sandy.

20% SANDSTONE, as above, very fine to occasionally fine grained, well sorted, tight, no shows. Trace COAL, as above; SAND, loose, very fine to fine QUARTZ

grains.

1710' - 1720'

40% SHALE, mid to dark grey, greybrown, light buff, soft, in part slightly silty, in part very elightly carbonaceous, firm.

17100	-	17301
(c.	cnt	;)

- 15% SILESTOME, as above, light to mid grey, in part groundsh, very slightly samly, in part slightly calcareous, in part sandy.
- 40% SANDSTONE, artesic, as above, speckled as above, very fine to fine grained, fair to well sorted, tight, no shows, in part very slightly calcareeus, 5% COAL, block glint to dult
 - 5% COAL, black, stiny to dull.

17301 - 17401

1740' - 1750'

17501 - 17601

- 20% SHALE, as above, occasionally light grey, firm, blocky; trace white.
- 50% SILTSTONE, as above, grades to very fine SAMOSTONE.
- very fine SAMDSTONE.
 30% SAMDSTONE, as above, very fine
 to fine grained, well served,
 tight, no show.
 Trace CQAL, as above.
- 30% SHALD, as chove, in part very silty; trace white, soft.
- 40% SILTSYOUR, as above.
- 30% SANDSTONE, as above, very fine to fine grained, trace red-brown, siliceous, slightly calcareous, tight, no shows. Trace COAL, as above.
- 30% SHALE, as above, in part salty and white, seed, blocky.
- 50/ SHLABGOIM, as above, argillaccous, alightly curbonnescus, in part candy.
- 20% SAMMSTONE, as above, wery fine to fine profined, taght, no show. Trace CALCEYS.
- 455 SMALD, as above, in part very carbonaceous, in part silty.
- 20% SELTSTONE, as above, in part sandy.
- 30% SANDSTOND, as above, fine grained, occasionally very fine grained, tight, no shows.
 - 5% CCAL, black, as above. Trace QUARTZ GRANULES, augular.
- 1760' 1770'
- 50% SHALE, mid to dark gray, in part grasuish or brownish, occasionally purple-brown and gray-black, slightly slity, firm to hard, fissile, occasionally blocky, in part carbonaceouc, in part well and thinly bodded,
- 30% STLTSTONE, light to mid grey, slightly greenish in part, argiliacoous, in part sandy, eccasionally grades to very fine grained SANDSTONE, artispic, firm, blocky, in part well and thinly bedded, in part slightly carbonacoous, in part very slightly calcareous.

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15% SANDSTONE, light gray, speckled, in part graenish, very fine to fine grained, well sorted, arkosic, firm, massive, consists of QUARTZ FELDSPAR (often decomposed) and mineral specks in an argillaceous matrix, tight, no shows. 5% COAL, black, shiny.

1770' - 1780°

60% SMALE, as above, trace white, soft, blocky.

30% SILTSTONE, as above.

10% SANDSTONE, as above, very fine to fine grained and occasionally brown, silty; tight, no shows. Trace COAL.

1780' - 1790'

30% SHALE, as above. 50% SILTSTONE, as above, in part sandy.

20% SANDSTONE, as above, very fine to fine grained, occasionally silty, tight, no shows. Trace brown, as above. Trace CALCITE crystals, clear to white,

1790' - 1800'

20% SMALE, as above and light grey, blocky, firm, slightly silty.

40% SILTSTONE, as above, slightly

sandy.

40% SANDSTONE, arkosic, soft to very fine grained, occasionally fine grained, tight, no shows. Trace COAL, black, as above.

1800' - 1810'

30% SHALE, as above, in part silty, trace light grey, firm to soft, blocky.

20% SILTSTONE, as above and trace buff, blocky, soft, very slightly calcareous.

50% SANDSTONE, light grey, arkosic, very fine grained to silty, occasionally fine grained, well sorted, slightly carbonaceous, tight, no shows. Trace COAL, CALCITE.

1810' - 1820'

30% SHALE, as above.

40% SILTSTONE, as above. 30% SANDSTONE, very fine to fine grained, arkosic, tight, no .wode Trace COAL, CALCITE, QUARTZ GRAINS.

1820' - 1830'

Slow drilling - grinding up SANDSTONE to loose SAND.

20% SHALE, mid to dark brown, firm to hard, fissile, occasionally blocky, and purplish-brown, slightly silty, bard, massive, in part thinly bedded, with evidence of folding and calcite veins and quarts - often with

PYRITE.

10% SILTSTONE, light to mid grey, argillaceous, slightly sandy, firm, blocky.

20% SANDSTONE, arkosic, light grey, speckled, fine to very fine grained, well sorted and cream, bard, arkosic, fine to medium grained, tight, no shows.

Trace PYRITE.

50% SAND, loose quartz grains from grinding of SANDSTONE above, fine to very fine grained with occasional medius grains, well sorted.

Trace COAL. Trace PYRITE.

1830' - 1833'

CIRC. SAMPLE - TRIP FOR NEW BIT.

20% SHALE, mid to dark grey, as above.

10% SHALE, indurated, light purplish-brown, very bard, as above, in part pyritic.

20% SILTSTOWE, as above.

50% SANDSTONE, as above, and loose SAND.

1833' - 1840'

30% SHALE, as above, and slightly brown-grey, in part carbonaceous, firm to soft, blocky, very slightly silty.

30% SILTSTONE, as above.

40% SANDSTONE, arkosic, very fine to fine grained, occasionally cream to buff, fine to medium grained, tight, no shows.
Trace COAL, black, Hard,

1840' - 1850'

20% SHALE, as above, silty, in part carbonaceous.

20% SILTSTONE, as above, in part slightly carbonaceous.

60% SANDSTONE, mainly very fine to occasionally fine grained, well sorted, some fine grained and rare buff, fine to medium grained. Tight, no shows.

Trace COAL, CALCITE, loose QUARTZ GRAINS.

1850' - 1860'

20% SHALE, as above, in part greenish.

20% SILTSTONE, as above.

60% SILTSTONE, as above, very fine to fine grained, fair sorted, tight, no shows.

Trace COAL.

1860' - 1870'

20% SHALE, as above.

15% SILTSTONE, as above, grades to very fine grained SANDSTONE.

60% SANDSTONE, as above, very fine to fine grained, in part greengrey, trace bedding tight, no shows.

5% COAL.

1870' - 1880'

18800 - 18900

20% SHALE, as above, dark to midgrey, light brown-grey and trace purple-brown, hard.

10% SILTSTONE, as above, argiliaceous, in part sandy.

70% SANDSTONE, as above, light grey, occasionally trace mid grey, slightly greenish, speckled, very fine to fine grained, tight, no shows.

10% COAL, black, in part shaly, poor fracture, semi dull.

20% SHALE, mid grey, occasionally dark or light grey, occasionally slightly greenish, in part slightly silty, firm, fissile, rarely slightly carbonaceous. in part well bedded, mainly massive.

30% SILTSTONE, light grey, greenish, in part sandy, argillaceous, firm, blocky, consists of white, groy, green, red and black mineral specks in green-grey matrix, in part slightly

carbonaceous.

40% SANDSTONE, light gray, occasionally very light grey, occasionally slightly greenish, arkosic, very fine grained, occasionally fine grained, well sorted, firm to bord, massive, in part carbonaceous, in part slightly calcareous, tight, no shows, and rarely buff, arkosic, yellow-brown matrix, fine to medium grained.

1890° - 1900°

20% COAL, as above.

10% SHALE, as above, in part purple brown and brownish, carbonaceous,

10% SILTSTONE, as above, grades to very fine SANDSTONE,

60% SANDSTONE, light gray, as above, very fine to fine grained, rarely poorly sorted (rounded QUARTZ) 25% buff to cream, hard, medium to fine grained QUARTZ, FILDSPAR, green and red mineral in creamy matrix, slightly calcareous, slightly carbonaceous, tight, no shows.

1900' - 1910'

- 20% SHALE, as above, and trace white to cream, soft, blocky.
- 30% SILTSTONE, as above, in part very sandy grades to very fine grained SANDSTONE.
- 60% SANDSTONE, light grey, very fine to fine grained and some buff, medium to fine grained, tight, no shows. Trace COAL, as above.

19100 - 19200

- 10% COAL, as above.
- 10% SHALE, as above, mid to dark grey, occasionally white, in part silty.
- 20% SILTSTONE, as above, light to mid grey, argillaceous, in part sandy.
- 60% SANDSTONE, as above, fine to very fine grained, occasionally with decomposed FELDSPAR, tight, no shows.

19200 - 19300

- 20% SHALE, as above.
- 30% SILTSTONE, as above, in part carbonaceous, argillaceous, Trace COAL, as above.
- 50% SANDSTONE, as above, very fine to fine grained, rare medium grains. Trace cream, tight, no shows, in part carbonaceous.

19301 - 19401

- 10% COAL, as above,
- 30% SHALE, as above, mid to dark grey, light grey, in part carbonaceous.
- 30% SILTSTONE, light and mid groy, occasionally brownish, carbonaceous, sandy in part.
- 30% SANDSTONE, very fine to fine grained, occasionally poorly sorted with rare medium grains, tight, no shows.

19401 - 19501

- 30% SHALE, mid to dark grey, in part greenish, brown, in part slightly silty, firm, fissile, occasionally blocky, in part slightly carbonaceous.
- 50% SILTSTONE, light to mid grey, rerely brown, argillaceous, in part sandy, in part carbonaceous, rare trace thin bedding, firm, blocky, trace MICA, in part grades to very fine grained SANDSTONE.

1950' - 1960'

- 20% SHALE, as above. Trace OCAL. as above.
- 50% SILTSTONE, as above, in part sandy, grades to very fine grained SANDSTONE and silty SANDSTONE.

1950' - 1960' (cont)

1960' - 1970'

1970' - 1980'

1980' - 1990'

1990' - 2000'

2000' - 2010'

- 30% SANDSTONE, as above, very fine grained to silty, occasionally fine grained, tight, no shows.
- 30% SHALE, mid to dark grey, occasionally greenish and possibly light brown. Vater soluble.

50% SILTSTONE, as above, in part sandy.

20% SANDSTONE, as above, silty to very fine grained, tight, no shows. Trace COAL.

40% SHALE, as above.

40% SILTSTONE, as above, in part sandy.

- 20% SANDSTONE, as above, silty, very fine grained.
 Trace COAL.
- 20% SHALE, as above, in part crumbles on exposure to moisture.
- 30% SILTSTONE, as above and brown, sillcoous, slightly sandy, calcareous, bard, grading to SANDSTONE,
- 50% SAMDSTONE, as above, light gray, very fine to fine grained, slightly carbonaceous, tight, no shows, and brown, siliceous, calcareous, hard, massive, silty, very fine grained, tight, no shows.
- 25% SHALE, as above, and dark brown, slightly carbonacous, slightly silty.

5% COAL, as above.

- 30% SILTSTONE, as above, and brown, as above.
- 40% SANDSTONE, as above, and brown, as above, very fine grained, in part silty, tight, no show.

 Trace PYRITE and pyritic SNALE.
- 30% SHALE, mid to dark grey, occasionally brownish or greenish, slightly silty, firm, fissile, occasionally blocky, massive, in part very slightly carbonaceous

and white, soft.

40% SILTSTONE, light to mid gray, argillacous with rare SHALE inclusions, firm, blocky, in part sandy and brown, silicoous, bard, slightly calcareous, in part slightly sandy, massive.

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30% SANDSTONE, light gray, arkosic, very fine to fine grained and silty, occasionally argillacoous, medium QUARTZ GRAINS, massive, firm; brown, fine to very fine grained, hard, siliceous, slightly calcareous, slightly argillaceous, tight, no shows. Trace COAL, black. Trace PYRITE.

2010' - 2020'

30% SHALE, as above.

50% SILTSTONE, as above, in part sandy.

20% SANDSTONE, as above, light grey, arkosic, tight, no shows, very fine, silty, eccesionally fine grained, occasionally brown, fine to medium grained, as above. Trace COAL, black, dull, occasionally shiny,

20209 - 20309

40% SHALE, as above, silty, slightly carbonaceous,

40% SANDSTONE, as above, very fine to silty and fine to medium grained, subangular QUARTZ and PELDSPAR mineral grains in an argillaceous, féldspathic matrix, tight, no shows, Trace COAL, as above.

2030" - 2040"

40% SHALE, as above, in part very silty.

50% SILTSTONE, as above, in part well and thinly bedded.

10% SANDSTONE, as above, very fine grained, grades to SILTSTONE, tight, no shows. Trace COAL,

2040' - 2050'

20% SHALE, as above, mid to dark grey, brownish, elightly silty, slightly carbonaceous.

50% SILTSTONE, as above, argillaceous, elightly sandy, slightly carbonaceous.

30% SANDSTONE, as above, arkosic, light grey, speckled, very fine to silty, occasionally fine grained, tight, no shows. Trace COAL.

20% SHALE, as above, in part water soluble - SHALE percentage bigh.

60% SILTSTONE, as above, and brown, argillaceous, well bedded. In part sandy.

20% SANDSTONE, as above, very fine to silty, occasionally very fine to fine grained, tight, no shows.

2060' - 2070'

2050" - 2060"

50% SHALE, as above, more gray-brown and light brown (water soluble)

40% SILTSTONE, as above. occasionally light grey, brown, and grey-brown, slightly sandy,

10% SANDSTONE, as above, very fine to fine grained, tight, no shows.

2070" - 2080"

- 40% SHALE, light to dark grey, slightly silty, in part very slightly carbonaceous, firm, fissile to blocky, occasionally water soluble, in part well bedded, occasionally brown, blocky firm to bard.
- 50% SILTSTONE, light to mid gray, in part slightly sandy, argillaceous, firm, blocky, in part slightly water soluble.
- 10% SANDSTONE, arkosic, light gray, speckled, whitish, very fine to silty, occasionally fine grained, composed of clear to gray, rounded to subrounded QUARTZ, subangular to enhedral, white FELDSPAR CRAINS, black, red and green mineral grains in an argillaceous, occasionally kaolinitic matrix, firm, massive, in part very slightly carbonaceous, tight, no shows.

 Rere trace PYRITE in SANDSTONE.

2080" - 2090"

- 60% SHALE, as above, light brown, very soft, very soluble.
- 30% SILTSTONE, as above, argillaceous, in part slightly carbonaceous, water soluble.
- 10% SANDSTONE, fine grained to very fine grained, tight, no shows.

 Trace COAL (to carbonaceous SHALE). Trace vein CALCITE.

2090' - 2100'

- 50% SHALE, as above, in part carbonaceous.
- 30% SILTSTONE, as above, in part very water soluble.
- 20% SANDSTONE, as above, very fine to fine, with rare mineral grains, tight, no shows.

 Trace COAL.

21000 - 21100

- 50% SHALE, as above.
- 30% SILTSTONE, as above, in part sandy.
- 20% SILTSTONE, as above, very fine grained to occasionally fine grained, tight, no show.

2110' - 2120'

- 50% SHALE, as above, mid to dark gray, occasionally light gray, firm to hard,
- 30% SILTSTONE, as above, argillaceous, in part sandy.
- 20% SANDSTONE, as above, arkosic, speckled, light grey, very fine to fine grained, tight, no shows. Trace COAL, as above.

2120' - 2130'

- 30% SHALE, as above, and brown.
- 50% SILTSTONE, as above.
- 20% SANDSTONE, as above, tight, no shows, silty to very fine grained, occasionally fine grained. Trace COAL, as above. ... 36.

60% SHALE, mid to derit gray, in part slightly greenish, firm, fissile, in part slightly silty, and white, seft, blocky.

30% SIMTSTONE, light to mid gray, in part slightly graenish, argillaceous, in part sandy, firm, blocky, rarely slightly carbonaceous.

10% SANDSTONE, arkasic, light grey, speckled, very fine to fine grained, fair served, tight, no shows.

Trace PYRITE.

Trace CALCITE.

21400 - 21500

40% SHALE, as above, in part slightly carbonaceous.

40% SILTSTONE, as above, in part sandy.

20% SANDSTONE, as above, light grey, occasionally whitish, arkosic, very fine to fine grained, well sorted, clear to grey QUARTZ, PELDSPAR, collowed mineral grains and carbonacocus fragments. 50% light grey, as above, but more of a feldspathic SANDSTONE with 10% decomposed FELDSPAR CHARRS, calcareous, with white (?) haclinitic/calcareous(?) matrix.

2150' - 2160'

30% SHALE, as above, in part silty, firm, fiscile.

40% SILTETONE, as above, avgillacoons, in part carbonaceous.

30% SAMDSTOME, as above: 50% arkosic, 50% very fine grained, feldspathic.
Trace CALCIAM.

2160' - 2170'

40% SHALE, rarely silty, in part carbonaceous.

30% SILTSTONE, in part very sandy.
30% SANDSTONE, as above, 50% arkosic, in part very carbonaceous, very fine to fine, occasionally medium grained, in part grading to feldspathic SANDSTONE, as above, very fine with occasional fine grains, fair scrting, tight, no shows.

Trace CALCITE.

2170' - 2180'

30% SMALE, as above, in part very carbonaceous.

50% SILTSTONE, as above, argillaceous, firm, blocky, in part slightly carbonaceous.

20% SANDSTONE, as above, mainly arkosic, as above, tight, no show.
Trace COAL, CALCITE.

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40% SEALE, as above.

30% SILTSTONE, as above.

30% SANDSTONE, as above, very fine to fine, occasionally medium grained, arkesic, with trace foldspathic, very fine, occasionally fine grained, tight, no show. Trace COAL, PYRITE, CALCITE.

21901 - 22001

20% SMALE, light to dark grey, in part alightly greenish or brownish, clightly silty, firm, fissile, cocasional trace bedding, in part very slightly

combonaceous.
50% SHIMOTONE, light to mid gray, in part slightly groomist, argillessons, in part candy, grading to viry fine grained SAMDSTOMM, firm, blocky, in purt slightly carbenacoous, cooncienal trace thin bedding.

36% SANDETCHE, ambodio, light grey, appointed, very fine grained to cocasicanlly fine grained or sality, firm, massive, in part salightly carbonnescus, consists of clear to grey, rounded to angular QUARTZ, white FELDSPAR, coloured minoral grains in an argillocour motrix, occasionally grades to a foldspathic QUARTZ SAMDSTOND; tight, no shows. Trace COAL, black, dull.

2200' - 2210' 20% SEARD, as chove, dank brewn to Birok, ourbentoseus, whim bedded, firm to seit.

40% SELECTORD, as above, brown, carbonnescus:

40% SANDSTOND, as above, very fine grained, well served, tight, no shous. Trace COAL, as above.

2210' - 2220'

20% SHALE, as above.

20% SHIMBYCHE, in part sandy, grades to very fine Cominca SANDSTONE,

50% SAHDSTOMM, as above, very fine to fine grained, fair serted, tight, no shows, tight.

20% SHALE, as above, in part slightly carbonaceous.

30% SILASTONE, as above.

50% SAMPSTONE, as above, very fine to fine grained, fair sorted, in part very quartzese, subrounded to angular QUARTZ, rare trace PYRITE, tight, no shows. Much loose QUARTZ GRAINS.

22201 - 22301

30% SHALE, as above, silty, in part carbonaceous.

50% SHLTSTONE, as above, in part

vory sandy.

26% SAMDSTORM, as above, arkosic, light grey, fine grained, cocasionally very fine grained, tight, no show. Trace PYRETE (as coment in SANDSTONE). Trace COAL.

22401 - 22501

40% SHALE, as above, in part very

silty.

40% SANDSTOND, as above, fine to very fine grained with occasional cause grains, tight, no shous.

20% SILTSTONE, as above. Trace COAL, CALCATE GRAINS.

2250: - 2250:

90% SHATA, rad to down gray, coccaienally propic-brown, alightly adlity, in part very sility, fine, fissile, occasion-ally blocky, im part slightly carbenaecous.

box selfstone, and to light gray, angillaceous, in part sandy, finn, blocky, in part with carbeanceous specks.

30% SAMDSTOND, autrosic, 60% light gray, very fine to fine grained, firm, mossive, in part slightly carbonaccous, well screed, angular to subrounded QUARTZ, FELDSPAR and coloured mineral, 40% light grey, occasionally pinkish, modium grained, firm, massive, in part slightly carbenaceous, fair sorted, rounded to subangular QUARTZ, FELDSPAR, coloured mineral; tight, no shows. Trace COAL, black.

22601 - 22701

30% SHALE, as above,

40% SILTSTONE, as above, in part

very sandy.

30% SANDSTONE, as above, 60% occasionally slightly greenish, 40% with common pinkish matrix; tight, no chous.

22701 - 22801

30% SHALE.

50% SILVSTONE, in part sandy and cambonaceeus,

20% SANDSTONE, as above, arkesic, light groy, slightly greenish and light gray, pink to brown, fine to occasionally medium grained, cocachonally very fine Orainol; tight, no shows.

40% SHALE, as obove, in part silty, firm, fiscile.

40% SILTSTONE, as above.

20% SAMOSTORE, as above, fine to modium grained, remely very Time grained, tight, no chows. Trace PYRKYD, COAL, CALCITE.

22901 - 23001

30% SHALE, as above. 30% SHLESTOWN, he above, argillaceous,

in part sandy.

to% SAMBETONE, light Grey, slightly greenich, very fine to coordinally fine grained, and lagus gray, cheagaicmaily brownich, fina to medium grained, both well to fedurly sorted, tight, no chous. Trace PYRITE, COAL.

2300' - 2310'

40% SHALE, as above, in part brown. 30% SHARTONE, as above. 30% SAMPSTONE, as above, arkesic, 50/50 light grey, very fine to occasionally fine and light groy, pinkino, fine to medium grained, massive, firm, tight, sewode on Trace PYREAT, COAL.

23101 - 29201

20% STULD, ac abere, with rame CALCETED VETER.

how cynducer, as above, eccasionally

blightly ourbeinceds. with COAD interleginations (thin), grades from year fine to fine to rodium grainol, well serted, in part greenish or pinkish; tight, no show, in part with slight amount PYRITE FLAKES. Trace CALCETE, COAL, PYRITE.

23201 - 23301

30% SHATA, light to devit gray, in yor's greenich or brownich, dark brown, in part silty, firu, fisallo, coonsiderally blocky, coessionally well and thinly baddad, opensionai trace carbenacecus.

30% SKIMSTONE, light to mid gray, in part shightly grosmish, Ĵ.II. part clightly camby, argillacoom firm, blowly, cocasionally well and thinly bodded, in part

slightly carbonaceous.

hop sampsyche, critesic, light grey, greenisk, cocasionally pinkish, and off-white, speckled, very fino to fine grained or fine grained, fair to well serted, Tirm, massive, in part slight trace badding shown by carbonacoous inclusions, consists of olear to gray and white, rounded

to subangular QUARTZ, white

FELDSPAR, coloured mineral

23201 - 23301

(cent)

(cent)	FELDSPAR, coloured mineral graims and carbonaceus epecks in an argillacecus, often foldspathic matrix; tight, no shows, in part slightly calcarecus. Trace COAL, black, good fracture.
2330° = 2340°	30% SHALE, as above, in part very silty. 30% SILESTONE, as above. 40% SAMESTONE, as above, in part slightly cally, very fine to fine and fine grained, tight, no above. Araes COME, CAMBERR, PURKER cubes.
23%0: ~ 2350:	50% CTALT, no object, in part untow soluble, in part silty. 90% SELECID, as above. 20% CALESTOID, as above, very fine to fine grained, tight, no show, in part singhtly calcarcous, Trace COAL.
2350: - 2360:	60% SHALD, as above, in part cilty. 30% SELESTOND, as above, in part grades to very fine SANDSTONE. 10% SANDSTONE, as above, mainly very fine grained, eccesionally fine grained, tight, no shows. Trace COAL, CALCITE.
2360° - 2370°	40% SEMLE, as above, in part very salty, in part water soluble. 40% SELTSTONE, as above. 20% SANDSTONE, as above, arkasic, very fine to fine grained, tight, no shows.
2370° - 2380°	40% SHALE, as above, in part very silty. 40% SILTSTONE, as above, argillaceous very occasionally slightly sandy. 20% SANDSTONE, as above, very fine to fine grained; tight, no shows. Trace COAL.
2380° - 2390°	40% SHALE, light to dark grey, cocasionally dark brown, carbonaceous, in part very silty, firm, fissile, slightly blocky, in part well and thinly bedded, in part slightly carbonaceous. 40% SELESTONE, light to mid grey, angillaceous, in part slightly sandy, speckled with white to black and green mineral specks,

firm, blooky, in part slightly

to whate, epochdod, vory fine to

20% SampSword, ambende, light groy

carbenaceeus.

2380' - 2390' (cont)

fine grained, in part slightly silty, firm, massive, occasionally very slightly carbonaceous, occasionally slightly calcareous, fair to well sorted, tight, no shows. Trace COAL, block, PYRITE, granular, rare QUARTZ GRAINS.

2390" - 2400"

hef SHALE, as above, in part very silty.

20% SILTSTONE, as above.

40% SANDSTONE, as above, in part very greenish, very fine grained, vell sorted and fine to medium grained, subungular, fair serted, tight, no sheet.

2003 CALGERS, COAL.

25000 - 25100

50% STALE, as shows, very silty in part.

30% SMARSTON, as above, in part

carbonace oue.

30% SAMESTONE, as above, very fine to fine grained, subrounded 'QUARTZ, tight, no shows. Trace CALCITE, GYPSUM(?), COAL.

2410' - 2420'

how SHALD, as above, in part salkty, in part weeky carbonaceous and thin bodded.

20% SILESTONE, as above, eccasionally grades to very fine SANDSTONE.

to white, as above, light grey to white, speckled, very fine to fine, occasionally medium grained, fair sorted, in part slightly carbonaceous, firm, massive, consists of clear to white and gray QUARTS, sub-rounded to augular, white PERSUAR, ecloured mineral grains, binch, carbonaceous specks and occasional PERSUE CRAINS and FLAKES; tight, no shows.

24201 - 24301

40% SMALE, as above, in part slightly brownish, carbonaceous.

30% SILTSTONE, as above, argillaceous, in part slightly sandy.

30% SANDSTONE, as above, very fine to mainly fine grained, tight, no shows.

2430 - 2440

60% SHALE, as above. 30% SILTSTONE, as above.

10% SAMDSTONE, as above, in part very groenish, very fine to fine, eccasionally medium grained, tight, no shows. Trace COAL.

60% SHALE, mid to down gray, econsicually brownish or gracuish, in part cilty, firm, fiscile, econsicually blocky, in part clightly carbonaceous, rarely carbonaceous, in part well bodded.

30% SILESTONE, light to mid grey, in part oldgithy greenish, argillacocus, chightly sandy, firm, blocky, with coloured march grains in an argillacocus matrix, in part chightly carbonacocus, in part thinly bedded.

to white, chicking green in part, very fine to fine grained and fine to modium grained, fair conted, firm, massive, consists of clear to dark grey and white, subangular to subranded QUANTE GRAINS, white PENDSPAR, and, green mineral grains, econolonally black carbenceous specks and rare PTRITE, in an argillaceous, feldspathic matrix, tight, no shows, in part chightly carbenceous; fine to medium grained is nore angular than very fine to fine grained.

Rare CALCINE VEINS.

Trace COAL, black.

24500 - 24600

60% SHALE, as above, brown, very slightly silty, hard, fissile.

20% SILISTONE, as above.

20% SANDSTOND, as above, tight, no shows, in part very carbonaceous with COAL interlaminations.
Trace water soluble SHALE,
COAL, quarts rounded granule,
clear.
H.B. SANDSTONE being ground up into loce, very fine to

24601 - 24701

50% SWALE, as above, in part very thinly and well bedded.

20% SILTSTONE, as above, in part sandy, argillaceous.

30% SANDSTONE, as above, very fine to fine and fine to medium grained, trace QUARTZ GRANULES, tight, no shows. Trace COAL.

2470 - 2480

40% SHALE, as above, cocasionally slightly greenish.

40% SILTETOITE, as above, in part slightly sandy, occasionally slightly carbonaceous.

20% SAMDSTOME, as above, arkesic, vory fine to fine grained and

	43	
	- L	
2470' - 2480' (cont)		fine to medium grained with well rounded, medium grains clear QUARTZ CRAINS, tight, no shows. Trace CCAL.
24801 - 25901	30%	STABE, as above, in part very carbonacecus, black. STLESTONE, as above, mid grey, carbonacecus. SANDSTONE, as above, very fine to fine grained, accessional angular QUARTE GRAIN and fine to medium grained; tight, no show. Trace CCAL.
2490° - 2500°	10%	STAIN, mid to dark gray and gray-blook, in part very slightly sality, firm, fissile, in part slightly carbonaceous. Starstown, and to light gray, occasionally graemish, argiliacous, very slightly sandy, firm, blocky, cocasionally slightly carbonaceous. EAMDSTOND, light gray to white, specified, armosic, very fine to fine graimed, fair serted, firm, massive, in part slightly carbonaceous, consists of clear to white and gray subrounded to subangular QUARTZ, FELDSPAR, coloured mineral grains, carbonaceous flocks, in an argillaceous/kaplinitic matrix,

2500' - 2510'

2510' - 2520'

50% SHALE, as above, in part groomish.

20% SILISTONE, as above.

seveds on , tight

30% SANDSTONE, very fine to fine grained, with occasional medium grains, tight, no shows.

50% SHALE, as above, in part silty, cocasionally dark brown, carbonaceous.

30% STLASTORM, as above, in part very sandy,

20% SANDSTONE, as above, very fine to fine grained, fair serted, tight, no show. Trace COAL, locse QUARTZ, coarse grains, well rounded, CALCITE.

2520' - 2530'

40% SHALE, as above, in part greenist 40% SILTSTONE, as above, in part sandy, firm, blocky, argillaceous.

20% SANDSTONE, as above, very fine, occasionally fine grained, tight, mo show. Trace COAL, PYRITE, QUARTE GRAINS, well rounded, coarse-to granulos, CALCITE. on offi

50% SHALE, as above, in part very 25301 - 25401 carbonaseons. 30% SILMSTOIM, as above. 105 SANDSTONE, na above, very fine, occasionally fine grained, tight, no sbows. Trace COAL, QUARTE, as above. 50% SHALE, as above, in part very 25400 - 25500 silty and trace buff, soft, olightly cilty. 30% SINTSTOND, as above, grades to very fine grained SANDSTONE. 20% SAIDSTOID, as above, askesic, light gray to white, speckled, slightly graduich, very fine grained, econsionally fine grained, firm, massive, tight, avods on Trace COAL, CALCUTE. 30% SIMILE, as above, trace buff. 25501 - 25601 20% SILESTONE, no chorn, argillaccous in part clightly sandy. 50% SANDSTONE, as above, very fine to fine grained, tight, no show. Trace COAL, CALCHYR, QUARTZ GRAINS, as abovo. 2565' - 2574' SME CORD DESCRIPTION. Core No. 6 Recevered 7'8". 25741 - 25801 30% SHALE, light to dark groy, greenich and black, in part slightly silty, firm, blocky, slightly carbonaceous. 50% SANDSTOWE, light grey, greenish. speckied, very fine to fine grained, fairly sorted, firm, massive, tight, no shows. Trace CALCITE, COAL. 25801 - 25901 80% SMALD, light to down gray, slightly grounish, black and purple-brown, in part slightly silty, firm, ficells, slightly carbonacerus, in part water soluble (covings) 20% SILTSTONI, light gray. greenish, argillaceous, firm, blocky, slightly carbanaceous, Trace SANDSTONE, very fine grained, silty, as above. Trace COAL. 2590 - 2600 40% SHALE, as above and water soluble SHALE, 10% SILISTONE, as above.
50% SANDSTONE, light grey-greenish, arkosic, speckied, very fine grained, cocasicabily fine grained, well sorted, firm, massive, very clightly carbon-

accens, bigget, mo chew. Consists of QUARME, because an ampiliacous

... 45.

oilioeona redunist. Canor COME, CANCITTE.

20% SHALE, as above, very slightly micaccous, traco PYRUTE CRYSTALS.

10% SILTSTOME, as above.

70% SANDSTONE, as above, very fine, occapionally fine grained, tight, no shows, very slightly michocous. Trace CALCITE. Trace bodding.

2610' - 2620'

50% SMALD, light to down gray and black, rancly water soluble.

20% SILISTOND, an above, slightly sandy, light grey, argillaceous and brownish-grey, sandy.

30% SANDSTONE, as above, light groy to white, in part brownish, very fine grained, slightly silty, tight no shows. Trace CALCIVE, engage FELDSPAR, rounded coarse QUARTZ GRAINS.

26201 - 25391

20% STAIM, es aboro. Not survivelle, as abors, light grey,

slightly grandship, sendy. how SAMBITONE, as above, grades from SKLTSTAME, very fine grained tight, no chouc. Trace COLL.

30% STALE, light to dark gray, olightly silty and brown to black, carbonaceous, firm, fissil trace HICA.

40% STLESTOMS, light to mid grey, in part greatish or slightly black, im pant skightly camely, sitghtly carbenacecus, firm, in part slightly onleareous, blocky, argillaceous, arades in part to. SAMDSTONE, very fine grained (see below),

30% SANDSYCHA, amkabic, light grey to white, slightly greenish, very fine grained to cilty, fair sorted, fine, encoive, slightly carbonaceous, occasional bodding tracca, consists of clear to white and groy QUARRE, white FULDSPAR, green mineral grains in a silicoous/argillacecus matrix, tight, no shows. Trace MICA.

Trace GOAL, FELDSPAR.

20% SHALE, as above, in part silty.

30% SILTSTOME, as above, carbonaccous in part.

30% SANDSTONE, as above, arkosic light groy-greenish, very fine grained, occasionally fine grained, hard, tight, no shows.

20% SAMESTONE, arkesic, pink-brown, very fine to fine grained, bard, siliceous, massive, slightly calcaroous, with rame vein? of QUARTE, order, dight, no show.

26300 - 56400

2640' - 2650'

- 50% SHALE, as above, green-grey, slightly silty and black, carbonaceouc.
- 20% SILTSTONE.
- 20% SANDSTOND, Light grey-greenish, very fine grained, tight, no strotte
- 10% SANDSTONE, pink-brown, very fine grained, siliceous, olightly augillacocus matrix, tight, ne chous. Traco CALTEER, PELDSPAR, orange.

26601 - 26701

- 60% STATE, as above, in part slightly couldy with rounded QUARTE,
- 20% STIMETONE, as above, argillactous firm, blocky, slightly sandy, trace bedding.
- 10/ SANDSTOLD, as above, green-gray,
- tight, no chous. 18% CAMBIROUS, as above, pumpko-brown in part silor, vight, no shows. Trace QUATTY, PHAUSPAR (orange), CALCITE.

26701 - 25801

- 40% STAIM, as above, in part water soluble.
- 30% SILTSTOWE, as above, grades to very fine Crained, light grey SANDSTONE, alightly greenish.
- 20% SAIDSTONE, as above, arkesic, hight grey, greenish, very fine grained, bight, no shows.
- 10% SANDSTONE, as above, pink, brown, very fine to fine grained; cue piece shows bedding by thin Losanations, vory fine grained SANDSTONE, very fine grained SANDSTONE. Trace QUARTE CHARLES and very coarse grains, woll rounded, crange PELDSPAR, white and olear CALCETE.

2680' - 2690'

- 60% SHALE, light to dark groygrownish, dark grey to black, carbonaccoun, in part very slightly cliby, firm, fissile, coesianally well bedded.
 30% STIMETON, light groy, mid grey,
- greenish, slightly sandy, ergillacours, firm, blocky, in part well and thinly bedded, alightly carbenacecus; trace reddish-pluk, argillaceous.
- 10% SANDSTONE, Light Grey, white, greenish, speckied, arkesic, fine to vory fine grained to salty, with an argillaceous matrix, slightly calcareous, tight, no ofero. Trace Cylude, FRIDSPAR GRAINS, subodnedrall. ... 47.

2690' - 2700'

40% SHALE, as above, and brownblack, carbonnesous.

30% SILTSTONE, as above, light grey-greenies, sandy, grades to very fine grained SANDSTONE.

30% SANDSTONE, as above, arkesic, very fine to fine grained, tight, no show. Trace COMP, CALCITE, FELDSPAR, orange substitutioni.

27001 - 27101

2710' - 2720'

20% SHALE, as above.

30% SHLTSTONE, as above.
50% SAMDSTONE, as above, very fine to fine grained, tight, no shows, fair sorted. Trace COAL.

20% SHALE, as above, light to dark grey, greenish, black to brown, carbonaccous,

17% SILTSTOND, as abevo, in part very sandy.

70% SAIDSTONE, as above, very fine to fine grained, fair to well certod, in part very carbonaccou tight, no shows. Trace COAL, QUARTE, cloudy. rounded, very coarse grains.

27201 - 27301

20% SHALE, in part very carbonaceous broune

10% SILISTOME, as above, argillacecu sandy, firm, blocky, slightly carbonacecus.

70% SANDSTOFF, as showe, arkeste, very fine to fine grained, light gray to white to greenich, specialod, foir to well serted, tight, no shous; trace carbonacean rattor and coccional (20%) Light yellowbrown, arkaske, very fine to fine grained, firm to hard, massive, shightly siliceous, olightly colormoous, tight, no . ಶಾಗಾರ್ಥ Trace COAL, CALCETE.

27301 - 27401

20% SHALD, raid to dark groy-greeniel cocasicantly black to brown, carbenaceous, slightly silty, firm, fiscile, occasionally slightly carbonneous, occasionally well bedded.

40% SIMPSTONE, light to mid grey, groenich, very slightly sandy and occasionally grades to very fine grained SAMDSTONE, argillaccous, firm, blocky, occasionally slightly carbonaceaus, in part well hedded.

40% SANDSTORD, ortosic, light grey to white, greenish, speckled, morature, the point clinghting

27301 - 27401 (comt)

carbonaccous, consists clear to gray and aloudy, subrounded QUARTE, white and constitual orange PEEDSPAR, coloured minoral grains and occasional comboning form appoint in an argillassono metrir, tigat, ណូខ នាំខ្មែរនៃ ៖ Trops COAL, CALARIN, yellow to bung Suarra.

27400 - 27501

- 20% SHADD, as allove, in part well and thinky builded. 30% SHIMOTOTT, as above,
- amgiliaco kus, samiy.
- 50% SAMBBTOTM, as above, very Sime to Sime, econsionally modium grainad, fair corted, in part very ambenaceeus, tigāt, me chaus. Trace CALCETE, COAL.

27501 - 27601

- 30% CHALD, as above, in part very onribennesons.
- 50% SILMETCIE, no above, light grey-greenish, argiliaceous, in part sandy, firm, blocky. 20% SANDSTOND, as above, vory fine
 - to fine grained, tight, no show. Trace COAL, common (to approx. 5%) pobbles QUARTZ, white, clear, brown, from coarse grained to I on, well to submounded.

2760' - 2770'

- 40% SHALE, as above, eccasionally very carbonaceous.
- 20% SILTSTONE, as above, very
- sandr, en dilineerus. 30% Sammertell, ne above, very fine to fine grained, tight,
- no obout coordinal trace PYRLTS now constituent characters and PEBELW! QUARTE, closer, white, cloudy, coargo, case to i cm, well to aubranizloi. Trace COMI, CALUITE.

2770' - 2780'

- 60% STAIR, as above, this to dark gray, acceptionally greenich, in part slightly silty.
- 16% STLESTORD, as above, argallacceus, firm, blocky, menchy slightly carbonaceous.
- 30% SAMBETTUM, as above, very fine to fine grained, slightly carbenacous, rarely pyritic, tight, no shows. Trace COAL, TIRITE, CALCITE, QUARME COLLEGE, as above.

2780" - 2790"

- 60% SHALD, light to dami grey, greenich, black to brown, carbonaceous, firm, fissile, considerally silty, in part well bedded, in part very carbonaceous.
- 20% SELESTONE, light gray, grasmich, angillacoour, very slightly sandy, firm, blocky, trace bodding, clightly carbonaceous. 10% SAMBRONE, light gray to
- 10% SAMBBROND, light grey to white, greenish, arhesic, very fine grained, occasionally fine grained, in part silty, tight, no show.
- 10% CCNCLORMAND, very coarse grains to 1 mm, well to subreunled, clear, cloudy, white and slightly brown to amber QUARTE CRANTE, econcionally pitted. Trace PYRITE, COAL.

2790' - 2800'

- 60% SHALE, as above, in part very silty and well bodded.
- 30% SILTSTONE, light grey, as above, in part scally and grading to very fine grained SANDSTONE.
- 10% SANDSTONE, as above, very fine to fine grained, tight, no show. Trace COAL, QUARTZ GRAINS, as above.

2800' - 2810'

- 50% SHALE, as above, in part milky.
 30% SHALE, as above, argiliaceou occasionally sandy, in part slightly carbonaceous.
- 10% SANDSTONE, as above, arkosic, very fine to fine grained, tight, no shows,
- 10% CONGLOMERATE, QUARTZ, clear to white and cloudy, rounded to sub-rounded, very coarse to less, and cocasional QUARTZITE PABBLE to 2cms, yellow-brown, well rounded.

 Trace COAL.

2870, ~ S250,

- 60% SHALE, as above and (25%)
 light brown, firm, very slightly
 silty, fissile, well bedded.
- 20% SHLTSTOME, as above, occasionally very sandy and grading to very fine grained SANDSTONE.
- 20% SANDSTONE, arkesie, as above, very fine to fine grained, eccasionally very carbonaceous, thent, no shows.

 Trace COAL, CONCLOMERATE, as above. Popasional trace badding.

2820' - 2830'

40% SHALE, as above, approx. 10% Brown as above.

30% STLASTONE, argillaceous, slightly sandy, as above.

20% SANDSTONE, as above, very fine to fine grained, tight, mo show,

10% CONGLONELLYB, very coarse to pobbles (lom), well rounded, occasionally pitted. Trace COAL, CALCITE.

2830' - 2840'

50% SHALE, as above and approx. 10% brown, as above.

30% SILTSTONE, light to mid gray, occasionally greenish, angiliacocus, slightly sandy, very slightly carbonaccous.

20% SANDSTONE, as above, very fine to occasionally fine grained, tight, no shows (Possibly more SAMDSTONE in interval but fines have passed through sieve). Trace COAL, CONGLOMMATE (approx 5%) .

28401 - 28501

20% SHALE, light to dark gray, slightly slity, slightly greenish and black, carbonaceous firm, fiscile, in part well bedded, thinly bedded.

30% SILTSTOMM, light gray-grasmish, acceptionally mid gray, argillacoons, in part elightly sandy, firm, blocky, occasionali well bedded, very slightly carbonateeus,

40% SAMDSTOND, amicosic, light groy, in part groom-groy, very fine to fine grained, occasionally modium grained, fairly corted, consists of QUARTZ, FELDSPAR, green and red mineral grains, carboneces apocks in an argillaccons matrix; tight. no show, firm, massive. Traco PIRITE,

10% CONGLOMERATE, cocasionally amber and pinkish, well to subrounded, econsionally pitted QUARTZ. Unimova matriz, possibly occurs as pubbles in the SANDSTONE,

Trace CCAL, CALCETE.

50% SHALE, as above, in part

slightly silty, firm, fissile. 30% SILTSTONE, as above, in part grades to very fine grained SANDSTONE.

20% SAMDSTOME, as above, very fine to fine grained, occasionally silly and green-grey, as above, fine grained to occapionally medium grainel: tight, mo show. Traco COAL, QUALTE, CALCETS. eea 310

2850' -- 2860'

hop SHALD, as above, light to dank grey, clightly groenish, black, carbonaccous and light brown, slightly silty.

brown, slightly silty.

40% SILESTONE, as above, light gray, acceptenally gracmish, in part candy, argillacaous, firm, elightly carbonacaous.

20% SAMDSTOM, no above, light grey, greenler, very fine grained, occasionally cilty, tight, no shows.

Trace CALCETT, CONGLOWRATE.

2870: - 2883:

40% SYMLE, as above, no light brown. 30% SELMONOTE, as above, im part dark grey, very argiliaccous, carbonaccus, fina, blocky.

30% SHALE, as above, very fine, obsasionally fine grained, considerally green-grey, fair corted, tight, no shows. Trace COAL, PIRITE.

2880' - 2890'

40% SHALD, as above, also coesienally grown, firm, fissile.

20% SILTSTONE, as above, in part sandy, in part very carbonaceous

40% SANDSTONE, as above, light grey to white, in part green-grey, very fine to fine grained, tight, no shows.

Trace MIGA.

Trace PYRITE, QUARTZ, PELDSPAR.

. 2890" - 2900"

- 60% SHALE, light to dark groy, in part black, carbonaceous, firm, fissile, occasionally slightly silty, in part well and thinly bedded, occasionally slightly carbonaceous.
- 20% SILTSTONE, light to mid groy, grosnish, in part sandy, firm, blocky, argillacocus, slightly carbonecous.
- 20% SANDSTONE, light grey to white, elightly greenish, arkosic, fine to very fine grained, fair sorted, firm, massive, in part very slightly carbon-accous, tight, no shows.

 Trace MICA.

 Trace COAL, black, brittle;
 QUARTZ GRAINS.

2900' - 2910'

- 50% SHALE, as above, in part greenish.
- 30% SILTSTOME, as above, angillaceous, slightly sandy, firm, blocky.
- 20% SANDSTONE, as above, very fine to fine grained, tight, no shows.

29109 - 29209 .

40% SHALD, as above, and biack to brown, carbenacount, in part very sality.

10% EILISTONS, as above.

50% SANTSTONE, light gray to white, occasionally slightly graemish, arhosic, fine to very fine grained, fair souted, firm, massive, consists of clear to gray, subangular to subrounded QUARTZ, white FELDSPAR, rare coloured mineral grains, occasional carbonaceus spocks or MICA in a white, kaclimitio matrix (Matrim: grains varies \$\frac{1}{2}\$ to \$\frac{1}{4}\$), eccasionally slightly calcarous.

Trace COAL, CALCTER,

29201 - 29301

30% SHALE, as chove, with abundant black to become, carbonaceus.

30% SILMETONE, as above, in part

vory sandy.

40% SANDSTONE, as above, taght, no shows, and trace brown, hard, fine grained, sub-arkesic, tight, no shows, slightly calcareous.
Trace COAL, QUARTZ, rounded granules.

2930' - 2934'

50% SMALE, as above, in part well bedded.

20% SHLTSTONE, as above, argiliaceou sandy in part, firm, blocky,

singhtly carbonnesus.

30% SAMDSTONE, as above, light grey to white, very fine to fine grained, eccesionally cility, tight, no chowe and trace brown to yellow-brown, fine to medium grained, tight, no shows.

Trace COAL, QUARTE PEBLE and very cearse graine, CALCUTE, white.

2934' - 2940' TRIP M.B. Ikuch pipe dept in compile.
30% SMAND, as above, light to dark
gray and coessionally black,
carbonaceous; rare light brown,
fire.

40% SHLTSTONE, light to mid gray, occasionally greenish, argillactous, slightly sandy, in part carbonaceous, occasionally dark brown.

30% SANDSTONE, as above, in part greenish, tight, no show.
Trace PYRITE, CVARTZ PEBBLE.

29501 - 29601

2960" - 2970"

2970' - 2980'

40% SHALE, light to dark grey, in part greenish and black, carbonaceous, eccasionally slightly slidy, firm, blocky.

20% STUTSTOWN, light to mid grey, slightly greenish, argillaceous, very slightly sandy, firm, rassive, econsionally very slightly carbonacecus,

40% SANDSTONT, antecie, light grey, greenich, very fine to occasionally fine grained, cocasionally salty, fairly corted, firm, massive, cocasionally slightly carbonaceus, tight, no obous.

Trace COAL, GUARTZ, CALCETE, white and expressionergrees

50% SHALE, as above, mainly slightly stilty.

30% SELTSTONE, as above, angillactous, very slightly sandy, firm, blocky, slightly carbonacecus.

20% SANDSTOME, arhosic, light greenish-grey, as above, very fine to occasionally fine or medium grained, tight, no show. Trace CALCITE, QUARTZ, COAL.

50% STALE, as above, firm, fissile, eccasionally carbonaceous.

20% STIASTONE, as above, occasionall white, very fine grained, fair to well sorted.

30% SANDSTOND, as above, very fine to fine grained; accasionally fine to medium grained, fair sorted, consistably embou-accous, tight, no shows.
Trace COAL, CALCETE, coarce to very coarse QUARTZ GRAINS, approx. 10% well rounded, madium to fine QUARTZ GRAINS.

30% SHALD, as obere, with 5% white, sandy, soft, well bedded, non calcarous.

50% SILTSTONE, as above, in part woll bedded, occasionally carbonaccous.

30% SANDSTONE, as above, light grey to white, occasionally greenish, very fine to fine grained, occasionally silty, firm, massiv occasionally slightly carbon-accoup, trace bedding, tight, no shows.

Trace PYATTE, and white, occasionally greenish, very fine to fine grained, tight, no show.

Trace COAL, CALCITE.

29901 - 30001

40 mins. ciare,

30000 -- 30100

30101 - 30201

30% SMATT, as above, light to damin Gray, productionally gracedal, slightly outlean scene, societatility trail hedded, slightly mility, since, since,

slightly cally, then, freezes, 50% SIIMMONIS, an above, angilineers very climber, and above, angilineers very climber, canly, calledy, carbentos, calledy, carbentos, calledy, very fine grained, cooncinally fine or silly, bigby, no shore.

These CCAL, CRIMM PROBLE,

ACT STREET, no electr, in pract chity, Eign, care reconstruction biodic

And crub runces one.

60% Simposative on runces, organized one.

60% Simposative on runces, organized one.

60% Simposative of runces, respective of the continuation of the continuation. tight, in class. Twoco Call, divorce, grands PESENS call want oraco guaina, well mounded,

10% SIMIM, as shows.
20% SIMIM, as shows.
70% SAMUSTOTT, and sole, light grop, coessionally such than some, wery fine to cooksimulit fine

grained, tight, he shows. Trace CCAL, cames CUARCES GRAING, woll magnified.

విశిస్త్ కానాడ్స్, సౌమర్జన్న నద **టెండాన్:** దర్శార్హ్మ occasionally arecatal, black, combonned ity aresetts, black, combonned and firm, in part silvy, flocide, componently slightly octive to the considerally slightly octive to the considerally and the considerally slightly outlinesses, considerally of the considerally of gray to which, and considerally considerally of considerally and considerally considerally of considerally of considerally of considerally considerally of c

gray to white, occariomally greenich er groom-grey, grechied, wert fine to fine grained, fein sertel, fine to consinedit head and brittle. massive, robantonally diagholy madring, roomstrommily stieghtly compounds of composition of GUARNY, FRAGRICATE and mimer colored (groom, rod and binet) wincerd (groom, for an empirite control (in directly of a control (in directly of a) controls, tight, me also so.

40% SHALR, as above, light to dark groy, in part slightly greenish, elightly carbonaceous.

30% SILTSTONM, as above, argillaceous. occasionally slightly sandy,

- 30% SAMDSTOND, as above, very fine to fine grained, with occasional runeral graine, tight, no shows. Trace COAL, QUARTZ GRAINS, whise CALCETE.
- 40% SHALM, as above, in part black and carbennessus; trace white, slightly candy, blocky,

20% SILASTONE, as above, occasionally

- very slightly sandy. fine grained, occasionally silty, rarely modium grained, tight, no shows, Traes COLL, GUARTZ GRANULES.
- 20% SHALE, as abeve, occasionally black to brown, slightly carbonaccous.

10% SILTSTONE, as above. Generally fairly to poorly scrted, very fine to fire grained, very silty, 30% white (knolimitic coment) ond 70% gray-green, tight, no show

30% SHALD, as above.

- 30% SILASTOMA, as above, in part clightly corbenaceous, well and thinly hedded.
- hog SAMDSTOME, as above, very fine to fine grained, silty, tight, no shows: 60% groy-green, no abor Trace Quiriz, COAL, PYRITE.
- 40% SHALD, as above, cocasionally clightly brownish.
- 20% SILESTONE, as above, cocasionally carbonaceous and dark grey.
- 40% SANDSTONE, very fine grained, econsisually fine grained, tight, no show. Trace COAL, QUARTE.
- 50% SHALD, light to dark grey, cooksionally slightly greenish, black, carbenaceous, Trace yeliow, slightly sandy, blocky, in part silty, firm, fissile, occasionally slightly carbonaccous, cocacionally well and thinly bedded.
- 20% SILASTONS, light to mid grey, groomish in part, argillaceous. cocasionally slightly saidy, firm, blooky, in part slightly carbenacesus.
- 30% SAMBSYCHS, Aight groy to white, cocceterally green-grey, arkesic.

3030' - 3040'

30401 - 30501

3050' - 3060'

20501 - 20701

30701 - 30801

3070' - 3080' (cont)

3080! - 3090!

3090' - 3100'

3100: - 31130

+ 10 min.

3113° and circ.

3113' - 3123'

3123' - 3128'

3128' - 3140'

very fine to fine grained, fair sorted, firm to hard, in part slightly siliceous, unssive, tight, as shous. Trace COAF, CALCITE.

40% SMAID, as cheve, in part silty.

10% SILVETONE, as above, green, argillaceous.

50% SAMDSTOND, as above, light grey to white and green-grey, fine to very fine and coasicnally medium grained, fair to well sorted, tight, no shows.

30% SHALE, as above.

20% SILTSTOWN, as above, in part slightly carbonaceous.

50% SANDSTOND, as above, very fine to fine and modium grained, tight, no above. Trace QUARTE, COAL, CALCITE,

30% SHALD, as above, mainly mid grey.

10% SILTSTONE, as above,

60% SANDSTONE, arhosic, light groy, greenish and white, slightly greenish, very fine to medium grained (with many loose QUARTZ GRAINS, subrounded to subangular, fine to medium grained), firm, massive, rarely slightly carbonaceous, very clightly calcareous, tight, no shows.

Trace CALCITE, pinkish;
LYMESTONE, grey, crystalline.

50% SHALE, as above. 20% STLISTONE, as above, tight, 30% SANDSTONE, as above, tight,

core no. 7. Recevered 10' 100% SEE CORE DESCRIPTION.

(Picked up with Core No. 8.)

CORE NO. 8. Recovered 2'6" 50%

SEE CORE DESCRIPTION.

20% SHALE, dark grey, slightly silty, firm, fissile, well and thinly bedded.

80% SANDSTONE, arkosic, light green-grey, fine to medium grained, occasionally very fine grained, fair sorted, firm, massive, consists of QUARTZ, FELDSPAR, minor MCA, coloured mineral graine, occasional carbonaceous flecks and black aggregates of very fine graine; tight, no shows.

20% SHALE, as above. 80% SANDSTONE, as above, in part very fine grained to silty, occasionally yellow-grey, tight, no shows.

Traco QUARTE GRANULES: PYRITE, SILTSTONE, light gray, argillacoous, firm, blocky,

31500 - 31600

20% SHALM, as above, coensienally slightly silty.

20% SILASTONE, light grow, clightly greenich, proillaceous, firm, blody, woll and thinly bedded,

60% SAMDSTOMM, as above, very fine to fine grained, light greengrey and fine to midium grained, yellow-grey, tight, me shows. Trace COAL, black, brittie.

31600 Circ. Sample TRIP

30% STALD, as above, in part salty, scoasionally greenish,

10% SILTETONE, as above, consismall grades to white; tight, no shows mainly very fine to fine, occasionally medium grained,

n.s.T. No. 2. 3095 - 3160'.

3160' - 3170'

3170' - 3180'

30% SHALD, light to mid gray, in part very cally, firm, facsile, occasionally slightly carbonacecus.

20% SELTSTONE, light to mid grey, argillocoons, very slightly sonly, finn, blocky.

50% SANDSTOND, cameric, light gray to unite, greenish, very fine to fine grained, fair to well sorted, firm, massive, cocasionally very slightly carbonaceous, tight, ne spens.

50% SHALE, as above, in part very cilty, occasionally slightly carbonaccous,

30% SILTSTONE, as above, argiliaceou

slightly charly, firm, blocky, coesically slightly carbonaccous, cocasicually well and thinly bedded.

20% SAMDSTONE, as above, very fine to fine grained, well to fair serted, tight, no shows. Trace COAL, CALCITE, white to buff, soft, blocky, slightly sandy SHALD.

3180' - 3190'

3190' - 3300'

32001 - 32101

32101 - 32201

50% SHALE, as above, and browngrey, firm, fiscile, in part clightly carbanaceous, eccasionally well bedded, trace PYRITE.

20% SILTSTONE, as above, occasionally with sandy otreals, well and thinly bodded,

30% SANDSTONE, as above, very fine to fine grained, cocacionally slightly carbonacous, tight, no shows.

30% SHALE, dark to mid gray, rarely graonide, vory slightly silty, firm to hard, fissile, eccasionally well and thinly bedded, in part slightly calcaracus, in part slightly carbonacacus.

10% SHITSTOND, mid groy, argillaceous slightly candy, firm, blocky, coensionally well and thinly bedded, in part slightly calcareous, in part slightly carbonaceous.

60% SANDSTONE orhocic, light gray to white, greenish, very fine to fine grained, eccasionally medium grained, fair to well sorted, firm, massive, rarely slightly earbonaceous, slightly micaceous, very slightly calcareous, tight, no shows.

Trace QUARTZ, COAL, CALCITE, Trace CALCITE VEINS in SANDSTONE.

50% SHAIR, as above, occasionally green, occasionally block, scapy, well and thinly bedded.

20% SILESTONE, as above, in part very well and thinly bedded, slightly carbonaceous.

30% SANDSTONE, as above, light green-grey to occasionally white very fine to fine, occasionally medium grained and occasionally very fine grained to silty, well and thinly bedded, slightly carbonaceous, white, tight, no shows, Trace CALCITE.

50% SHALE, as above, and brownblack, carbonacous.

20% SILTSTONE, as above, occasional) slightly sandy.

30% SANDSTONE, ac above, light grees grey, trace white, very fine to fine grained, well sorted, occasionally slightly carbon-accous, tight, no shows, with mare "veims" of QUARTZ, granular aggregate, clear to amber at contact with SANDSTONE.

3220° - 3230°

32300 - 32400

32401 - 32501

3250' - 3260'

40% SHALD, as above, light to dark groy, green-groy, black, brown, firm, fiscile, in part carbonaccous, econsicually well and thinly bedded, econsicually slightly micaceous.

20% SILTSTONE, in part mid grey, occasionally greenish, rore grey-brown, canbonaceus, argillaceous, cocasionally clightly candy, firm, blocky, eccasionally well and thinly

bedded.

40% SAMDSTOME, as above, arkesic,
grey-green to light grey and
white, very fine to fine graine
cocasionally medium grained,
well screed, firm, massive,
cocasionally alightly carbonaccess; tight, no shows, rare
trace bodding.

70% SHALD, light to dark grey, occasionally greenish, black, in part clightly silty, firm, fissile, edensionally slightly carbonessus, in part slightly calcarous, eccasionally well and thirly bedded.

calcarous, occasionally well and thinly bedded.

20% SILTSTONE, in part well and the ly bedded, light groy, argill-access, calightly sandy, first, blocky, in part elightly calcarous, occasionally well and thinly bedded.

10% SANDSTONE, arkonic, very fine to fine grained, tight, no shows.

10% SANDSTONE, arkesic, very fine to fine grained, tight, no chose.

50% SHALE, as above, and black, slightly scopy looking.

20% SILTSYONE, as above, in part granusb.

20% SANDSTOND, arkosic, light green-grey, very fine to bilty firm, emesive, slightly carbonaccous, tight, we shows. Trace PIRITE, CALCITE, QUARTZ.

50% SHALE, as above, occasionally brownish.

30% SILTSTONE, as above, grades to very fine grained SANDSTONE.

20% SANDSTONE, as above, very fingrained to silty, occasionally fine grained, occasional trace bedding; tight, no shows.

Trace CALCITE, clear and whit

40% SHALE, as above. 20% SILISTONE, as above.

40% SANDSTONE, arhosic, light grey-green, very fine to fine grained, fair sorted, firm, massive, rare trace bedding, in part slightly carbonacocuo, composed of clear to white and grey, well to subrounded QUARTZ, white FELDSPAR, groom and red minoral grains, carbenaceous specks, rare MiCA in a greengray, argillicoous matrix, tight, no shows. Trace CALCHIE.

32701 - 32801

60% GMALD, as above, and brown,

very slightly carbonatesus. to mid grey, argillaceous, slightly sandy, slightly carbonaceous.

20% SAMDSTONE, antesko, as above, vory fine to fine grained and occasionally very fine grained to silty, tight, no shows. Traco COAL, black, brittle.

32301 - 32961

40% SHALE, as above, occasionally with CALCUTE VEINS.

20% SILTSTONE, as abevo.

40% SANDSTONE, as above, in part carbonaceous, with lithic, carbonaceous fragments; tight, no shows,

32900 - 33000

- 60% SHALE, as above, in part cilty, light to dark grey, brown to black,
- 30% SILASTONE, as above, in part grades to very fine grained SAMDSTONE, light to mid gray, occasionally greenist.

10% SAMDSTONE, as above, very fine to fine grained, tight, mo shows. Traco COAL. CALCITE.

3300' - 3305'

- 50% SHALE, as above, mainly black to brown, occasionally grades to carbonaceous SMALE and COAL; occasionally greenish.
- 30% SHASTONE, as above, argillaccors, slightly candy to very fine grained SANDSTONE, occasionally slightly carbonaceous, well and thinly
- 20% SANDSTONE, very fine to fine grained, as above, tight, no shows. Trace CALCITE, COAL, PYRITE.

3310" - 3320"

3320' - 3330'

3330' - 3340'

3340' - 3350'

50% SHALE, mid to dark groy, greenish and brown to black, carbonecous, occasionally silty, rarely slightly sandy, firm, fissile, in part well bedded, occasionally slightly carbonacous.

top SILTSTONE, light to mid grey, occasionally graenish and browngrey, argillaceous, grades in part to very fine grained SANDSTONE, firm, blocky, in part slightly carbonaceous, eccasionally well and thinly bedded,

10% SAMDSTOND, Antesie, light grey, greenich, very fine graided to cilty, farm, macsive, rarely with pyritic commut, thent, me chors.

Trace COAL, CALCUTE.

70% SHALE, as chowe, coesionally black, classically acopy in appocrance,

20% SILISTONE, as above.

10% SANDSTONE, as above, tight, no shows.
Trace PYRETE, COAL, CALCITE.

60% SHALE, as above, in part greengray, and occasionally light arev.

grey.
30% SILTETCHE, as above, grades
into very fine grained SARDSTONE, light grey-green.

10% SANDSTONE, as above, vory fine grained to silty, tight, no shows. Large percentage FELDSPAR.
Trace COAL, CALCTTE, rare QUARTZ.

20% SHALE, as above.

20% SILISTONE, as above.

50% SANDSTONE, 30% light green-grey arkosic, fair to well sorted, eccasionally silty, 50% brown, very fine to fine and silty, hard, slightly calcareous, massive, composed of QUARTZ, some FELDSPAR, mineral grains, in a slightly calcareous matrix, tight, me shows.

Trace CALCITE, QUARTZ.

30% SHALE, as above, in part slightly silty, occasionally carbonacous.

20% SILESTONE, as above, light groy-green, grades to very fine grained SAMDSTONE, argillacoous.

50% SAIDSTONE, as above, 50% light gray to gray-green, very fina grained to silty, 20% brown, as above. ... 62.

30% SHALE, as above.

20% SILASTONE, as above.

50% SANDSTONE, as above, light grey to light grey-green, very fine to fine grained, silty, much being ground up to individual QUARTZ GRAINS, tight, argillacoous/kaolinitic cement, no shows. Trace CALCITE, QUARTZ.

3360" - 3370"

20% SHALE, light to dark gray, occasionally greenish and black carbonaceous, silty, firm, fissile, well and thinly bedded, occasionally slightly carbonaceous.

20% SILTSTONE, light to mid grey, greenish, and grey-brown and white, argillaceous, occasion-ally slightly sandy, firm, blocky, in part carbonaceous, well and thinly bedded, occasional CALCITE VEINS to

1", orange.

60% SANDSTONE, white and light green grey, arkosic, very fine to fine grained, silty, fair sorted, firm, macsive, rarely slightly carbonaceous, tight, mo shows. Trace PYRITE, COAL, CALCITE,

QUARTZ PEBBLE, Trace badding,

3370' - 3380'

40% SHALE, as above, brown to black, carbonaceous,

20% SILTSTONE, as above, grades to very fine grained SANDSTONE,

40% SANDSTONE, arkosic, white to light green-grey, very fine to fine grained, silty, tight, no shows,

3380" - 3385" Circ.

20% SHALE, as above.

60% SILTSTONE, as above, 50% of sample brown, sandy, slightly calcareous, hard, slightly siliceous, massive, grades to vory fine grained silty SANDSTONE.

20% SANDSTONE, as above, and brown, very fine grained, silty, tight, no shows. Trace COAL, PYRITE.

40% SHALE, as above.

30% SILTSTONE, light to mid grey, graonish, occasionally brown, argillaceous, occasionally alightly silty.

30% SANDSTONE, light grey, occasionally greenish, very fine grained, arkosic, tight, no shows.

33851 - 33901 TRIP

3390° - 3400°

34001 - 54201

34100 - 34200

3420' - 3430'
(New sample catching method - as sumples setting smaller - better tamples especially for fines)

20% SHALE, as above, light to dark grey, cocasionally green-ish, ware brown to black, carbonacous.

30% SILASTOND, as above, and trace brown, cilicaous, . slightly calcarcous, as above.

50% SANDSTONE, mainly white, cocasionally green-grey and brown, very fine grained, arkesic, tight, no shows, knolimitic coment.

Trace COAL, CALCITE.

20% SHALD, as above, slightly sality, firm, fissile, eccasionally slightly carbon-accous, well bedded.

20% STLMSTOMB, as above, mainly well and thinly bedded.

60% CANDSTONE, no above, mainly white, occasionally slightly greenish, very fine grained, occasionally fine to medium grained, fair to poorly sorted, tight, no shows.

Trace COAL.

40% SHALD, as above, in part brown to black, carbonaceous.

10% SXLISTOND, as above.

50% SANDSTONE, as above, white and occasionally brown, very fine grained and occasionally fine to medium grains; tight, no shows. Trace COAL, orange CALCITE.

10% SHALE, light to mid gray and brown to black, firm, fissile, cocasionally slightly silty, in part carbenaceous, cocasionally well and thinly bedded.

10% SILTSTOME, light gray, grashish, argillocacus, vary slightly sandy, firm, blocky, wall and thinly bedded, slightly carbon-

aceous,

80% SANDSTONE, white to very light grey-green, arkosic to subarkosic, very fine to fine grained, rare modium grains, firm to hard, occasionally slightly carbonacoous to very carbonaceous, composed of clear to cloudy and occasional coloured QUARTZ, white and occasional orange FELDSPAR, carbonaceous matter (detrital?) occasionally red, green or brown, mineral grains, rare matrix, tight, no shows. Trace COAL, black, SHALE light brown, CALCETE, dark brown.

34401 - 34501

20% SHALB, as above, in part slightly calcareaus.

10% SHASTOND, as above, light grey-greenish and coessionally grey-brown, slightly carbon-೩೦೦೦೮೩೩

- 70% SAIDSTONE, but more greenish than above, and occasionally yellow-brown, tight, no shows. Trace CALCITE to lon; QUARTZ gramuie, COAR, black, brittle.
- 30% SANDSTONE, as above, in part carbonaceous to very carbonaccours.
- 20% SHARSTONE, as above, light to mid, econsidentily dank grey, angillaceous, very slightly sandy, occasionally slightly ಂದಾಣಿಂದದಂತಿರಾಗರ.
- 50% SAITESTONE, as abevo, very fine to fine grained, well to fair sorted, tight, no shows. Trace CALCITE, QUARTZ granule and pebbles, PIRITE, COAL.

3450: - 3460:

10% SHALE, as above. 10% SILASTONE, as above.

- SO% SANDSTOND, as above, arkesic, white to very light greenishgray, very fine to fine grained, occasionally medium grained, hard to firm, well to fairly sorted, tight, no shows, massive, raroly slightly carbemaceous and elightly ealcareous, Trace QUARTZ, COAL, PYRITE.
- 10% SHALE, as above, light to dark brown-gray, occasionally groenish, slightly silty, occasionally slightly carbonaceous, firm, fissile,

20% STLISTONE, as above, argillaccous, occasionally slightly sandy, occasionally slightly carbonaceous, well and thinly bedded.

70% SANDSTOND, as above, tight, no shows, enkosic, very fine to fine grained, occasionally slightly carbonacecus. Trace COAL, QUARTE, PYRETE,

CALCITE,

30% SMALE, as above, in part silty. 30% SILTSTONE, as above,

occasionally grades to very fine

grained SANDSTONE.

40% SANDSTONE, as above, white to light groy, amasia, fine grained to silty, firm, tight, no shows.

34600 - 34700

34701 - 34801

10% SHALE, mid to dark grey, groy-brown.

10% SILMSTONE, light to mid groy-

greenich, argiilaceous. 80% SANDSTONE, light green-grey, arkosic, very fine grained, occasionally callty or fine grained, well to fair sorted, coasionally slightly carbonaccous, firm, massive, tight, no chave, Spades to SILISTOND. Trace CALCITE, pink; COAL, black, Much white to light gray mud in sample.

34901 - 34951 Circ.

20% SHALE, as above.

50% SWASTOWN, as above, argillinese well and thinly bedded, slightly carbonaceous.

30% SANDSTOLE, as above, arkesic, very fine grained to cilty, tight, no shows, cocasiomally slightly carbonaceous, grades to SILTSTONE. Trace black COAL, PERITE.

30% SMALE, as above, silty in

part. 50% SILTSTONE, as above, argiliaccous, slightly carbonaccous, well and thinly bedded,

20% SAMDSTONE, as above, yerr fine to cilty, slightly argillactors, tight, no shows. Trace CALCITE.

10% SHALE, as above, 11ght to mid groom-groy, slightly seady.

40% SANDSTOND, as above, arkesio, light green-gray, vory fine grained to silty, fair to woll sorted, tight, no shows, Trace COAL, blacky FYRITE,

20% SMALE, as above, and graybrown to black, carbonacoous, silty,

50% SILTSTONE, as above, occasionally grading to very fine grained SANDSTONE,

30% SANDSTONE, as above, very fine grained to silty, occasionally brownish-gray, tight, no shows. Trace black COAL, clear CALCITE

20% SHALE, as above, in part slightly bilty, well and thinly bedded, slightly carbonaceous,

50% SILITSTONE, as above, light to mid greenish-grey, occasionally slightly carbenaccons, occasionally sandy,

30% SANDSTONE, as above, very fine grained, cocasionally fine

34951 - 35101

35000 - 35100

3510' - 3520'

3520' - 3523' Circ,

3520' - 3523' (cont)

3523° - 3530°

35301 - 35401

35401 - 35501

35501 - 35601

grained, in part cilty, occasionally carbonaceous and well bedded, firm, slightly brittle, tight, no shows.

Trace PYRITE, CALCITE.

60% SHALE, light to dark grey, coessionally green-grey, and brown, carbonaceous, in part very slightly silty, firm, fissile, in part very slightly carbonaceous, in part very slightly calcareous, occasionally well and thinly bedded.

30% STLTSTONE, light to mid and occasionally dark gray, cocasionally graemish, argillacoous, rarely slightly sundy, firm, blocky, occasionally slightly carbonacous, cocasionally well and thinly bedded.

10% SANDSTONE, Artosic, light groygreen, very fine grained to
occasionally silty, fair to
well serted, firm, massive,
kaolinitic/argillaceous matrix,
tight, no shows.
Trace CALCITE, milky, QUARTZ
GRANULE; COAL, black; SHALE,
white, soft, blocky, occasionally slightly silty,

70% SHALE, as above and brown to purplish-brown, carbonaceous.

20% SANDSTONE, as above, very fine grained, occasionally fine or silty, tight, no shows.

or silty, tight, no shows. 10% STLISTONE, as above, argillaccous, very slightly sandy. Trace COAL, CALCITE,

60% SHALE, as above, in part very salty.

20% SILTSTOND, as above, occasionally grades to very fine grained silty, rarely very carbonacous SANDSTONE,

20% SANDSTONE, light green-grey and buff, occasionally nonarkosic to sub-arkosic, very fine to fine grained, tight, no shows. Trace COAL, black; CALCITE, vein type; PYRITE.

40% SHALE, as above. 20% SILTSTONE, as above, argill-

acocus, well and thinly bedded
40% SANDSTONE, light green-grey,
as above, and mid to dark green
(burnt in drying?), arkesic,
silty to very fine grained,
firm, massive, carbonaceous,
tight, no chous.
Trace PYRITE, CALCITE.

000 676

50% (Millia), as above, likely to durk brown and coencionally black, carbonaceous, firm, fissile.

30% SILMSTONE, as above, light to mid greenieb-grey, argillacecus, in part slightly sendy.

10% SAMDSTOME, an above, tight, no shows. Trace CALCETE, COAL, FYRITE.

3570' - 3580'

50% SIMIA, as above and occasion-

ally grey-green or brown. mid grey and greenish-grey, angillacoous, in part slightly candy.

10% SHALE, as above, very fine to films grained, tight, mo shore. These CALCING.

10% SHAMM, as above, light to dank grey, eccasionally silty.

30% STLASTONE, as above, in part sandy, occasionally slightly calcareous, an part grades to SAMDSTONE,

60% SAIDSTONE, grey-green, yellow-brown, awkosic, silty to very fine grained, slightly cillicous, slightly calcameous, fair sorted, with argillacoous matrix, tight, no shows. Trace CALCITE.

20% SMALD, light to dark gray, occasionally greenish, firm, fissile, well and thinly bedded, in part slightly carbonaceono, in part slightly calcareous.

50% SILTSTONE, light grey to late to green-grey, argullaceous, grades to very fine grained SAMDSTONE, firm, blocky, in part well bedded, in part

sinconivo.

30% SAMUSTONN, autocio, light groon-groy, light grey and cocasiomally yellow-brown, vory fine grained to salty, fair scried, firm to hard, massive, in part carbonnescus, thinly boaded, with argillaccous (slightly silicified?) matrix, tight, no shows. Trace CALCITE, white to clear; PYRITE.

50% SHALE, as above with trace slickensides.

20% STLTSTONE, as above, light grey to light green-grey, argillacoous.

30% SANDSTONE, as above, (mostly as losse QUARTE GRAINS 30% of cample) arkecie, very fine

35801 - 35901

35901 - 36001

3600' - 3620'

... 58.

3610' - 3620' (cont) to fine grained, fair sorted, light grey to buff, speckled, firm, massive, composed of clear, cloudy to grey QUARTZ GRAINS, rounded to subangular, white FELDSPAR GRAINS, rare mineral specks in a kaclimitic or argillaceous matrix, tight, no shows, slightly calcareous. Trace COAL, black brittle; PYRITE; CALCUTE, clear, granules of QUARTZ.

3620" - 3630"

30% SHALE, as above, in part slightly silty, firm, fissile, occasionally well and thinly bedded.

20% SILTSTONE, as above, in part well and thinly bodded.

50% SANDSTONE, as above, fine to very fine grained, light grey to light green-grey and buff, fair sorted, tight, no shows. Trace COAL, as above. QUARTZ GRAINS. CALCITE.

3630° - 3647°

30% SHALE, as above, firm, fissile, occasionally slightly silty, slightly carbonaceous.

jo% SILTSTONE, as above, argillaccous, light grey, occasionally green-grey, in part very slightly sandy,

40% SANDSTONE, as above, tight, no shows, kaolinitic comont.

3640° = 3650°

20% SHALE, light to dark grey, very slightly cilty, firm, fissile, slightly carbonaceous.

20% SILTSTONE, light grey and greenish-grey, argillaceous, firm, blocky, slightly carbonaceous.

60% SANDSTONE, as above, light gray to green-gray, occasion-ally blueish tings and buff to yellow-brown, very fine to fine grained, tight, no shows. Trace COAL, CALCITE.

30% SHALE, light to dark grey, occasionally greenish and brown to black, carbonaceous, occasionally very slightly silty, firm, fissile, occasionally well and thinly bedded, in part slightly calcareous, in part slightly carbonaceous.

in part slightly carbonaceous.

30% SILTSTONE, light to mid grey, occasionally greenish, grades to very fine grained, silty SANDSTONE, argillaceous, firm, blocky, in part elightly calcareous, well and thinly bedded, occasionally slightly siliceous, mon argillaceous, massive.

3650" - 3660"

2650°	0	ვ ძ 60 1	9
(c	ont	•	

40% SANDSTONE, arkosic, white to light groy, and light green-grey, silty to fine and very fine grained, fair to poorly sorted, firm, massive, occasionally slightly carbon-aceous, kaolinitic matrix, slightly calcareous, tight, no shows.

Trace CALCITE, voin type, black COAL, QUARTZ GRAINS. Most likely much very fine grained QUARTZ and SILT sized QUARTZ going through shaker; therefore, more SILTSTONE and SANDSTONE than shown.

36601 - 36701

30% SHALE, as above, occasionally slightly silty.

40% SILTSTONE, as above, in part argillaceous, in part grades to very fine grained SANDSTONE.

30% SANDSTONE, very fine to silty, occasionally fine grained, tight, no shows, occasionally light green mineral grains, Trace CALCITE, as above, PYRITE.

3670" - 3680"

30% SHALE, as above.

50% SILTSTONE, as above, occasion-

ally slightly sandy.

20% SANDSTONE, as above, very fine grained to silty, occasionally fine grained, tight, no shows.

Trace CALCITE, QUARTZ, COAL.

3680" - 3690"

3690" - 3700"

50% SHALE, as above, light to dark grey, firm, slightly fissile, occasionally black, carbonaceous

40% SILTSTONE, as above, mainly argillaceous, very slightly sandy, light to mid grey.

10% SANDSTONE, as above, very fine to fine grained or silty, tight, no shows.

60% SHALE, as above, mainly light to rid grey, firm, slightly

fissile, slightly calcareous.
30% SILTSTONE, as above, argillaceous. in part slightly sandy.

10% SANDSTONE, as above, very fine to fine grained, tight, no shows, grey-green to light grey.
Trace CALCITE, COAL, QUARTZ.

3700" - 3710"

30% SHALE, as above, light to dark grey, brown to black, firm, fissile, occasionally silty.

20% SILTSTONE, as above, argillaceous, occasionally slightly sandy, firm, blocky, occasionally well and thinly bedded. 3700' - 3710' (cont)

3710' - 3711' Cire,

37111 - 37201

- 50% SANDSTONE, (including loose very fine QUARTZ GRAINS), as above, arkosic, light grey to green grey, occasionally buff and occasionally white, very fine grained, occasionally fine grained, sometimes silty, frim, massive, kaclinitic coment, tight, no shows.

 Trace COAL, CALCITE, PYRITE.
- 40% SHALE, light to dark gray, gray-green, black to brown, occasionally gray-brown, occasionally slightly silty, firm, fissilo, occasionally slightly carbonaceous, occasionally well and thinly bedded.
- 20% SILTSTONE, light to mid gray, occasionally groenish, argill-accous, in part slightly sandy, firm, blocky, occasionally slightly carbonaccous, occasionally well and thinly bedded.
- 40% SANDSTONE, arkesic (includes loose, very fine to silty grains), very fine to silty, occasionally fine grained, light grey to light greengrey and buff, occasionally slightly carbonaceous, firm, massive with rare trace bedding, composed of QUARTZ, FELDSPAR, miner colcured mineral grains (green, black and occasionally red), rare MICA, in a white kaelimitic matrix, tight, no shows.
- 60% SANDSTONE, light greenish-grey, very fine grained to fine grained, arkesic, slightly calcareous, firm, consists of fairly sorted, subangular, light grey QUARTZ, pale brown FELDSPAR, minor indeterminate green grains, trace brown MICA, carbonaceous and coaly grains, and red specks in kaclinitic, slightly calcareous matrix; tight.
- hatrix; tight.

 40% SHALE, grey, green-grey, some brown, firm, silty in places, very slightly micaceous, occasional carbonaceous specks, only rarely fissile. The brown variety shows trace slickensides, is slightly carbonaceous.

3720' - 3730'

60% SHALE, as above, mostly grey variety.

40% SANDSTONE, as above, tight. Trace CALCITE, COAL.

37301 - 37401

Sample contaminated - 70% SHALE, as above.

37400 - 37500

30% SANDSTONE, as above, tight.

50% SHALE, medium grey, occasionally green-grey, as above, some dark grey, carbonaceous.

50% SANDSTONE, as above, tight, varies to brown, very calcareous, in a few places; coaly and carbonaceous grains slightly more common.

Trace CALCITE, PYRITE and medium to coarse grained, loose, subangular to angular QUARTZ GRAINS.

37509 - 37609

80% SHALE, medium gray, silty in places, slightly micaceous, (very fine), occasionally slightly carbonaceous, some weak fissility.

20% SANDSTONE, as above, tight.
Trace CALCITE, loose, very
coarse grained, angular, clear
QUARTZ grains and granules.

3760' - 3770'

50% SANDSTONE, light greenish-grey, light brown, fine grained to occasionally medium grained, fairly sorted, subangular QUARTZ, etc. as above. Light brown variety very calcareous, tight,

50% SHALE, as above; some dark grey, dark brown-grey, slightly slickensided SHALE.
Rare coaly inclusions in dark grey SHALE.
Trace CALCITE, very coarse grains of QUARTZ, as above.

3770' - 3780'

10% SILTSTONE, light gray, whitishgray, firm to rather friable, kaolinitic, fine carbonaceous specks, common - grades to very fine grained SANDSTONE.

30% SANDSTONE, light greenish-grey, very fine to fine grained, consists of fairly sorted, subangular QUARTZ, etc. as above, in a kaolinitic, slightly calcareous matrix, tight.

60% SHALE, as above.
Common trace COAL (black and shaley) in sample. Trace CALCITE, white, some pink.
Rare trace PYRITE.

70% SANDSTONE, as above, very fine to fine grained; tight.

30% SHALE, as above. Common trace COAL, black. Some bright, brittle, better quality than previously.

37901 - 38001

30% SANDSTONE, as above, tight. 70% SHALE, as above, occasionally very silty. Trace COAL, as above, Trace very coarse grained, sub-

angular to angular, clear QUARTZ GRAINS, occasional granules. Trace CALCITE.

3800' - 3805' Circ.

20% SANDSTONE, as above, tight,

rarely with coaly laminae. 80% SHALE, medium grey, brown, greenish-grey, slightly micromicaceous, silty in part, occasional carbonaceous specks. Between 5 and 10% of SHALE is black or dark brownish, soft, fissile, coaly, occasionally slightly slickensided. Common trace COAL (possibly 2-5%) black, bright, brittle and black, shaley,

3805' - 3810'

40% SANDSTONE, light grey, light greenish-grey, fine to occasionally medium grained, arkosic, slightly calcareous in places, fairly hard, brittle. Consists of fairly sorted, subangular to subrounded, light grey to medium grey QUARTZ, pale to medium brown FELDSPAR, trace carbonaceous grains, some greenish, reworked, shaley grains, rare trace brown MICA, red specks, some brown, ashy, tuffaceous? grains in a kaolinitic, slightly calcareous, very slightly siliceous matrix. Tight.

20% SILTSTONE, light medium grey, finely micaceous, argillaceous, carbonaceous specks.

40% SHALE, medium gray, green-gray, dark brown-gray, rarely fissile, firm, silty in part. Dark brown variety slightly carbonaceous.

3810' - 3820'

30% SANDSTONE, as above, slightly more calcareous, traces of pale brown, calcite filled fractures. Less well sorted, tight.

10% SILTSTONE, as above.

60% SHALE, as above. Trace CALCITE loose in sample. . . . 73 .

20% SAMDSTONE, as above, tight. Trace grains CHLORITE?

10% SILTSTOWE, as above.

70% SHALE, as above. Trace black COAL. Trace plant fragments in dark brown to grey SHALE. Trace loose, coarge to very coarse grained, clear, subangular to angular QUARTZ GRAINS.

38301 - 38401

30% SANDSTONS, as above, tight.

10% SILTSTONE, as above.

60% SHALE, as above. Trace CALCITE, loose in sample. Rare trace COAL.

38401 - 38501

10% SANDSTONE, as above, tight.

20% SILTSTONE, as above.

70% SHALE, as above. Includes 20% of dark brown-grey and dark grey SHALE, which is carbonaceous, coaly, slicken-sided in part, soft, with rar laminations of GYPSUM, with rare CALCITE, associated with coaly laminations

3850' - 3860'

70% SHALE, mid grey, medium green-grey and medium browngrey. Some dark brown-grey and dark grey. Hid grey variety slightly micromicaceous, firm, raroly flasile. Dark grey variety soft, slightly carbonaceous, occasionally coaly.

20% SANDSTONE, light greenishgrey, fine grained, arkosic, fairly hard, brittle, consisting of fairly sorted grey QUARTZ, pale brown FELDSPAR, some reworked green-grey SHALE GRAINS? some coaly flecks, trace CHLORITE? GRAINS, trace brown, ashy, tuffaceous? grains in kaolinitic to slightly calcarecus matrix. Tight.

10% SILTSTONE, light grey, whitieh grey, argillaceous. Trace carbonaceous specks. Trace CALCITE.

38601 - 38701

80% SHALE, as above.

10% SANDSTONE, as above, tight, some softer, rather friable. Tight.

10% SILTSTONE, as above.

38701 - 38781 Circ.

70% SHALE, as above. 20% SANDSTONE, as above, tight.

10% SILTSTONE, as above. Trace black COAL, GYPSUM and CALCITE as laminae in dark grey SHALE.

80% SHALE, as above.
20% SANDSTONE, as above, fine grained, occasionally medium grained, tight.
Common trace SILTSTONE, as above Trace COAL.
Trace soft, brown, ashy TUFF

3890' - 3900'

70% SHALE, as above, slightly silty in places.

which hydrates readily.

20% SANDSTONE, as above, very fine grained to fine grained, tight.

10% STLTSTONE, as above.
Trace COAL, CALCITE, Rare
trace PYRITE.

3900' - 3910'

60% SHALE, as above, slightly more silty. SHALE is dominantly the medium grey to medium greenish-grey variety.

20% SILTSTONE, light to medium grey and greenish-grey, argillaceous, finely micaceous, fine carbonaceous specks.

20% SANDSTONE, as above, mostly fine grained, some very fine grained. In places very hard, partly silicified, eccasionally fairly soft, slightly friable. Tight.

Trace COAL, CALCITE.

Rare trace brown, soft, ashy, tuff, hydrates readily.

3910' - 3920'

70% SHALE, as above.

20% SILTSTONE, as above.

10% SANDSTONE, as above, tight.
Trace COAL, CALCITE.
Rare trace soft, ashy TUFF,
as above.

80% SHALE, as above, includes 10% of black, soft, coaly, fissile, partly slickensided SHALE.

20% SANDSTONE, light to medium grey, very fine to fine grained arkosic, consists of fairly sorted, subangular to sub-rounded QUARTZ, pale brown FELDSPAR and reworked carbon-accous and coaly grains in a slightly calcareous, slightly siliceous, clayey matrix. Trace red specks. Tight, moderately hard.

Trace CALCITE, common trace COAL. One chip of asby TUFF, as above with scattered QUARTZ GRAINS.

3920' - 3930'

3930" - 3940"

70% SHALE, as above, commonly slightly silty. Trace only black, carbonaceous, coaly SHALE, as above.

20% SILTSTONE, as above.

10% SANDSTONE, as above, occasionally medium grained. Rare trace coaly laminations; tight.
Trace CALCITE (white). Rare trace pink CALCITE.
One chip of soft, asky TUFF, as above, with scattered fine to medium grained, subrounded QUARTE GRAINS.

3940' - 3945'

70% SMALE, as above. Cormon trace black coaly SMALE.

20% SILISTONE, as above, generally light grey. Occasionally very slightly calcaraous.

10% SANDSTONE, as above, varies to whitish-grey, hackinitic. Some grochich-grey SANDSTONE present, well reverted green-ish-grey SHALE GRAINS? and rare trace brown MICA, in addition to pale brown FELDSPAR and coaly grains. Tight.

Trace CALCITE, COAL and rare trace soft, ashy, sandy TUFF,

es above.

60% SHALE, as above, silty.
Includes 20% of dark brown to black, soft, fissile, partly slickensided coaly SHALE.

30% SILTSTONE, as above, varies to medium grey and greenish-grey

in places.

10% SANDSTONE, as above, very fine to fine grained, tight.
Common trace COAL, black, brown-black, shaley.
Trace CALCITE. One small (4mm) subrounded, frosted QUARTZ PEBBLE noted, loose in sample.

3945°

CORE NO. 2:

600' - 610'

Cuttings: 600' - 605'

Recovered 42"

10% MUDSTONE, light grey, silty, blocky, occasionally laminated, firm, slightly carbonaceous.

10% SILTSTONE, light grey, sandy in part, some occasional white FELDSPAR and carbonaceous flecks.

80% SANDSTONE, light green-grey, fine grained, arkesic, argillaceous, consists of QUARTZ, white FELDSPAR and green and black minerals, in an argillaceous matrix; occasionally coaly flecks; tight, no shows.

605 - 610

20% MUDSTONE, as above. 10% SILTSTONE, as above. 70% SANDSTONE, as above, very argillaceous in part, occasionally

lithic; tight, no shows.

Top 2"

SANDSTONE, arkosic, grey-green, fine grained, occasionally medium grained, with very argillaceous matrix (grains: matrix = 1,2) consists of clear, cloudy and grey QUARTZ, white FELDSPAR, black and red mineral specks, in a green to grey-green, argillaceous matrix, tight, no shows, very slightly calcareous; massive.

Bottom 25"

SANDSTONE, medium grey-green, fine grained, hard, slightly siliceous, consists of clear to light grey QUARTZ, carbonaceous flecks and partly decomposed FELDSPAR, in a medium grey, argillaceous, slightly siliceous matrix, calcareous, tight, no shows; massive, but has tendency to split vertically.

CORE NO. 3:

610' - 620'

Recovered 10'

UNIFORM LITHOLOGY - Greenish-grey, speckled SANDSTONE, arkosic, very fine to fine grained, occasionally fine to medium grained, well sorted, consisting of clear, white and grey QUARTZ, white FELDSPAR, often decomposed, green, red, black mineral grains and specks, in a greenish or greenish-grey, argillaceous, very slightly calcareous matrix. Rare INICA, possibly black mineral is carbonaceous; tight, no shows. The core exhibits no definite bedding with only the very slightest indication of a dip of 15-20°. In the bottom foot the core is, in part, more siliceous than arkosic - slightly harder with leas green colour.

CORE NO. 4:

1597' - 1607'

Ditch Cuttings: 1597' - 1607'

Recovered 9"

20% SAND, loose QUARTZOSE, fine to occasionally medium grained, fair sorted, well to subrounded, clear and cloudy and grey QUARTZ GRAINS, occasionally coloured (red, green and white), mineral grains. Constituents same as of arkosic SANDSTONE and probably result of grinding instead of coring.

20% SANDSTONE, arkosic, in part QUARTZOSE, fine, occasionally very fine or medium grained, well sorted, consists as above, with MICA, massive, firm, tight, no shows.

10% SILTSTONE, light gray, argillaceous, slightly sandy, firm, well bedded, in part massive.

50% SHALE, wid to dark groy and greyblack, carbonaceous, firm, blocky, occasionally fissile, in part slightly silty, in part carbonaceous. Trace COAL, black.

CORE DESCRIPTION:

SHALE, dark grey, in part slightly silty, firm, fissile, very carbonaceous with abundant plant fessils, well and thinly bedded with occasional thin laminations and lenses of very silty SHALE and shaly SILTSTONE, light to mid grey, slightly carbonaceous.

Bottom 3"

Silty SHALE, mid grey, firm, fissile, well and thinly bedded with black and white mineral specks, slightly micaceous, in part grades to SILTSTONE and very fine grained SANDSTONE, arkosic, firm, calcareous, light greenish-grey, massive with QUARTZ, FELDSPAR and coloured mineral grains, tight, no shows.

The silty SHALE had a distinctive

The silty SHALE had a distinctive coal gas odour upon removing from core barrel.

CORE NO. 5:

16070 - 16100

Recovered 1'6"
(Cut 3' only as core head appeared to be blocked, and was),

Top 5"

Silty SHALE, dark grey, hard, fissile, well and thinly bedded with undulatory bedding and lensing, general flat dip, carbonaceous with plant fessil fragments, occasionally fine FELDSPAR GRAINS.

CORE NO. 5 (cont):

Next 5"

Next 8"

CORE NO. 6:

Top 4:9"

CONGLOMERATE, brown-grey, consists of granules and pebbles to 2cms in a silty matrix, firm, fissile, in part very carbonaceous, in part slightly calcareous, thinly bedded with undulatory bedding. Pebbles and granules consist of well rounded green-grey, brown-grey and yellow-brown SHALE, occasionally well bedded and contorted and soft, white, non-calcareous mineral, usually in a carbonaceous coating. Coal gas odour upon extraction from core barrel.

SILTSTONE, mid-grey, hard, slightly fissile, argillaceous, in part very slightly sandy, very slightly calcareous, well and thinly bedded with undulatory bedding and lensing, in part carbonaceous with plant fossils, in part very slightly micaceous with trace PYRITE. Shows in core due to coal gas.

Recovered 7' 8"

Interlaminated SHALE and silty SHALE, finely interlaminated, fissile, in part carbonaceous and in part with plant fossils, hard, occasionally CALCITE covered, slickenside planes approx 60° to axis of core and CALCITE filled cracks, trace of coal gas in the silty SHALE, light grey-greenish and dark grey to black, slightly greenish. Top 4'9" SHALE and silty SHALE, black. Shows current structures, lensing, washouts, occasionally short break shown by uneven bedding plane and small fragments in overlying sediments. Dips vary from 0-30° with dips between black SHALE and silty SHALE from 5-20'

Thinly interlaminated SHALE and silty SHALE, light green-grey, in part slightly silty, rarely slightly micaceous, firm to bard, fissile, carbonaceous with fragments of plants and it breaks more readily along bedding delineated by more carbonaceous content, very occasionally slightly calcareous and rare interbeds of SHALE, black, very slightly sandy with occasionally fine grained, well rounded QUARTZ, slightly silty, bard, fissile, carbonaceous, thinly bedded. Dips 0-30°. Trace coal gas in silty SHALE in bottom 3°.

core No. 6(cont):

Bottom 2'11"

SHALE, black, rarely very slightly silty, carbonaceous, firm to bard, fissile, non calcareous with carbonaceous fragments of plants and trees, with rare interlaminations of light green-grey SHALE, as above. Bedding dips up to 10°. Occasionally slickensided surfaces making 60° to axis of core, CALCITE covered and occasionally CALCITE FILLED cracks. No shows.

CORE NO. 7:

3113' - 3123'

Recovered 10' (Core No. 7 picked up in barrel with Core No. 8).

SANDSTONE, arkosic, grey-green, speckled, fine to medium or very fine grained, fairly to poorly sorted, firm, slightly crumbly on exposure to atmosphere with grains held reasonably loosely in matrix, mainly massively bedded with occasional bedding planes visible (due often to black LICA type matter) showing dips from approx 20 to approx 20°. Rare trace of (?) bedding on a fine (mm scale) scale. The SANDSTONE consists of QUARTZ, well to occasionally subrounded, clear, cloudy and grey, medium to very fine grained with roundness decreasing with grainsize, FELDSPAR, usually white, occasionally orange to pink, in clear blocks and subhedral grains, usually rarely twinned, slightly decomposed, occasional MICA PLATES, occasionally green; red, black and white mineral grains, occasionally carbonaceous specks, rare trace IIICA, in part slightly calcareous, in a green to greenish white matrix, chloritic or chloritic/kaolinitic. The core has no visible perosity (x30) and has no fluorescence.

<u>core no. 8:</u> 3123' - 3128'

Recovered 2'6"

SANDSTONE, as above, but fine to very fine grained, fair to well sorted, bedding traces 0-5, with abundant black (IICA type mineral, scapy (chloritic?) or occasionally finely granular; tight, no shows.

APPENDIX NO. 3.

GEOLOGICAL SURVEY OF VICTORIA - UNPUBLISHED REPORT 30/1965.

REPORT OF MARINE FAUNAS FROM TARVIN MEADOWS NO. 1 WELL

Cores and cuttings were submitted from Alliance Oil Development's Tarwin Meadows No. 1 Well. The sample datum was 30 feet, this being the elevation of the rotary table above sea level (ground level = 25 feet).

Sediments bearing marine fauna was first intersected at 30 feet within a silty sand. This fauna was present in cuttings for 130 feet below its initial appearance, but these occurrences were probably due to caving or mud contamination. No other fauna was reported from the section.

The fauna consists of predominantly foraminifera, with some gastropods, estraceds, bryozeal fragments and adherrent coiled worm tubes.

Foraminifora: Ammonia Beccarii is the dominant form, with Elphidium spp (including E. Advenum and E. pseudonodosum) and milliolide common. Planktonic species are present (approx. 5%) and include Globigerina bulloides E. subcretaces and Globorotalia inflata. Refer species include Patellinelia inconspica and Trifarina bradyi.

The faunal aspect is similar to that living at present off the Victorian coast line. The planktonic fauna suggests direct communication with oceanic currents, and thus the depositional site was in the vicinity of an open shore line and not in a narrow embayment. A. beccarii indicates near-shore conditions.

Gastropeds:- The gastropeds include Charisma josephi.
Notesetra of H.atkinsoni and Lodderia lodderia, which
are listed and illustrated by Vallentine (1965) from a
near shore Quaternary deposit at Port Fairy (Western
Victoria). As is the case of the foreminifera, the
preservation of the gastropeds is near perfect with
the retention of delicate ornamentation and traces of
shell colouration.

Age: The close similarities to living foraminiferal faunas and comparison with the Port Fairy Quaternary molluscan faunas, together with the excellent state of shell preservation suggests these faunas to be of recent origin. The Port Fairy deposits are post "Newer Basalt" and thus are obviously Quaternary. Therefore, the Tarwin Meadows fauna is considered as being of Quaternary age.

Similar foraminiferal and molluscen faunas are present within 100 feet of the surface along the Gippsland coastline. These Gippsland Quaternary faunas are specifically distinct and stratigraphically above the Plicene Jemmys Point Formation.

Reference:-

VALENTINE J.W. - 1965

Quaternary mollusca from Port Fairy, Victoria, Australia, and their palaececlogical implications. Proc. Roy. Soc. Vict. 78 (1) 13-73.

ALLIANCE OIL MANAGEMENT PTY. LTD.

DRILL STEM TEST DATA SHEET

SHEET No.:I
TEST No.:I
DATE: 11.7.1965

WELL NAME TARWIN MEADOWS NO. 1.	CO- °— ORDINATES —— °—	,,,E ,'S
HOLE DATA DEPTH 3128' FULL HOLE SIZE 55" RAT HOLE TOP	rat hole size	:
TESTING EQUIPMENT TESTING COMPANY PACKER(S): No. TYPEUII Hole SIZE 43" TOOL TYPE: Johns on Disc Valve Formation Tester LENGTH OF PERFORATIONS 11.2 ft. JARS USED SURFACE CHOKE SIZE WATER CUSHION ft. DRILL PIPE SIZE, OD. 28" LENGTH DRILL COLLARS 345.4	BOTTOM CHOKE SIZETOOL SIZE LENGTH ANCHOR	5" 23" 11.7
TEST DATA FORMATION TESTED Sandstone - Strzelecki Fm. Tester on Interval tested - From 3101! To 3128! Initial of Time Open Min. Initials.i. Finals.i. Initial cluwater cushion to surface Min. Initial flowards to surface Min. Final clowature of blow Pulled LC Out of Homeonetics.	PENING	AM/PMAM/PMAM/PMAM/PMAM/PM
GAS FLOW MAXIMUM RATE'H 2O'Hgp.s.ig METHOD OF MEASUREMENT	RISER SIZE	
PIPE RECOVERY TOTAL RECOVERY 430' FT. BBLS No. SAMPLES TAKEN MUD RECOVERY 430' FT. BBLS DESCRIPTION OIL RECOVERY FT. BBLS DESCRIPTION WATER RECOVERY FT. BBLS DESCRIPTION		
DRILLING MUD WT 10.5 VISC 49 DID LEVEL DROP IN AN	NNULUSNo	FT.
RECORD OF PRESSURES: BOTTOM OR TOP RECORDER INITIAL HYDROSTATIC INITIAL SHUT-IN INITIAL FLOW FINAL FLOW MAX. SURFACE PRESSURE TYPE OF RECORDS	FINAL SHUT-I	N
WEIGHT OF STRING BEFORE 5200 LBS. AFTER 5200 LBS. PULL LOC	ose5200 Le	s.
REMARKS Leak in drill pipe? enables 430! mud to e This acted as a "water cushion" and caused the "go disc valve with insufficient force to break it.	devil" to st	rikethe
SUPERVISOR:	G. C. Camp	e ,

ALLIANCE GIL MANAGEMENT PTY. LTD.

DRILL STEM TEST DATA SHEET

SHEET No.	:2
TEST No.:	12.7.1965
ישיים איזיים.	

		°	'	', F
WELL NAME TARWIN MEADOWS NO. 1.	ORDINATES	•	_,	?°\$
HOLE DATA				,
DEPTH 3160 FULL HOLE SIZE 55 RAT HOLE	TOPRAT HOL	E SIZE		
TESTING EQUIPMENT				
TESTING COMPANY	OPERATOR W.L. S	Sides &	Son	
PACKER(S): No. TYPE Full Holesize	43n BOTTOM CHOK	E SIZE	<u>5.11</u>	
TOOL TYPE: Johnson Disc Valve Tester				
LENGTH OF PERFORATIONS ft JARS USEI)			· • • • •
SURFACE CHOKE SIZE WATER CUSHION DRILL PIPE SIZE, OD. $2\frac{3}{8}$ LENGTH DRILL COLLARS	ft. LENGTH ANCHO	OR51	7 K	
TEST DATA				
FORMATION TESTED Sandstone - Strzelecki Fm.	TESTER ON BOTTOM	2,30	AN	1/PI
INTERVAL TESTED - FROM 3093. TO3160	INITIAL OPENING	2.45	AN	1/Pi
TIME OPEN 30 MIN. INITIAL S.I. FINAL S.I. I	NITIAL CLOSING		AN	1/P:
WATER CUSHION TO SURFACE MIN. I				
GAS TO SURFACEMIN., OIL TO SURFACEMIN. I				
NATURE OF BLOW Weak puff, dimin. gradually No puff or blow after 15 mins.				
GAS FLOW				
MAXIMUM RATE	p.s.ig		MCF/	DA:
METHOD OF MEASUREMENT	RISER SIZ	Œ		
GAS FLARE LIT ESTÌMATED HE	IGHT OF FLARE			
PIPE RECOVERY				
TOTAL RECOVERY 200 FT. BBLS No. SAMPLE	S TAKEN SENT	`TO		
MUD RECOVERY200 FT. BBLS DESCRIPTION	on Drilling mud.	wt10	6	• • • • •
OIL RECOVERYFT. BBLS DESCRIPTION				
WATER RECOVERYFT. BBLS DESCRIPTION	N			• • • • •
DRILLING MUD				
wr 10.6 visc 47 did level i	PROP IN ANNULUSap	prox4	t.`	FT.
RECORD OF PRESSURES:				
BOTTOM OR TOP RECORDERINITIAL HYDROSTAT	IC FINAL HYDI	ROSTATIC		
INITIAL SHUT-IN INITIAL FLOW FINAL F				
MAX, SURFACE PRESSURETYPE OF REC				
WEIGHT OF STRING BEFORE5200LBS. AFTER5200LBS.	PULL LOOSE5200	LBS.		
REMARKS Weak puff , very weak for 15 mins , the	ennoblow0n	opening	·	
of disc valve annulus dropped 4! and remaine				
.Formation tight.	•			
SUPERV	rison:G.C. Camp	e		

PALYNOLOGY

by Mary E. Detimenn

TARWIN MEADOWS NO. 1 WELL:

Samples from between 600 and 2,572 feet yielded restricted microfloras in which Dictyotosporites speciosus is a component. Thus, the Valanginian-Aprian Speciosus Assemblage is represented at these horizons. Beds at 2,567 - 2,572 feet also yielded Cooksonites variabilis Pocock which indicates the presence of the older category of the Speciosus Assemblage and suggests correlation of the beds with those at 6,845 feet in Wellington Park No. 1 Well and at 3,977 feet in Bengworden South No. 1

The succeeding horizons (600 - 1,610 feet) that contain <u>Dictyotosporites speciesus</u> are probable equivalents of at least part of the sequence between 3,818 and 6,845 feet in Wellington Park No. 1 Well, but the absence of <u>Cyclosporites</u> <u>hugbesi</u> and <u>Crybelosporites striatus</u> within the Tarwin Meadows interval precludes precise correlation.

The upperment horizon (304 - 314 feet) lacked diagnostic species of the Speciesus and Paradeza Assemblages. However, the presence of <u>Pilosisporites</u> notensis Cookson & Dettmenn indicates an age no younger than Aptian.

REFERENCES:

DETTMANN, N.E. - 1963. Upper Mesoscic microflores from south-eastern Australia. Proc. Roy. Soc. Vict. 77. 1-148.

DETTMANN, M.E. ~ 1965.

Palynological report on Woodside Wellington Park

No. 1 Well. Unpublished report submitted to

Haematite Explorations Pty. Ltd. 9/8/65.

Mary E. Dettmnnn, Department of Geology, University of Queensland, St. Lucia, Queensland.

4 November, 1965.

· ·	•	Microspores	Pollen	
		Gyclosporites hughest Dietyotosporites speciosus Lequitriredites speciosus Giestricosisporites eustraliensis Gooksonites veriabilis Khukisporites seeberis Leptolepidites verrucatus Gychidites spp. Fycopodiumsporites spp. Geratosporites oquelis Neoraistrickis notensis Poraninisporis dailyi Foraninisporis symetricus Grybelosporites striatus		
The second secon	30 -314°	* * * * * * * *	- <u>-</u> - }	I ndet.
Neadows	600610°	+		
	1597-1607	* * * *	∻ 	Speciosus
Terwin	1607-10'		Ì	
್ಲ [=	2567-721		+	

Table 1: Distribution of selected spore and pollen species from Rosedale, Darriman, and Tarwin Meadows wells. + - species present

(4-11-65) A

Page 1

PALYNOLOGICAL EXAMINATION OF ROSEDALE, DARRIMAN, AND TARVIN MEADOUS WELLS

Samples of 19 cores were submitted for palynological examination by flacmatite Explorations Pty. Ltd. from three wells sunk in eastern Victoria. The wells and the intervals examined include: Rosedale well between 2469 and 5833 feet, Darriman well between 4309 and 4475 feet, and Tarwin Meadows well between 304 and 2572 feet. The majority of the samples yielded identifiable sports and pollen grains, but the microfloras are generally poorly preserved. Moreover, the plant matter contained in samples from between 5243 and 5836 for in Rosedale well has been carbonized such that identifiable spores and pollen grains appear to be lacking. As outlined below the productive samples contamicrofloras that conform with the Lower Cretaceous assemblages described by Doutmann (1963) from South-eastern Australia. The presence of these microfloras enables correlation of the well asquences both with each other and with Lower Cretaceous sediments at other localities in Gippsland. Details of the microfloral sequence in each of the wells follows (see also Table 1). Rosedale well

Samples from the lower part (5245 - 5836 feet) of the sequence failed to produce identifiable spores and pollen grains and thus no age assessment can be made on palynological grounds. Sediments between 4747 and 5065 feet yielded only a few poorly preserved spores and pollen grains that signify an Upper Mesozoic age, but possess little stratigraphical value within the Upper Mesozoic.

More diverse and better preserved microfloras were obtained from the remainder of the sequence (between 2469 and 4496 feet). Samples between 54 and 4496 feet yielded <u>Dictyotosporites</u> <u>speciosus</u> Cookson & Dettmann in assoc

Cyclosvorites hughesi (Cookson & Dettmann). The combined occurrence of mese species indicates the presence of the older category of the Valanginian-Aptian Speciosus Assemblage that was described by Dettmann (1963). Comparabl microfloras were obtained in Wellington Park No.1 well between 6845 and 9019 feet (Dettmann 1965).

The two uppermost samples (2469-83 feet and 3208-28 feet) are also of Valenginian-Aptian age since <u>Dictyotosporites speciosus</u> occurs at 2439-33 feet. However, neither <u>Cyclosporites hughesi</u> nor <u>Crybelosporites strictus</u> (Cookson & Dettmann) was observed and there is thus insufficient evidence to determine whether the microflora belongs to the older or younger categories of the Speciosus Assemblage. Although no precise correlation can be achieved, the horizons between 2469 and 3228 feet in Rosedale well can be regarded as equivalents of at least part of the sequence between 38\$8 and 9019 feet in Wellington Park No.1 well.

Derriman well

Neither of the two samples examined provided abundant microflores.

That obtained from 4474-75 feet includes <u>Crybelosporites striatus</u> and <u>Coptospora striata</u> Dettmann which indicate the presence of either the younger (Aptian) category of the Speciosus Assemblage or the Aptian-Albian Paradoxa Assemblage. It should be noted that <u>Coptospora striata</u> possesses a restricted stratigraphical range in sediments of the Otway Basin where it extends from the uppermost horizons containing the Speciosus Assemblage to the lowermost bods that have yielded the Paradoxa Assemblage. This evidence indicates that the deposite 4474-75 feet in Darriman well are similar in age or younger than those between 5818 and 4340 feet in Wellington Park No1 well.

The sample from 4309-10 feet provided only a few spores and pollen grain

hat are of little stratigraphical significance within the Upper Mesozoic. gorrin Headows well.

Samples from between 600 and 2072 feet yielded restricted microflores in which Dictvotosporites speciosus is a component. Thus, the Valancinian-Applien Speciosus Assemblage is represented at these horizons. The 1-12 feet also yielded Gooksonites variabilis Pocock which indicates the Species of the older entegory of the Speciesus Assemblage and suggests white was so the beds with those at 6845 feet in Wellington Park No.1 well and at 3977 feet in Bengworden South No.1 well (see Dottmann 1965).

The succeeding horizons (600-1610 feet) that contain Dietyotosporites The probable equivalents of at least part of the sequence between 3313 and 6845 feet in Wellington Park No.1 well, but the absence of Cyclospecifics hughesi and Crybelosporites strictus within a the interval: preclude procise correlation.

The uppermost horison (504-14 feet) lacked diagnostic species of the Speciosus and Paradoxa Assemblages. However, the presence of Pilosist naveneis Bookson à Detthann infloates an age no younger than Aptian.

Balarences

Upper Mesozoic microfloras from south-eastern Proc. Roy. Soc. Vict., 77, 1-148.

1965. Palynological report on Woodside Wellington Park Dettmann, M.E. Australia. Unpublished report submitted to Haematite Explorations Pty. Ltd Dottmann, M.E. wall. 9/8/65.

4th November, 1965.

Mary E. Dettmann, Department of Geo University of Que St. Lucia, Queens

	1			ollen	
· AR			Microspores Po	orren	•
			Gyolosporites hughesi Dictyotosporites speciosus Acquitriradites spinulosus Cicatricosisporites australiensi Cooksonites variabilis. Klukisporites scaberis Leptolepidites verrucatus Cyathidites spp. Lycopodiunsporites spp. Ceretosporites cquelis Newaistrickie truncate Perceninisporite actensis Foreminisporite actuals Foreminisporite actuals Crybolosporites striatus Coptosporites striatus	Alisporites spp. Tsugaepollenites dampieri	
	Rosedale	c.15 2469-35' c.18 3208-23' c.19 3447-67' c.20 3615-35' c.21 3926-42' c.23 4476-96' c.24 4747-67' c.25 5045-65' c.26 5243-61' c.27 5495-5508' c.28 5742-58' c.29 5818-36'	**************************************		Indet.
	Darriman	4309-10°	* * * * * * * * * * * * * * * * * * *	+	Indet.
	Tarwin Meadows	304-514° 600-610° 1597-1607° 1607-10' 2567-72'	+ + + + + + + + + + + + + + + + + + +	+	I ndet.

Table 1: Distribution of selected spore and pollen species from Rosedale, Darriman, and Tarwin Meadows wells.

^{+ -} species present

2 dopy. Pa

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University of New South Wal
PO Box 1
KENSINGTON NSW 2033

27 October 1981

Mr. D.J.French, Bell, Cochrane & Associates Pty Ltd, 44 Chetwynd Street, WEST MELBOURNE VIC 3003

Dear Mr French,

Please find enclosed my report on the six samples submitt for palynological examination and age determination early this month (no covering letter).

In comparison with the previous batch this set has yielde relatively good results. Even the outcrop sample, HH-7, contained a well preserved, although not very diverse microflora.

I have not included species lists for each sample, but am keeping in my laboratory permanent slides of each prepara and a record of the locations thereon of specimens and species sighted which are available for further study or comparisons as necessary.

Yours sincerely

P.R. Evans

ADDED BY DURE

11/5/99

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ALYNOLOGICAL REPORT ON SIX SAMPLES FROM THE STREZELECKI GROUP, GIPPSLAND BASIN

GENERAL

Six samples of core, cuttings and outcrop from the Strezelecki Group, Gippsland Basin were received early in October from Bell, Cochrane & Associates Pty Ltd for palynological age determination.

RESULTS

All six samples proved to contain relatively abundant and well preserved microfloras, the nature of which permits assignment of the samples to the following Early Cretaceous zones.

SAMPLE	ZONE			
TARWIN Meadows Noi) TM-1 Core 1600' " " 2565' " " 2574' " Cutt. 2930-34'	?Dictyotosponites speciosus Fonaminisponis assymetricus "			
" " 3400-301 HH-7 Outcrop (Harmer's Haven)	" Crybelosporites stylosus or Cyclosporites hughesi			

The relative ages of these zones are expressed in the attached table.

COMMENT

No standard zonation of the Australian Lower Cretaceous based on microfloral content has yet come into being. Two basic schemes are used

The scheme that has been widely applied to the Lower Cretaceous of Victoria is that established by Dettmann (1963) and Playford & Dettmann (1969) in which three zones, the stylosus, speciosus and panadoxa were recognized. The speciosus Zone was divided into two subzones, C. hughesi and C. striatus. Douglas further

...2

divided the C. hughesi Subzone into three units (Douglas 1976).

The second major scheme was instituted by Evans (1966) and elaborated by Burger (1973, 1980), who, from studies of the Surat Basin, identified the M. florida and O. du Zones below the C. striatus Zone. Burger divided the M. florida Zone into the C. australiensis, F. wonthaggie and F. assymmetricus Subzones.

Allocation of a sample to one of these divisions depends on the content of the component assemblage. He the varied designations applied to the samples examined.

The yield from TM-1 core 1600' was insufficiently diverse to be dated more precisely than Early Cretaceous ?D. speciosus Zone and hence does little to place a precise upper limit on the age of the well sequence.

The yields from TM-1 core 2565' and 2574' were definitive in that rare specimens of key species were identified.

For TM-1 cuttings 2930' and 3400' the assigned age of the *F. assymetricus* Zone must be regarded as their upper limit; the sa'ples could be older. None of the few critical species which could define an older zone in cuttings were observed.

The outcrop sample HH-7 was very coaly. Unlike the batch of samples previously examined (Report 21 Sep 81), HH-7 withstood considerable oxidation and yielded a remarkably well preserved, although not diverse assembla

REFERENCES

- BURGER, D., 1973: Palynological zonation and sedimentary history of the Neocomian in the Great Artesia Basin, Queensland; in Mesozoic and Cenozoic Palynology; essays in honour of Isabel Cooksc (Eds J.E.Glover and G. Playford). Geol. Soc. Aust. Spec. Pull. 4,87-118.
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EVANS, P.R., 1966: Mesozoic stratigraphy palynology in Australia. Aust. Oil Gas j., 12(6), 58-63.

P.R. Evans

27 October 1981

TABLE 1

AGE	DETTMANN (1963)		EVANS (1966	BURGER (1973, 1980)	
ALB	C.paradoxa		K2	C.paradoxa	
	D.speciosus	C.striatus	K1d	C.striatus	
APT		C.hughesi	Klb-c	0.dubius	
НС					F.assymetricus
ان NEOCOM	C.stylosus		Kla	M.florida	F.wonthaggiensi
z -?-	?	? ? _			C.australiensis
JUR			J6		

NOTE

Although the relative positions of the zonal scales are well defined, the relationship of the zones to the time scale are not so accurately fixed. The Aptian/Albian boundary is satisfactorily fixed by: information from the marine of the Great Artesian Basin. Subdivisions of the Neocomian (which represents a major time interval) have not yet been satisfactorily assigned to the microfloral scales.

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This is an enclosure indicator page. The enclosure PE906421 is enclosed within the container PE902940 at this location in this document.

The enclosure PE906421 has the following characteristics:

ITEM_BARCODE = PE906421
CONTAINER_BARCODE = PE902940

NAME = Regional Geological Map

BASIN = GIPPSLAND

PERMIT = PEP53

TYPE = GENERAL

SUBTYPE = GEOL_MAP

DESCRIPTION = Regional Geological Map showing Tarwin

Meadows-1

REMARKS =

 $DATE_CREATED = 12/12/65$

DATE_RECEIVED =

 $W_NO = W491$

WELL_NAME = TARWIN MEADOWS-1

CONTRACTOR =

CLIENT_OP_CO = ALLIANCE OIL DEVELOPMENT AUSTRALIA NL

This is an enclosure indicator page. The enclosure PE602040 is enclosed within the container PE902940 at this location in this document.

CONTAINER_BARCODE = PE902940

NAME = Cross Section

BASIN = GIPPSLAND

PERMIT =

TYPE = WELL

SUBTYPE = cross section

DESCRIPTION = Cross Section through Tarwin Embayment

REMARKS =

DATE_CREATED =

DATE_RECEIVED =

 $W_NO = W491$

WELL_NAME = Tarwin Meadows-1

CONTRACTOR = Geodrafting services

CLIENT_OP_CO = Alliance Oil Development

This is an enclosure indicator page. The enclosure PE602705 is enclosed within the container PE902940 at this location in this document.

The enclosure PE602705 has the following characteristics:

ITEM_BARCODE = PE602705
CONTAINER_BARCODE = PE902940

NAME = Tarwin Meadows 1 Composite well log

sheet 1 of 4

BASIN = GIPPSLAND

PERMIT = PEP53

TYPE = WELL

SUBTYPE = COMPOSITE_LOG

DESCRIPTION = Tarwin Meadows 1 Composite well log

sheet 1 of 4

REMARKS =

 $DATE_CREATED = 31/12/65$

DATE_RECEIVED =

 $W_NO = W491$

WELL_NAME = Tarwin Meadows-1

CONTRACTOR = Schlumberger

CLIENT_OP_CO = Alliance Oil Development Australia N.L

This is an enclosure indicator page. The enclosure PE602706 is enclosed within the container PE902940 at this location in this document.

The enclosure PE602706 has the following characteristics:

ITEM_BARCODE = PE602706
CONTAINER_BARCODE = PE902940

NAME = Tarwin Meadows 1 Composite well log

sheet 2 of 4

BASIN = GIPPSLAND

PERMIT = PEP53

TYPE = WELL

SUBTYPE = COMPOSITE_LOG

DESCRIPTION = Tarwin Meadows 1 Composite well log

sheet 2 of 4

REMARKS =

 $DATE_CREATED = 31/12/65$

DATE_RECEIVED =

 $W_NO = W491$

WELL_NAME = Tarwin Meadows-1

CONTRACTOR = Schlumberger

CLIENT_OP_CO = Alliance Oil Development Australia N.L

This is an enclosure indicator page.

The enclosure PE602707 is enclosed within the container PE902940 at this location in this document.

The enclosure PE602707 has the following characteristics:

ITEM_BARCODE = PE602707
CONTAINER_BARCODE = PE902940

NAME = Tarwin Meadows 1 Composite well log

sheet 3 of 4

BASIN = GIPPSLAND

PERMIT = PEP53

TYPE = WELL

SUBTYPE = COMPOSITE_LOG

DESCRIPTION = Tarwin Meadows 1 Composite well log

sheet 3 of 4

REMARKS =

 $DATE_CREATED = 31/12/65$

DATE_RECEIVED =

 $W_NO = W491$

WELL_NAME = Tarwin Meadows-1

CONTRACTOR = Schlumberger

CLIENT_OP_CO = Alliance Oil Development Australia N.L

This is an enclosure indicator page. The enclosure PE602708 is enclosed within the container PE902940 at this location in this document.

The enclosure PE602708 has the following characteristics:

ITEM_BARCODE = PE602708
CONTAINER_BARCODE = PE902940

NAME = Tarwin Meadows 1 Composite well log

sheet 4 of 4

BASIN = GIPPSLAND

PERMIT = PEP53

TYPE = WELL

SUBTYPE = COMPOSITE_LOG

DESCRIPTION = Tarwin Meadows 1 Composite well log

sheet 4 of 4

REMARKS =

 $DATE_CREATED = 31/12/65$

DATE_RECEIVED =

 $W_NO = W491$

WELL_NAME = Tarwin Meadows-1

CONTRACTOR = Schlumberger

CLIENT_OP_CO = Alliance Oil Development Australia N.L

This is an enclosure indicator page.

The enclosure PE907688 is enclosed within the container PE902940 at this location in this document.

The enclosure PE907688 has the following characteristics:

ITEM_BARCODE = PE907688
CONTAINER_BARCODE = PE902940

NAME = Bouger Anomalies Gravity Map

BASIN = GIPPSLAND PERMIT = PEP53

TYPE = OTHER_SURVEY
SUBTYPE = GRAVITY_MAP

DESCRIPTION = Bouger Anomalies Gravity Map,

Gormandale Gravity Survey, Plan of Strezelecki Ranges and adjoining area,

(enclosure from WCR) for Tarwin

Meadows-1

REMARKS = DATE_CREATED = DATE_RECEIVED =

 $W_NO = W491$

WELL_NAME = Tarwin Meadows-1

CONTRACTOR = CLIENT_OP_CO =

This is an enclosure indicator page. The enclosure PE603801 is enclosed within the container PE902940 at this location in this document.

The enclosure PE603801 has the following characteristics:

ITEM_BARCODE = PE603801
CONTAINER_BARCODE = PE902940

NAME = Composite Well Log (Header)

BASIN = GIPPSLAND PERMIT = PEP53

TYPE = WELL

SUBTYPE = COMPOSITE_LOG

DESCRIPTION = Composite Well Log (Header) for Tarwin

Meadows-1

REMARKS = Header only, no data

DATE_CREATED = 28/07/65

DATE_RECEIVED =

 $W_NO = W491$

WELL_NAME = TARWIN MEADOWS-1

CONTRACTOR =

CLIENT_OP_CO = ALLIANCE OIL DEVELOPMENT AUSTRALIA NL

This is an enclosure indicator page.

The enclosure PE907688 is enclosed within the container PE902940 at this location in this document.

The enclosure PE907688 has the following characteristics:

ITEM_BARCODE = PE907688
CONTAINER_BARCODE = PE902940

NAME = Bouger Anomalies Gravity Map

BASIN = GIPPSLAND PERMIT = PEP53

TYPE = OTHER_SURVEY SUBTYPE = GRAVITY_MAP

DESCRIPTION = Bouger Anomalies Gravity Map,

Gormandale Gravity Survey, Plan of Strezelecki Ranges and adjoining area,

(enclosure from WCR) for Tarwin

Meadows-1

REMARKS =

DATE_CREATED =

DATE_RECEIVED = W_NO = W491

WELL_NAME = Tarwin Meadows-1

CONTRACTOR = CLIENT_OP_CO =