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EL 234

COWARD SPRINGS

FINAL REPORT AT LICENCE SURRENDER, FOR THE PERIOD 12/8/1975 TO 22/10/1976

Submitted by
Endeavour Oil Co. NL
1976

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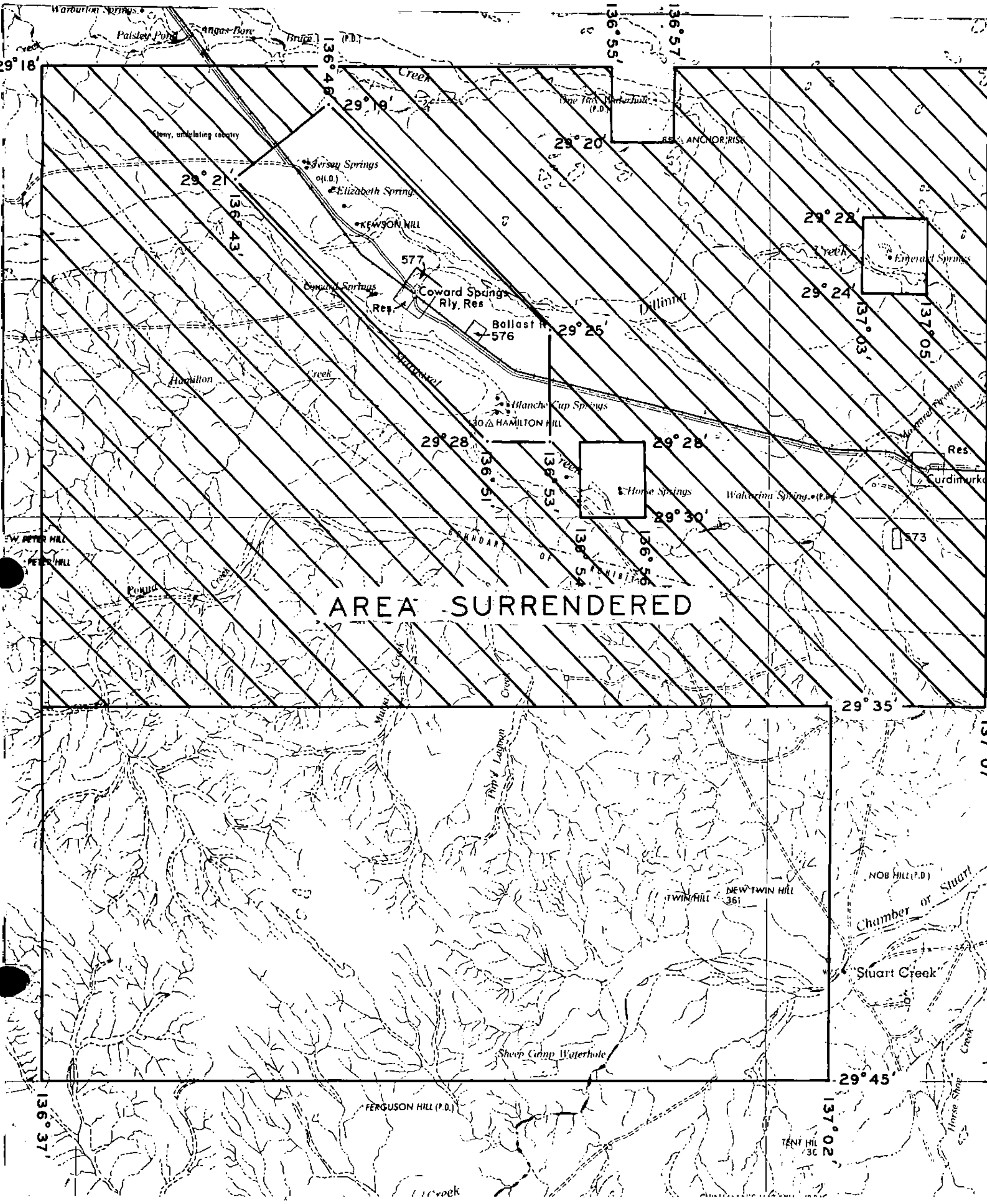
Government of South Australia
Department of State Development

SCHEDULE 'A'



SCALE 1:250,000

KILOMETRES 5 0 5 10 15 20 25 KILOMETRES

APPLICANT : ENDEAVOUR OIL COMPANY N.L.

D.M. : 599/75 AREA : ~~2123~~ 745 Square Kilometres

1:250 000 PLANS : CURDIMURKA

LOCALITY : COWARD SPRINGS AREA – Approximately 120 kilometres west of Marree

E.L. No. : 234 EXPIRY DATE : 11-2-77

234

Pg A

CONTENTS ENVELOPE 2741

TENEMENT: EXPLORATION LICENCE No. 234

TENEMENT HOLDER: ENDEAVOUR OIL N.L.

REPORTS:

JABLONSKI H. 1976
Final Report on Exploration Licence No. 234.
Coward Spring area S.A. (pgs. 1-15)
21st June 1976.

Plans:

Fig 1	Drill hole locality map.	(2741-3)
	Resistivity SP Coward Spring Stuarts Creek No. 4	(2741-1)
	Gamma Neutron " " " " "	(2741-2)

ENDEAVOUR OIL COMPANY N.L.

FINAL REPORT ON

EXPLORATION DRILLING FOR COAL

IN

EXPLORATION LICENCE No. 234

COWARD SPRINGS AREA

SOUTH AUSTRALIA

ENDEAVOUR OIL COMPANY N.L.

FINAL REPORT ON

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SOUTH AUSTRALIA

BY

H. JABLONSKI

CONTENTS **PAGE NO.**

ATTACHMENTS

H. JABLONSKI

21st June, 1976

ENDEAVOUR OIL COMPANY N.L.

REPORT ON

EXPLORATION DRILLING FOR COAL

IN

EXPLORATION LICENCE No. 234

COWARD SPRINGS AREA

SOUTH AUSTRALIA

BY

H. JABLONSKI

INTRODUCTION

The Concession Area where the drilling programme was carried out is fully owned and controlled by Endeavour Oil Company N.L. The Concession lease is E.L. 234 and is referred to as the Coward Springs Concession, covering an area of 2,123 sq.km. Drill holes 4 & 5 are located in E.L. 234.

The purpose of the Coward Springs Drilling programme was to locate possible sub-surface coal horizons. It was considered that these coal horizons might be intersected in relatively shallow basin structures between basement highs, on the margin of the great Artesian Basin.

The area in which the drilling programme was carried out is located on the southwestern margin of the Great Artesian Basin, south of Lake Eyre South.

This is an area of unreliable rainfall, usually less than 5"/p.a., mound springs, west and southwest of Lake Eyre provide the only permanent water. Ephemeral braided creek and tributary systems flow only after heavy rains and drain into Lake Eyre.

Vegetation is mostly restricted to salt and blue bush and gums line the drainage systems.

The land surface is dominated by gibber plains, gypsiferous clay pans, duricrusted tablelands and flat topped hills and parallel sets of sand dunes.

The Concession area is located approximately 500 miles north of Adelaide, the distance by road to Coward Springs Siding via Marree on Highway 83 is approximately 700 miles. The road is bitumenized as far as Hawker, metalled to Marree, then gravel formed from Marree northwards to the South Australian border.

Access to individual drill sites was by way of existing tracks or by travelling across country.

There were difficulties in mobility, for the heavy vehicles particularly on sandy dune and steep sided sandy creek crossings, where the vehicles often became bogged. There were no mobility problems for the lighter 4-wheel drive vehicles.

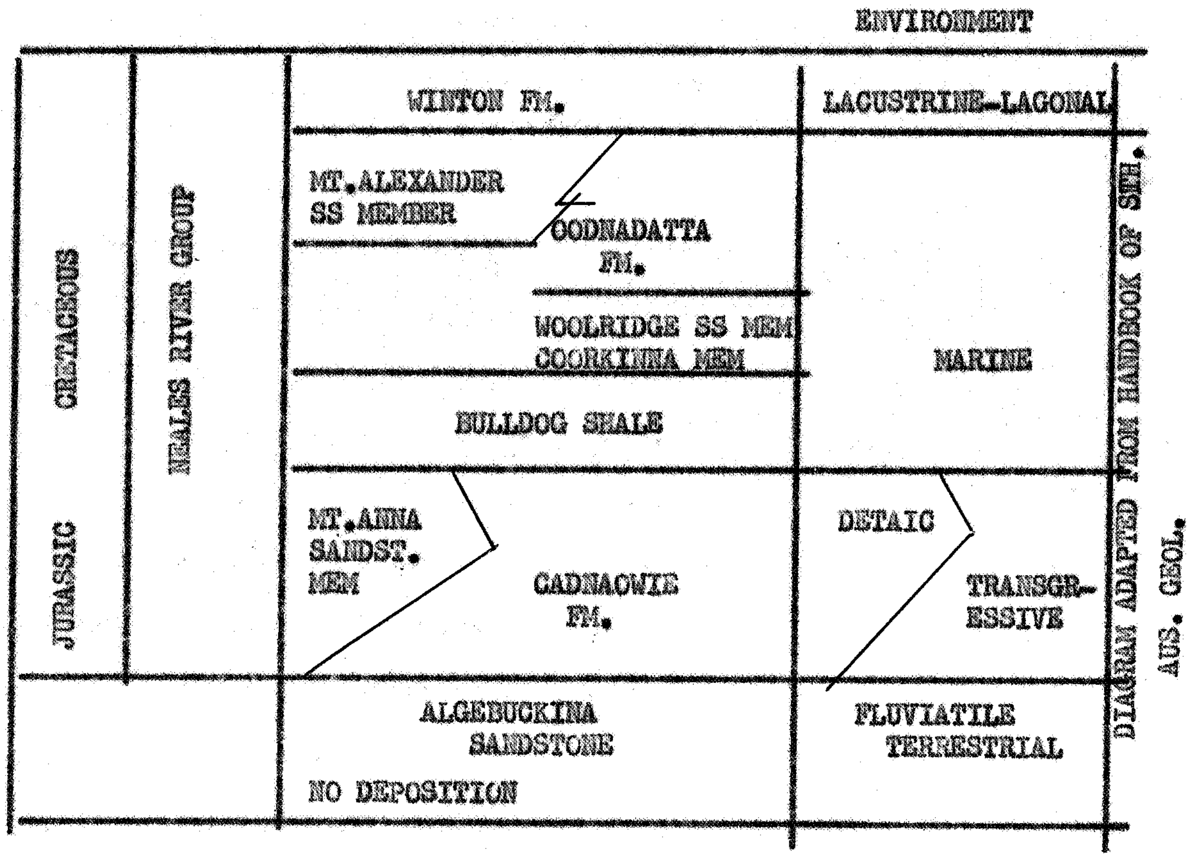
REGIONAL GEOLOGY

The Great Artesian Basin is a vast depression occupying much of the central portion of Australia. It is essentially a Jurassic-Cretaceous basin in which up to 8,000ft. of sediments were deposited on an older basement complex.

Several sub-basins within the main basin have been interpreted as delineated by major basement relief structures. These structures are in the form of north and NNW trending ridges. Two such structures, the Peake-Denison - Mt. Alice Ridge and the Stuart Range define the Ackaringa Basin on whose southeastern margin the drilling was carried out.

The basement rocks which provide the basin floor in the drill area comprise relatively unaltered Proterozoic sandstones and shales.

The Stratigraphy of the west and southwest margins of the South Australian portion of the Great Artesian Basin, as proposed by Freytag (1966) and Wopfner et.al. (1970) is shown on the diagram below.



JURASSIC

The Jurassic Algebuckina Sandstone comprises a lower kaolinitic sandstone unit and an upper well sorted clean sand. It is the product of a fluviatile-terrestrial environment ranging from a seasonally arid to moist sub-tropical climate.

CRETACEOUS

The Cretaceous Cadnaowie Formation consists of fine sandstones - siltstones, interbeds of carbonaceous material and calcareous sandy oolitic beds and boulder beds. These lithologies can be attributed to various marginal marine environments and represent the transgression of an Early

Cretaceous Sea.

The Mt. Anna Sandstone Member is considered to be deltaic-fluviatile margin with a source area in the uplifted Gawler Range Massif.

The Bulldog Shale consists of thin interbeds of silt and shale grading into a clean dark grey shale. It contains marine faunas in a horizon of spherical and ellipsoidal shaped limestone concretions. The depositional environment is considered to be shallow marine.

The shallow marine regime persisted throughout the deposition of the silty shales and lenticular limestones (Woolridge Limestone Member) of the Oodnadatta Formation. The Coorkinna Member and the Mt. Alexander sandstone Member are both glauconitic sands.

The Winton Formation consists of interbedded silts, sands and shales. The increased sand content and presence of interbedded coals indicate the regression of the Cretaceous sea, and the unit is considered to be deposited in lagoonal and lacustrine conditions.

TERTIARY

The Tertiary sequence consists of gravel and sands which occur at flat topped hills capped by a siliceous duricrust.

The Quaternary sequence include freshwater limestones, gypsite sediments and gypseous lacustrine clays. Depositional environment is fluvio-lacustrine.

RECENT

The gibber plains are vast, relatively unvegetated areas which are littered with rounded, polished gravels and pebbles. The polish on the gibbers is the result of sand blasting. Gibber composition appears to be dominantly ferruginous and siliceous.

Within shallow depressions, clay pans often form. The sediments of the pans are gypsiferous and clayey. The clays settle out of saline waters which drain into the pans and the gypsum crystallizes out with evaporation.

Branded drainage systems allow the transport and deposition of sediments ranging from clays and silts of flood plains to the sand, gravel and pebbles of the river bed.

Sand dunes occur throughout part of the drill area, particularly around Stuart Creek. These dunes are elongate and run in parallel sets trending N.N.E.

There are several occurrences of flat topped hills, thought to consist of Tertiary sediments which have been capped by a siliceous duricrust.

LOCAL GEOLOGY

Drill Hole No. 4

Drill Hole No. 4 is located on a plateau. The surrounding geology includes gypsiferous clay development and gibber.

The drill penetrated 40' of ferruginous, oxidized, gypsiferous light-grey sands, silts and clays, which represent the weathered horizon. ??

This is followed by 280' of dark-grey shales and mudstones with minor gypsum horizons and several zones containing fragments of shelly fauna. A zone of secondary silicification is located at approximately the 265' level. A pyrite cube was also recovered in this unit.

A weathered basement unit of pale-green and purple clays, 10' in thickness occurs below the dark-grey shale and mudstone interval.

Unweathered basement material is located at the 325' level.

Drill Hole No. 5

Drill Hole No. 5 is located in the flood plain depression of a tributary system of Stuart Creek. The surrounding geology consists of recent river clays on which are scattered pebbles and gravels of older possibly Precambrian sediments.

The hole intersected gypsiferous clays and minor sands in the upper 10'.

This is followed by 25' of pale-green and chocolate clays, representing weathered basement.

Unweathered basement was not penetrated.

DRILLING

The Drilling Contractors were Thompson's Drilling Company, who provided a Mayhew 1000 Drill Rig, Water Truck and Back up vehicle.

The drilling Programme began on 22.3.76 and was completed on 23.3.76, a total of 2 days.

Difficult terrain hampered mobility of the drilling vehicles, particularly where negotiation of cross country routes was necessary.

A total depth of 360ft. was drilled. This was distributed over 2 holes. Depth of individual holes ranged from 35 to 325ft. All holes penetrated Adelaidean basement sediments, evidenced by a dramatic drop off in drilling rate or weathered basement material in samples. This relatively shallow depth to basement indicates a probable basement high in the area drilled. Mesozoic sediments were encountered in all the holes.

The majority of drilling was carried out using tungsten tipped bit.

A Chevron bit was required once to penetrate a silicified zone in No. 4. The average drilling rate for the entire programme was 87ft./hr.

Hole No. 4 was logged using a Neltronic Model 1A logger including Self Potential, Resistivity, Neutron and Gamma, Hole No. 5 was not geophysically logged.

Hole No. 4 cemented to a depth sufficient to seal off sandy layers and possible aquifers. A sandy horizon occurred immediately above weathered basement, its thickness being only 10ft.

HOLE NO.	LATITUDE	LONGITUDE	PLANNED DEPTH	DRILLED DEPTH	DRILLING RATE	DEPTH OF CEMENT
4	29°31 12	136°55 30	900'	325'	81ft./hr.	50ft.
5	29°45 00	136°58 48	-	35'	140" "	-

RESULTS OF DRILLING

The stratigraphic horizons recognised in the 2 holes drilled can be summarised as in the Table below:-

HOLE NO.	OXIDIZED WEATHERED ZONE	BULLDOG SHALE	SANDY CLAY HORIZONS	WEATHERED BASEMENT	TOTAL
4	40'	280'	-	5'	325'
5	10'	-	-	25'	35'

The oxidized and weathered zone is a remnant of the Mesozoic Bulldog shale. It is commonly gypsiferous and ferruginous; a parallel of the present day and environment acting on the Mesozoic sediments.

The Bulldog shale is everywhere a very dark-grey coloured clay to mudstone. Ir contains some thin gypsum horizons and zones with fragments of shelly fauna and occasional hard silicified sandstone bands.

The sandy horizon immediately above the weathered basement material is a relatively thin zone of rounded fine to medium-grained quartz sand. It fines gradually upwards through a siltstone to the mud and clay regime of the Bulldog Shale.

Weathered basement material is commonly light-green and grey coloured and sometimes purple and chocolate coloured clays grading downwards into relatively hard siltstones and fine-grained quartzites.

DISCUSSION

In the area of interest, basin strata shelve across an ancient truncated land surface of folded but unmetamorphosed Adelaidean sediments.

It has been suggested by Wopfner et.al. (1970) that the area drilled is underlain by a basement high known as the Stuart Creek Salient. This high persisted throughout the transgressive and part of the marine phase of the Lower Cretaceous.

Evidence from drill hole data of the presence of this high is suggested by a relatively shallow depth to basement and considerable thickness of weathered basement material.

The Mesozoic sediments penetrated by drill holes have been identified as an interval of the Cretaceous Bulldog Shale. The upper part of the Bulldog Shale can be considered absent, as the unit is weathered at the surface. The lower part can also be considered absent as contact with the transgressive Cadnaowie Formation is not observed. The thin sandy horizon at the base of the Bulldog Shale interval can be considered as a local transgressive phase prior to inundation of the Stuart Creek Salient in Bulldog Shale time.

SUMMARY

The purpose of the Coward Springs Drilling Programme was to locate coal horizons within Mesozoic sediments.

Two holes were drilled on the southwest margin of the Great Artesian Basin. Mesozoic sediments and basement were penetrated at relatively shallow depths.

The Mesozoic sediments were dominantly shales and mudstones with minor silt and sand. Although the shales were often carbonaceous no coal horizons were located.

REFERENCES

PARKIN, L.W. (Ed.) (1969) Geological Survey of South Australia. Handbook of South Australian Geology.

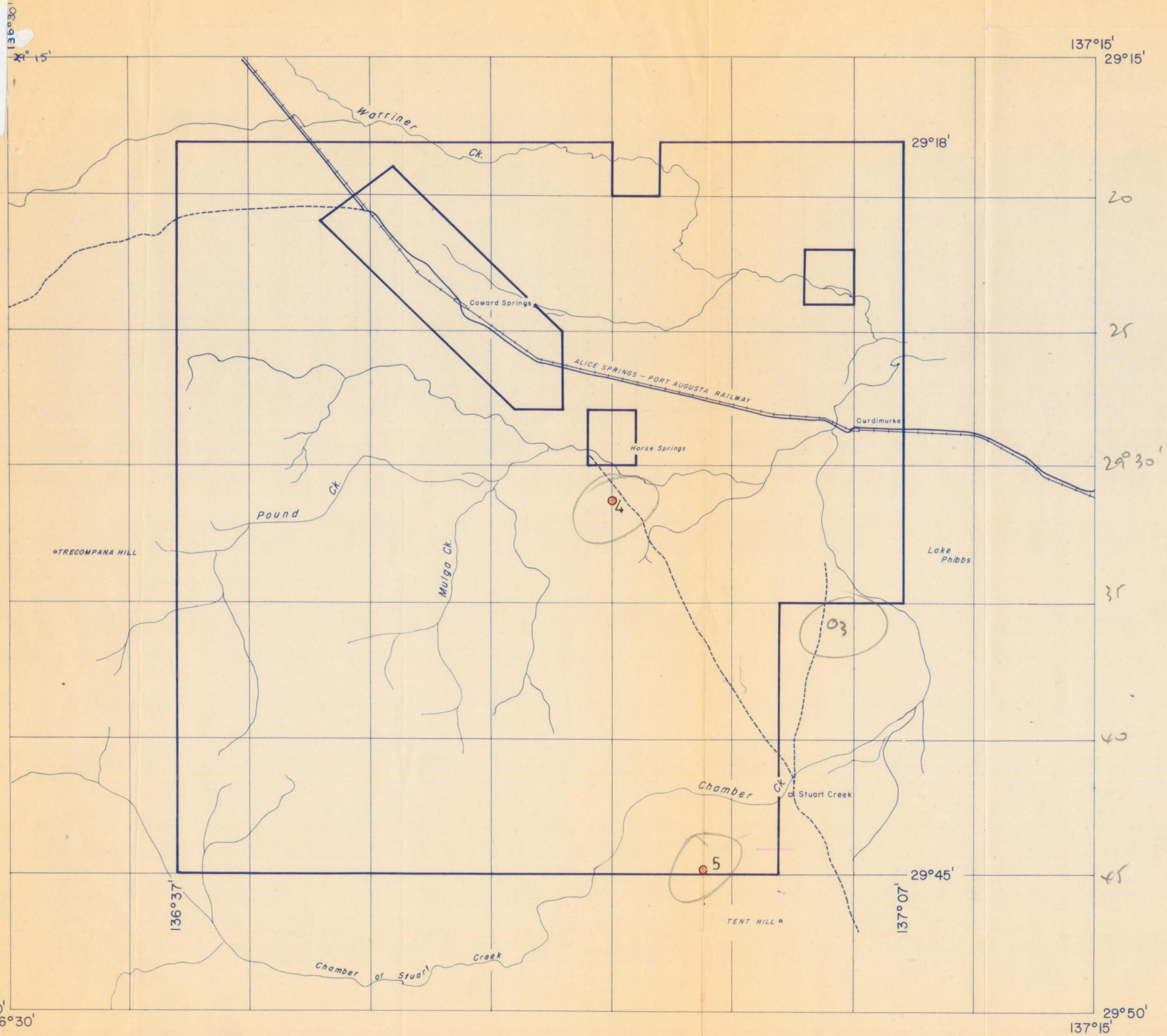
FREYTAG, I.B. 1966: Proposed rock units for marine Lower Cretaceous Sediments in the Oodnadatta Region of the Great Artesian Basin. QUART.GEOL.NOTES GEOL.SURV. S.AUST. 18: 3 - 7.

WOPFNER, H, FREYTAG, I.B. and HEATH, G.R. (1970) Basal sediments (Jurassic-Cretaceous) of Western Great Artesian Basin, South Australia, Stratigraphy and Environment. BULL.AM.ASS. PETROL. GEOL. 54:

GLAESSNER, M.F. and PARKIN, L.W. 1957: The Great Artesian Basin in South Australia. JOURN.GEOL.SOC.AUST. 5(2), 88 - 102.

for H. JABLONSKI

1st June, 1976



LEGEND

(solid line)	Boundary of E.L.
(line with cross ticks)	Railway
(dashed line)	Roads
(red dot, "4")	Bore hole

02

ENDEAVOUR OIL COMPANY N.L.
SOUTH AUSTRALIA
E.L. 234 - COWARD SPRINGS AREA

BORE HOLE LOCATION MAP

SCALE 1:250,000

5 0 5 10 15 20 Km.

AUTHOR: L.G. Nixon — DRAWN: August, 1975
REVISED: April, 1976 — DRAWING NUMBER: A 0692

1

ENV 2741-3

SOUTH AUSTRALIAN DEPARTMENT OF MINES

GEOLOGICAL SURVEY

TYPE OF LOG (S): RESISTIVITY · SP

DATE: 24 · 3 · 76 TIME: 1130 / / /

AREA: COWARD SPRINGS LOCATION: Lat. Long.

WELL: STUARTS CREEK NO4

ELEVATION G.L.: Log from 0 metres above G.L. Depth Scale: 1cm rep. 2 metres

RUN NUMBER: 1 / / / /

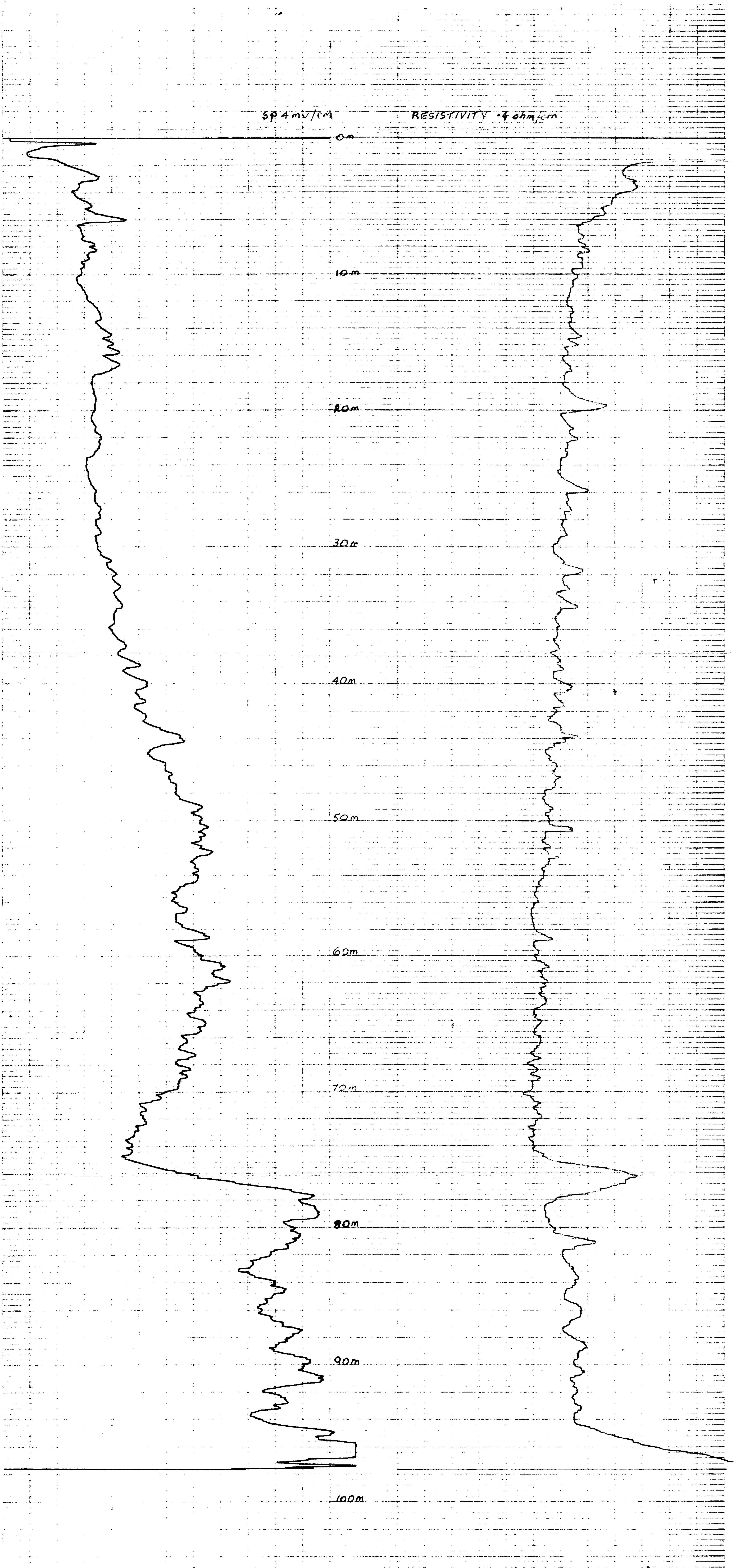
CASING SHOE DEPTH (cm): LOG metres DRILL metres TOTAL DEPTH: LOG 97·6 metres DRILL metres

MUD: Type RESISTIVITY: Ohm metres @ °C

OPERATING TIME: 25m / / / /

RECORDED BY: AWYoung

REMARKS:



ENV 2741 - 1

SOUTH AUSTRALIAN DEPARTMENT OF MINES

GEOLOGICAL SURVEY

TYPE OF LOG (S): GAMMA NEUTRON

DATE: 24.3.76 TIME: 1200 / /

AREA: COWARD SPRINGS LOCATION: Lat. Long.

WELL: STUARTS CREEK NO 4

ELEVATION G.L.: Log from 0 metres above G.L. Depth Scale: 1cm rep. 2 metres

RUN NUMBER: / / 2 / / /

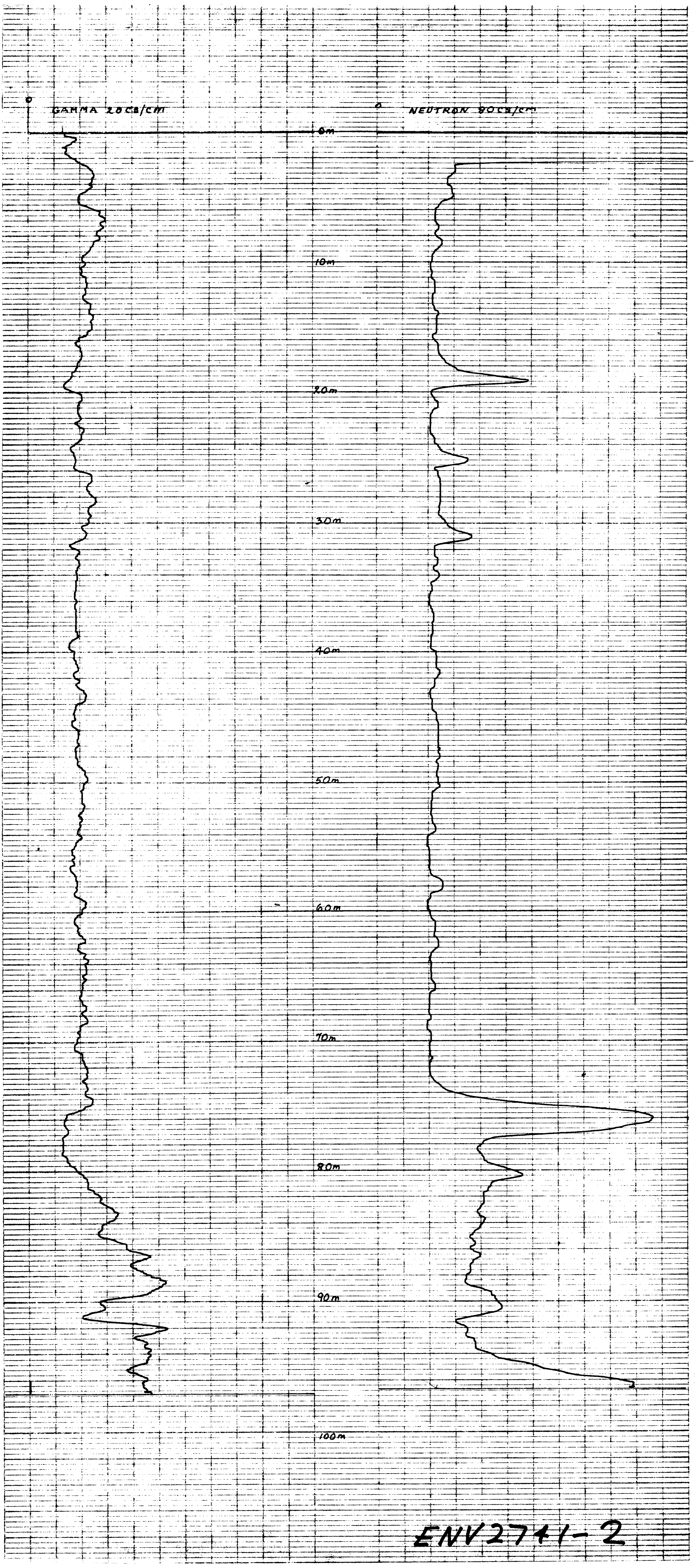
CASING SHOE DEPTH (cm): LOG metres DRILL metres TOTAL DEPTH: LOG 97 metres DRILL metres

MUD: Type RESISTIVITY: Ohm metres @ °C

OPERATING TIME: 35m/35m/ / /

RECORDED BY: [signature]

REMARKS:



ENV2741-2

ENDEAVOUR OIL COMPANY N.L.

LOG OF ROTARY DRILL HOLE No. 4

PROJECT: Coal Drilling, E.L. No. 234, COWARD SPRINGS

DIRECTION: Vertical PLANNED DEPTH: 900ft. DRILLED DEPTH: 325ft.

DRILLING CONTRACTOR: Thompson's Drilling Co. DRILL: Mayhew 1000

DRILLER: C. Stratford ASSISTANTS: R. Brown, T. Auld

DATE HOLE COMMENCED: 23.3.76 COMPLETED: 24.3.76

HOLE LOGGED BY: R. Jablonski ON: 24.3.76

FIX: Speedo reading from Mound Spring on east-side of Margaret River Crossing.

OBJECT: To test for coal bearing strata.

RESULT: No coal bearing strata intersected.

LOG COMPRISES: GEOLOGICAL LOG GEOPHYSICAL LOG

DEPTH FROM	TO	GEOLOGICAL LOG Drilling commenced 4.50 p.m.
0	5	Red clay, gypsum, sand, some grey clay.
5	10	Grey clay, gypsum, some red clay and sand.
10	15	Highly gypsiferous light grey clay to silt.
15	20	Highly gypsiferous light grey clay to silt.
20	25	Gypsiferous pale grey clay to mud.
25	30	Gypsiferous pale grey clay to mud, Fe oxidation.
30	35	Gypsiferous pale grey clay to mud, Fe oxidation.
35	40	Slightly gypsiferous pale grey clay to mud, Fe oxidation.
40	45	Dark grey clay.
45	50	Dark grey clay to mud.
50	55	Dark grey clay, some Fe oxidation on bedding.
55	60	Dark grey clay, some Fe oxidation on bedding.
60	65	Dark grey clay.
65	70	Gypsiferous dark grey clay.
70	75	Dark grey clay to mud.
75	80	Dark grey clay to mud.
80	85	Dark grey clay.
85	90	Dark grey clay.
90	95	Dark grey clay.
95	100	Dark grey clay, gypsum, shell fragments.

ROTARY DRILL HOLE No. 4 (CONTINUED)

DEPTH FROM	DEPTH TO	GEOLOGICAL LOG Drilling commenced 4.50 p.m.
100	105	Dark grey clay with some gypsum.
105	110	Dark grey clay, some gypsum and shell fragments.
110	115	Dark grey clay with shell fragments.
115	120	Dark grey clay with shell fragments.
120	125	Dark grey clay.
125	130	Dark grey clay, shelly fragments.
130	135	Dark grey clay, shelly fragments.
135	140	Dark grey clay.
140	145	Dark grey clay.
145	150	Dark grey clay.
150	155	Dark grey clay with minor gypsum.
155	160	Dark grey clay, shelly fragments.
160	165	Dark grey clay, shelly fragments.
165	170	Dark grey clay, shelly fragments.
170	175	Dark grey clay, shelly fragments.
175	180	Dark grey clay.
180	185	Dark grey clay.
185	190	Dark grey clay.
190	195	Dark grey clay.
195	200	Dark grey clay.
200	205	Dark grey clay.
205	210	Dark grey clay.
210	215	Dark grey clay.
215	220	Dark grey clay, minor gypsum.
220	225	Dark grey clay, minor gypsum.
225	230	Dark grey clay.
230	235	Dark grey clay.
235	240	Dark grey clay, minor gypsum.
240	245	Dark grey clay.
245	250	Dark grey clay, minor gypsum.
250	255	Dark grey clay, some fragments hard sandstone.
255	260	CHANGE BIT TO CHEVRON Dark grey clay, hard sandstone, gypsum.

ROTARY DRILL HOLE No. 4 (CONTINUED)

DEPTH FROM	TO	GEOLOGICAL LOG Drilling commenced 4.50 p.m.
260	265	Dark grey clay, hard sandstone, gypsum. CHANGE BIT TO ROTARY
265	270	Dark grey clay, fragments from secondary silcrete horizon. CHANGE BIT TO TUNGSTEN
265	270	Dark grey clay, secondary silcrete.
270	275	Dark grey clay, minor silcrete.
275	280	Dark grey clay, minor silcrete.
280	285	Dark grey clay.
285	290	Dark grey clay.
290	295	Grey clay.
295	300	Grey clay.
300	305	Grey clay.
305	310	Grey clay, pyrite, some hard rock fragments.
310	315	Grey clay, some hard rock fragments.
315	320	Pale Grey clay.
320	325	Pale green and purple clays.

DRILLING COMPLETED AT 12.30 p.m.

GEOPHYSICAL LOGGING FROM 12.45 p.m. - 2 p.m.

ENDEAVOUR OIL COMPANY N.L.

LOG OF ROTARY DRILL HOLE No. 5

PROJECT: Drilling for coal, E.L. 234, COWARD SPRINGS

DIRECTION: Vertical PLANNED DEPTH: DRILLED DEPTH: 35ft.

DRILLING CONTRACTOR: Thompson's Drilling Co. DRILL: Mayhew 1000

DRILLER: C. Stratford ASSISTANTS: R. Brown, T. Auld

DATE HOLE COMMENCED: 24.3.76 COMPLETED: 24.3.76

HOLE LOGGED BY: H. Jablonski ON: 24.3.76

FIX: Surveying Sextant. Readings on New Tent Hill - New Twin Hill - Nobs Hill.

OBJECT: To test for coal bearing strata.

RESULT: No coal bearing strata intersected.

LOG COMPRISES: GEOLOGICAL LOG

DEPTH FROM	DEPTH TO	GEOLOGICAL LOG Drilling commenced at 4.30 p.m.
0	5	Highly gypsiferous mud, minor sand.
5	10	Highly gypsiferous mud, minor sand.
10	15	Gypsiferous pale green grey mud.
15	20	Pale green clay, some chocolate clays.
20	25	Pale green and chocolate clays.
25	30	Pale green and chocolate clays.
30	35	Pale green and chocolate clays with chips of unweathered basement.

DRILLING COMPLETED AT 4.45 p.m.

GEOPHYSICAL LOGGING NOT ATTEMPTED