Open File Envelope No. 1487

SML 364

WEST LAKE FROME

PROGRESS REPORT TO LICENCE EXPIRY FOR THE PERIOD 18/12/69 TO 17/6/70

Submitted by
CRA Exploration Pty Ltd
1970

Enquiries: Customer Services
Ground Floor
101 Grenfell Street, Adelaide 5000

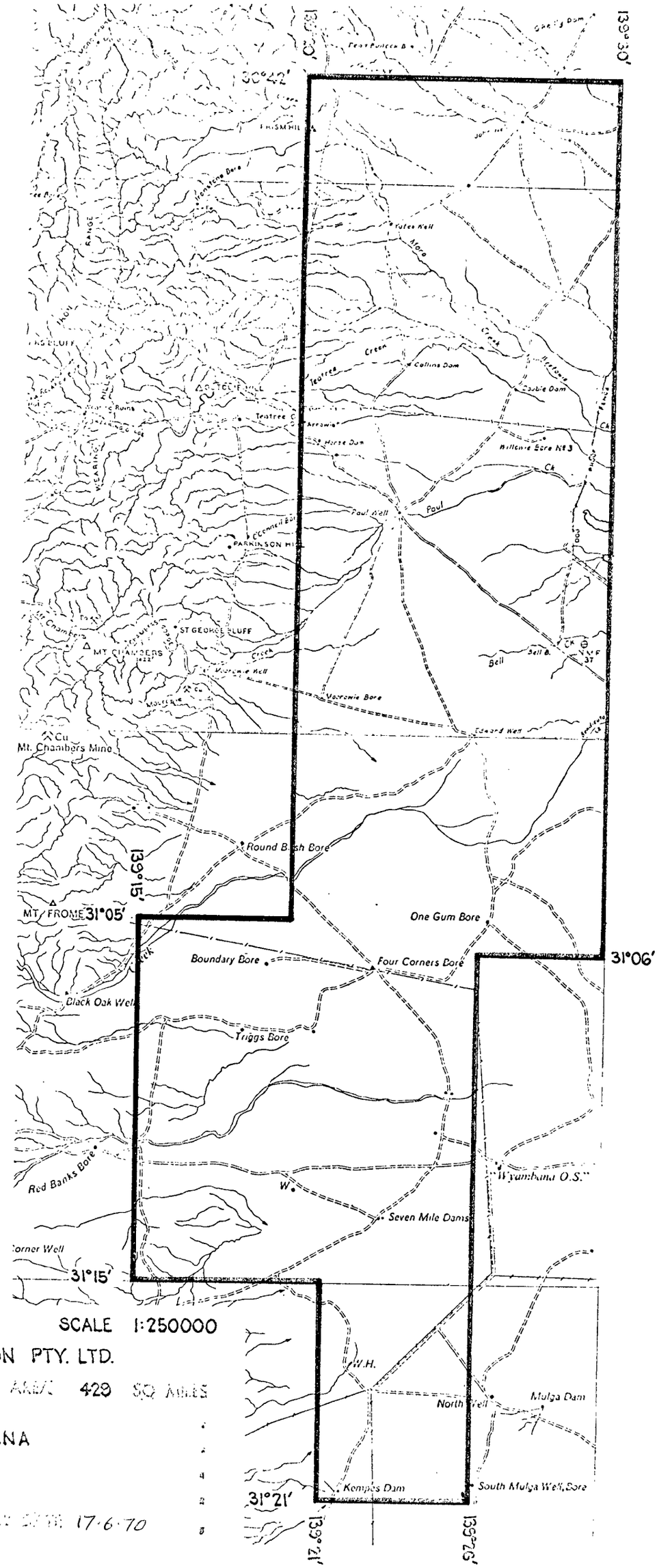
Telephone: (08) 8463 3000
Facsimile: (08) 8204 1880

PRIMARY INDUSTRIES AND RESOURCES SA

CONTENTS ENVELOPE 1487

TENEMENT: S.M.L. 364 - West Lake Frome.

TENEMENT HOLDER: C.R.A. Exploration Pty. Ltd.



SCALE 1:250000

C.R.A. EXPLORATION PTY. LTD.

D.M. 1297/69 AREA 429 SQ MILES

. COPLEY

. PARACHILNA

S.M.L. No. 364 EXPIRY DATE 17·6·70

C.R.A. EXPLORATION PTY. LIMITED

October, 1970.

Memorandum to : A.F.McQUEEN

Copies : D.S. Carruthers
C.L. Knight

From : A.K. Hodgkin

Scout Drilling for Sedimentary Uranium, S.M.L.364, West Lake Frome, South Australia

SUMMARY AND RECOMMENDATIONS

The Tertiary and Cretaceous sediments in the west of the Lake Frome Embayment area are considered to be possibly favourable as host rocks for the formation of sedimentary uranium deposits, particularly in view of discoveries already made to the north and southeast.

The drilling and gamma logging of 12 rotary scout holes has, however, established a lithology of impermeable muds and silts. This is considered unfavourable and relinquishment of S.M.L.364 is recommended.

INTRODUCTION

From May to July, 1970 twelve holes (WLF 1 to 12) were rotary drilled and gamma logged* on Special Mining Lease 364 (West Lake Frome) to establish whether or not the Tertiary and Cretaceous sediments included a suitable environment for the formation of sedimentary uranium deposits of the Western United States type.** The sediments are in the part of the southern edge of the Great Artesian Basin known as the Lake Frome Embayment.

PREVIOUS WORK

In 1969 R. Klaric collected bore water samples over a wide area of the Lake Frome Embayment for uranium assay (3); in the same year the Toolaby area (S.M.L. 273) to the south of the West Lake Frome area, was drilled for sedimentary uranium (4).

---

* One, WLF1, was drilled to only 61 feet and was not gamma logged.

** This term is used to include both the Tertiary "solution-front" deposits and the Mesozoic buried river channel deposits.

In 1970, G. F. Pigott studied water and oil bore lithologies and literature of the West Lake Frome area in order to establish if suitable environments for the formation of sedimentary deposits of uranium might exist in the area. On the basis of his research the present drilling programme was planned.

LOCATION AND ACCESS

The West Lake Frome area (SML 364) is situated on the piedmont plain between the North Flinders Ranges on the west and Lake Frome on the east; the plain is about 12 miles wide at its narrowest point and on average 100 feet above sea level.

All holes were drilled on Wertaloona Station, and close to either station tracks or the Gidgealpa-Adelaide gas pipe line; access to holes is therefore good. Wertaloona Homestead is 67 miles from Copley.

METHODS USED

1. Samples collected and described every 10 feet.

2. Samples scanned with a scintillometer, two types were used, a Scintrex BGS 1 and Technical Associates Model PUG 1.

3. Holes logged for gamma rays, self potential resistivity and in some cases neutron absorption. This was nearly all open hole logging and maximum depth was not reached in many cases. Two types of Neltronic Logger were used; machines and operators were from the South Australian Department of Mines.

4. One sample was sent to The Zinc Corporation for uranium assay, and one to A.M.D.E.L. for mineral identification.

DRILLING INFORMATION

All holes except WLF 1 were drilled to 525 feet; this depth was decided with reference to the likely maximum depth for economic open-cutting of sedimentary uranium. Total footage drilled was 5,836 feet (this figure does not include the several attempts to penetrate surface gravel in the northern holes).

Contractors: Mines Dept., South Australia.

Machinery: Truck-mounted Mayhew 1000 rotary drill rig. (For WLF 1 a percussion cable tool rig was used to penetrate the surface gravel, but it was not successful).

Conditions: Pleistocene and Recent gravels in holes WLF 1 to 5 and 10 were extremely difficult to drill due to loss of circulation and collapse of hole; WLF 1 was abandoned at 61 feet after several unsuccessful attempts to penetrate the gravel.

Tertiary & Cretaceous: Drag bit was used throughout.

GEOLOGY OF WEST LAKE FROME AREA

SML 364 covers a small part of the western edge of the Lake Frome Embayment. A thick sequence of Quaternary, Tertiary, Cretaceous and Jurassic sediments overlie Archean granites, metasediments of the Proterozoic Adelaide System and Cambrian sediments.

The embayment is so called because it is bounded on the west, south and east by outcropping Palaeozoic and Precambrian rocks of the North Flinders Ranges, the Olary Region and the Broken Hill and Tibooburra blocks, respectively, and is partly closed off in the north by a basement high (the Mount Painter Ridge).

The West Lake Frome area is of interest as an area of potential sedimentary uranium deposition because sedimentary uranium has been found at the foot of Mt. Painter to the north and between Kalabity and Curnamona homesteads to the south, the sediments of both these areas are derived largely from known uranium provinces, Mt. Painter and Radium Hill respectively. Host rocks of the two sedimentary uranium deposits are thought to be silty and sandy beds within a thick sequence of black carbonaceous argillite of probable Cretaceous age. SML 364 lies between the two areas but there are no known uranium-bearing rocks in the source area of the sediments; no black carbonaceous argillites were drilled.

The location of drillholes was determined largely by an indicated north trending basement trough which passes through the S.M.L. It was hoped that, given f ourable lithology, the trough may have acted as a channel for the movement of uranium-bearing solutions.

The post Palaeozoic sequence is as follows:

Jurassic: the Mooga sandstone, equivalent of the Blythesdale Group; fresh water sands, gravels and minor shales. Not reached in drillholes.

Cretaceous: Lower Cretaceous marine blue shales and sands, minor limestone. Drill results on SML364 show the Cretaceous to be entirely argillaceous with some limestone and dolomite; the higher parts are pale to dark green-grey muds; blue-grey muds appear at depth. The Upper Cretaceous Winton Formation pinches out well to the north of the S.M.L.

Tertiary: red-brown undifferentiated mottled silts, muds and sands with common carbonaceous fragments and often calcareous. These sediments are from about 360 to 160 feet thick, and generally thin to the east; the boundary with the Cretaceous is not sharp, but grades over 20 to 40 feet.

Quaternary: grey-brown Pleistocene and Recent unconsolidated sands and muds; extensive but discontinuous, maximum thickness (more than 60 feet) in the northwest of the SML, thinning to the east. The gravels are often associated with calcareous layers and nodules ('kunkar' or 'calcrete'). Alluvium and aeolium form a thin veneer over most of the area.

SUMMARY LITHOLOGS

00 6

For detailed description refer Appendix

Hole No.	Footage	Description	Age
WLF 1	0 - 61	Brown and grey unconsolidated gravel and sand.	Quaternary
WLF 2	0 - 21	Red-brown muddy silts, calcareous.	Quaternary
	21 - 62	Grey unconsolidated coarse gravel, some limestone	
	62 - 404	Interbedded red-brown fine sands silts and muds, gravelly in parts; 330-350' highly carbonaceous grey silt.	Tertiary
	404 - 525	Green-grey muds, minor red-brown and pale grey muds. Dark green grey mud significant below 468'.	Cretaceous
WLF 3	0 - 14	Pale brown sandy silt.	Quaternary
	14 - 40	Grey unconsolidated coarse gravel.	
	40 - 289	Brown and red-brown muds and silts; minor pale grey muds, sandy and gravelly in parts.	Tertiary
	289 - 525	Green-grey muds, pale to dark; trace red-brown mud. Blue-grey mud below 453'.	
WLF 4	0 - 6	Pale brown silts, calcareous Pale brown to white limestone gravel at base.	Quaternary
	6 - 52	Pale brown to white limestone, gravel at base.	Quaternary
	52 - 255	Brown silts and muds; minor grey mud.	Tertiary
	255 - 328	Pale green-grey mud.	Cretaceous
	328 - 348	No sample probably limestone.	
	348 - 525	Mainly blue-grey and dark green-grey muds, minor red-brown and black muds, yellow-brown mud.	

Hole No.	Footage	Description	Age
WLF 5	0 - 28	Brown gravelly and silty sand, calcareous.	Quaternary
	28 - 288	Red-brown silts and muds; grey and yellow mottling at base.	Tertiary
	288 - 525	Green-grey muds, minor red-brown and black muds; blue-grey below 446'.	Cretaceous
WLF 6	0 - 53	Grey sands and gravels, calcareous.	Quaternary
	53 -?385	Mainly red-brown muds and silts; grey, yellow and pink in parts; carbonaceous and calcareous.	Tertiary
	385 - 525	Mainly green-grey muds, darker with depth.	Cretaceous
WLF 7	0 - 25	Gravelly and silty sand with kuncar.	Quaternary
	25 - 293	Red-brown silts and muds, grey at top.	Tertiary
	293 - 525	Mainly green-grey muds, darker with depth. Dark blue-grey mud significant below 374'.	Cretaceous
WLF 8	0 - 10	Brown gravelly sand.	Quaternary
	10 - ?54	Highly calcareous brown sand.	
	?54 - 299	Red-brown silts and muds.	Tertiary
	299 - 525	Gradual change to green-grey muds, becoming darker with depth.	Cretaceous
WLF 9	0 - 10	Brown sand	Quaternary
	10 -?188	Grey and red-brown calcareous sands, gravels and silts.	Tertiary
	?188 - 345	Red-brown sandy silts and muds, finer with depth.	
	345 - 525	Green-grey muds, multi-coloured at top, dark blue mud below 458'.	Cretaceous

Hole No.	Footage	Description	Age
WLF 10	0 - 150	Grey, brown and red-brown gravels and sands, calcareous.	Quaternary to Tertiary
	150 - 392	Red-brown sands silts and muds, minor gravel.	Tertiary
	392 - 525	Green-grey muds, darker with depth.	Cretaceous
WLF 11	0 - 9	Pale brown muddy silt, gypsum and kunkar.	Quaternary
	9 -?180	Red-brown muds and silts, sandy and gravelly in parts.	Tertiary
	?180 - 380	Mainly red-brown muds, increasing grey mud below 294'.	Tertiary to Cretaceous
	380 - 525	Mainly grey and green-grey muds, minor red-brown, white and dark blue muds. Hard bar at 490', gamma kick 492' - 494'.	Cretaceous
WLF 12	0 - 94	Brown calcareous sands, silts and muds, minor gravel.	Quaternary
	94 - 310	Mainly red-brown muds and sandy silts mud below 220'.	Tertiary
	310 - 525	Mainly green-grey muds, white dolomite 340' - 410'.	Cretaceous

Assay Result

Sample No. 141401 490' - 500', WLF 11 2 ppmU.

GAMMA LOG RESULTS

All holes except WLF 1 were gamma logged, usually to 517 feet (WLF 12 and 6 are exceptions). The logging failed to show any beds of interest, it being quite common to have no kicks greater than three times surface background. The highest kick came from WLF 11 where a 9 x surface background kick occurred between 492 and 494 feet; no other holes gave kicks greater than 4½ x background.

The lithology at 492 feet in WLF 11 is a mixture of different coloured clays, mainly blue-grey and pale grey within the Cretaceous. A six inch hard bar occurs at 490 feet and the electric logs suggest a change in lithology at 492 feet, but there is no evidence of these in the drill chips.

The gamma log, the neutron, self potential and resistivity logs are of limited use in determining lithological changes, and it is difficult to correlate logs with samples.

CONCLUSIONS

Holes drilled on SML 364 did not intersect favourable lithologies for the formation of sedimentary uranium deposits, and gamma logging of these holes did not give encouraging results.

There is no reason to suppose that further drilling would show different results and therefore relinquishment of the SML is recommended.

A.K. Hodgkin

AKH:dc

Attach: Appendix:

Detailed lithologies WLF 1 to 12
Gamma, self potential and resistivity logs WLF 2 to 12 (S.A. 148 - 169).

REFERENCES

0010

(1)	Freeman, R.N.	1966	The Lake Frome Embayment Area. A.P.E.A. Journal 1966.
(2)	Ker, D.S.	1966	Report of Investigation No. 27 Hydrology of Frome Embayment S.A. Department of Mines, Geol. Surv. 1966.
(3)	Klaric, R.	1969	Uranium Search, Lake Frome Embayment S.A. C.R.A.E. Report (unpublished) 7/8/1969.
(4)	Pigott, G.F.	1969	Rotary Drilling in S.M.L.273 Toolaby South Australia. C.R.A.E. Report (unpublished) October, 1969.
(5)	Pigott, G.F.	1970	Study of Water and Oil Bores in the Lake Frome Embayment, S.A. C.R.A.E. Report (unpublished) Junuary, 1970.

KEYWORDS

Uranium, Sedimentary, Tertiary and Cretaceous; Drilling-rotary, logging - gamma.

Locality: 1:250,000 map sheets - SH54-9 Copley
SH54-13 Parachilna

PLAN

		Scale
No. S.A.140	Location of Drill Holes, West Lake Frome South Australia. S.M.L. 364	1:250,000.

TYPE OF LOG (S): GAMMA 50 C.P.S.-1"

DATE: 9 July 1970 TIME: 1515 hrs 1600 hrs

AREA: West Lake Frome SA LOCATION: Lat. Long

WELL: W.L.F. No. 3.

ELEVATION G.L.: K.B.: Log from Ft Above G.L. DEPTH SCALE:

RUN NUMBER: 1 / / / /

FIRST READING: 5171 / / / LAST READING: 0'1 / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH LOG feet DRILL feet

MUD: Type Density Viscosity Resistivity @ °F @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mc} @ °F

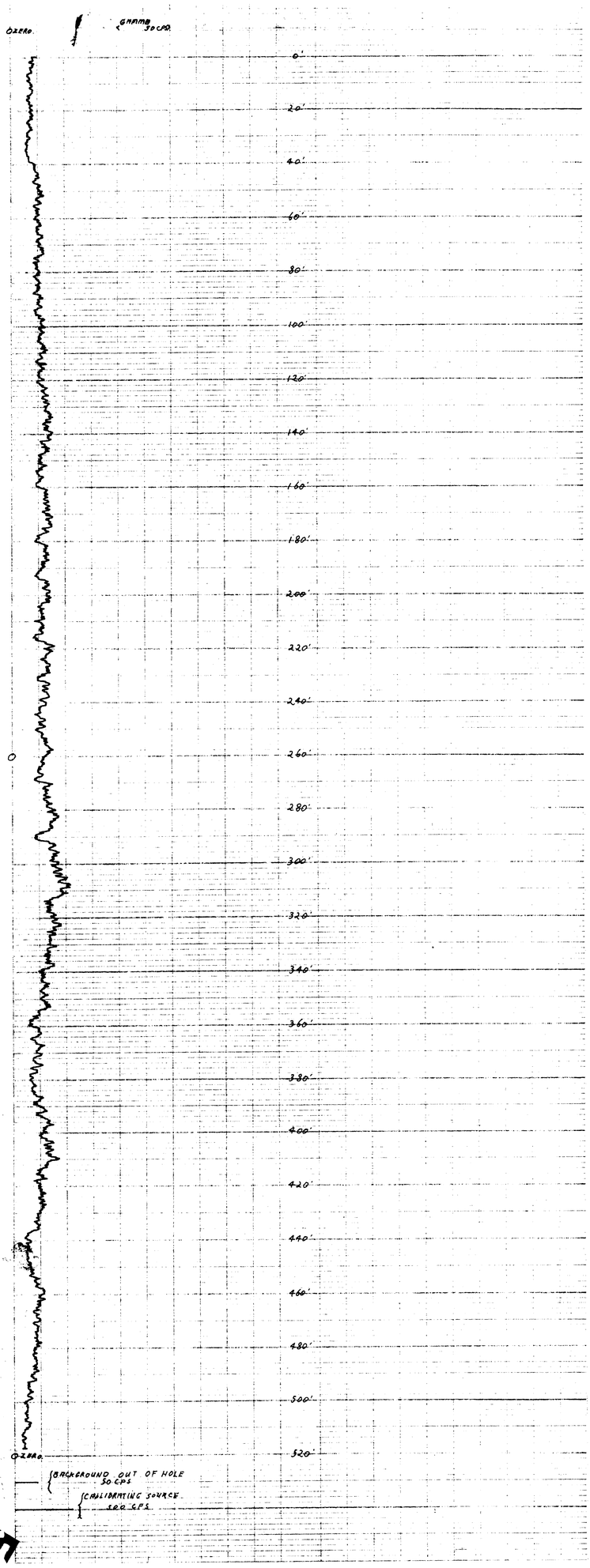
CASE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 45 min. / / / /

RECORDED BY: B.A.C. BRICE

REMARKS:

1487-1



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): S.P. & Point Resistivity
5 mV. 2.52 m.

DATE: 11/7/70 TIME: 1825 hrs / 1900 hrs /

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: W.L.F. No. 4

ELEVATION G.L.: K.B.: Log from feet above G.L. DEPTH SCALE:

RUN NUMBER: / / / /

FIRST READING: 517' / / / / LAST READING: 0' / / /

CASING SHOE DEPTH ("):LOG 517' feet DRILL 525' feet TOTAL DEPTH:LOG feet DRILL feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{inf} @ °F R_{mc} @ °F

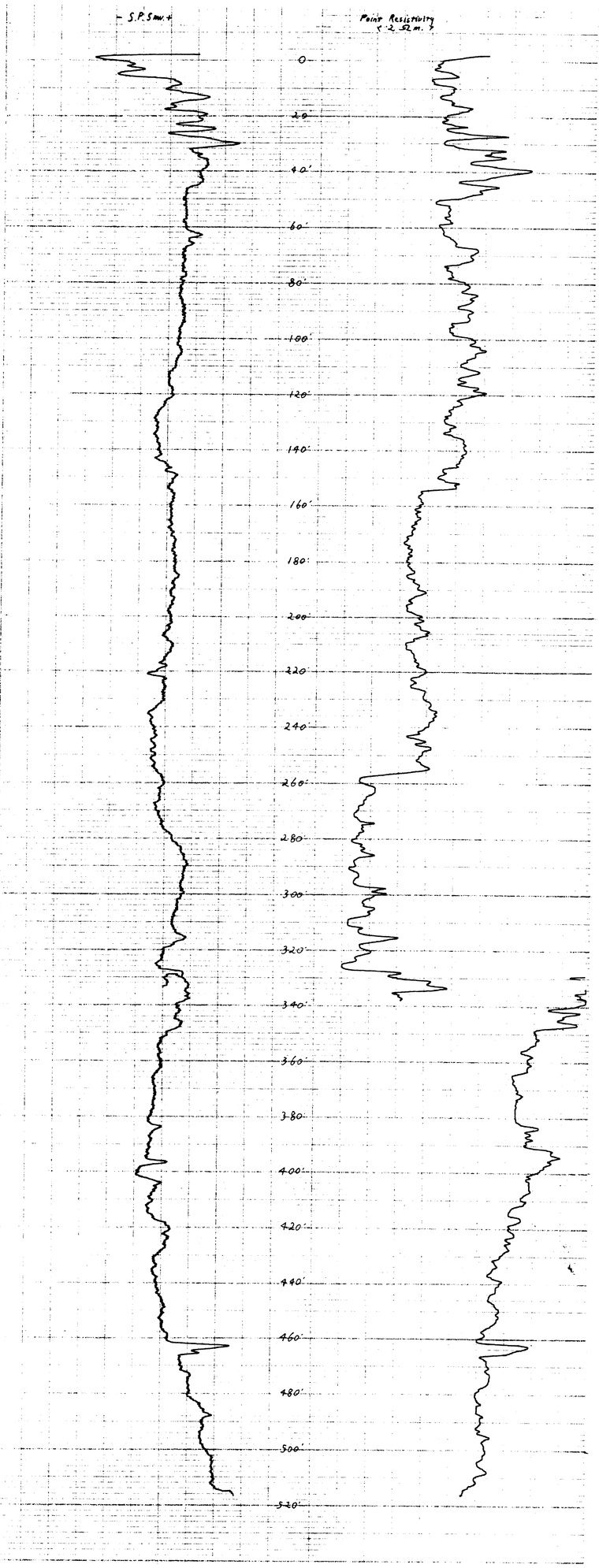
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 25 min. / / / /

RECORDED BY: B.H.C. BRICE

REMARKS:

1487-2



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): Gamma-ray

DATE: 9-6-70 TIME: 5·30pm / / /

AREA: CRA Lease (Wentaloona) SA LOCATION: Lat. Long.

WELL: WLF 6

ELEVATION G.L.: K.B.: Log from 0 feet above G.L. DEPTH SCALE: 20ft/in.

RUN NUMBER: / / / / /

FIRST READING: 426 / / / / LAST READING: / / / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH:LOG 426 feet DRILL 525 feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mc} @ °F

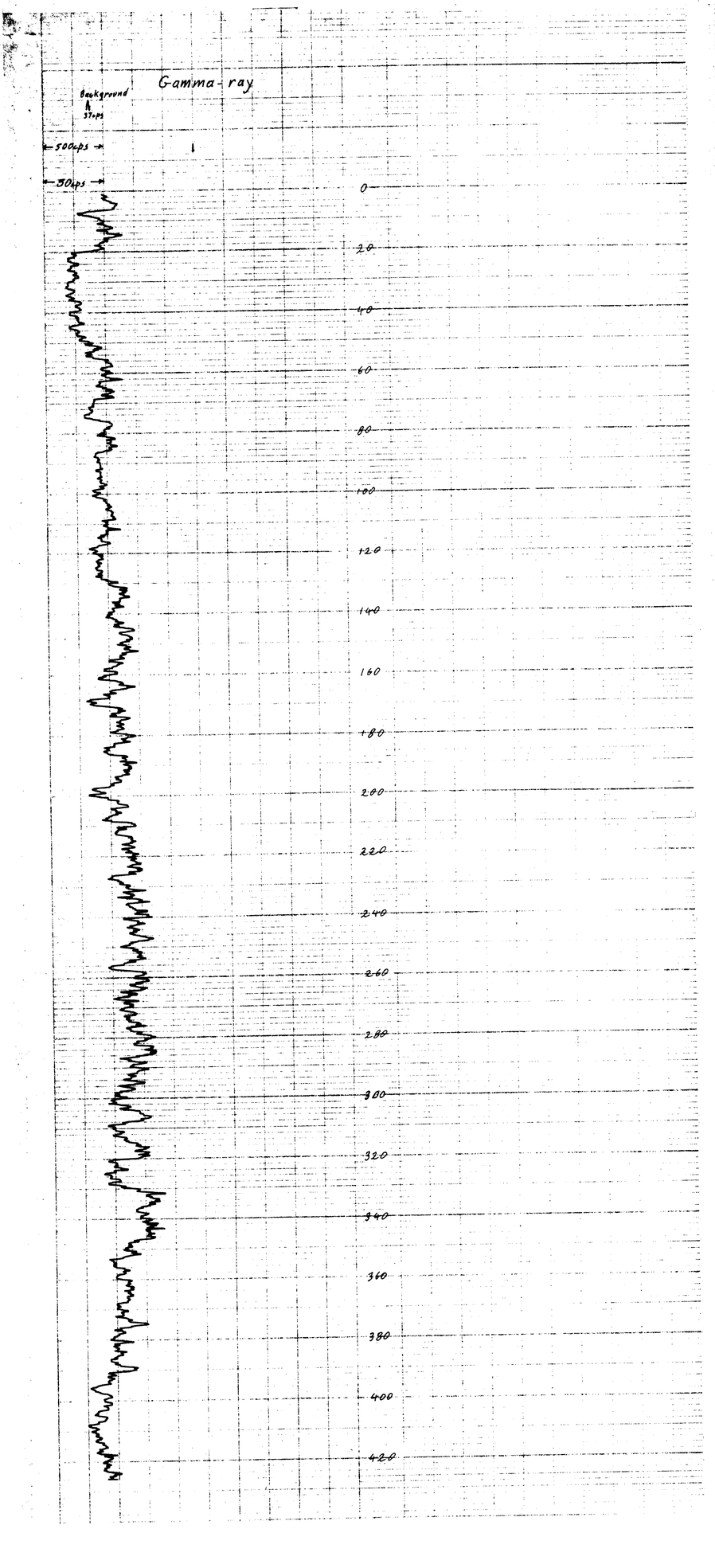
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 1·5 hrs. / / / /

RECORDED BY: B P Taylor

REMARKS:

1487-3



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): S.P., Point Resistivity

DATE: 9-6-70 TIME: 7:00pm / / /

AREA: CRA Lease (Wertaloona) LOCATION: Lat. Long.

WELL: WLF 6

ELEVATION G. L.: K. B.: Log from 0 feet above G. L. DEPTH SCALE: 20ft/in

RUN NUMBER: / / / / /

FIRST READING: 361 / / / / LAST READING: / / / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH:LOG 361 feet DRILL 525 feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 mins. Cake /32" R_{mf} @ °F R_{mc} @ °F

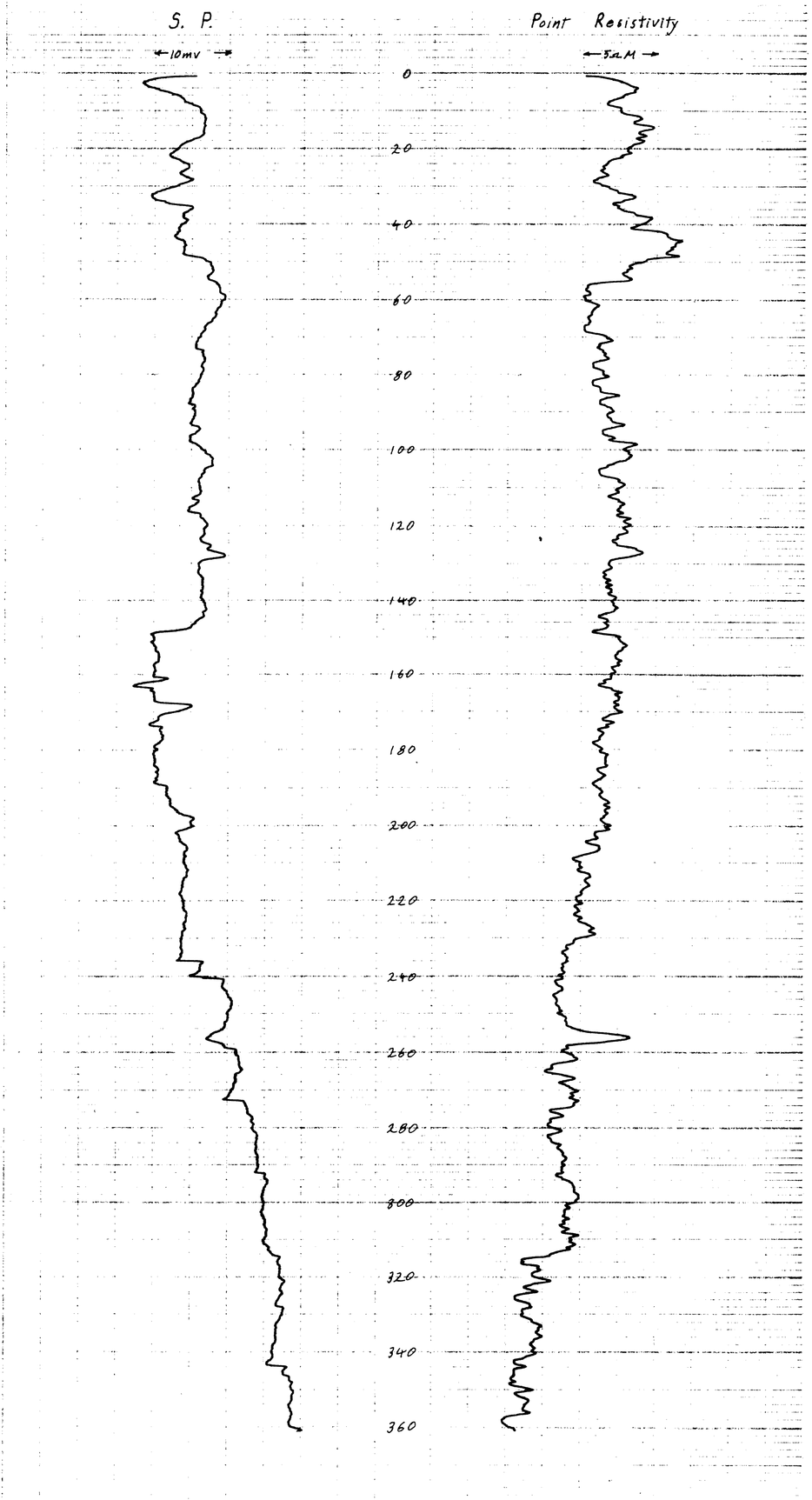
BIT SIZE: " ADDITIONAL CASING: " to feet

OPERATING TIME: 30 mins. / /

RECORDED BY: B. P. Taylor

REMARKS:

1487-4



1487-5

RUN NO. (SUFFIX): S.P. 20M & Point Resistivity 2 Ω m.

DATE: 21/6/70 TIME: 1755 hrs - 1810 hrs

AREA: Wertaloona. S.A. LOCATION: Lat. Long.

WELL: W.L.F. 12.

ELEVATION G. L.: K.B.: Log from feet above G.L. DEPTH SCALE:

API NUMBER: / / / / /

FIRST READING: 323' / / / / LAST READING: 0' / / / /

CASING SHOE DEPTH ("):LOG 323 feet DRILL 525 feet TOTAL DEPTH LOG feet DRILL feet

MUD: Type Density Viscosity Resistivity @ °F Ω-M @ °F

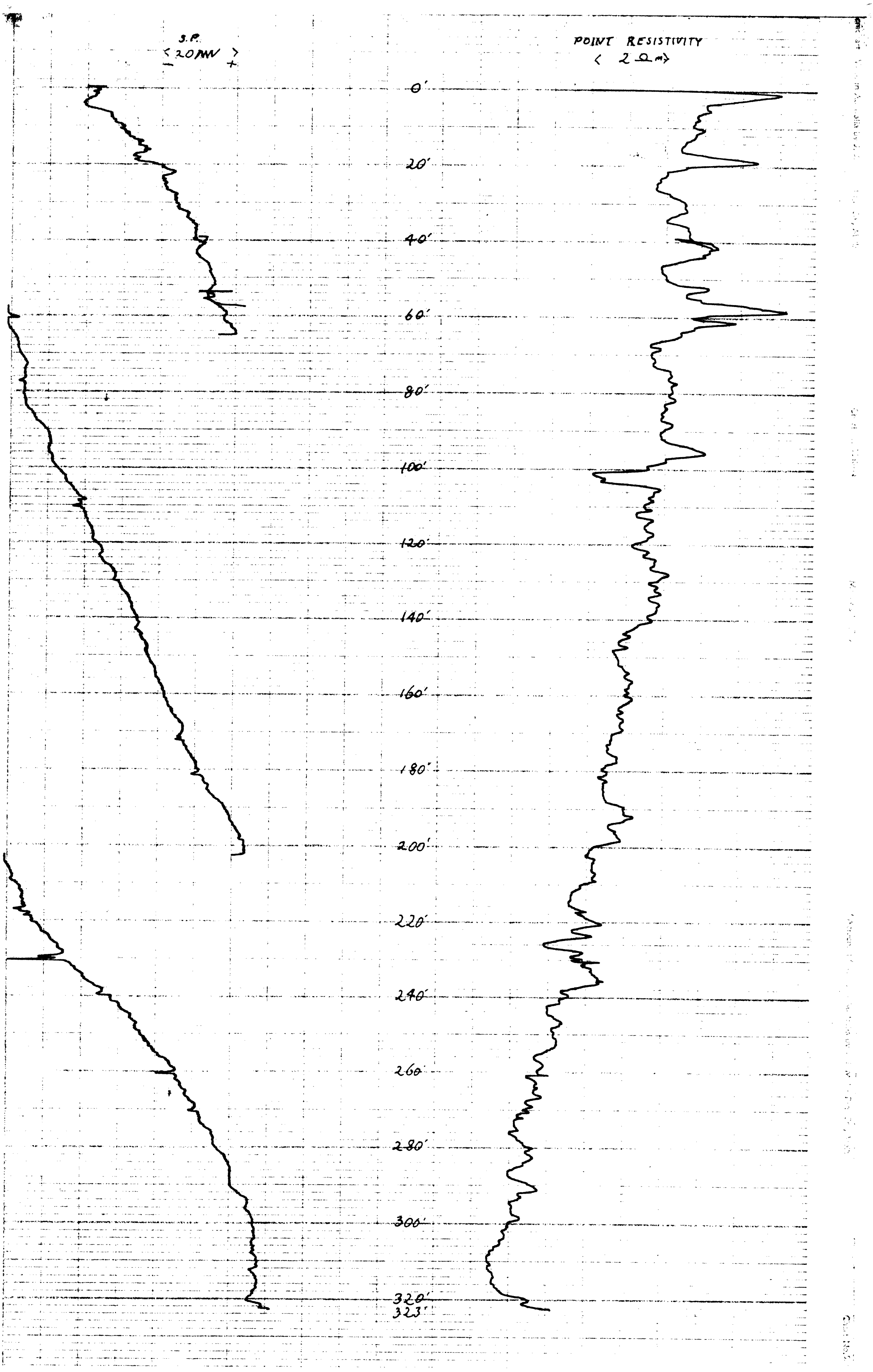
pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mc} @ °F

BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 15 min. / / / /

RECORDED BY: B.H.C. BRICE

REMARKS:



14876

TYPE OF LOG (S): 'GAMMA' 50 C.P.S.

DATE: 21/6/70 TIME: 1715 hrs / 1745 hrs /

AREA: Wertaloona. SA LOCATION. Lat. Long.

WELL: W.L.F. 12

ELEVATION G. L.: K. B.: Log from feet above G. L. DEPTH SCALE:

RUN NUMBER: 1 / / / /

FIRST READING: 323' / / / / SET READING: 0' / / / /

CASING SHOE DEPTH ("):LOG 323 feet DRILL 525 feet TOTAL DEPTH:LOG feet DRILL feet

MUD: Type Density Viscosity Resistivity @ °F °F

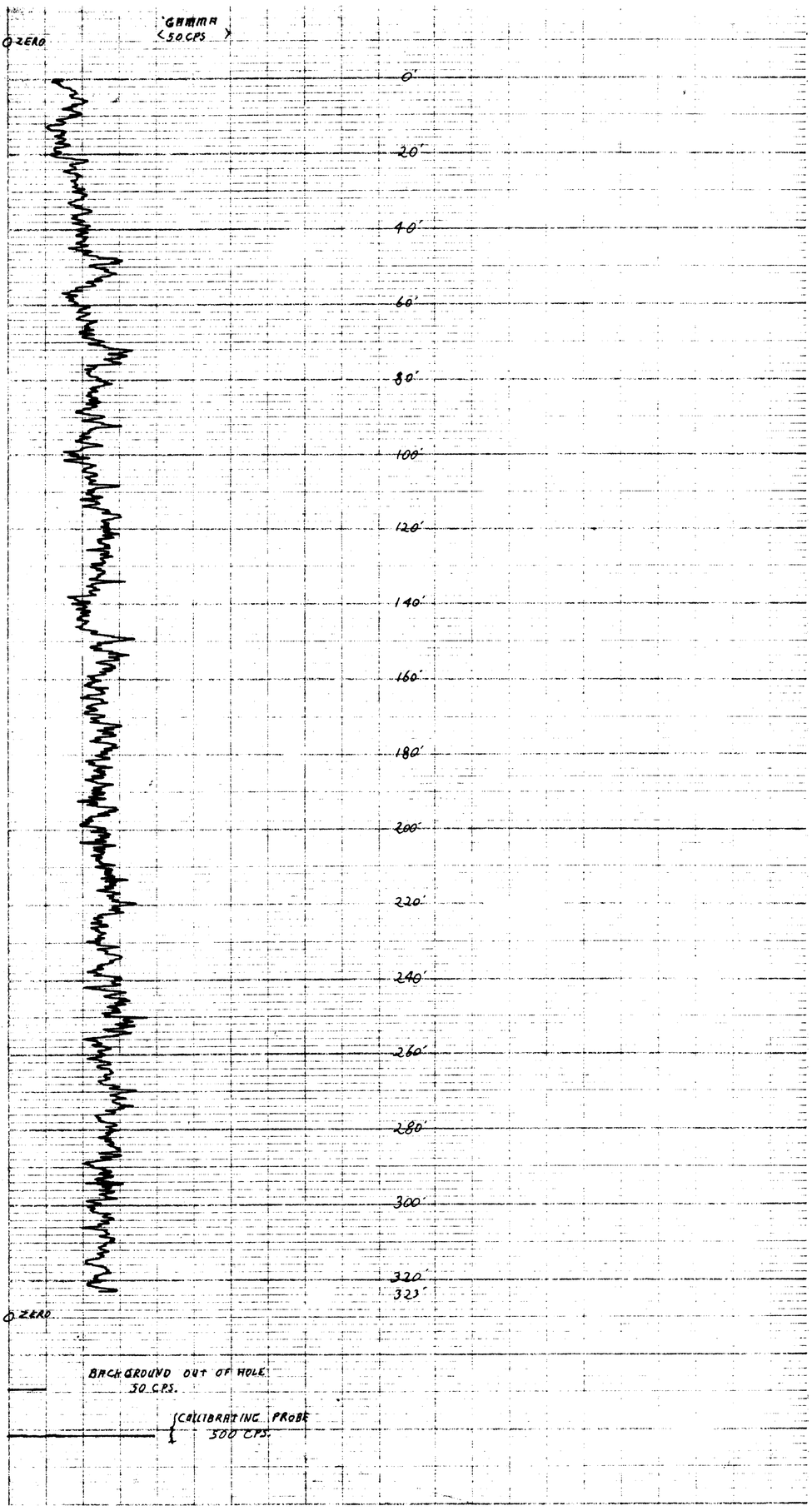
pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mf} @ °F

BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 30 min. / / / /

RECORDED BY: B.A.C. BRICE

REMARKS:



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): GAMMA 50 CPS.

DATE: 5/7/70 TIME: 1220 / 1300 /

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: W.L.F. No.2.

ELEVATION G.L.: K.B.: Log from feet above G.L. DEPTH SCALE:

RUN NUMBER: 2 / / / /

FIRST READING: 517 / / / / ; LAST READING: 0 / / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH:LOG feet DRILL feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{inf} @ °F R_{mc} @ °F

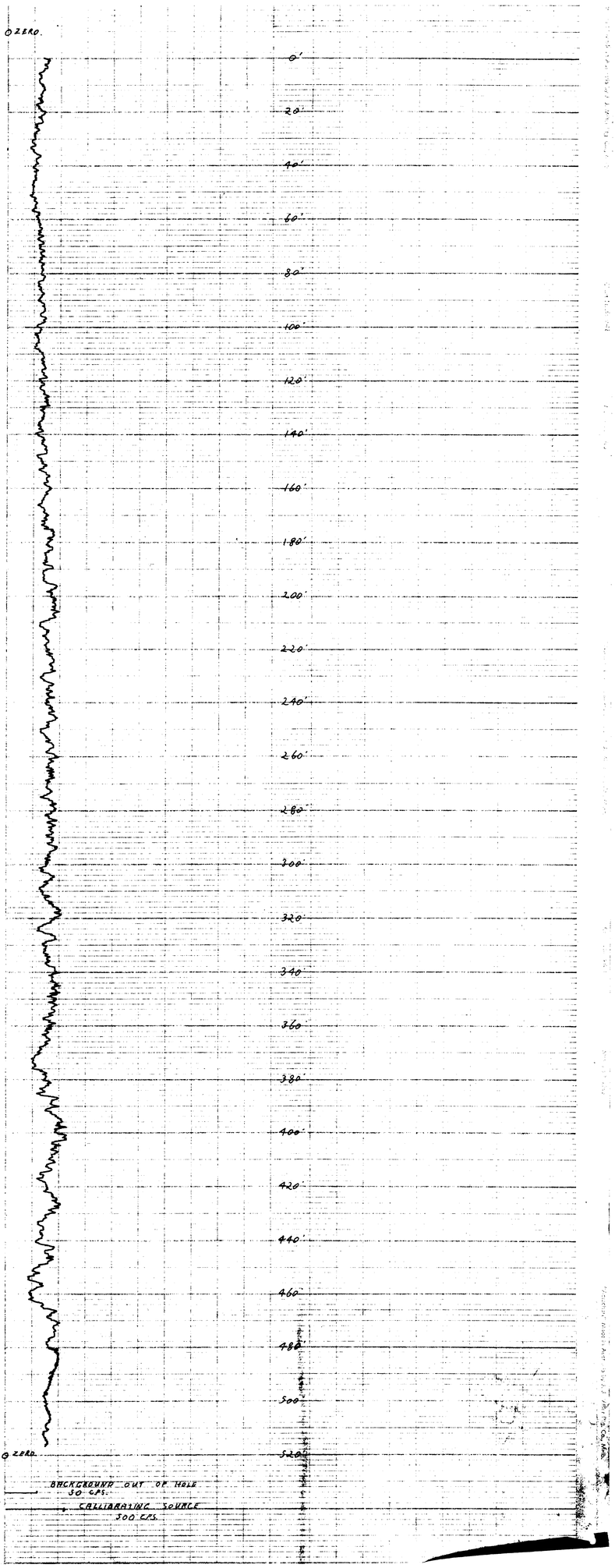
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 40 min / / / /

RECORDED BY: B.A.C. BRICE

REMARKS:

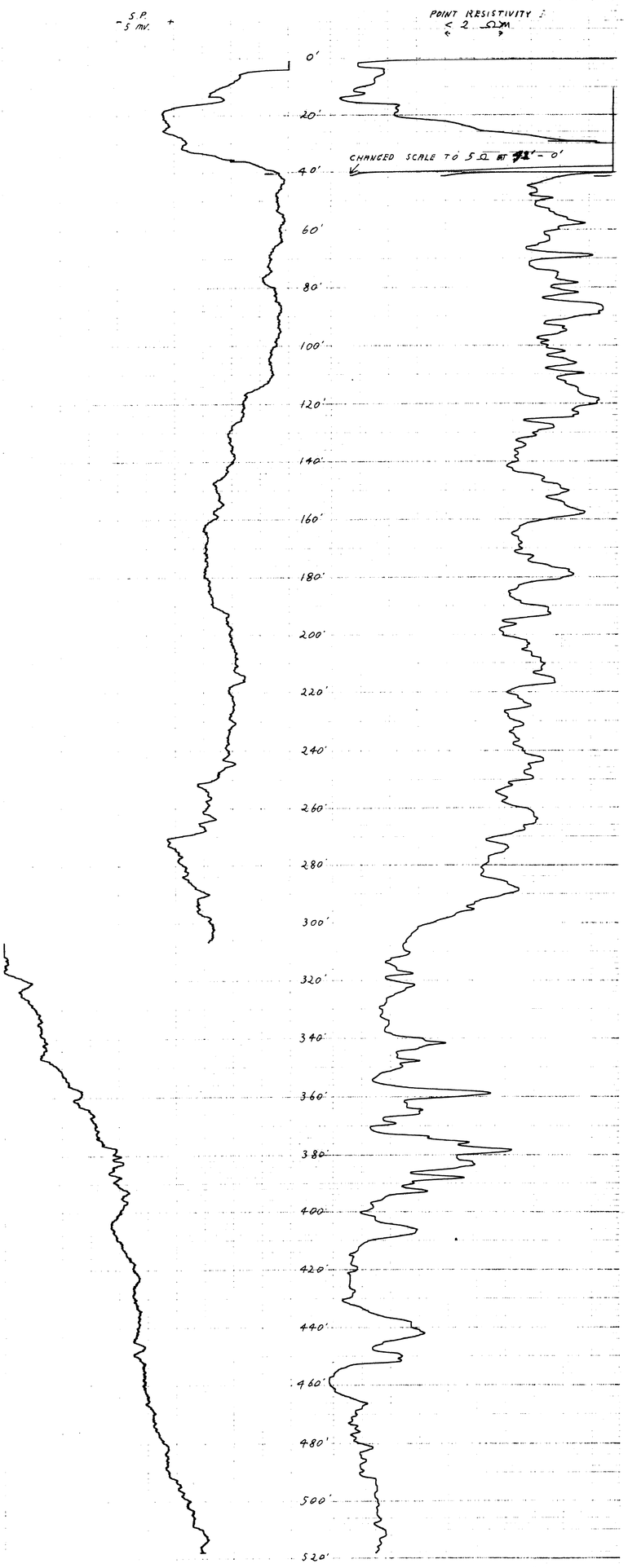
1487-1



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): S.P. @ 5 mv. Point Resistivity 2 Ω
DATE: 9/7/70 TIME: 1615 hrs / 1640 hrs /
AREA: West Lake Frome. SA LOCATION: Lat. Long.
WELL: W.L.F. No. 3.
ELEVATION G. L.: K.B.: Log from feet above G. L. DEPTH SCALE:
RUN NUMBER: 1. / / / /
FIRST READING: 518' / / / / LAST READING: 0' / / /
CASING SHOE DEPTH ("):LOG feet DR'LL 525' feet TOTAL DEPTH:LOG feet DRILL feet
MUD: Type Density Viscosity Resistivity @ °F BHT @ °F
pH Fluid Loss cc/30 min. Filter Cake /32" R_{maf} @ °F R_{mc} @ °F
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet
OPERATING TIME: 25 min / / / /
RECORDED BY: B.A.C. BRICE
REMARKS:

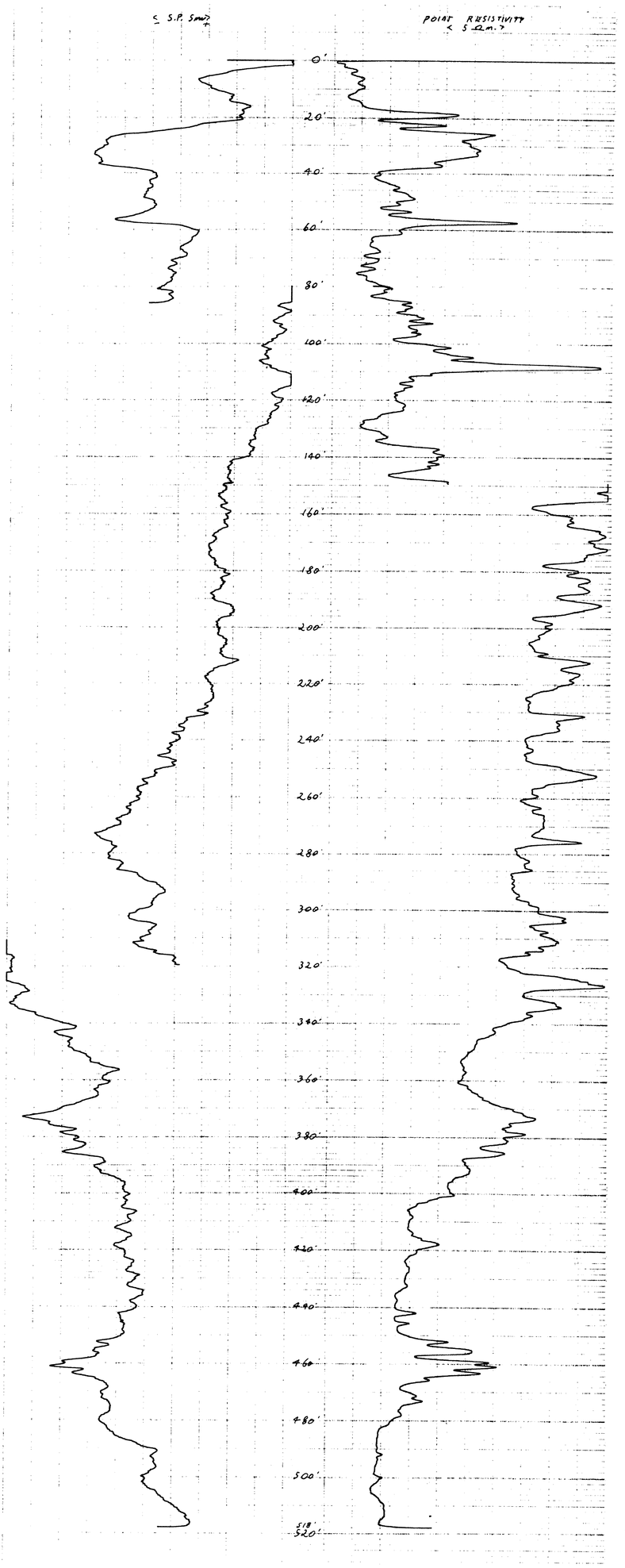
14878



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): S.P. & Point Resistivity
DATE: 4/7/70 (5 mv. 5 Ω) TIME: 1415hr / 1435hr /
AREA: West Lake Frome SA LOCATION: Lat. Long.
WELL: W.L.F. No. 2.
ELEVATION G.L.: K.B.: Log from feet above G.L. DEPTH SCALE:
RUN NUMBER: / / / / /
FIRST READING: 518' / / / LAST READING: 0' / / /
CASING SHOE DEPTH ("):LOG feet DR'LL 525 feet TOTAL DEPTH:LOG feet DRILL 525' feet
MUD: Type Density Viscosity Resistivity @ °F BHT @ °F
pH Fluid Loss cc/30 min. Filter Cake /32" R_{maf} @ °F R_{mc} @ °F
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet
OPERATING TIME: 20 min. / / /
RECORDED BY: B.A.C. BRICE
REMARKS:

1487-9



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): GAMMA 50 CPS.

DATE: 5/7/70 TIME: 1220 to 1300 hrs

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: W.L.F. No.2.

ELEVATION G.L.: K.B.: Log from feet above G.L. DEPTH SCALE:

RUN NUMBER: 2 / / / /

FIRST READING: 517 / / / / ; LAST READING: 0 / / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH:LOG feet DRILL feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mc} @ °F

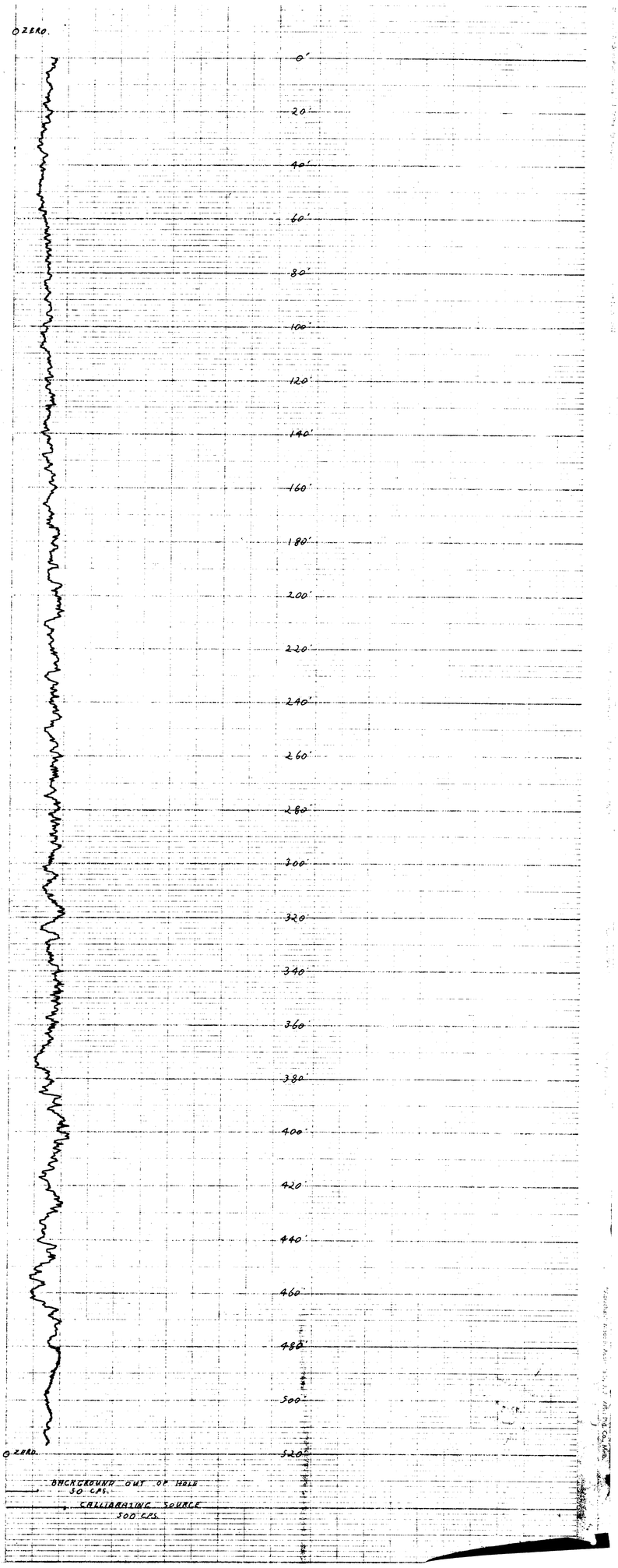
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 40 min / / / /

RECORDED BY: B.A.C. BRICE

REMARKS:

1987-10



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): S.P. 5mv. & Point Resistivity 2.2m.

DATE: 11/7/70 TIME: 1825hrs / 1900hrs /

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: W.L.F. No. 4

ELEVATION G.L.: K.B.: Log from feet above G.L. DEPTH SCALE:

RUN NUMBER: / / / / /

FIRST READING: 517' / / / / LAST READING: 0' / / / /

CASING SHOE DEPTH ("):LOG 517' feet DRILL 525' feet TOTAL DEPTH:LOG feet DRILL feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{maf} @ °F R_{mc} @ °F

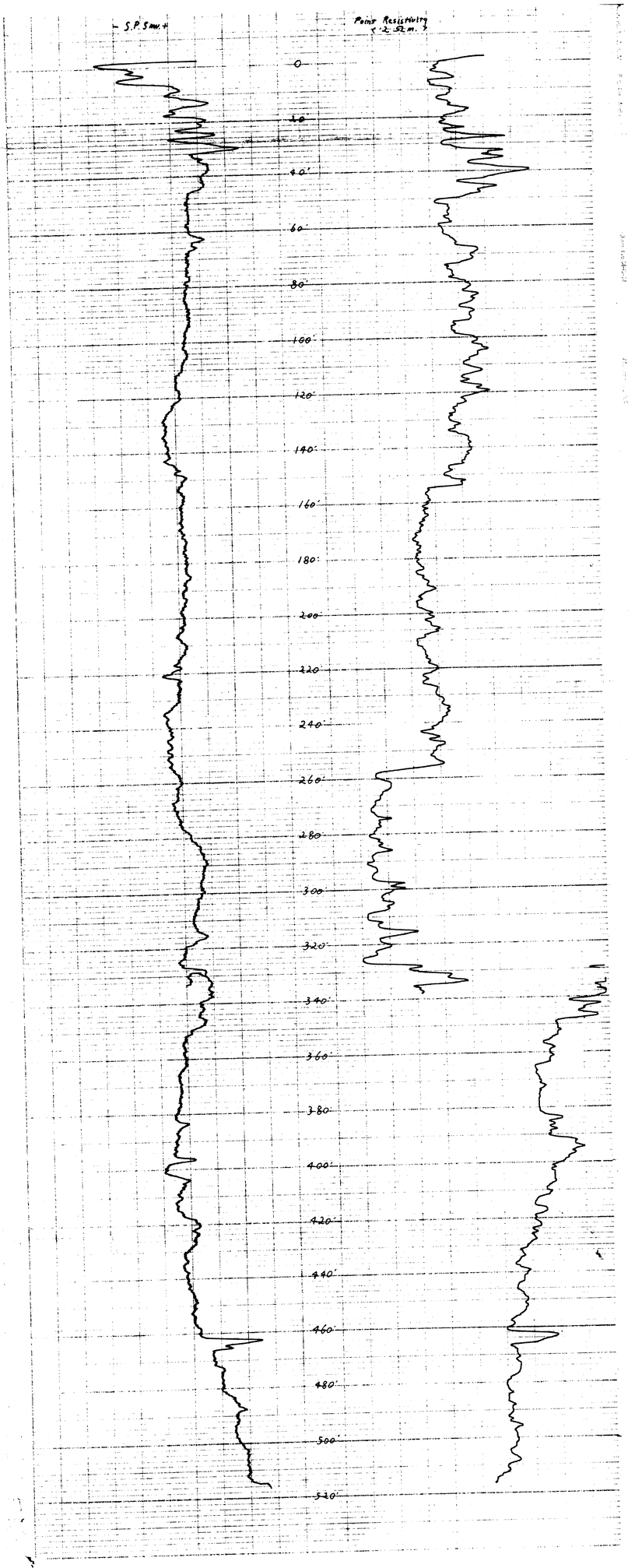
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 25 min / / / /

RECORDED BY: B.A.C. BRICE

REMARKS:

1487-11



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): GAMMA 50 cps - 1"

DATE: 11/1/70 TIME: 1715 hrs - 1815 hrs /

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: W.L.F. No. 4

ELEVATION G.L.: K.B.: Log from feet above G.L. DEPTH SCALE:

RUN NUMBER: / / / / /

FIRST READING: 516' / / / / LAST READING: 0' / / / /

CASING SHOE DEPTH ("):LOG 516' feet DRILL 525' feet TOTAL DEPTH:LOG feet DRILL feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{inf} @ °F R_{mc} @ °F

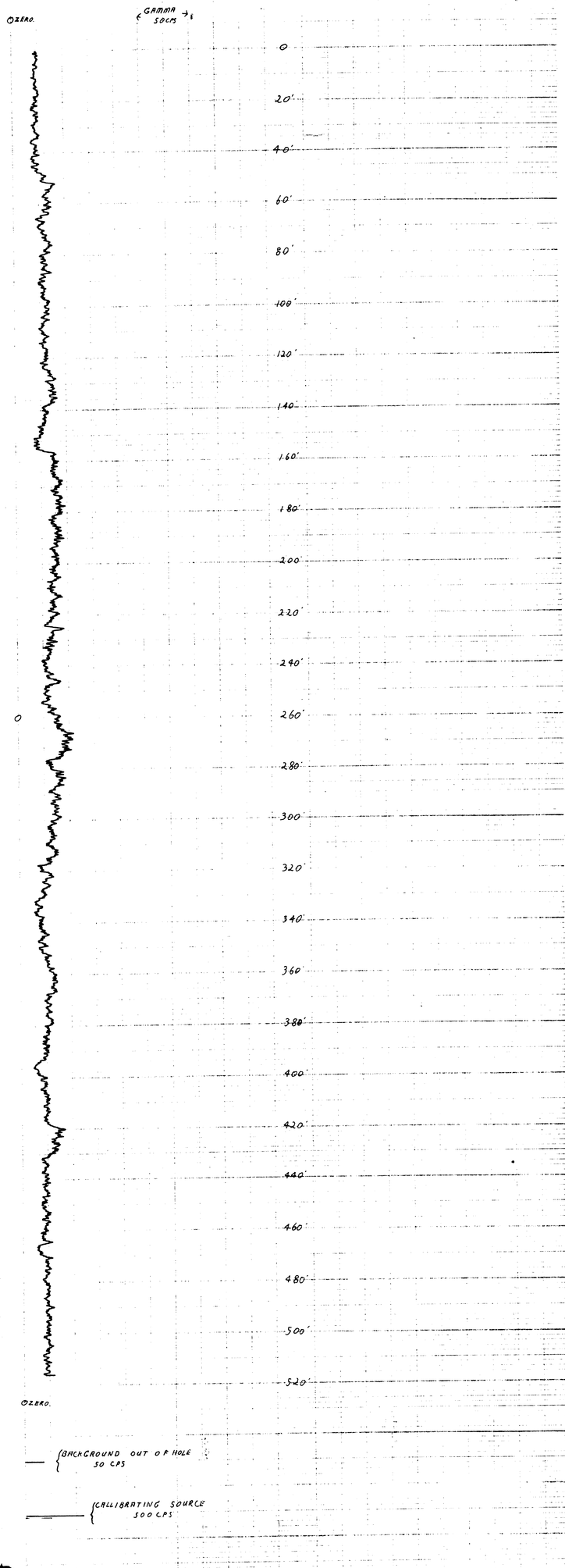
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 60 min. / / / /

RECORDED BY: B.A.C. BRICE

REMARKS:

1487-12



TYPE OF LOG (1): Gamma-ray

DATE: 2-6-70 TIME: 4·00pm / /

AREA: West Lake Frome SA. POSITION: Lat. Long.

WELL: WLF 5

ELEVATION G.L.: K.B.: Log from 0 ft. Above G.L. DEPTH SCALE: 20 ft/in.

RUN NUMBER: 1 / / / /

FIRST READING: 517 / / / / LAST READING: 0 / / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH DRILLED 517 feet LOGGED 525 ft

MUD: Type Density Viscosity Resistivity @ °F

pH Fluid Loss cc/30 min. F/Cake /32" R_{mf} @ °F R_{mfe}

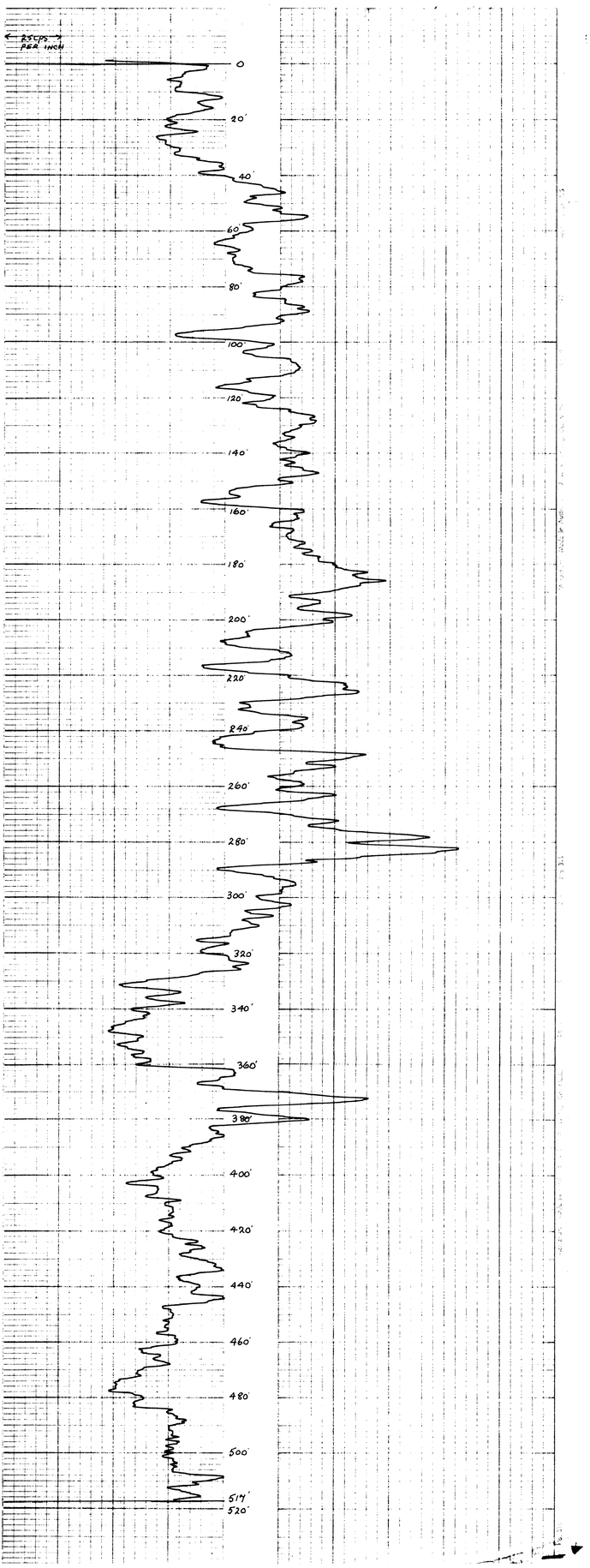
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 45mins / / /

RECORDED BY: A.W. YOUNG.

REMARKS:

1487-13



1487-14

TYPE OF LOG (S): Gamma-ray

DATE: 2-6-70 TIME: 4.00pm / / /

AREA: West Lake Frome S.A. LOCATION: Lat. Long.

WELL: WLF 5

ELEVATION G.L.: K.B.: Log from 0 Feet Above G.L. DEPTH SCALE: 20 ft/in.

API NUMBER: / / / / /

FIRST READING: 517 / / / / LAST READING: 0 / / / /

CASING SIDE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH LOG 517 feet DRILL 525 feet

MUD: Type Density Viscosity Resistivity @ °F °C

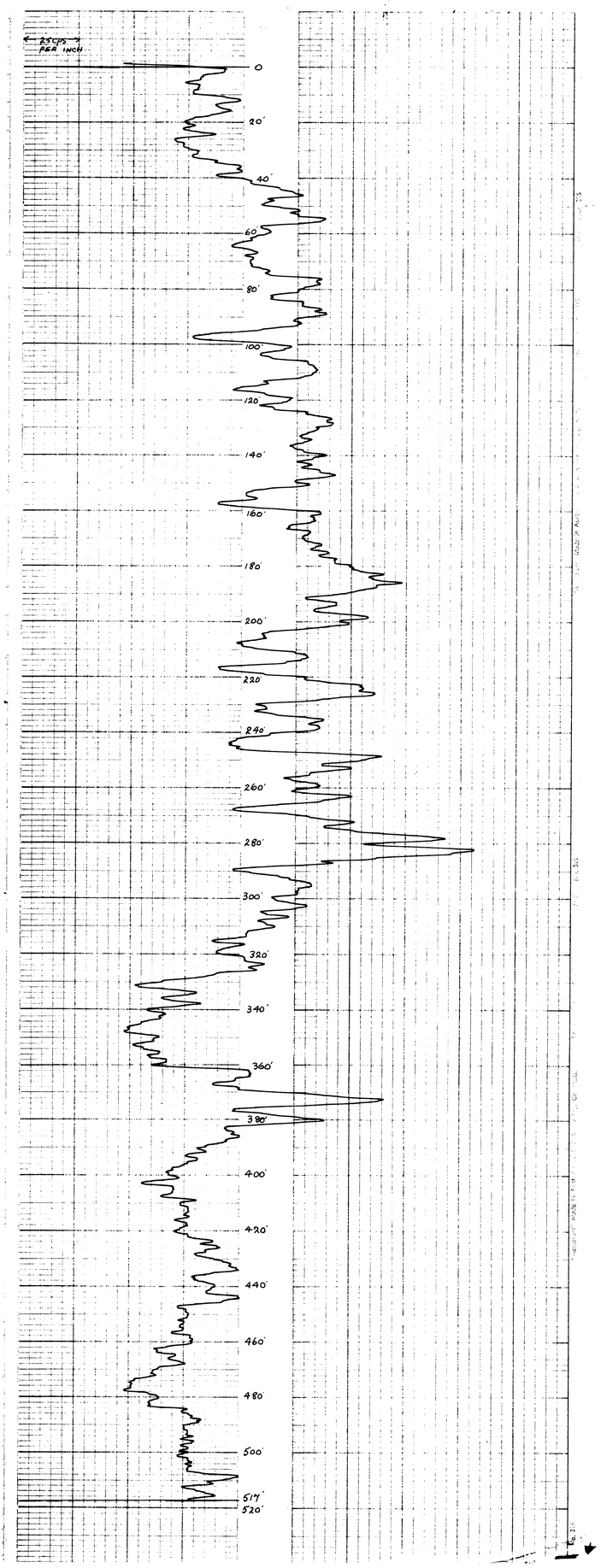
pH Fluid Loss cc/30 min. Filter Cake /32" @ °F °C

BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 45mins / / /

RECORDED BY: A.W. YOUNG.

REMARKS:



S.P., Point Resistivity

2-6-70 TIME: 4:50pm / /

West Lake Frome S.A. LOCATION: Lat. Long:

WLF 5

ELEVATIONS: K.B.: Log from 0 ft. above G.L. DEPTH SCALE: 20ft/in.

CASING: / / / /

DEPTH-DRILLER: 519 / / / DEPTH REMAINS: 0 / / / /

DEPTH-LOGGER (WL) LOG feet (WL) feet TOTAL DEPTH LOGGED 519 feet BOTTOM 525 feet

MUD: Type Density lb/cu Viscosity Resistivity ohm-m at °F

pH Fluid Loss cc/30 min. Mud Cake /32nd Source

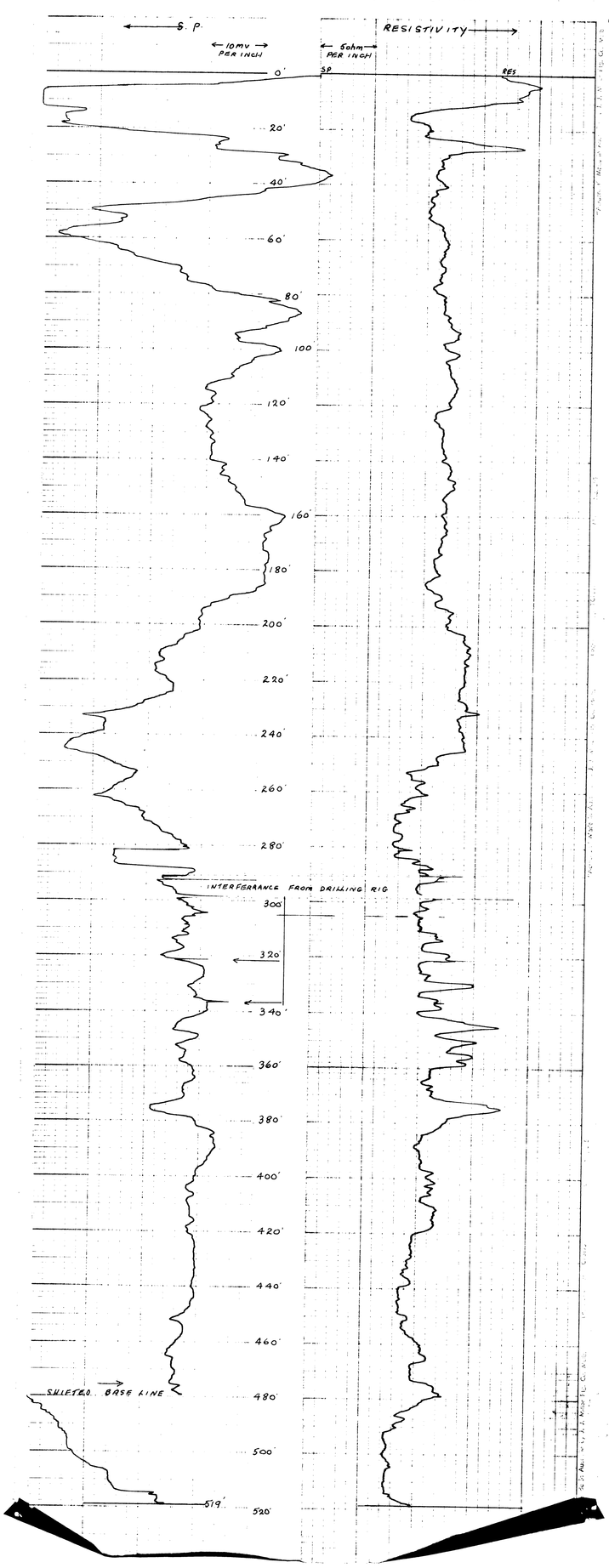
CASING SIZE: " ADDITIONAL CASING (1) " set at feet (2) " set at feet

LOGGING TIME: 25 mins / / /

RECORDED BY: A.W. YOUNG

REMARKS:

1487-15



1487-16

TYPE OF LOG (3): Gamma-ray

DATE: 5-6-70 TIME: 9·45am / / /

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: WLF 7

ELEVATION G.L.: K.B.: Log from 0 feet Above G.L. DEPTH SCALE: 20ft/in.

RUN NUMBER: 1 / / / /

FIRST READING: 494 / / / / BASE READING: 0 / / / /

CASING SHOE DEPTH ("): LOG feet DRILL feet TOTAL DEPTH: LOG 499 feet DRILL 525 feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

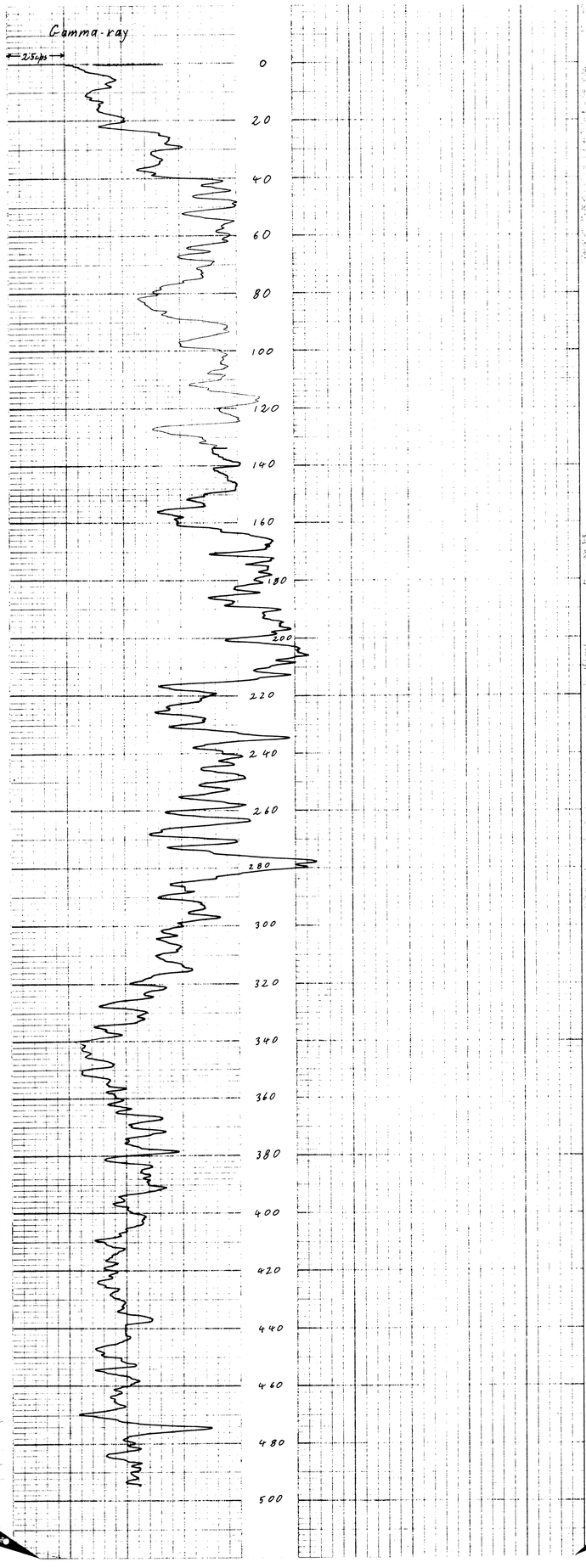
pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mc} @ °F

BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 45mins. / / / /

RECORDED BY: A.W. Young

REMARKS:



S.P., Point Resistivity

5-6-70 TIME: 10:30am / /

West Lake Frome SA

WLF 7

DEPTH DRILLER: 0 DEPTH SCALE: 20ft/in.

RUN NUMBER: 1 / / / /

DEPTH READING: 452 / / / CASING: 0 / / / /

DEPTH LOGGER ( ) LOG 452 SCALE: 525

MUD: Type Density Visc. W.L. Rm @ MEAS. TEMP.

pH Fluid Loss cc/30' Rmf @ MEAS. TEMP. Rmc @ MEAS. TEMP.

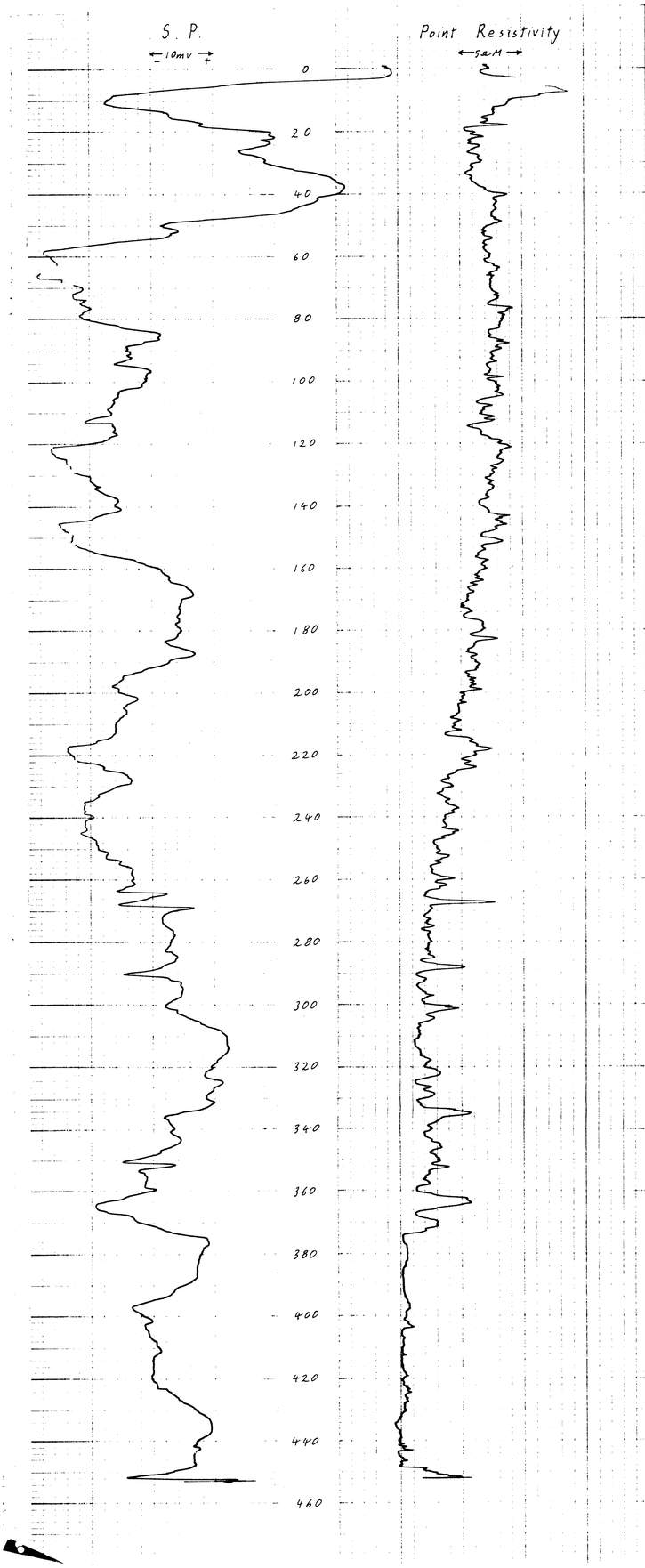
BIT SIZE: " ADDITIONAL CASING: @ feet (3) @ feet @ feet

RECORDING TIME: 30mins / / /

RECORDED BY: A. W. Young

REMARKS:

1487-17



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

1487-18

TYPE OF LOG (S): S.P. , Point Resistivity

DATE: 12-6-70 TIME: 10.00 am / / /

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: WLF 8

ELEVATION G.L.: K.B.: Log from 0 feet above G.L. DEPTH SCALE: 20 ft/in.

RUN NUMBER: 1 / / / /

FIRST READING: 301 / / / / LAST READING: 4 / / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH:LOG 301 feet DRILL 525 feet.

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

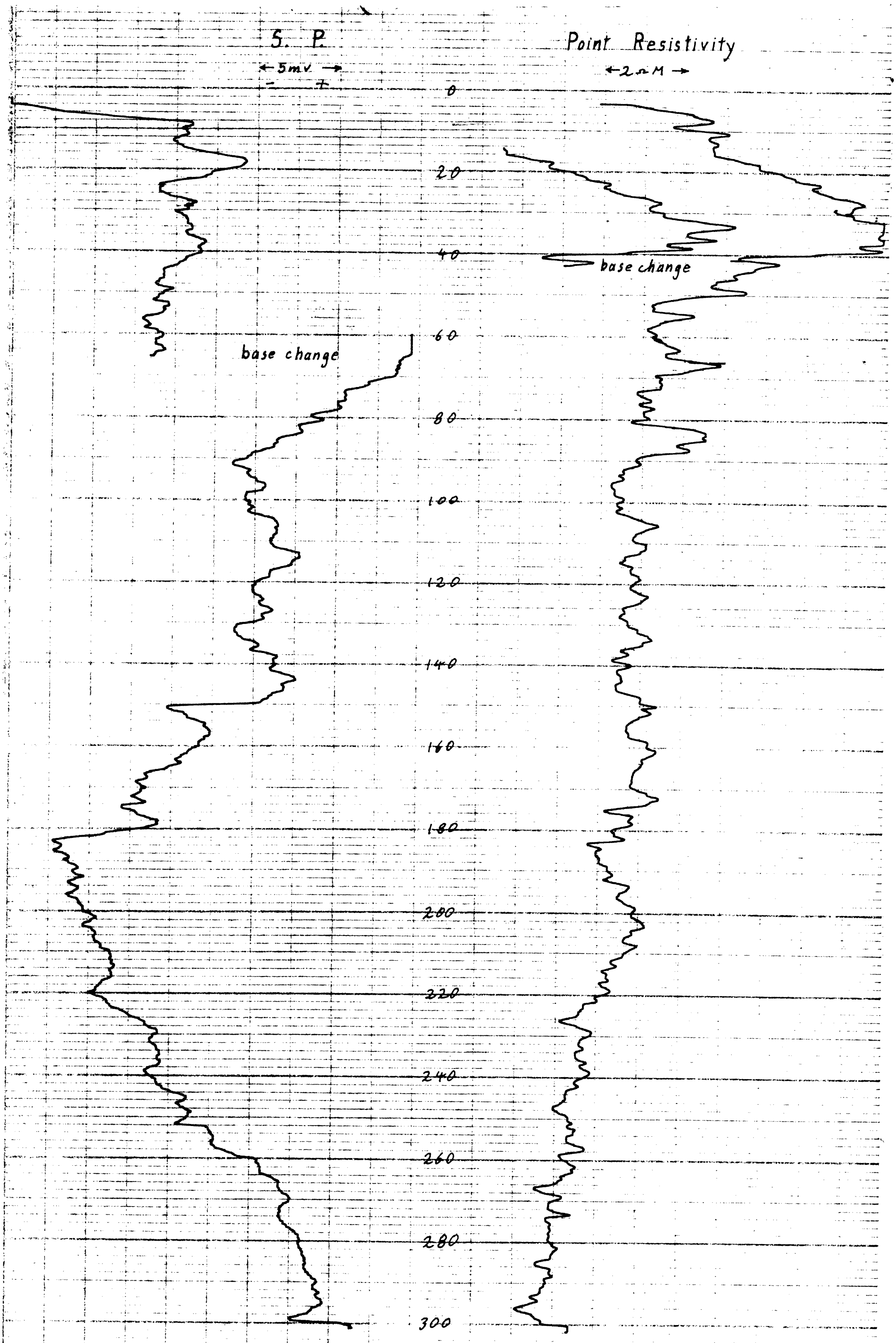
pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mc} @ °F

BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 1 hr. / / / /

RECORDED BY: B. P. Jaylor.

REMARKS:



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): Gamma-ray, Neutron

DATE: 12-6-70 TIME: 9:00am 11:00am /

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: WLF 8

ELEVATION G.L.: K.B.: Log from 0 feet above G.L. DEPTH SCALE: 20ft/in.

RUN NUMBER: 1 / 1 / / /

FIRST READING: 516 1302 / / LAST READING: 0 1 5 / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH:LOG 516 feet DRILL 525 feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mc} @ °F

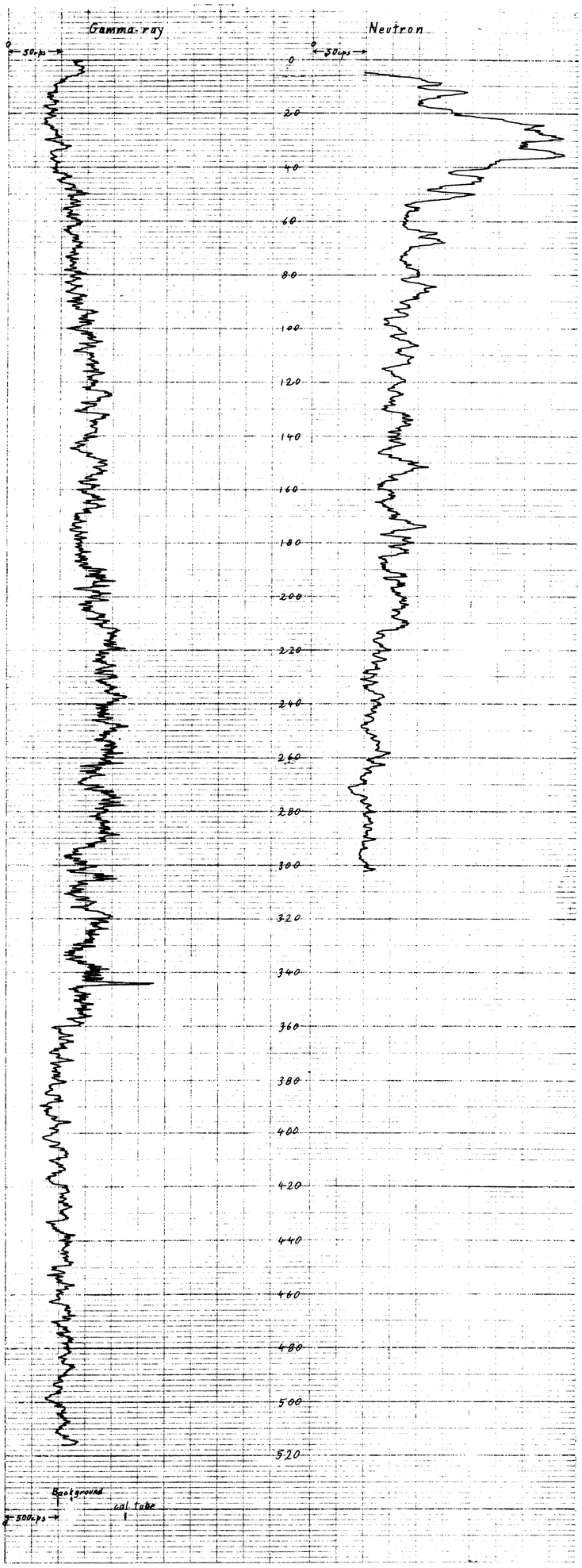
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 1hr. 1hr. / / /

RECORDED BY: B.P. Jaylor

REMARKS: Calibration Tube = 2764 API units
266 mr/hr
170 micrograms radium/ton.

1487-19



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): Gamma-ray, Neutron

DATE: 13-6-70 TIME: 6·05pm / 6·45pm /

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: WLF 9

ELEVATION G.L.: K.B.: Log from 0 feet above G.L. DEPTH SCALE: 20ft/in.

RUN NUMBER: / / / / /

FIRST READING: 517 / 5191 / / LAST READING: 0 / 13 / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH:LOG519 feet DRILL525 feet.

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mc} @ °F

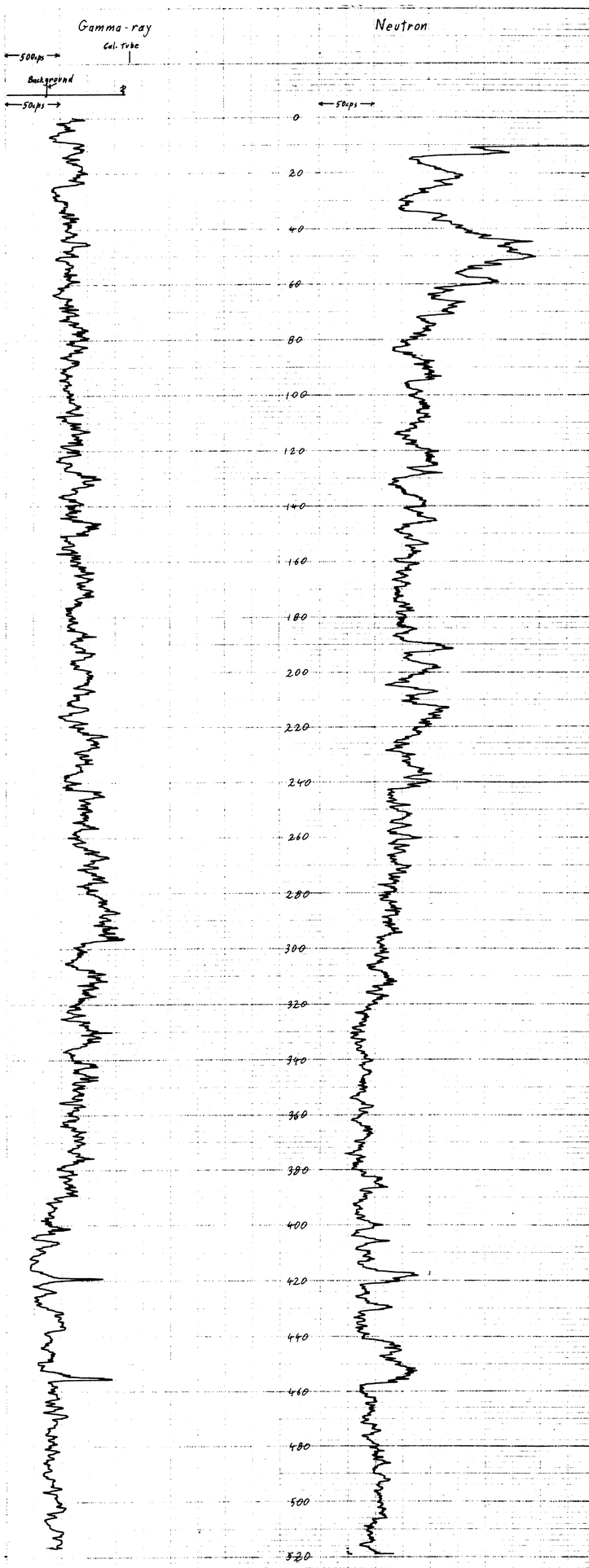
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 40mins / 40mins / /

RECORDED BY: B.P. Jaylor

REMARKS: Calibration tube = 2764 API
266 mr/hr
170 micrograms radium/ton

1487-20



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): S. P., Point Resistivity

DATE: 13-6-70 TIME: 7·25pm / / /

AREA: West Lake Frome SA LOCATION: Lat. Long.

WELL: WLF 9

ELEVATION G. L.: K. B.: Log from 0 feet above G. L. DEPTH SCALE: 20ft/in.

RUN NUMBER: 1 / / / /

FIRST READING: 519 / / / / LAST READING: 13 / / / /

CASING SHOE DEPTH ("):LOG feet DRILL feet TOTAL DEPTH:LOG 519 feet DRILL 525 feet.

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mc} @ °F

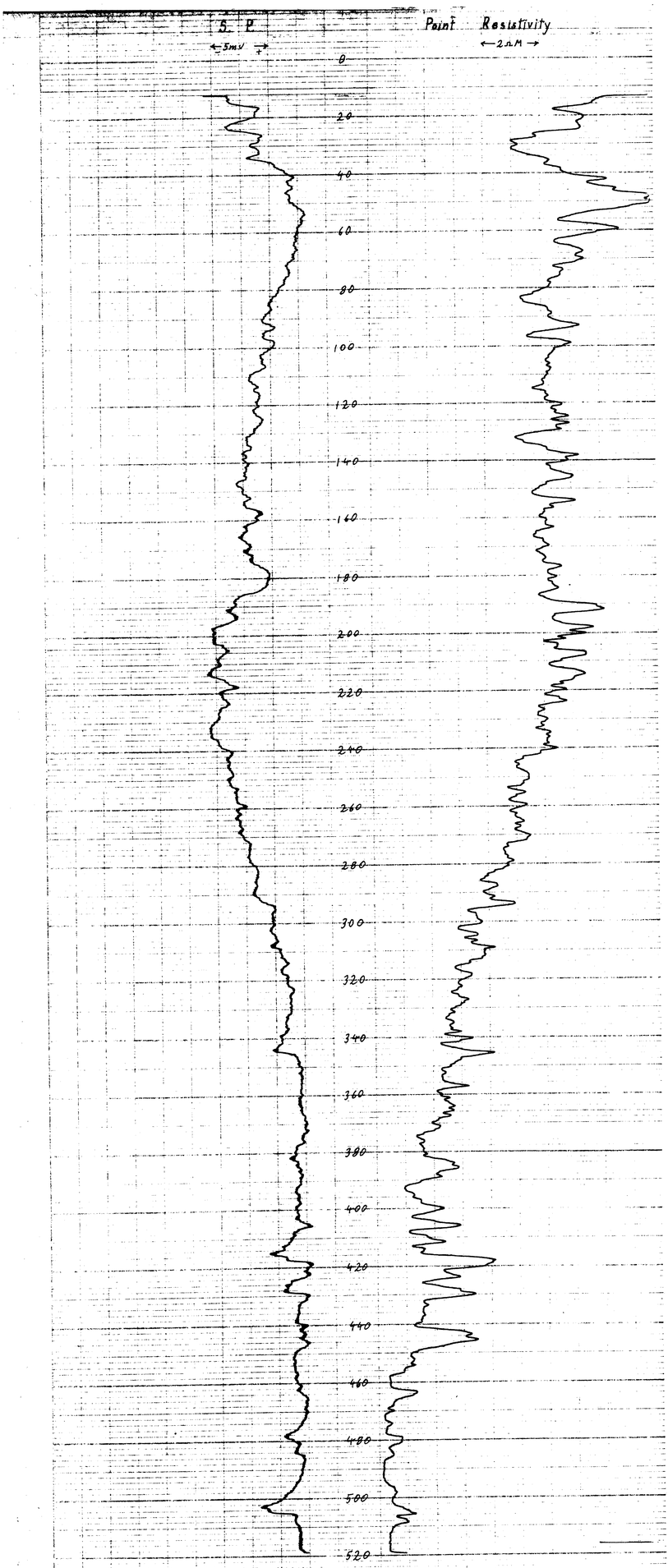
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 35mins / / / /

RECORDED BY: B.P. Taylor

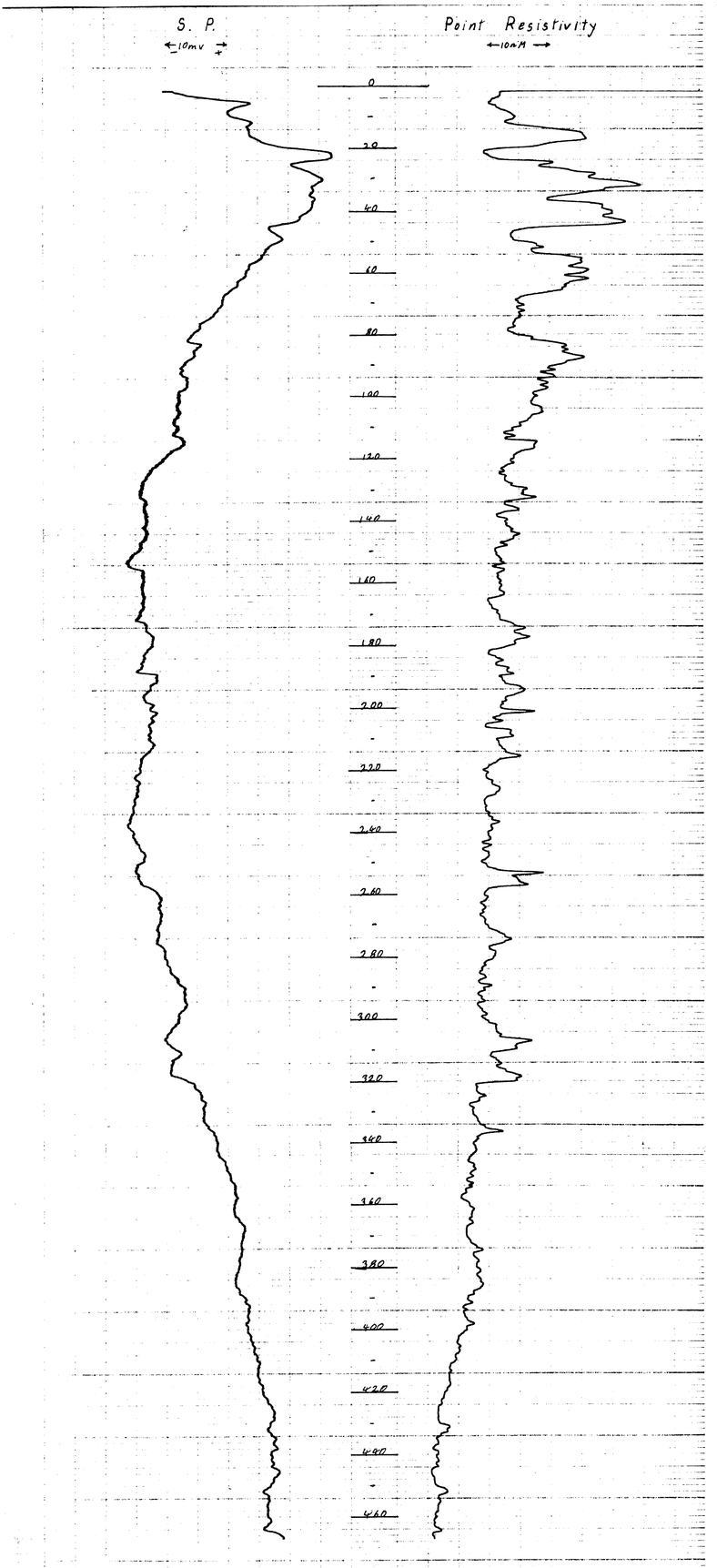
REMARKS:

1487-21



1497-22

RUN: S. P., Point Resistivity
DATE: 16-6-70 TIME: 6·30pm
AREA: West Lake Frome SA LOCATION, Lat. Long.
BORE: WLF 10
ELEVATION G.L.: K.B.: Log from 0 ft. above G.L. DEPTH SCALE: 20ft/in.
CASING NUMBER:
RECORDING: 467 READING: 2
CASING SHOE DEPTH ( )LOG feet TOTAL DEPTH(D) 467 feet (LOG) 525 feet
MUD: Type Density lb/gal Resistivity Ω-m at °F
pH Fluid Loss cc/30 min Mud Cake /32" R_mf Ω-m at °F
HOLE SIZE: " ADDITIONAL CASING (I): " set at feet (2) " set at feet
OPERATING TIME: 30mins
RECORDED BY: B P Taylor
REMARKS:



GAMMA 50 CPS.

19 June 1970
Werraloona SA
W.L.F. 11

TIME: 1930hrs - 2020hrs.

1487-23

CASING: 0'

DEPTH (DRILLER) 517' SCHLUM. 525'

Density

R.M. Resistivity

ADJACENT CASING (I)

TIME: 50 min

RECORDED BY: B.A.C. BRICE

REMARKS:

GAMMA (50 CPS.)

0 ZERO.

0'
20'
40'
60'
80'
100'
120'
140'
160'
180'
200'
220'
240'
260'
280'
300'
320'
340'
360'
380'
400'
420'
440'
460'
480'
500'
517'
520'

0 ZERO.

BACKGROUND OUT OF HOLE
50 CPS - 1"

CALLIBRATING SQUARE
500 CPS - 1"

Gamma-ray, Neutron

16-6-70 5:00pm 5:45pm

West Lake Frome

WLF 10

0 20ft/in.

517 517 0 1

517 525

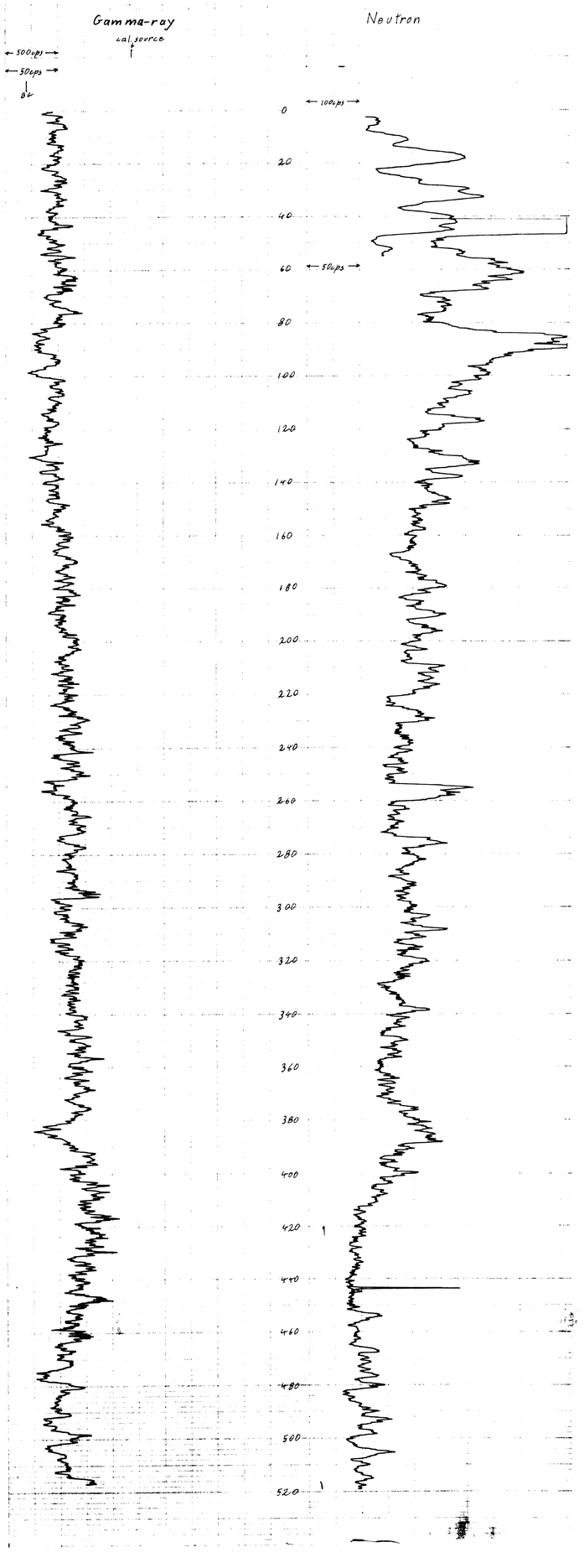
1487/24

TIME: 45mins / 45mins

BY: B P Jaylor

REMARKS: Neutron log is reading 2ft lower than actual depth.

Calibration source = 2764 API units
266 micro roentgens/hour
170 micro grams radium/ton



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG (S): Point Resistivity @ S.P
20. 20 mv.

DATE: 19 June 1970 TIME: 2045hr - 2100hr

AREA: Wertaloona SA LOCATION: Lat. Long.

WELL: W.L.F. II

ELEVATION G.L.: K.B.: Log from feet above G.L. DEPTH SCALE:

RUN NUMBER: 1 2 / / /

FIRST READING: 517' / / / LAST READING: 0' / / /

CASING SHOE DEPTH ("):LOG feet DRILL 525 feet TOTAL DEPTH:LOG feet DRILL feet

MUD: Type Density Viscosity Resistivity @ °F BHT @ °F

pH Fluid Loss cc/30 min. Filter Cake /32" R_{mf} @ °F R_{mfe} @ °F

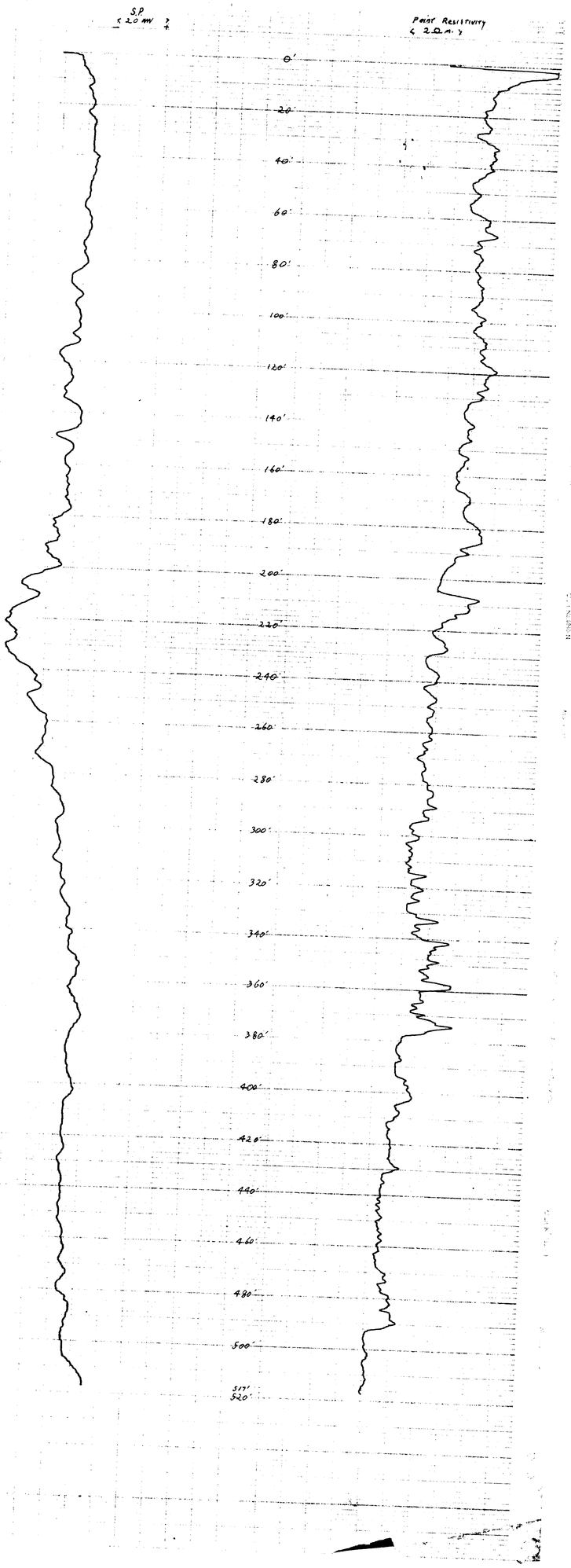
BIT SIZE: " ADDITIONAL CASING: (1) " set at feet (2) " set at feet

OPERATING TIME: 15 min / / / /

RECORDED BY: B.A.C. BRICE

REMARKS:

1497-25



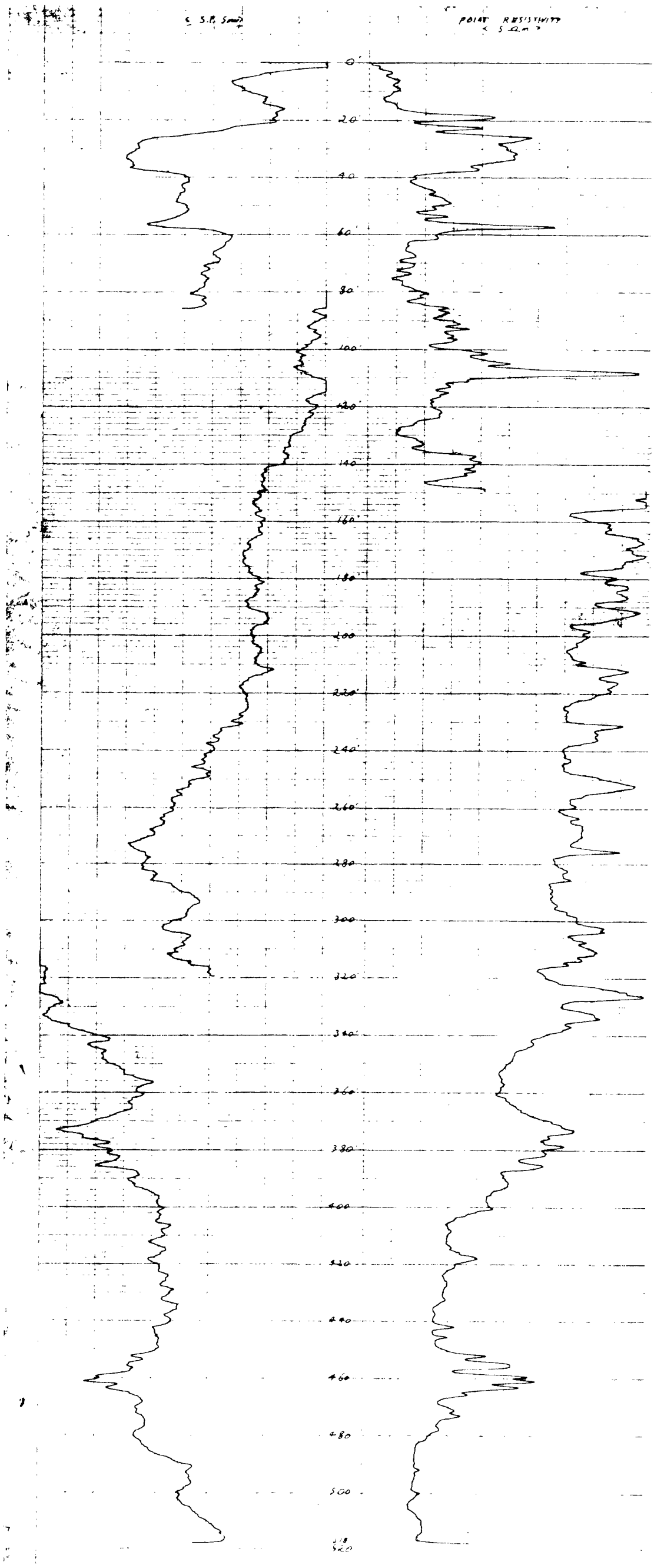
BORE NO WLF 1

ROTARY CUTTINGS LOG

DRILLING COMMENCED 29/5/70 AND COMPLETED 14/8/70 LOCATION WEST LAKE FROME LOGGED BY A.K.H.
SOUTH AUST. SML 864. RADIATION DETECTOR SCINTREX B.G.S.1.
(Many attempts were made to drill this hole to 525 feet including Not Gamma logged, or Electric Logged.
using a percussion tool, between these dates, but hole was
abandoned on 14/8/70).

FEET FROM	FEET TO		% CARBON T	% CARBON NIL	PYRITE % T	PYRITE NIL	RADIOACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX Sil	
0	10			✓		✓	30	—				✓			Brown fine grained unconsolidated (aeolian) sand.
10	20			✓		✓	30	—				✓	✓		10-17 ft as above; 17-20 Brown unconsolidated ~~pebbly~~ and silty-sandy gravels
20	30			✓		✓	30					✓	✓		as above; gravel is quartzite, limestone, mudstone/shale, kunkar
30	40			✓		✓	30					✓	✓		as above. gravel is angular and quite coarse (>5" dia) & pats.
40	50			✓		✓	30					✓	✓		40-47 grey clay with gravel, is consolidated.
50	60			✓		✓	31	—				✓	✓		47-52 medium yellow gravel and sand.
60	-61			✓		✓	30	—				✓	(✓)		52-61 Reddish-brown gritty clay.
												✓	(✓)		
															61 END OF HOLE.

ENV 1487-Vol I-1.

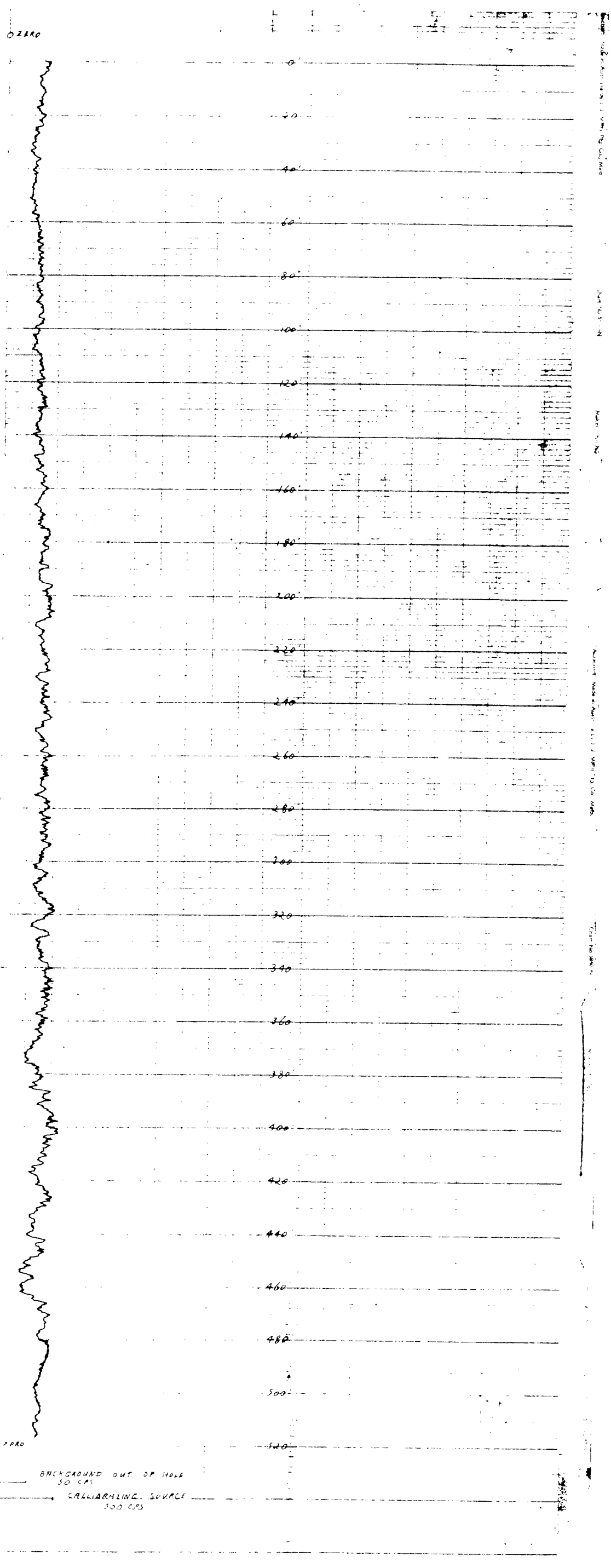


SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S): S.P. & Point Resistivity
DATE 4-7-70 5mV 5Ω TIME 1415 hrs - 1435 hrs
AREA WEST LAKE FROME - S.A. LOCATION: Lat Long.
WELL W.L.F. N°2
ELEVATION G.L.: K.B. Log from feet above G.L. DEPTH SCALE
RUN NUMBER: 1.
FIRST READING 518' LAST READING 0'
CASING SHOE DEPTH: "LOG feet, DRILL 525 feet, TOTAL DEPTH LOG feet, DRILL 525'
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING (1) "set at feet (2) "set at feet
OPERATING TIME: 20 mins
RECORDED BY B.A.C. BRICE
REMARKS:

PLAN No

ENV 1487-Vol I-2



SOUTH AUSTRALIAN DEPARTMENT OF MINES

GEOLOGICAL SURVEY

TYPE OF LOG(S) GAMMA 50 c.p.s

DATE 5-7-70 TIME 1220 hrs - 1300 hrs

AREA WEST LAKE FROME, SA LOCATION Lat Long.

WELL WLF No 2

ELEVATION G.L. K.B Log from feet above G.L DEPTH SCALE

RUN NUMBER 2

FIRST READING 517 LAST READING 0

CASING SHOE DEPTH "LOG feet, DRILL feet, TOTAL DEPTH LOG feet, DRILL feet

MUD Type Density Viscosity Resistivity °F BHT °F

pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F

BIT SIZE " ADDITIONAL CASING (1) "set at feet (2) "set at feet

OPERATING TIME 40 min

RECORDED BY B.A.C. BRICE

REMARKS:

PLAN No

ENV 1487-Vol 3

CRA EXPLORATION PTY. LIMITED.

CRAE FORM No 77

ROTARY CUTTINGS LOG

BORE NO W.L.F. 2.

DRILLING COMMENCED 30/6/70 COMPLETED 4/7/30

LOCATION WEST LAKE FROME SOUTH AUSTRALIA SML 364

LOGGED BY A.K.H.

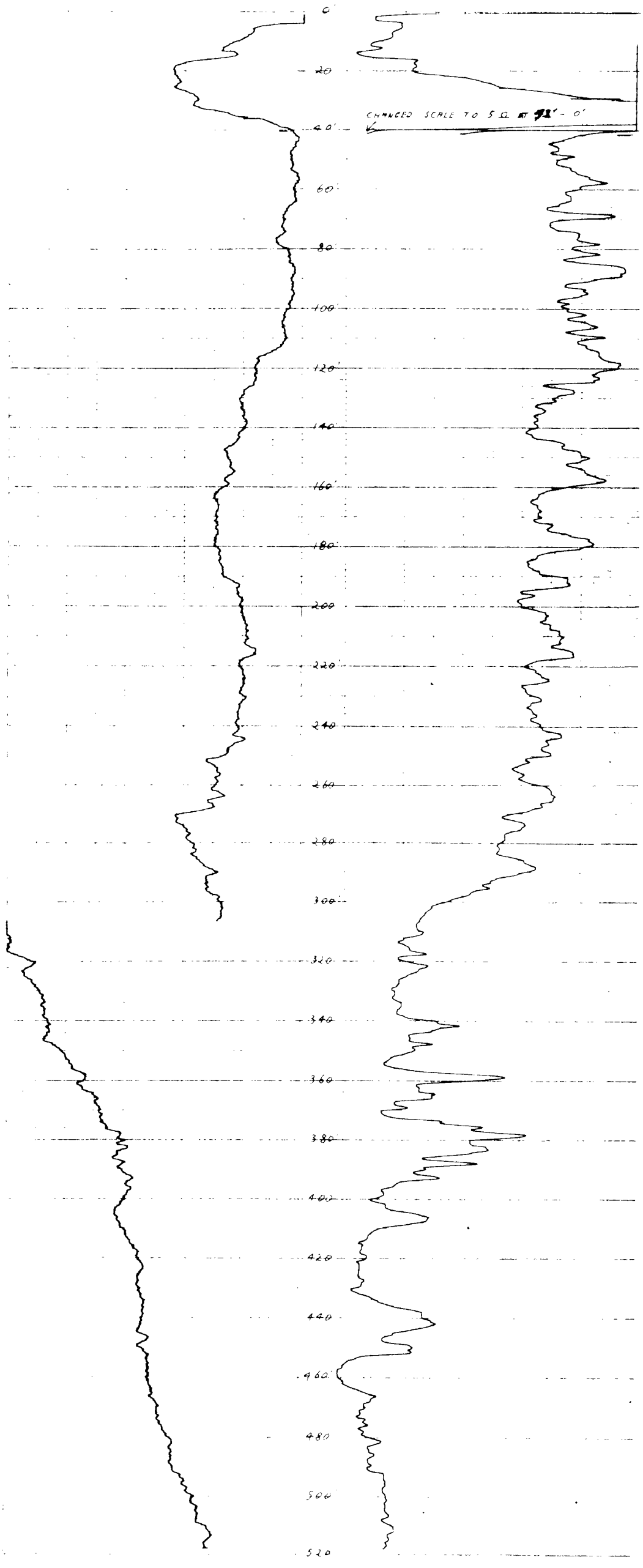
RADIATION DETECTOR NOT USED. GAMMA LOG TO 517 feet SP & Resistivity to 518 feet.

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON %	CARBON T	CARBON Nil	PYRITE %	PYRITE T	PYRITE Nil	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX Si	DESCRIPTION OF LITHOLOGY
0	10			✓	·			✓	NOT TAKEN.					✓	/		0-2 Red-brown sand (medium) 2-10 Brown calcareous clayey silt.
10	20			✓				✓						✓	✓		As above.
20	30				✓			✓						✓			20-21 As above, 21-30 Grey unconsolidated coarse gravel, limestone
30	40				✓			✓									As above. sand quartzite mainly.
40	50				✓			✓									As above. 45-50 one large boulder ?
50	60				✓			✓									As above, increase in fines. to 62.
60	70			✓				✓						✓	✓		Interbedded Red-brown fine sands & silts, calcareous. Grey clay.
70	80			✓				✓						✓	✓		As above
80	90			✓				✓						✓	✓		As above.
90	100			✓				✓						✓	✓		As above. } increasing coarseness with depth ?
100	110			✓				✓						✓	✓		As above } coarser 100-160
110	120			✓				✓						✓	✓		As above
120	130			✓				✓						✓	✓		As above Fine 126-134. Grey clay carbonic 20-35%.
130	140			✓				✓						✓	✓		As above 136-145 Coarse
140	150			✓				✓						✓	✓		As above 145-148 fine.
150	160			✓				✓						✓	✓		As above.
160	170			✓				✓						✓	✓		As above 158-164 fine.
170	180			✓				✓						✓	✓		As above 164-177 coarse, 177-179 fine.
180	190			✓				✓						✓	✓		As above 179-196 coarse.
190	200			✓				✓						✓	✓		As above 196-210 fine. Grey clay reduced 10%.
200	210			✓				✓						✓	✓		As above .
210	220			✓				✓						✓	✓		As above 210-214 sandy.
220	230			✓				✓						✓	✓		As above. 220-228 fine.
230	240			✓				✓						✓	✓		As above 230-238 coarse.
240	250			✓				✓						✓	✓		As above 238-248 fine. Generally getting finer with depth
250	260			✓				✓						✓	✓		As above 248-256 coarse. – implied by logs.
260	270			✓				✓						✓	✓		As above 256-274 fine 274-276 } Coarse, hard layer, very.
270	280			✓				✓						✓	✓		As above 276-298 fine. could be limestone.
280	290			✓				✓						✓	✓		As above.
290	300			✓				✓						✓	✓		As above.
300	310			✓				✓						✓	✓		As above 298-316 Coarse.
310	320			✓				✓						✓	✓		As above 316-322 fine hard bar?
320	330			✓				✓						✓	✓		As above 322-326 coarse 327-330 fine = grey calc silt?
330	340		✓	✓	✓			✓						✓	✓		(As above ?) Hard bar at 327, Mixture of red-brown sand, grey calc silt, grey clay
340	350			✓				✓						✓	✓		As above IE mixture of sandy silts or silty sands.
350	360			✓				✓						✓	✓		80% Red brown silty + sands; + as above.
360	370			✓				✓						✓	(✓)		85% " " " " " 15% Grey silty sand.
370	380 ?		?	✓				✓						✓			? No sample, poor sandy layer.
380	390				✓			✓						✓			Grey sandy silt + sandy silt Hard bar at 385.
390	400			✓				✓						✓			50% Red brown silty clay 25% deep red silty sand 25% pale grey silt.
400	410			✓				✓						✓			As above. band 30:10?60.
410	420			(✓)	✓			✓						✓			65% red. green. grey sand 30% v. pale grey clay 5% Red brown
420	430			(✓)	✓			✓						✓			65% 15 20
430	440				✓			✓						✓			70 6 20
440	450				✓			✓						✓			As above.
450	460				✓			✓						✓			As above.
460	470				✓			✓						✓			As above, more silty 90:0:10. Hard band from 410 to 460
470	480				✓			✓						✓			As above. 80:10:10. Chips of everything Kunker, quartz etc.
480	490				✓			✓						✓			As above, finer. V. Dark green clay 60%, Pale green grey 40 Trace red
490	500				✓			✓						✓			As above. 30:70 + Trace mulberry silty clay. logs hard gradually
500	510				✓			✓						✓			As above. 30:70, band { 10% red-brown, yellow silty sand
510	520				✓			✓						✓			As above. { 5% Mulberry clay.
520	525				✓			✓						✓			As above. { 5% White or v. pale grey clay. reacts to acid – probably dolomitic.

T = Trace G = Good F = Fair P = Poor Arg = Argillaceous Calc = Calcareous Si = Siliceous

ENV 1487-Vol I-4

CRAE PLAN No M243

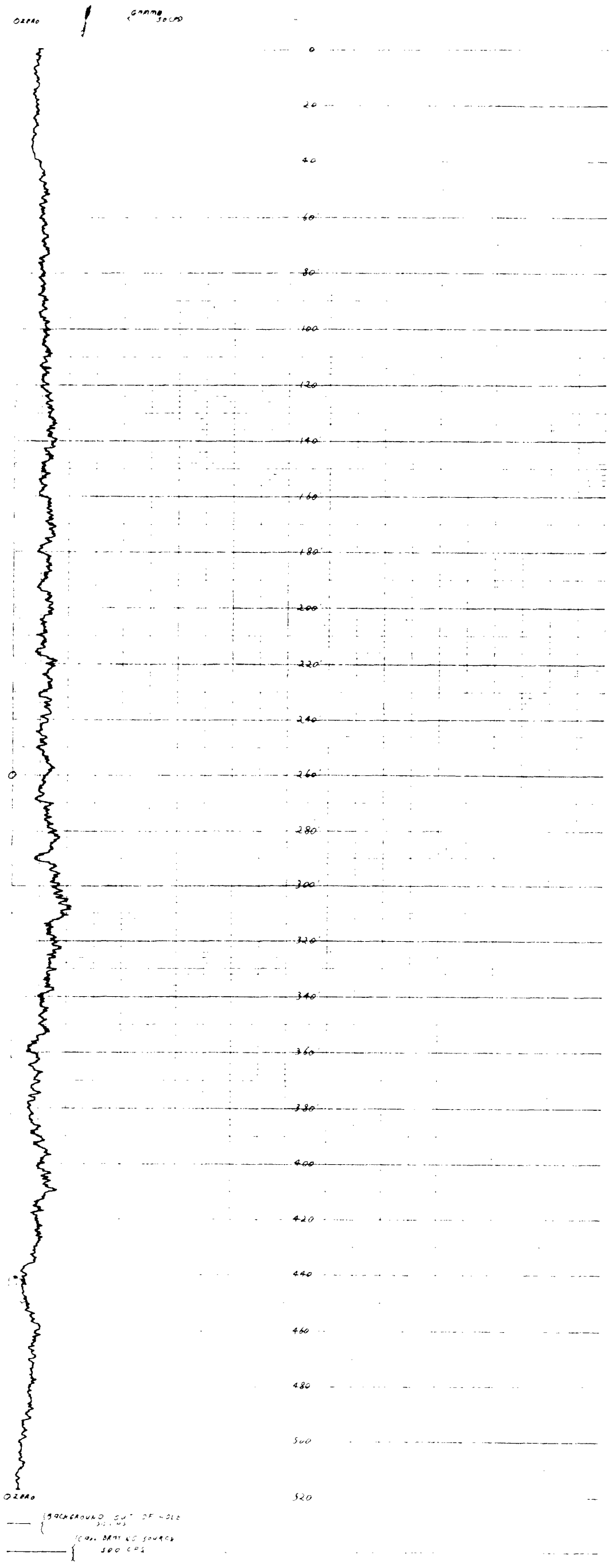


SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S): SP & Point Resistivity
DATE 9-7-70 5mv 2Ω TIME 1615 hrs - 1640 hrs
AREA WEST LAKE FROME - S.A. LOCATION Lat Long.
WELL W.L.F N°3
ELEVATION G.L: K.B Log from feet above G.L. DEPTH SCALE
RUN NUMBER 1.
FIRST READING 518' LAST READING 0'
CASING SHOE DEPTH: "LOG feet, DRILL 525 feet, TOTAL DEPTH LOG feet, DRILL feet
MUD Type Density Viscos ty Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING (1) "set at feet (2) "set at feet
OPERATING TIME 25 mins.
RECORDED BY B.A.C. BRICE.
REMARKS:

PLAN No

ENV-Vol I-5



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S) GAMMA 50 cps - 1"
DATE 9-7-70 TIME 1515 hrs - 1600 hrs
AREA WEST LAKE FROME - S.A LOCATION. Lat. Long.
WELL W.L.F. No3
ELEVATION G.L: K.B: Log from feet above G.L. DEPTH SCALE
RUN NUMBER: 1
FIRST READING: 517' LAST READING. 0'
CASING SHOE DEPTH (") LOG feet, DRILL feet, TOTAL DEPTH LOG 517 feet, DRILL 525'
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE. " ADDITIONAL CASING (1) "set at feet (2) "set at feet
OPERATING TIME. 45 min.
RECORDED BY. B.A.C. BRICE
REMARKS:

PLAN No

ENV 1487-Vol I-6

CRA EXPLORATION PTY LIMITED

CRAE FORM No 77

ROTARY CUTTINGS LOG

BORE NO WLF 3

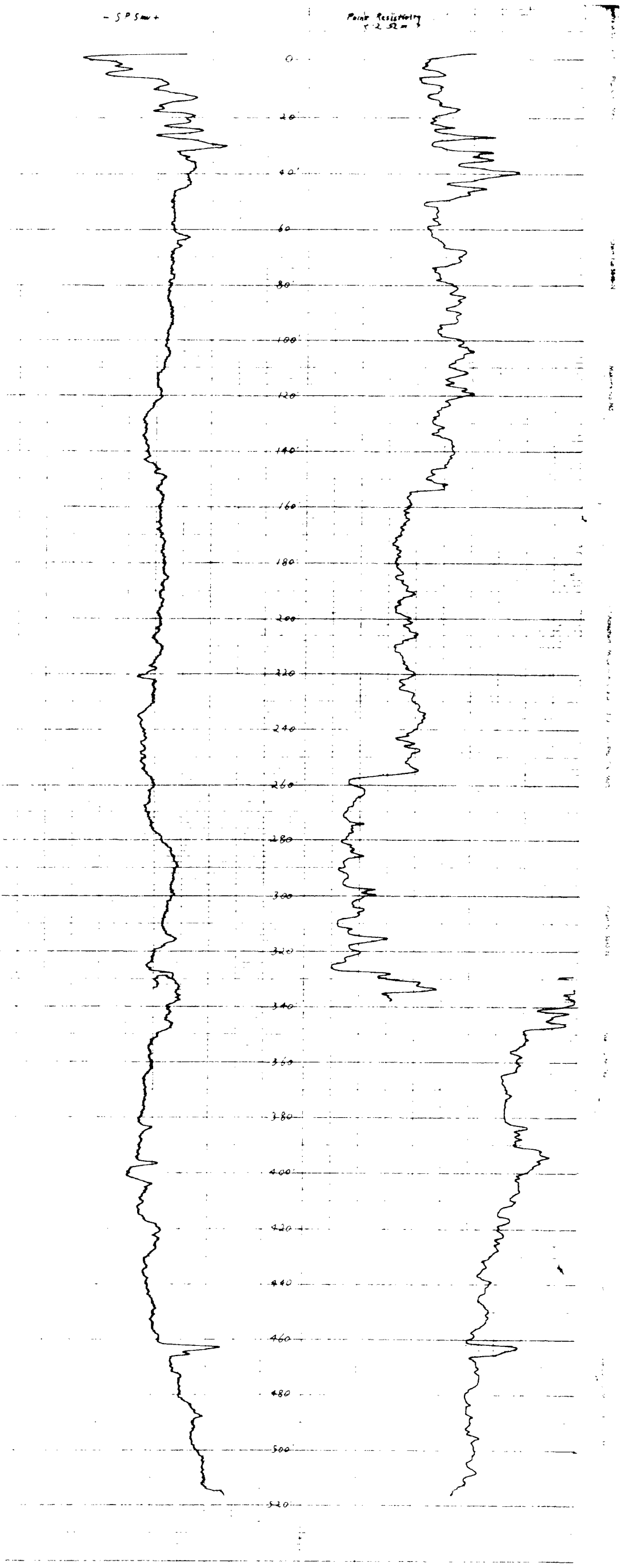
LOGGED BY A K H.

DRILLING COMMENCED 7.7.70 COMPLETED 9/7/70 LOCATION WEST LAKE FROME SOUTH AUSTRALIA S.M.L 364

RADIATION DETECTOR TECHNICAL ASSOCIATES PUG 1 +GAMMA LOG TO 517', SP & Resistivity to 518'

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON T	CARBON N	PYRITE T	PYRITE N	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX Si	DESCRIPTION OF LITHOLOGY
0	10			✓		✓	240-330					✓	✓		Pale brown silty sand.
10	20			✓		✓	"					✓	✓	14	10-14 as above 14-20 Grey unconsolidated coarse ground. 60 20 20 Quartz, Lith Kinds
20	30			✓		✓	"					✓			As above.
30	40			✓		✓	"					✓		40	As above
40	50		✓			✓	"					✓	✓		Brown muddy silt with pale grey sandy silty mud 30%. (70:30),
50	60		✓			✓	"					✓	✓		As above 58' sandy or gravelly.
60	70		✓			✓	"					✓	✓		As above. (90:10.) 67-71 sandy.
70	80		✓			✓	"					✓	✓		As above 70-75, 75 gritty gravelly 75-80 as above.
80	90		✓			✓	"					✓	✓		As above. 84-92 sandier Med grey muddy silt 70:30
90	100		✓			✓	"					✓	✓		As above
100	110		✓			✓	"					✓	✓		As above (decreasing grey silt). 111-288? More clayey
110	120		✓			✓	"					✓	✓		As above (" " ") 111-125 coarse.
120	130		✓			✓	"					✓	✓		As above (" " ")
130	140		✓			✓	"					✓	✓		As above (" " - 95:5) Yllw brn silt + rounds appear. <5%
140	150		✓			✓	"					✓	✓		As above but coarse. 140-152 coarse.
150	160		✓			✓	"					✓	✓		As above.
160	170		✓			✓	"					✓	✓		As above.
170	180		✓			✓	"					✓	✓		As above 175-182 coarse (Kaolin?)
180	190		✓			✓	"					✓	✓		As above 5% Kaolin ground.
190	200		✓			✓	"					✓	✓		As above 190-201 coarse. 194-201 esp. fine
200	210		✓			✓	"					✓	✓		As above fine 194 201-218 coarse. Grey + yllw-brn sig.
210	220		✓			✓	"					✓	✓		As above.
220	230		✓			✓	"					✓	✓		As above but yellow brown in Yllw-brn 70, Rd-brn 20 Grey brn 10.
230	240		✓			✓	"					✓	✓		As above grey brown 242-250 cm 10 40 50
240	250		✓			✓	"					✓	✓		As above Yllw-grey-rd-brown 30 40 30
250	260		✓			✓	"					✓	✓		As above 250-260 finer. ? 15 55 30 ?
260	270		✓			✓	"					✓	✓		As above 260-270 csw esp 268-270. 5 70 25
270	280		✓			✓	"					✓	✓		As above 270-285 finer. 285-292 csr 5 65 30
280	290		✓			✓	"					✓	(✓)	289'	Grey-brown silty mud + red brown silty mud 5:40:55 High carb grey & brown
290	300		✓			✓	"					✓	(✓)		As above, Some yllw fine gritz sand. 10:70:20 " " "
300	310		✓			✓	"					✓			As abar, it V. variable sandy silt + clays " " . Brick + purple red silty clay
310	320		✓			✓	"					✓			As above Mainly pale green-grey clay. 5: 80:15 " " " " 5
320	330		✓?	✓		✓	"					✓	?		As above 318-322 clayey, 322-326 csw. 5: 80 15
330	340		?	✓		✓	"					✓	?		A sabove 339: 344 coarser. ?:75:25?
340	350			✓		✓	"					✓	?		As above.
350	360			✓		✓	"					✓	?		As above 350-357 fine, 357 silici @: 85: 15 0:95:5
360	370			✓		✓	"					✓			As above, mixture of pale grey + med. green grey clay + dark green clay
370	380			✓		✓	"					✓			As above. Pale : med : dk = 20 : 60 : 20 ? Trace yllw, trace red.
380	390	?	?	✓		✓	"					✓		?	As above 373-379-384 csw-; P & Med brn? 40:40:20 Sample poor.
390	400			✓		✓	"					✓			As above 40:40:20 + 5-10% Rd brown
400	410			✓		✓	"					✓			As above 40. 40:20 but 30 40% rd brown. carbonaceous 404-406
410	420			✓		✓	"					✓			As above probably! 410-431 fine 30% " "
420	430			✓		✓	"					✓			As above. Greys 20:60:20, Rd-brn 50%.
430	440			✓		✓	"					✓			As above 435-453 cs.
440	450			✓		✓	"					✓			As above 453-466 finest. 30% Rd brown. Trace blue grey
450	460			✓		✓	"					✓			453-466 Blue clay (20%)
460	470			✓		✓	"					✓			466-512 Constant Blue 20 Rd-brn 50 Green grey 20 (10:85:5)
470	480			✓		✓	"					✓			As above 35: 15: 45 (10:80:10) +15 yellow brown.
480	490			✓		✓	"					✓			As above
490	500			✓		✓	"					✓			As above 30: T: 60 60 (10:85:5) :10
500	510			✓		✓	"					✓			As above Red brown Kaolin appears (T) genuine?
510	520			✓		✓	"					✓			As above 40: 5 (Kaolin): 40 :15
520	525			✓		✓	"					✓			As above 60: 5 (") 20 5

ENV1487-Vol I-7

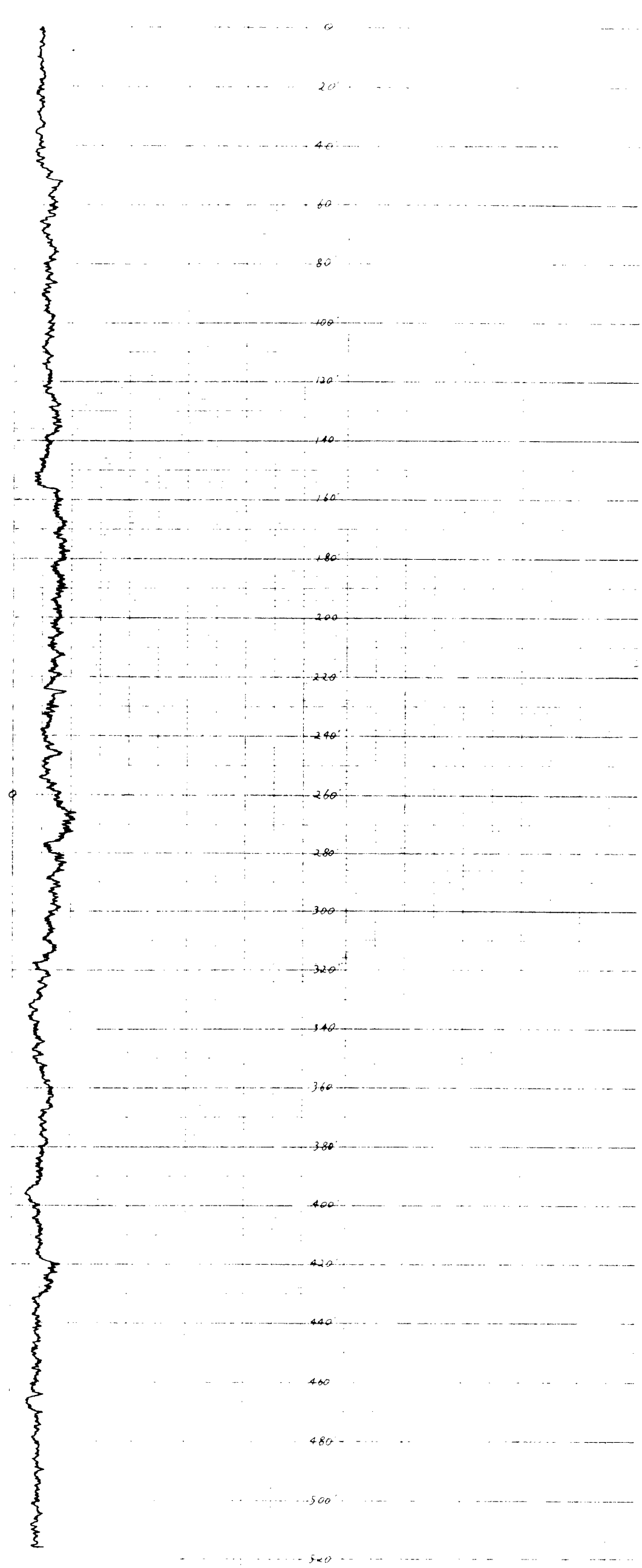


SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S) SP @ 5mv Point Resistivity @ 252m
DATE 11-7-70 TIME 1825 hrs - 1900 hrs
AREA WEST LAKE FROME - SA LOCATION Lat. Long.
WELL WLF No 4
ELEVATION G.L: K.B Log from feet above G.L. DEPTH SCALE
RUN NUMBER. 1
FIRST READING. 517' LAST READING. 0'
CASING SHOE DEPTH (1) LOG 517 feet, DRILL 525 feet, TOTAL DEPTH LOG feet, DRILL feet
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING (1) "set at feet (2) "set at feet
OPERATING TIME: 25 min.
RECORDED BY. B.A.C. BRICE
REMARKS:

PLAN No

ENV 1487-Vol I - 8



SOUTH AUSTRALIAN DEPARTMENT OF MINES

GEOLOGICAL SURVEY

TYPE OF LOG(S) GAMMA 50cps - 1"

DATE 11-7-70 TIME 1715 hrs - 1815 hrs

AREA. WEST LAKE FROME - S.A. LOCATION. Lat Long.

WELL W.L.F. N°4

ELEVATION G.L: K.B Log from feet above G.L. DEPTH SCALE

RUN NUMBER: 1.

FIRST READING: 516' LAST READING 0'

CASING SHOE DEPTH (") : LOG 516' feet, DRILL 525 feet, TOTAL DEPTH LOG feet, DRILL feet

MUD Type Density Viscos ty Resistivity °F BHT °F

pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F

BIT SIZE. " ADDITIONAL CASING (1) " set at feet (2) " set at feet

OPERATING TIME. 60 mins.

RECORDED BY. B.A.C. BRICE.

REMARKS:

PLAN No

ENV1487 - Vol I - 19

CRA EXPLORATION PTY LIMITED

CRAE FORM No 77

ROTARY CUTTINGS LOG

BORE NO W.L.F.4.

DRILLING COMMENCED 10/7/70 COMPLETED 11/7/70 LOCATION WEST. LAKE FROME SOUTH AUSTRALIA SML 364

LOGGED BY A.K.M.

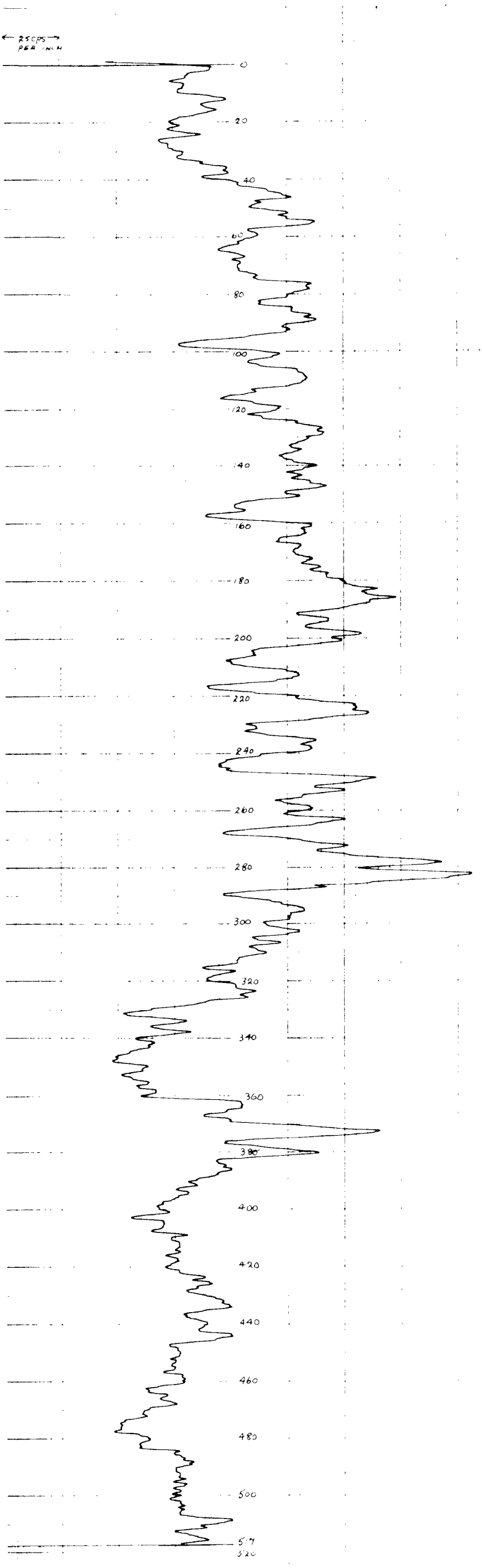
RADIATION DETECTOR SCINTREX B.C. 3-1. + GAMMA LOG to 516', SP/Resistivity to 517'

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON ·	CARBON T	CARBON Nil	PYRITE ·	PYRITE T	PYRITE N	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX Si	DESCRIPTION OF LITHOLOGY
					✓			✓						✓	✓	6	Pale brown sandy + muddy silt, highly calcareous. 0-6
0	10			✓				✓	250-320	—				(✓)	✓		6-10 Pale brown to white limestone, friable; probably some clay
	20			✓				✓	"					?	✓		As above
	30			✓				✓	"					?	✓		As above
	40			✓				✓	"					?	✓		As above 40-44 ← Lst^a, gritsite, limestone.
	50			✓	✓			✓	"					?	✓		44-50 Grey unconsolidated gravel ~~50-52 As above. 52~~
	60			✓				✓	"			—		✓		51	50-52 As above. 52-60 Brown + grey brown silty clay.
	70			✓				✓	"			—		✓	?)		As above 67-74 coarse. 85 : 15 Parts highly carbonaceous
	80			✓				✓	"			—		✓			As above
	90			✓				✓	"			—		✓			As above 79-94 slightly coarse. 95 : 5.
	100			✓				✓	"			—		✓			As above 94-99 finer. 100% Brown.
	110			✓				✓	"			—		✓			As above 99-122 slightly coarse
	120			✓				✓	"			—		✓			As above.
	130			✓				✓	"			—		✓			As above 124-134 finer.
	140			✓				✓	"			—		✓	✓		As above 134-146 slightly coarser.
	150			✓				✓	"			—		✓	✓		As above 146-151 finer.
	160			✓				✓	"			—		✓			As above 151-154 slightly coarse At 154 increase in clay content.
	170			✓				✓	"			—		✓			As above 154-185 fine interbeds of clayey material
	180			✓				✓	"			—		✓			As above 186-195 slightly coarse.
	190			✓				✓	"			—		✓			As above 198-209 slightly coarse.
	200		(✓)	✓				✓	"			—		✓			Predominantly Red Brown, best 25% pale grey, 10% yellow-grey/brown
	210			✓				✓	"			—		✓			As above. + some very carbonaceous layers, red-brown
	220		(✓)	✓				✓	"			—		✓			As above [No change in log] but now grey brown 30 : 35 : 35
	230		(✓)	✓				✓	"			—		✓	(✓)		Predominantly grey 219-222, 227-242 slightly coarse. 20 : 50 : 30
	240		(✓)	✓				✓	-			—		✓	(✓)		Predominantly brown muddy silt. 50 : 35 : 15
	250		(✓)	✓				✓	"			—		✓	(✓)		Equal Brown and grey 243 fine, 245, 248 coarse. 40 : 40 : 20
	260		(✓)	✓				✓	"			—		✓	(✓)	255?	250-255 As above. 255-260 As below, ? clay. 260-264 csse
	270				✓			✓	"			—		✓			Predominantly Pale green-grey clay 60 : 40 : T.
	280				✓			✓	"			—		✓			As above 274 coarse 40 : 60 : T
	290				✓			✓	"			—		✓			As above 286 csse. Green-Brown 70 : 30 : T
	300				✓			✓	"			—		✓			As above 297-300 Csse. 60 : 40 : T.
	310				✓			✓	"			—		✓			As above 308-311 finer 80 : 20 : T.
	320				✓			✓	"			—		✓			As above 314-318 csse. Med grey appears. 90 : 10 : T.
	330				✓			✓	"			—		✓		328	320-328 As above, 328-330 Unknown, poss limestone. 95 : 5 : T.
	340	?							"							?	As above. Water loss {possibly marked blue grey clay. 95 : 5 : T
	350								"							348	340-348 As above; 348-350 Probably darker green clays 95 : 5 : T.
	360				✓			✓	"			—		✓			As above Blue clay poss 358-364. 364-382 green clays. 65/30/5 : T
	370				✓			✓	"			—		✓			As above ~~40~~ 50/45 : 5 : 0
	380				✓			✓	"			—		✓			As above Creamy brittle clay somewhere. 30/65 : 5 : 0
	390	?			✓			✓	"			—		✓		?	380-382 As above 382-390 poss. as above, poss Red brown silty marl etc
	400				✓			✓	-			—		✓			390-392 As above. 392-400 Prob. Bluish grey clay (silty)
	410				✓			✓	"			—		✓			400-401 As above. 401-410 Prob medium green clay.
	420				✓			✓	"			—		✓			410-418 As above. 418-420 Prob red-brown clay.
	430				✓			✓	"			—		✓			As above. (Slightly higher gamma kick)
	440				✓			✓	"			—		✓			Grey clays of various shades - bluish, green, pale to med.
	450				✓			✓	"			—		✓			As above.
	460				✓			✓	"			—		✓			As above.
	470				✓			✓	"			—		✓			460-462 As above. 462-466 prob dark grey soft clay. 466-470 As below
	480				✓			✓	"			—		✓			Bluish grey clay, pale to dark, traces black, + yellow brown/grey
	490				✓			✓	"			—		✓			As above. clay.
	500				✓			✓	"			—		✓			As above.
	510				✓			✓	"			—		✓			As above.
	520				✓			✓	"			—		✓			As above.
	525				✓			✓	"			—		✓			As above.

T = Trace G = Good F = Fair P = Poor A = Argillaceous Calc = Calcareous S = Siliceous

CRAE PLAN No M/41

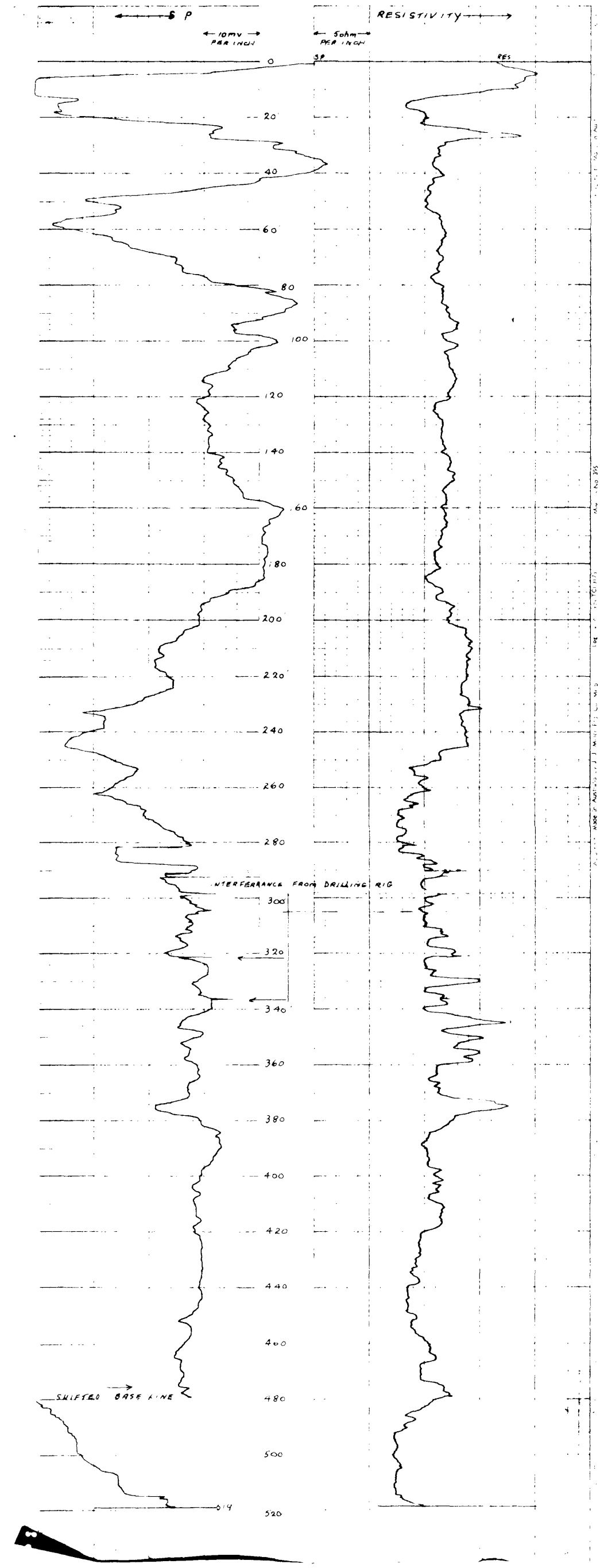
ENV 1487-Vol I-10



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S). GAMMA - RAY.
DATE 2-6-70. TIME. 4-00 p.m
AREA. WEST LAKE FROME - S.A. LOCATION: Lat. Long.
WELL W.L.F. 5
ELEVATION G.L: K.B: Log from 0. feet above G.L. DEPTH SCALE 20 Ft/in
RUN NUMBER: 1.
FIRST READING: 517' LAST READING: 0
CASING SHOE DEPTH ("):LOG feet, DRILL feet, TOTAL DEPTH LOG 517 feet, DRILL 525'
MUD. Type Density Viscosity Resistivity @°F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} @°F R_{mc} °F
BIT SIZE: " ADDITIONAL CASING: (1) "set at feet (2) "set at feet
OPERATING TIME: 45 mins.
RECORDED BY. A.W. YOUNG.
REMARKS:

PLAN No



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S): *S.P., Point Resistivity*
DATE *2-6-70* TIME. *4-50 p.m.*
AREA *WEST LAKE FROME, S.A.* LOCATION: Lat. Long.
WELL *W.L.F. 5*
ELEVATION G.L.: K B Log from *0* feet above G.L. DEPTH SCALE *20 ft/in*
RUN NUMBER *1*
FIRST READING *519* LAST READING: *0*
CASING SHOE DEPTH "LOG feet, DRILL feet, TOTAL DEPTH LOG *519* feet, DRILL *525'*
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING: (1) "set at feet (2) "set at feet
OPERATING TIME *25 mins.*
RECORDED BY *A.W. YOUNG*
REMARKS:

PLAN No

CRA EXPLORATION PTY LIMITED. CRAE FORM No. 27

ROTARY CUTTINGS LOG

BORE NO W.L.F. 5. LOGGED BY A.K.H.

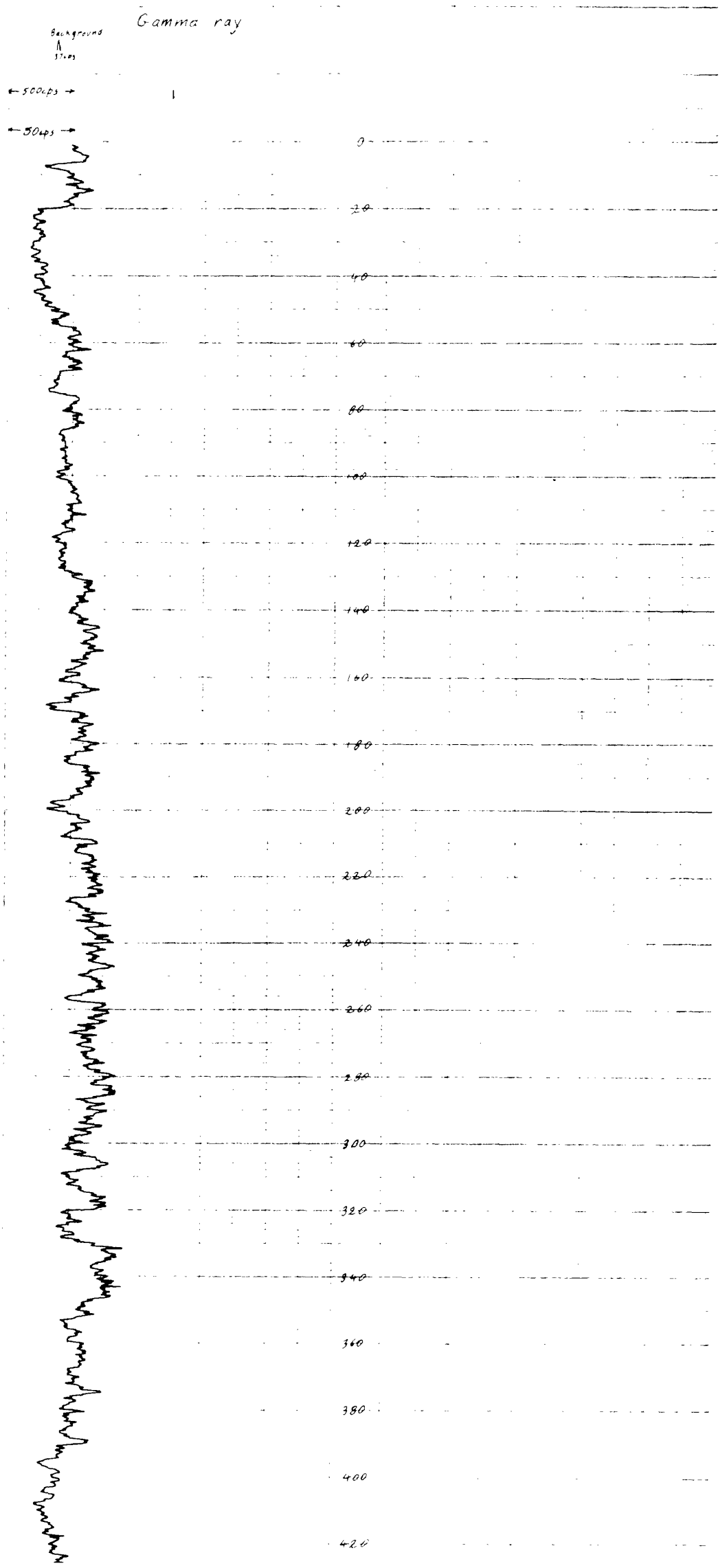
DRILLING COMMENCED 1/6/70 COMPLETED 2/6/70 LOCATION WESTLAKE FROME SOUTH AUSTRALIA SMAP 3644

RADIATION DETECTOR MODEL PUG 1 Technical + GAMMA LOG TO 517 feet. Spiral check to 514 feet. Associates.

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON ?	CARBON T	CARBON Nil	PYRITE ?	PYRITE T	PYRITE N	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX AR	MATRIX C	MATRIX S	DESCRIPTION OF CUTTINGS
0	10'				✓			✓	550 /min. Very variable		✓			✓	✓		Brown gravelly and silty sand. Gravel limestone, kunkar, quartzite, siltstone, mudstone.
10	20				✓			✓	550			✓		✓	✓		Red brown muddy, gravelly sand. to 28ft.
20	30				✓			✓	"			✓		✓		28	Red brown sandy silty mud.
30	40				✓			✓	"			✓		✓			As above.
40	50				✓			✓	"			✓		✓			As above.
50	60				✓			✓	"			✓		✓			As above.
60	70				✓			✓	"			✓		✓			As above.
70	80				✓			✓	"			✓		✓			As above.
80	90				✓			✓	"			✓		✓			As above.
90	100				✓			✓	"			✓		✓			As above.
100	110				✓			✓	"			✓		✓			As above.
110	120				✓			✓	"			✓		✓			As above.
120	130				✓			✓	"			✓		✓			As above. Electric logs show possible clayey bed 122-189?
130	140				✓			✓	"				✓	✓			Red-brown silty clay with grey-brown & yellow-brown mottling.
140	150				✓			✓	"				✓	✓			As above.
150	160				✓			✓	600-1000				✓	✓			As above.
160	170				✓			✓	"				✓	✓			As above.
170	180				✓			✓	"				✓	✓			As above.
180	190				✓			✓	"				✓	✓	✓		As above, with hard pellets which react to acid.
190	200				✓			✓	"				✓	✓	✓		As above.
200	210				✓			✓	"			✓		✓	✓		(Yellowish-)red-brown sandy silty mudstone. Yllw-red & grey clays.
210	220				✓			✓	"			✓		✓	✓		As above.
220	230				✓			✓	"			✓		✓	✓		As above, yellowishness continues to increase.
230	240				✓			✓	"			✓		✓	✓		As above. Apparently red silty beds interlayered with yllw & grey clays
240	250				✓			✓	"			✓		✓	✓	242	As above. Predominant colour of clay is grey. 1% gravel.
250	260				✓			✓	"			✓		✓	✓		As above. Hard calcareous nodules continue.
260	270				✓			✓	"			✓		✓	✓		As above.
270	280				✓			✓	"			✓		✓	✓		As above.
280	290				✓			✓	"			✓		✓	✓		As above. 276-286 Gamma kick circa 4x bg.
290	300				✓			✓	"				✓	✓		288	Grey-green clay; harder than upper beds.
300	310		?		✓			✓	"				✓	✓			As above. Interbeds of red-brown muddy silt with black carbonaceous matter.
310	320		?		✓			✓	"				✓	✓			As above.
320	330		?		✓			✓	"				✓	✓			As above. (Higher % silt).
330	340		?		✓			✓	"				✓	✓			As above. Clay darker green grey in parts.
340	350		?		✓			✓	"				✓	✓			As above. Red brown thin silty mud persists.
350	360		?		✓			✓	"				✓	✓			As above.
360	370		?		✓			✓	"				✓	✓			As above. Clay very dark green, harder than grey green clay.
370	380		?		✓			✓	"				✓	✓			As above. Mostly dark green grey clay with c. 10% red mud.
380	390		?		✓			✓	"				✓	✓			As above. 370-380 Gamma kick circa x3½ background
390	400		?		✓			✓	"				✓	✓			As above.
400	410		?		✓			✓	"				✓	✓			As above; red material less silty, less % of total sample.
410	420		?		✓			✓	"				✓	✓			As above more dark green clay.
420	430		?		✓			✓	"				✓	✓			As above
430	440		?		✓			✓	"				✓	✓			As above.
440	450		?		✓			✓	"				✓	✓		446'	As above. Iron (limonite) staining on pale clays.
450	460		?		✓			✓	"				✓	✓			As above (V. Dark grey clays becoming frequent (≡ Blue Shale
460	470		?		✓			✓	"				✓	✓			As above of the bore records ?)
470	480		?		✓			✓	"				✓	✓			As above, red material no longer silty.
480	490				✓			✓	"				✓	✓			As above. Dark grey green clay has become dk. blue-grey clay
490	500				✓			✓	"				✓	✓			As above. Still much pale grey-green clay.
500	510				✓			✓	"				✓	✓			As above
510	520				✓			✓	"				✓	✓			As above.
520	525				✓			✓	"				✓	✓			As above.

T = Trace G = Good F = Fair P = Poor A = Argillaceous C = Calcareous S = Sandy

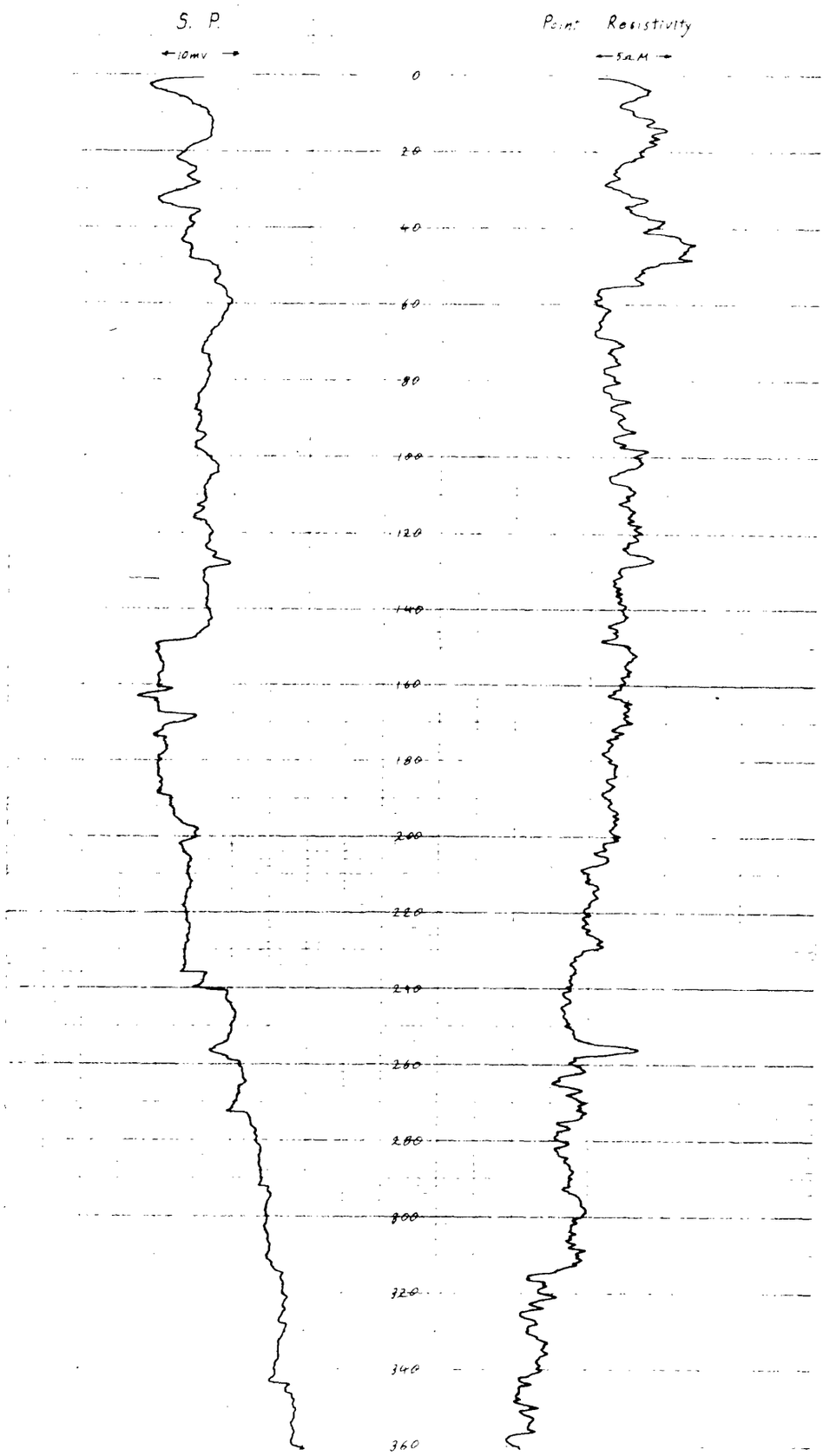
CRAE PLAN No. 1421



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S) GAMMA-RAY
DATE 9-6-70 TIME 5-30 p.m
AREA CRA LEASE (WERTALOONA) SA LOCATION Lat Long.
WELL WFL 6
ELEVATION G.L. K.B Log from 0 feet above G.L. DEPTH SCALE 20 ft/in
RUN NUMBER 1
FIRST READING 426 LAST READING 1
CASING SHOE DEPTH "LOG feet, DRILL feet, TOTAL DEPTH LOG 426 feet, DRILL 525'
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING (1) "set at feet (2) "set at feet
OPERATING TIME 15 hrs
RECORDED BY B.P. TAYLOR
REMARKS:

PLAN No



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S). S.P, Point Resistivity
DATE 9-6-70 TIME 7.00 pm
AREA. C.R.A. LEASE (WERTALOONA)-S.A. LOCATION. Lat Long.
WELL WLF 6
ELEVATION G.L: K.B: Log from 0 feet above G.L. DEPTH SCALE 20 ft/in
RUN NUMBER: 1
FIRST READING 361 LAST READING 1
CASING SHOE DEPTH (1): LOG feet, DRILL feet, TOTAL DEPTH LOG 361 feet, DRILL 525 feet
MUD. Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING (1) "set at feet (2) "set at feet
OPERATING TIME. 30 mins.
RECORDED BY B.P. TAYLOR.
REMARKS:

PLAN No

CRA EXPLORATION PTY LIMITED

CRAE FORM No. 77

ROTARY CUTTINGS LOG

BORE NO **WLF 6**

DRILLING COMMENCED 8/6/70 COMPLETED 9/6/70

LOCATION WEST LAKE FROME SOUTH AUSTRALIA SML 364

LOGGED BY A.K.H.

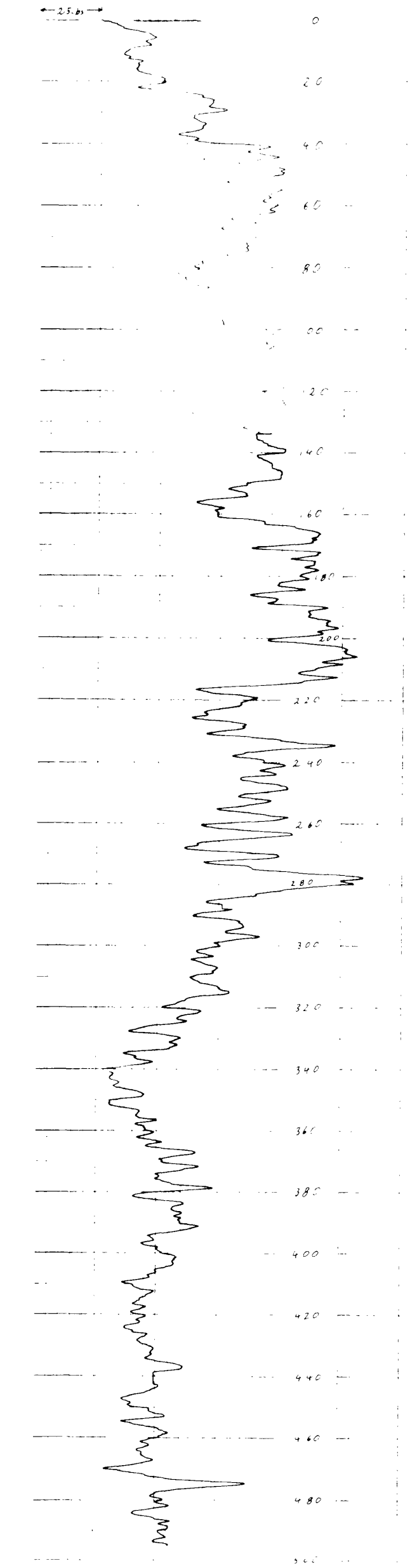
RADIATION DETECTOR PLUC & Technical Associates. + GAMMA LOG to 426, SP. resistivity to 361

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON T	CARBON N	PYRITE T	PYRITE N	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX S	DESCRIPTION OF LITHOLOGY
0	10			✓		✓	800/1500					✓	✓		Red-brown gravelly sand. Gravel mainly mudstone-siltstone kunkar
10	20			✓		✓	"					✓	✓		Grey brown gravelly sand.
20	30			✓		✓	"					✓	✓		As above, increasing kunkar.
30	40			✓		✓	"					✓	✓		As above. Pale grey sandy gravel 10% gravel Kunkar.
40	50			✓		✓	"					✓	✓		As above
50	60			✓		✓	"					✓	✓	53	Change from as above to grey brown gravelly sand at about 53 ft.
60	70			✓		✓	"					✓	✓		Grey brown silty sand. Interbedded with above.
70	80		✓	✓		✓	"					✓	✓		Pink grey sandy silt. Sand matrix with red brn clay.
80	90		✓			✓	"					✓	✓		As above, higher mud, more redness.
90	100		✓			✓	"					✓	✓		Pink grey muddy silt. Sand may be interbedded, as pink grey
100	110		✓			✓	"					✓	✓		As above. silty sandstone.
110	120		✓			✓	"					✓	✓		As above, but 2% Gravel - red ss. mudst? and grey silty clay.
120	130		✓			✓	"					✓	✓		As above, deeper pink colour (almost red-brown)
130	140		✓			✓	"					✓	✓		Red brown muddy silt. + some pale grey clay.
140	150		✓			✓	"					✓	✓	?	As above. } increasing mud?
150	160		✓			✓	"					✓	✓		As above. }
160	170		✓			✓	"					✓	✓		As above. Red clay flecked with white clay.
170	180		✓			✓	"					✓	(✓)		As above. Increasing clay. May be silty limestone
180	190		✓			✓	"					✓	(✓)		As above.
190	200		✓			✓	"					✓	(✓)		As above. } increasing mud.
200	210		✓			✓	"					✓	(✓)		As above.
210	220		✓			✓	"					✓	(✓)		As above
220	230		✓			✓	"					✓	(✓)		As above
230	240		✓			✓	"					✓	(✓)		As above.
240	250		1% ?			✓	"					✓	(✓)		As above.
250	260		1% ?			✓	"					✓	(✓)	?	As above. } gypsum?
260	270		1% ?			✓	"					✓	(✓)		As above. Crystalline flaky, transparent grey mica like flakes
270	280		1% ?			✓	"					✓	(✓)		As above. Yellow-brn + grey clays appear significantly. 5%?
280	290		✓			✓	"					✓	(✓)		c. 281. change to mixture of red yellow-brn + pale grey clays + red brn. 50
290	300		✓			✓	"					✓	(✓)		As above. } increasing yellow + grey clays → yellow-brn silty
300	310		✓			✓	"					✓	(✓)		As above } mudstone
310	320			✓		✓	"					✓	(✓)		Yellow brown silty mudstone. Bedded Sand?
320	330			✓		✓	"					✓	(✓)		As above, more clayey. (Clays yllw, grey, red-brn as above).
330	340			✓		✓	"					✓	(✓)		As above; interbedded? silts + clays. Some hard white clay
340	350			✓		✓	"					✓	(✓)		Pink-grey silty mudstone mainly green-grey + yellow-brn clays +
350	360			✓		✓	"					✓	(✓)		red brown to brown silty clay. + some white clay + silt
360	370			✓		✓	"					✓	(✓)	?	As above White clay increases, friable.
370	380			✓		✓	"					✓	(✓)		As above
380	390			✓		✓	"					✓	(✓)		As above Grey clay increasing, at 385 feet appx.
390	400			✓		✓	"					✓		385?	Mixture of clays. Mainly pale green grey clay + dark green-grey + some red-brown
400	410			✓		✓	"					✓			As above. Less friable.
410	420			✓		✓	"					✓			As above.
420	430			✓		✓	"					✓			As above
430	440			✓		✓	"					✓			As above.
440	450			✓		✓	"					✓			As above, but more friable from c 445
450	460			✓		✓	"					✓			As above, parts crumbly
460	470			✓		✓	"					✓			As above.
470	480			✓		✓	"					✓			As above
480	490			✓		✓	"					✓			As above
490	500			✓		✓	"					✓			As above
500	510			✓		✓	"					✓			As above
510	520			✓		✓	"					✓			As above
520	525			✓		✓	"					✓			As above.

T = Trace, G = Good, F = Fair P = Poor, Arg = Argillaceous Calc = Calcareous S = Siliceous

ENV1487 - Vol I-16

CRAE PLAN No. M.43

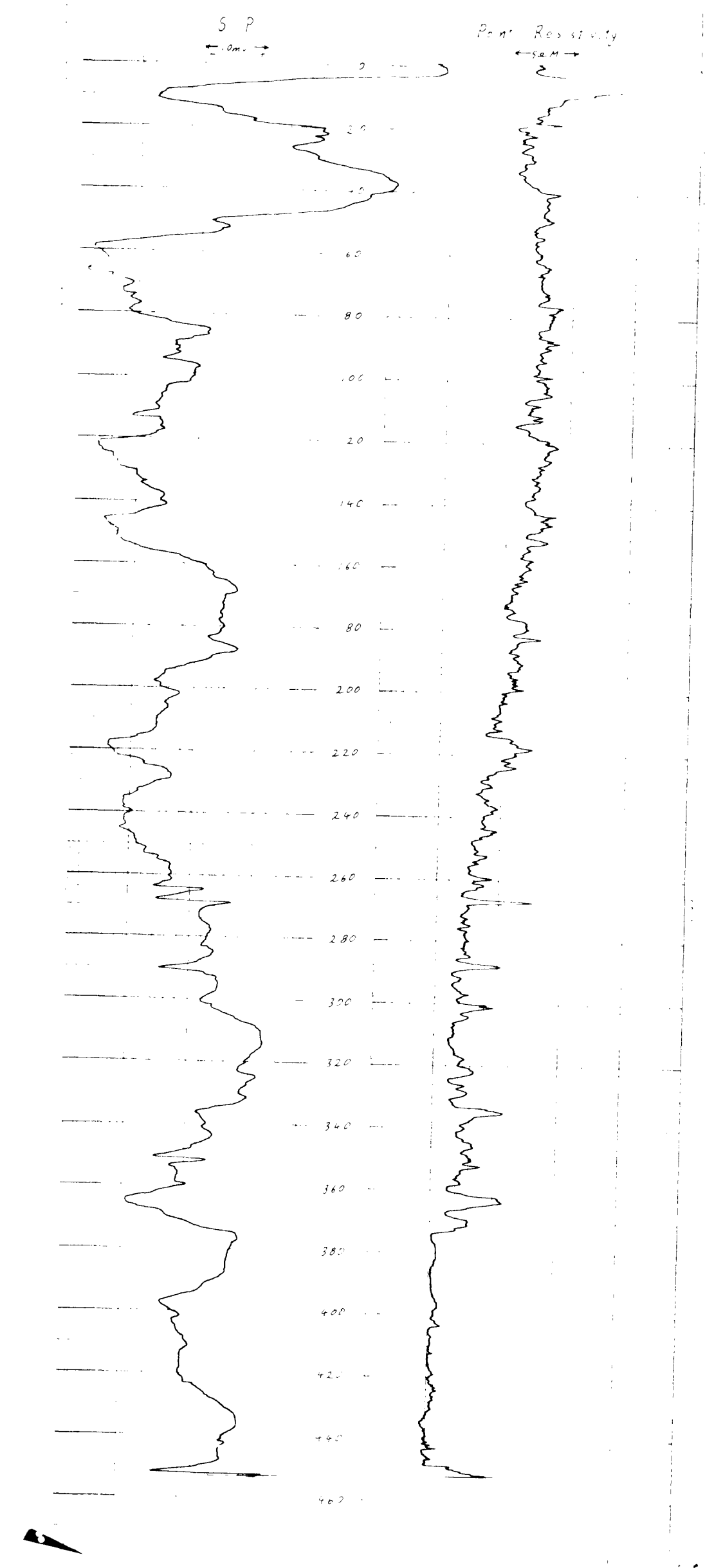


SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S) GAMMA-RAY.
DATE 5-6-70 TIME 9.45am
AREA WEST LAKE FROME - S A LOCATION: Lat Long.
WELL W.L.F 7.
ELEVATION G.L: K.B Log from 0 feet above G.L. DEPTH SCALE 20ft/in
RUN NUMBER 1
FIRST READING 494 LAST READING: 0
CASING SHOE DEPTH (1): LOG feet, DRILL feet, TOTAL DEPTH LOG 494 feet, DRILL 525'
MUD Type Density Viscosity Resistivity @ °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} @ °F R_{mc} @ °F
BIT SIZE " ADDITIONAL CASING (1) " set at feet (2) " set at feet
OPERATING TIME 45 mins.
RECORDED BY A.W. YOUNG.
REMARKS:

PLAN No

ENV 1487 VOL 1



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S): S.P., Point Resistivity
DATE. 5-6-70 TIME. 10·30am.
AREA: WEST LAKE FROME - S.A. LOCATION: Lat.. Long.
WELL. W.L.F. 1
ELEVATION G.L: K.B. Log from 0 feet above G.L. DEPTH SCALE.
RUN NUMBER: 1
FIRST READING 452 LAST READING 0
CASING SHOE DEPTH("):LOG feet, DRILL feet, TOTAL DEPTH LOG 452 feet, DRILL 525'
MUD Type Density Viscosity Resistivity @°F BHT @°F
pH Fluid Loss cc 30 min Cake 32 R_{mf} @°F R_{mc} @°F
BIT SIZE. " ADDITIONAL CASING: (1) "set at feet (2) "set at feet
OPERATING TIME. 30 mins.
RECORDED BY: A.W. YOUNG.
REMARKS:

PLAN No

ENV 1487-Vol I-18

CRA EXPLORATION PTY LIMITED

CRAE FORM No 77

ROTARY CUTTINGS LOG

BORE NO WLF. 7.

DRILLING COMMENCED 3/6/70 COMPLETED 5/6/70

LOGGED BY A.K.H, S.A Mines Dept.

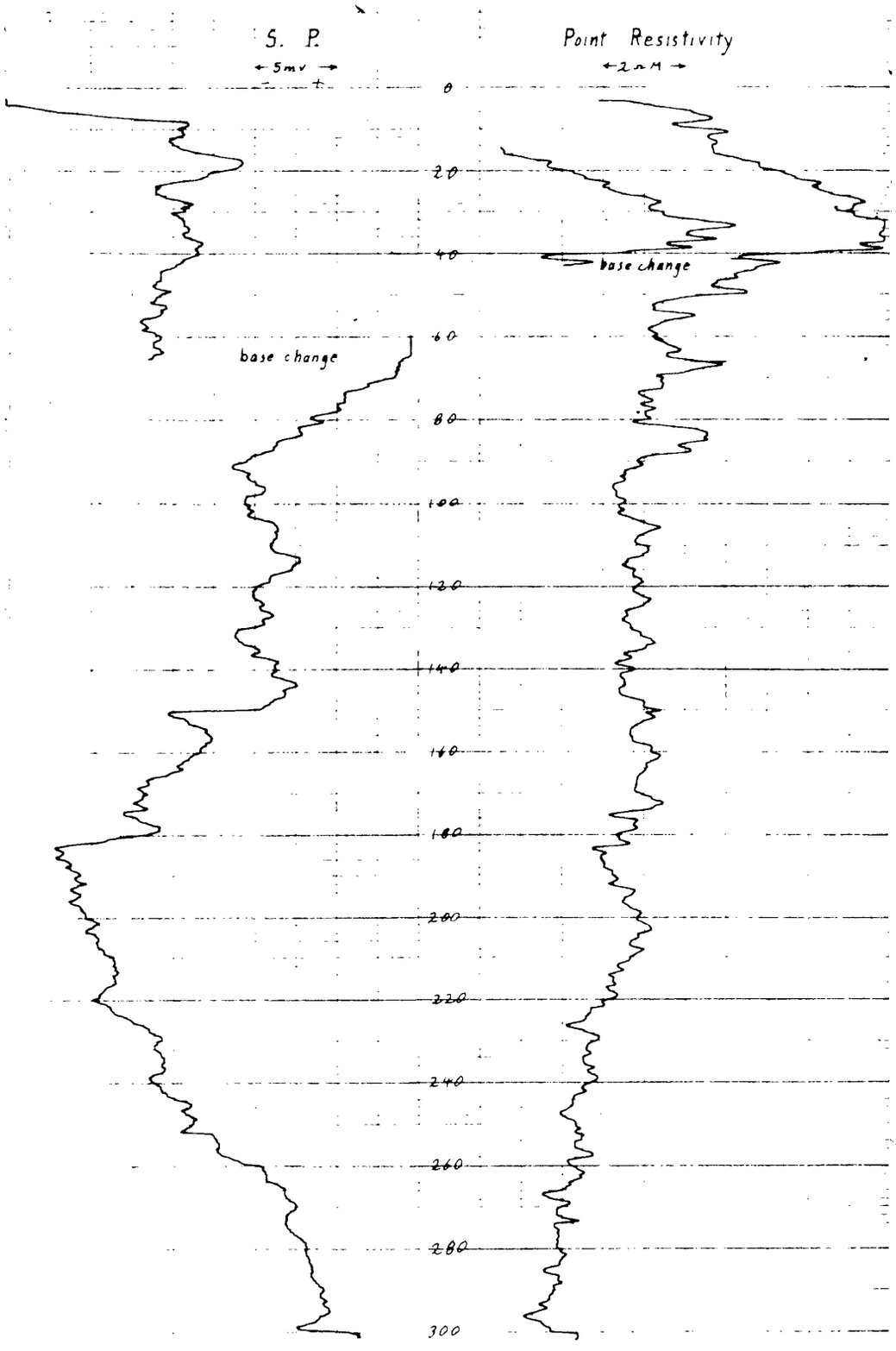
LOCATION WEST LAKE FROME, SOUTH AUSTRALIA SML 364

RADIATION DETECTOR MODEL PUC 1, Technical Associates.

+ GAMMA LOG to 494 feet, SP + resistivity to 452.

Depth From	Depth To	Percentage Log	Carbon	Carbon T	Carbon N	Pyrite	Pyrite T	Pyrite N	Radio Activity	Porosity G	Porosity F	Porosity P	Porosity T	Matrix Ac	Matrix C	Matrix S	Description of Lithology
0	10			.	✓			✓	500-700	✓				✓	(✓)		Red brown gravelly and silty sand; Gravel + sand 80%
10	20				✓			✓	"					✓	(✓)		Grey brown " " " "; Kunkar; + siltstone, mdst, gptd
20	30				✓			✓	"					✓	(✓)		Grey-red-brown clayey and gravelly) sand.
30	40				✓			✓	"					✓			Mottled (?) grey and red-brown silty mudstone.
40	50				✓			✓	"					✓			As above.
50	60			✓				✓	"					✓			As above. (Some dark grey clay)
60	70			✓				✓	"					✓			As above.
70	80			✓				✓	"					✓			Red Brown silty mudstone.
80	90			✓				✓	"					✓			As above.
90	100		1	.				✓	"								As above. 1% Gravel, – black + red-brn. carbonaceous nodules.
100	110			✓				✓	"					✓			As above. (Paler red-brown, with pale grey + white clay).
110	120			✓				✓	"					✓			As above. (Higher % mud).
120	130			✓				✓	"					✓			Red-Brown mudstone (5% grey clay; 1% green-grey clay)
130	140			✓				✓	"					✓			Red-Brown silty mudstone. (Many coloured clays; sand lithic
140	150		1	.				✓	"					✓			As above. (White, grey, green grey, dark)
150	160			✓				✓	"					✓			As above (green; mainly red brown)
160	170			✓				✓	"					✓			As above.
170	180			✓				✓	"					✓			Pale red brown mudstone, with clays of many colours ↑.
180	190			✓				✓	"					✓			As above. Interbedded (?) red-brown silty mudstone.
190	200			✓				✓	"					✓			As above.
200	210			✓				✓	"					✓			As above. Mud flecked with white or grey clay patches; greenish clay
210	220			✓				✓	"					✓			As above. also occurs contorted with red-brn mud.
220	230			✓?				✓	"					✓			Mixture of as above with dk greenish to yellowish red-grey silty mudstone.
230	240			✓?				✓	"					✓			As above. Overall colour reddish greyish brown.
240	260			✓?				✓	"					✓			As above. } decreasing silt.
250	260			✓?				✓	"					✓			As above }
260	270			✓?				✓	"					✓			Red brown mudstone 15% grey green clay, trace white + grey clay.
270	280			✓?				✓	"					✓			As above ↑ in white + grey clay
280	290			✓?				✓	"					✓			As above.
290	300			✓?				✓	"					✓			As above to 293. Then Pale green grey (clay) mudstone, variable colour
300	310			✓?				✓	"					✓			As above from 293. Red-brn. clay 5%, Pale grey clay 10%,
310	320				✓			✓	"					✓			As above. These clays probably interbedded (lenses).
320	330				✓			✓	"					✓			As above
330	340				✓			✓	"					✓			As above, but dark green grey clay equal in amount to pale green grey.
340	350				✓			✓	"					✓			Medium grey clay and light grey to white clay. + others
350	360				✓			✓	"					✓			Pale grey (50%) + dark green grey clay (40) + medium grey clay (10)
360	370				✓			✓	"					✓			As above, increasing dark green grey clay 60%.
370	380				✓			✓	"					✓			As above. Still traces other coloured clays incl. red-brown.
380	390				✓			✓	"					✓			As above. Trace dark blue-grey clay
390	400				✓			✓	"					✓			As above Dark blue clay (≡ Blue shale?) significant
400	410				✓			✓	"					✓			Dark blue grey clay mainly (+ minor clays of many colours)
410	420				✓			✓	"					✓			As above till end of hole. Porosity probably varies, as some parts are quite crumbly-friable, as opposed to the tacky 'rollable' clays of the same colour + composition higher + lower in the sequence.
420	430				✓			✓	"					✓			
430	440				✓			✓	"					✓			
440	450				✓			✓	"					✓			
450	460				✓			✓	"					✓			
460	470				✓			✓	"					✓			
470	480				✓			✓	"					✓			
480	490				✓			✓	"					✓			
490	500				✓			✓	"					✓			
500	510				✓			✓	"					✓			
510	520				✓			✓	"					✓			
520	525				✓			✓	"					✓			

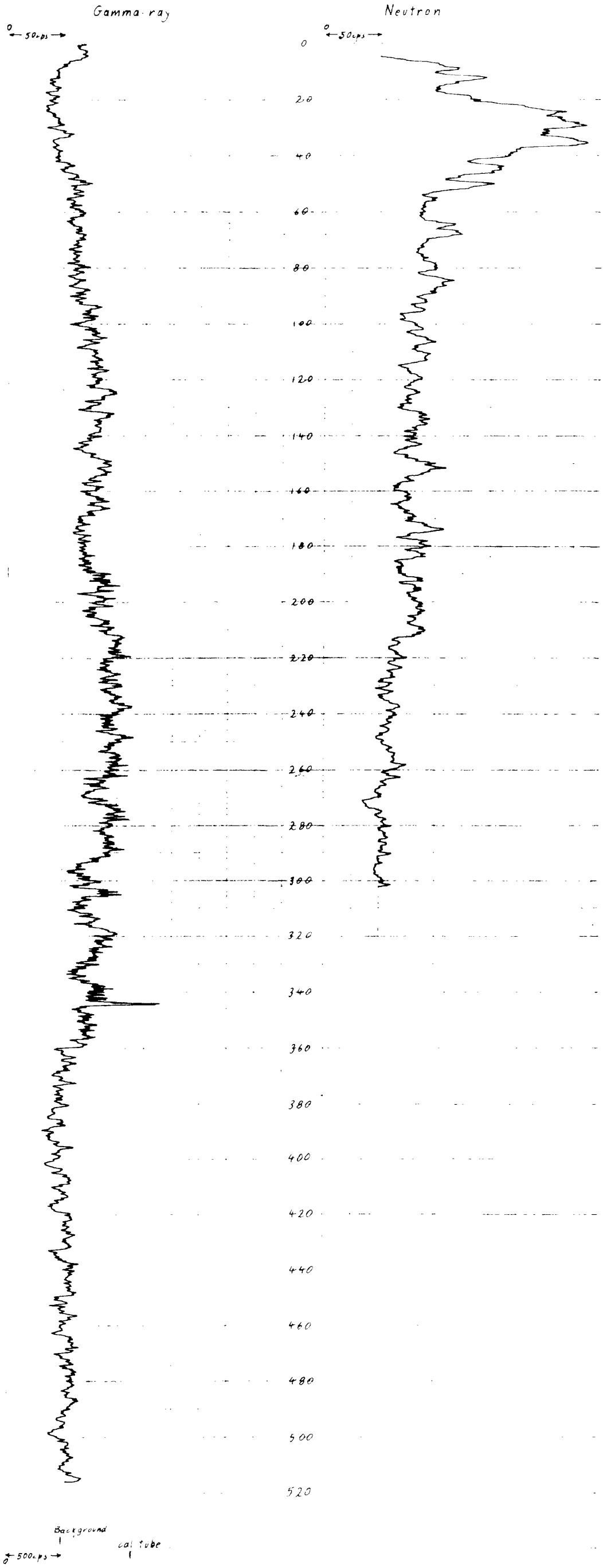
ENV 1487 - Vol I - 19



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S) S.P. Point Resistivity
DATE 12-6-70 TIME 10 00 am
AREA WEST LAKE FROME, S.A LOCATION: Lat Long.
WELL W.L.F 8
ELEVATION G.L: K.B Log from 0 feet above G.L. DEPTH SCALE 20 ft/in
RUN NUMBER 1
FIRST READING 301 LAST READING 4
CASING SHOE DEPTH " LOG feet, DRILL feet, TOTAL DEPTH LOG 301 feet, DRILL 525
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING (1) " set at feet (2) " set at feet
OPERATING TIME 1 hour
RECORDED BY B P TAYLOR
REMARKS:

PLAN No



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S). GAMMA-RAY, NEUTRON
DATE: 12-6-70 TIME. 9·000m / 11·00am
AREA: WEST LAKE FROME - S.A. LOCATION: Lat. Long.
WELL: W.L.F 8
ELEVATION G.L: K.B: Log from 0 feet above G.L. DEPTH SCALE 20 ft/in
RUN NUMBER: 1/1
FIRST READING. 516 / 302 LAST READING: 0/5
CASING SHOE DEPTH (") LOG feet, DRILL feet, TOTAL DEPTH: LOG 516 feet, DRILL 525'
MUD: Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE. " ADDITIONAL CASING (1) "set at feet (2) "set at feet
OPERATING TIME. 1 hour / 1 hour
RECORDED BY: B P TAYLOR.
REMARKS: CALIBRATION TUBE. = 2764 API units.
266 mr/hr
170 mircograms radium/ton
PLAN No.

ENV 1487-Vol I-21

CRA EXPLORATION PTY. LIMITED.

CRAE FORM No. 77

ROTARY CUTTINGS LOG

BORE NO. WLF 8.

LOGGED BY A K.H.

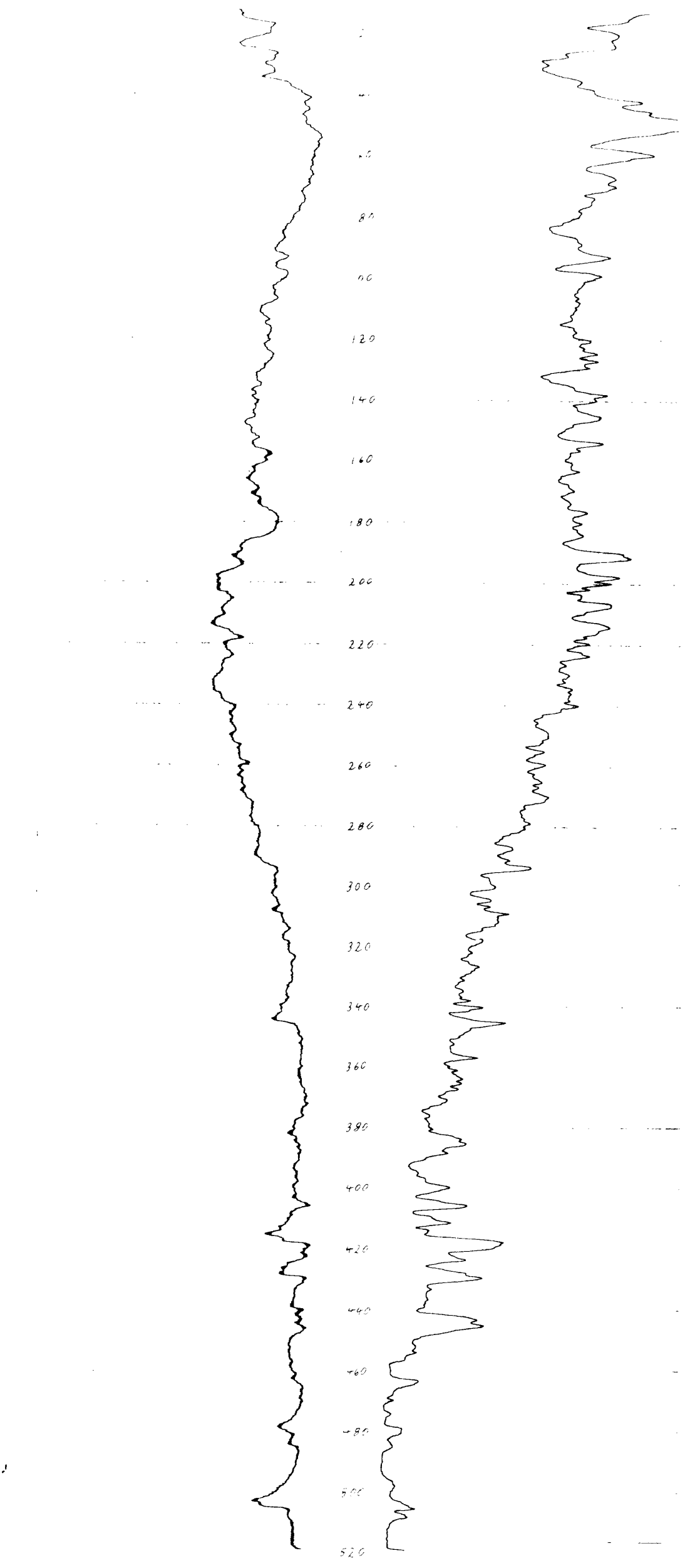
DRILLING COMMENCED 10/6/70 COMPLETED 11/6/70

LOCATION WESTLAKE FROME SOUTH AUSTRALIA SML 364.

RADIATION DETECTOR PUC MODEL 1 (TECHNICAL ASSOCIATES) + GAMMA LOG to 516, NEUTRON LOG to 302, SP / RESISTIVITY to 302

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON %	CARBON T	CARBON Nil	PYRITE %	PYRITE T	PYRITE Nil	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX Sil	DESCRIPTION OF LITHOLOGY
0	10				✓			✓	700-1200					✓		10	Brown gravelly sand.
10	20				✓			✓	"					(✓)	✓		White massive Kunkar - nodules? and brown sand.
20	30				✓			✓	"					(✓)	✓		As above Reddish black material: manganese?
30	40				✓			✓	"					(✓)	✓		As above Green clays appear at c. 38ft.
40	50				✓			✓	"					(✓)	✓		As above " 20% - mild reaction to acid.
50	60				✓			✓	"					(✓)	✓	58	As above - Probable pollution of limestone below 54', See logs.
60	70				✓			✓	"					(✓)	✓		As above Has $CaCO_3$ in various form. Kunkar fragments.
70	80				✓			✓	"					✓	✓		Brown friable calcareous sandy silt + Kunkar gravel + nodules?
80	90				✓			✓	"					✓	✓		As above.
90	100				✓			✓	"					✓	✓		As above, increasing mud.
100	110			✓				✓	"					✓	(✓)		Red brown muddy silt + calcareous matter.
110	120			✓				✓	"					✓	(✓)		Red brown muddy silt.
120	130			✓				✓	"					✓	(✓)		As above.
130	140			✓				✓	"					✓	(✓)		Transition to Red. brown silty mud + mottled grey clays, flecks of white
140	150			✓				✓	"					✓	(✓)		As above. white clays, Interbedded silts + clays ?
150	160			✓				✓	"					✓	(✓)		As above
160	170			✓				✓	"					✓	(✓)		As above (Sandiness increases at 169).
170	180			✓				✓	"					✓	(✓)		As above.
180	190			✓				✓	"					✓	(✓)		Interbedded? Red brown clays + silts + some pale sandy beds.
190	200			✓				✓	"					✓	(✓)		As above, less sand. Trace gravel.
200	210			✓				✓	"					✓	(✓)		As above - Red brown silty mud. Magnetic grains?
210	220			✓				✓	"					✓	(✓)		As above. Increasing grey + white clays. (Strong reaction to acid).
220	230			✓				✓	"					✓	(✓)		As above
230	240			✓				✓	"					✓	(✓)		As above.
240	250			✓				✓	"					✓	(✓)		As above. Increasing - grey, red and yellow brown, brown clays.
250	260			✓				✓	"					✓	(✓)		As above less silty.
260	270			✓				✓	"					✓	(✓)		As above.
270	280			✓				✓	"					✓	(✓)		As above.
280	290			✓				✓	"					✓	(✓)		As above.
290	300			✓				✓	"					✓	(✓)	298	As above
300	310			✓				✓	"					✓			As above. % grey, green-grey, yellow, brown clays, increasing. No reaction to acid
310	320			✓				✓	"					✓			As above.
320	330			✓				✓	"					✓			As above Mixture of red brown + grey clays, mostly green pale to dark.
330	340			✓	✓			✓	"					✓			Increasing grey clays.
340	350				✓			✓	"					✓			As above. Overall colour (reddish) green grey
350	360				✓			✓	"					✓		?	As above. less red + brown clays.
360	370				✓			✓	"					✓			As above. Now red + brown clays minor.
370	380				✓			✓	"					✓			As above. Overal colour (reddish) green-grey.
380	390				✓			/	"					✓			As above
390	400				/			/	"					✓			As above
400	410				/			/	"					✓			As above
410	420				/			/	"					✓			As above
420	430				/			/	"					✓			As above
430	440				/			/	"					✓			As above - dark green grey clay becomes dominant
440	450				/			/	"					✓			As above - Overall colour now dark green grey
450	460				/			/	"					✓			As above Other clays remain as before.
460	470				/			/	"					✓			As above Variation in fracturing with depth.
470	480				/			/	"					✓			As above
480	490				/			/	"					✓			As above
490	500				/			/	"					✓			As above
500	510				/			/	"					✓			As above
510	520				/			/	"					✓			As above
520	525				/			/	"					✓			As above.

T = Trace G = Good F = Fair P = Poor Arg = Argillaceous Calc = Calcareous Sil = Siliceous

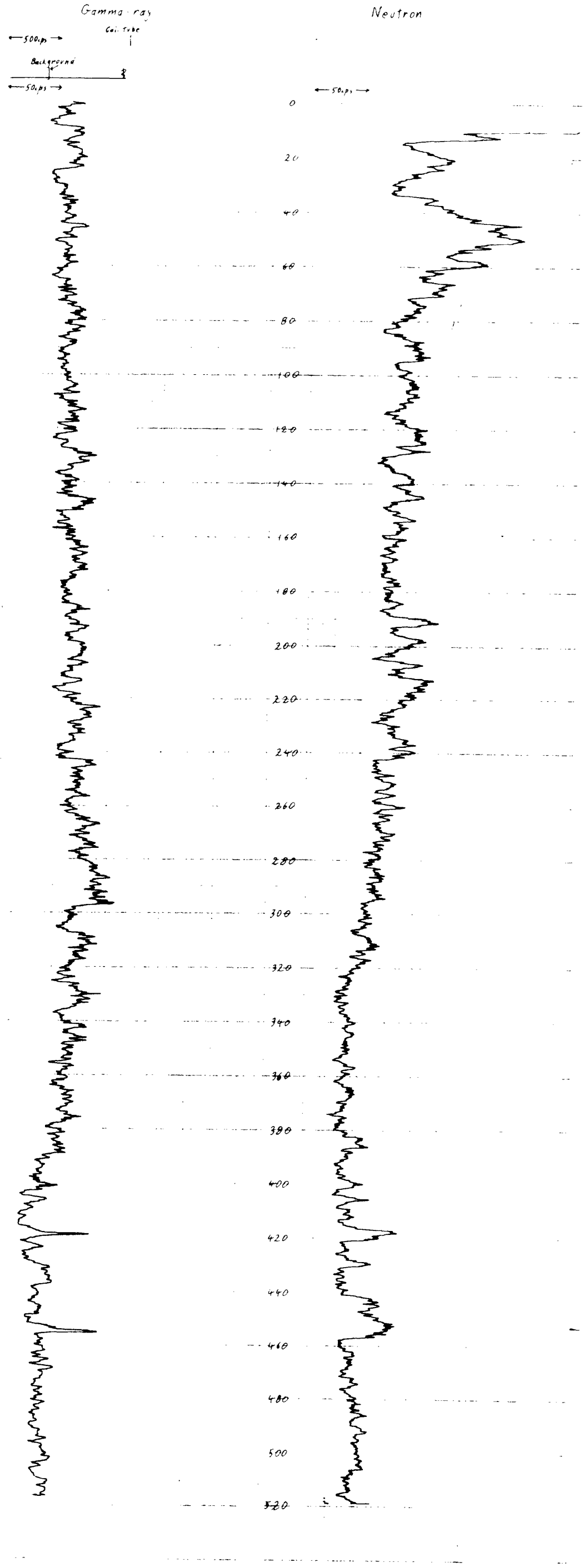


SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S). S.P, Point Resistivity.
DATE: 13-6-70 TIME. 7·25pm
AREA. WEST LAKE FROME, S.A. LOCATION: Lat. Long.
WELL W.L.F. 9
ELEVATION G.L: K.B: Log from 0. feet above G.L. DEPTH SCALE: 20 ft/in.
RUN NUMBER. 1
FIRST READING: 519 LAST READING: 13
CASING SHOE DEPTH (") : LOG feet, DRILL feet, TOTAL DEPTH: LOG 519 feet, DRILL 525'
MUD Type Density Viscosity Resistivity @ °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} @ °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING: (1) " set at feet (2) " set at feet
OPERATING TIME. 35 mins.
RECORDED BY. B.P. TAYLOR.
REMARKS:

PLAN No

ENV 487 - Vol I - 23



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S). GAMMA - RAY. NEUTRON
DATE: 13-6-70 TIME. 6·05 pm - 6·45 pm.
AREA. WEST LAKE FROME - S.A. LOCATION: Lat Long.
WELL: W.L.F 9.
ELEVATION G.L: K.B: Log from 0 feet above G.L. DEPTH SCALE 20 ft/in.
RUN NUMBER. 1/1
FIRST READING 517 / 519 LAST READING: 0 / 13.
CASING SHOE DEPTH ": LOG feet, DRILL feet, TOTAL DEPTH: LOG 519 feet, DRILL 525'
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING (1) "set at feet (2) "set at feet
OPERATING TIME: 40 mins / 40 mins.
RECORDED BY B.P. TAYLOR.
REMARKS: CALIBRATION TUBE = 2764 API
266 mr/hour
170 mircograms radium/ton.
PLAN No

ENV 1487 - Vol I - 24

CRA EXPLORATION PTY. LIMITED.

CRAE FORM No 77

ROTARY CUTTINGS LOG

BORE NO **WLF 9**

LOGGED BY A.K.H

DRILLING COMMENCED 12/6/70 COMPLETED 13/6/70

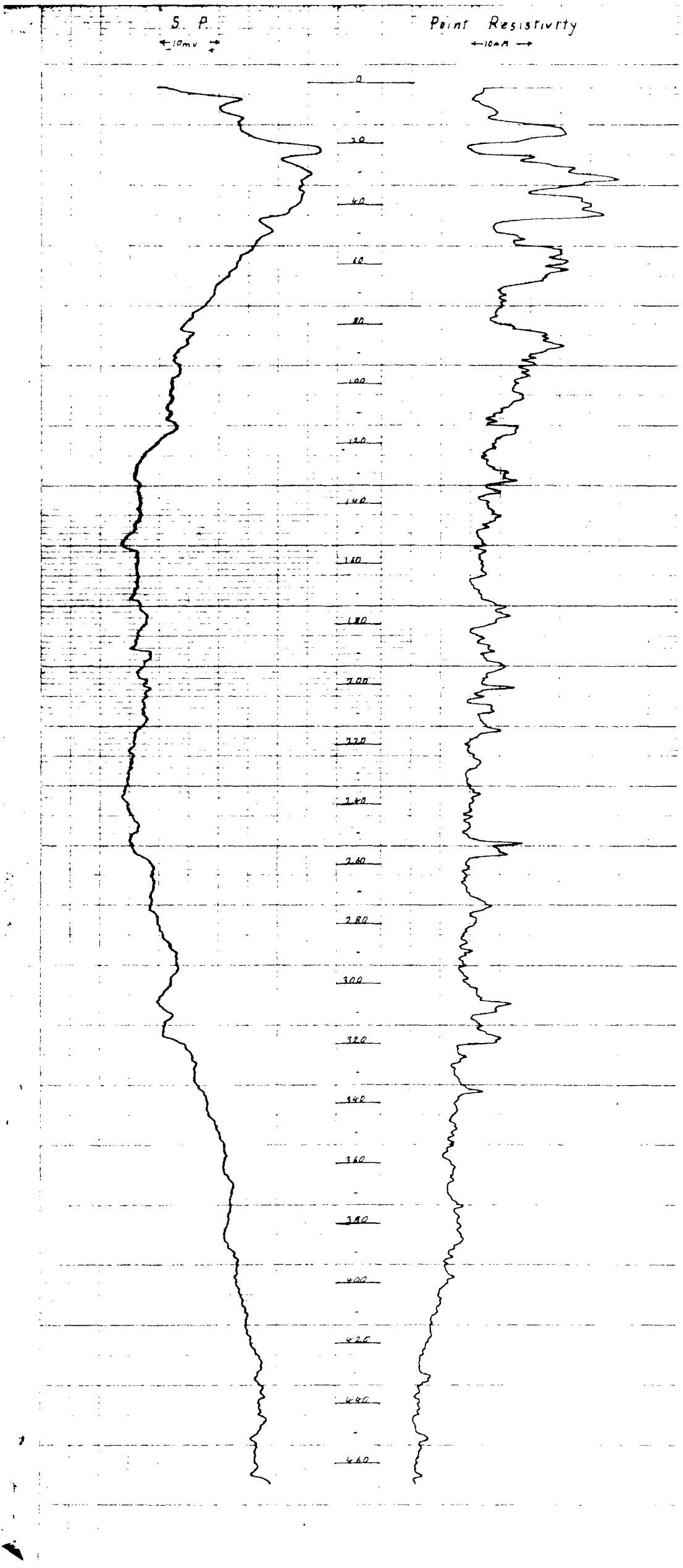
LOCATION WEST LAKE FROME SOUTH AUSTRALIA SML 364

RADIATION DETECTOR P.U.G-1 (TECHNICAL ASSOCIATES) + GAMMA, NEUTRON, SP, RESISTIVITY to 517 ft

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON T	CARBON Nil	PYRITE T	PYRITE Nil	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX Sil	DESCRIPTION OF LITHOLOGY
0	10			✓		✓	SCANNED BUT		—			✓	✓		Brown silty sand.
10	20			✓		✓	NOT RECORDED.	—				✓	✓		Grey brown gravelly sand.
20	30			✓		✓	NO ANOMALIES.	—				✓	✓		As above.
30	40			✓		✓	SEE GAMMA LOG.	—				✓	✓		As above.
40	50			✓		✓		—				◀	(✓)		As above Trace clay mud.
50	60			✓		✓		—					(✓)		As above. change at 60' to:
60	70		✓			✓		—		—		✓	✓		Brown muddy silt + 5% grey clay. change at 66. to:
70	80			✓		✓		—				(✓)	✓		Pale grey (agate calcedonies (Cuncta) gravel.
80	90		✓			✓				—		✓	✓		Brown muddy silt as above.
90	100			✓		✓		—		—		✓	✓		This mixture of gravels + muds continues to 205 ft
100	110		✓			✓		—				✓	✓		As above
110	120		✓			✓		—				✓	✓		As above
120	130		✓			✓		—				✓	✓		As above
130	140		✓			✓		—				✓	✓		As above
140	150		✓			✓		—				✓	✓		As above
150	160		✓			✓			—	—		✓	✓		As above, less gravel
160	170		✓			✓			—	—		✓	✓		As above " "
170	180		✓			✓				—		✓	✓		As above — Red brown sandy silt with mica pale green-grey clay.
180	190		✓			✓				—		✓	✓		As above On 197 - 206 gravel bands.
190	200		✓			✓				—		✓	✓		As above. No gravel
200	210		✓			✓				—		✓	✓		As above, less grey clay.
210	220		✓			✓				—		✓	✓		As above.
220	230		✓			✓				—		✓	✓		As above
230	240		✓			✓				—		✓	✓		As above. Sandy layer 234-243 (Gamma log).
240	260		✓			✓				—		✓	✓		As above. 10% grey clay.
250	260		✓			✓				—		✓	✓		As above.
260	270		✓			✓				—		✓	✓		As above.
270	280		✓			✓				—		✓	✓		As above. Increasing clay to 300
280	290		✓			✓				—		✓	✓		As above.
290	300		✓			✓				—		✓	✓		As above
300	310		✓			✓				—		✓	✓		As above. Red brown silty mudstone
310	320		✓			✓				—		✓	✓		As above
320	330		✓			✓				—		✓	✓		As above
330	340		✓			✓				—		✓	✓		As above White clay "flecks" + red brown mud react to acid, as above.
340	350		✓			✓				—		✓	N		348 As above 344? change of lithology? - (logs, especially elastic) - to green grey clays?
350	360		✓			✓				—		✓	✓		Mixture of colored clays, mainly red-brown and grey
360	370		✓			✓				—		✓	✓		as above, mostly red brown.
370	380			✓		✓				—		✓	✓		as above Trace sand. Carbonaceous matter in red muds.
380	390			✓		✓				—		✓	✓		Mixture of pale green grey to blue grey, brown and white (dolomite?) clays. (calcareous)
390	400			✓		✓				—		✓	✓		as above, increasing grey.
400	410			✓		✓				—		✓	✓		as above 80% Grey 5% Red-brown 15% White.
410	420			✓		✓				—		✓	✓		as above. 416-420 Sand? Gamma kick x 3 bg at base - 2420). No sand in samples.
420	430			✓		✓				—		✓	✓		as above. dark green grey clay mud appears. 10%
430	440			✓		✓				—		✓	✓		as above mainly pale grey and white plus dark green clays.
440	450			✓		✓				—		✓	✓		as above (441-457 Sand? Gamma kick x 3+ bg at base) Dark green increasing
450	460			✓		✓				—		✓			455 as above increasing dark green grey muds, trace dark blue mud. No evidence
460	480			✓		✓				—		✓			as above of sandy material. Blue clay brittle + friable, occasional water
480	500			✓		✓				—		✓			as above 15% blue grey clay, 10% red brown. Darkening of color overall.
500	520			✓		✓				—		✓			as above
520	525			✓		✓				—		✓			as above.
510	520			✓		✓				—		✓			80% Dark blue grey mud
520	525			✓		✓				—		✓			as above
															as above
															525 END OF HOLE

T = Trace G = Gritty F = Fine P = Pebbly A = Arg C = Calc

ENV 1487-Vol I-25

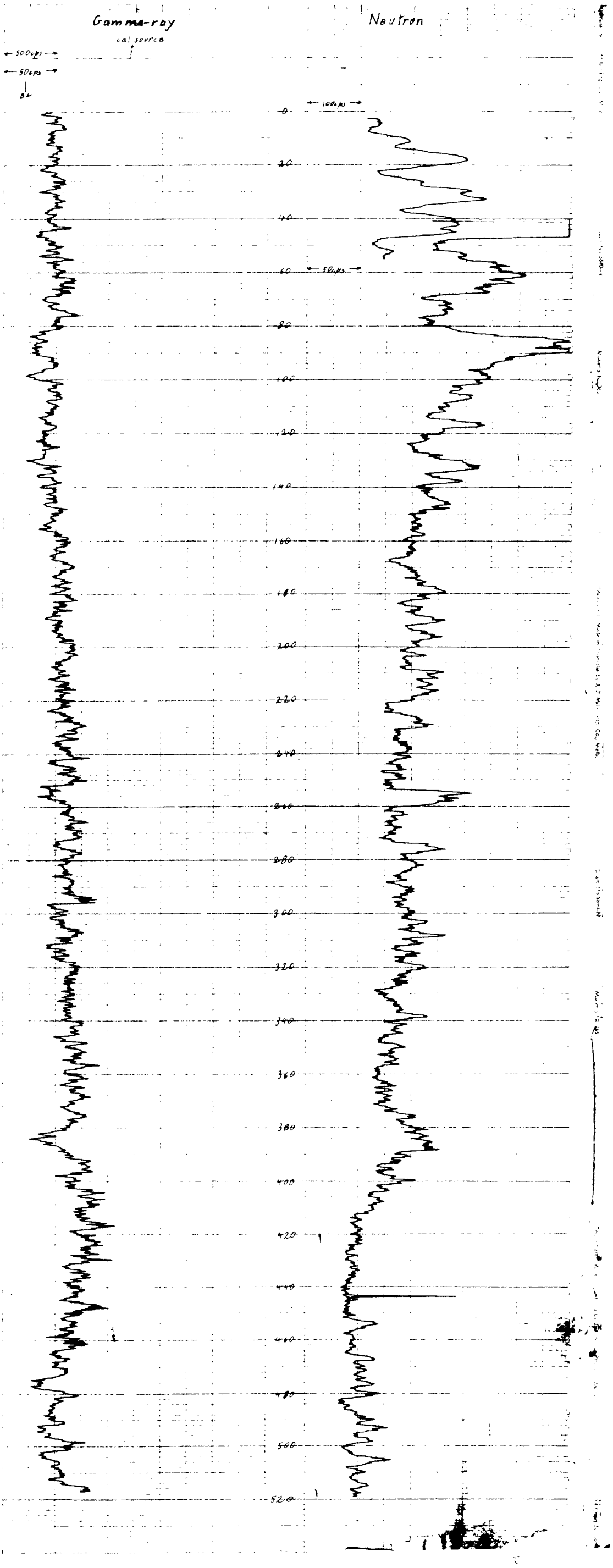


SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S) S.P, Point Resistivity
DATE 16-6-70 TIME 6·30p.m
AREA WEST LAKE FROME - S.A LOCATION Lat: Long.
WELL W.L.F 10
ELEVATION G.L. K.B Log from 0 feet above G.L. DEPTH SCALE 20 Ft/in.
RUN NUMBER 1/1
FIRST READING 467 LAST READING 2
CASING SHOE DEPTH (1) LOG feet, DRILL feet, TOTAL DEPTH LOG 467 feet, DRILL 525'
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING (1): "set at feet (2) "set at feet
OPERATING TIME 30 mins
RECORDED BY B.P. TAYLOR.
REMARKS:

PLAN No

ENV 1487- Vol I -26



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S): GAMMA-RAY, NEUTRON.
DATE 16-6-70 TIME 5 00p.m. - 5 45pm
AREA WEST LAKE FROME - S.A LOCATION Lat Long.
WELL W.L.F 10
ELEVATION G.L: K.B Log from 0 feet above G.L. DEPTH SCALE 20ft/in
RUN NUMBER 1/1
FIRST READING 5/7 5/7 LAST READING 0/1
CASING SHOE DEPTH "-LOG feet, DRILL feet, TOTAL DEPTH LOG 5/7 feet, DRILL 525
MUD: Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE: " ADDITIONAL CASING (1): "set at feet (2) "set at feet
OPERATING TIME: 45mins / 45mins.
RECORDED BY: B.P TAYLOR
REMARKS: NEUTRON LOG IS READING 2ft LOWER THAN ACTUAL DEPTH.
CALIBRATION SOURCE = 2764 API units PLAN No
266 mirco roentgens/hour
170 mirco grams radium/ton

CRA EXPLORATION PTY. LIMITED.

CRAE FORM No 77

ROTARY CUTTINGS LOG

BORE NO WLF 10

DRILLING COMMENCED 16/6/70 COMPLETED 17/6/70

LOCATION WEST LAKE FROME SOUTH AUSTRALIA ; SML 364.

LOGGED BY A.K.H.

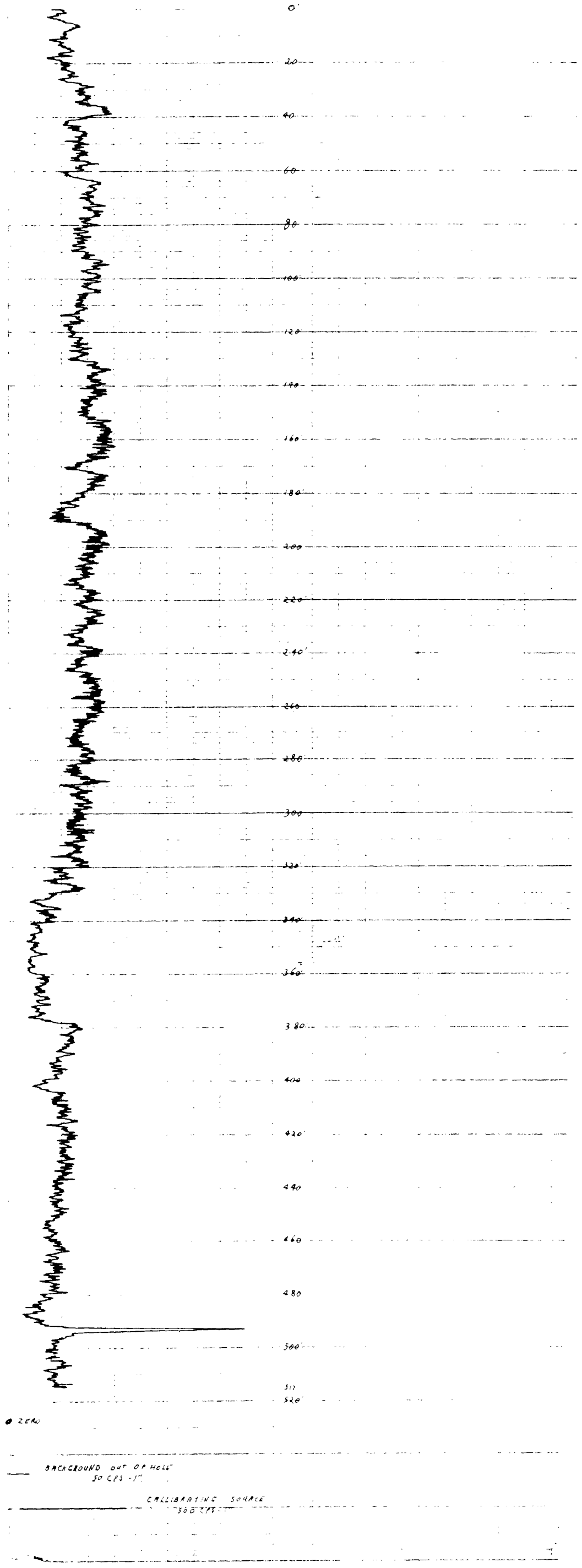
RADIATION DETECTOR P.U.G-1.
+ GAMMA AND NEUTRON LOG No 577, 3P and Resistivity 6 477 ft.

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON ·	CARBON T	CARBON Nil	PYRITE ·	PYRITE T	PYRITE Nil	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX Si	DESCRIPTION OF LITHOLOGY
0	10				✓			✓	500-1000					✓	✓		0-6 Rd-brn sandy silt 6-10 Grey brown sandy gravel
10	20				✓			✓	..					✓	✓		Grey-brown gravel
20	30				✓			✓	..					✓	✓		As above
30	40				✓			✓	..					✓	✓		As above
40	50				✓			✓	..					✓	✓		As above.
50	60				✓			✓	..					✓	✓		As above to 54, 54-60 Red brown sandy silt.
60	70				✓			✓	..					✓	✓		Red-brown sandy silt to 66, 66-70 Grey brown sandy gravel
70	80				✓			✓	..					✓	(✓)		As above to 72, 72-80 Brown sandy silt.
80	90				✓			✓	..					✓	(✓)		As above
90	100				✓			✓	..					✓	(✓)		90-92 As above, 92-100 Brown silty gravel
100	110				✓			✓	..					✓	(✓)		As above.
110	120				✓			✓	..					✓	(✓)		As above
120	130				✓			✓	..					✓	(✓)		As above
130	140				✓			✓	..					✓	(✓)		As above
140	150				✓			✓	..					✓	(✓)		As above
150	160			✓	✓			✓	..					✓	(✓)	150	Red brown sandy silt
160	170			✓				✓	..					✓	(✓)		As above.
170	180				✓			✓	..					✓	(✓)		170-172 As above, 172-180 Brown gravelly silt.
180	190			✓				✓	..					✓	(✓)		180-182 As above 182-190 Red brown sandy & muddy silt.
190	200		2?	✓				✓	..					✓	(✓)		As above.
200	210		2					✓	..					✓	(✓)		As above
210	220		2					✓	..					✓	(✓)		As above
220	230		2					✓	..					✓	(✓)		As above.
230	240		2					✓	..					✓	(✓)		As above
240	250		2					✓	..					✓	(✓)		As above.
250	260			✓				✓	..					✓	(✓)		More sandy log of as above (252-258) 258-260 Rd-brn muddy silt
260	270		2					✓	..					✓	(✓)		As above
270	280			✓				✓	..					✓	(✓)		270-272 As above 272-278 Rd. brn silty sand. 278-280 " "
280	290			✓				✓	..					✓	(✓)		As above (more clayey 282-296)
290	300			✓				✓	..					✓	(✓)		As above.
300	310			✓				✓	..					✓	(✓)		300-303 As above, 303-310 Brown gravelly & silty sand
310	320			✓				✓	..					✓	(✓)		310-316 Rd-brn silt 316-320 " " " "
320	330			✓				✓	..					✓	(✓)		320-322 as above, 322-330 Rd-brn muddy silt.
330	340			✓				✓	..					✓	(✓)		As above
340	350			✓				✓	..					✓	(✓)		As above, more muddy.
350	360			✓				✓	..					✓	?		As above
360	370			✓				✓	..					✓	?		As above
370	380			✓				✓	..					✓	(✓)		370-375 as above 375-380 Rd-brn gravelly & silty sand.
380	390			✓				✓	..					✓	(✓)		As above.
390	400			✓				✓	..					✓	?	392	390-392 as above, 392-400 Rd-brn silty sand, + grey clays.
400	410			✓				✓	..					✓	?		Red brn & grey clays 65:35 + other colours
410	420			✓				✓	..					✓	(?)		As above 25:75 .. ..
420	430				✓			✓	..					✓	(?)		70% Pale green-grey clay.
430	440				✓			✓	..					✓	(?)		As above.
440	450				✓			✓	..					✓	(?)		As above
450	460				✓			✓	..					✓	(?)		As above.
460	470				✓			✓	..					✓			90% grey clay of various shades, minor red & yellow brn clay.
470	480				✓			✓	..					✓			As above
480	490				✓			✓	..					✓			As above
490	510				✓			✓	..					✓			As above
510	520				✓			✓	..					✓			As above
520	525				✓			✓	..					✓			As above Dark green-grey clays appear
														✓			As above. .. .. Continues to appear.

T = Trace G = Good F = Fair P = Poor Arg = Argillaceous Calc = Calcareous Si = Siliceous

CRAE PLAN No. M.1

ENV 1487- Vol I- 28

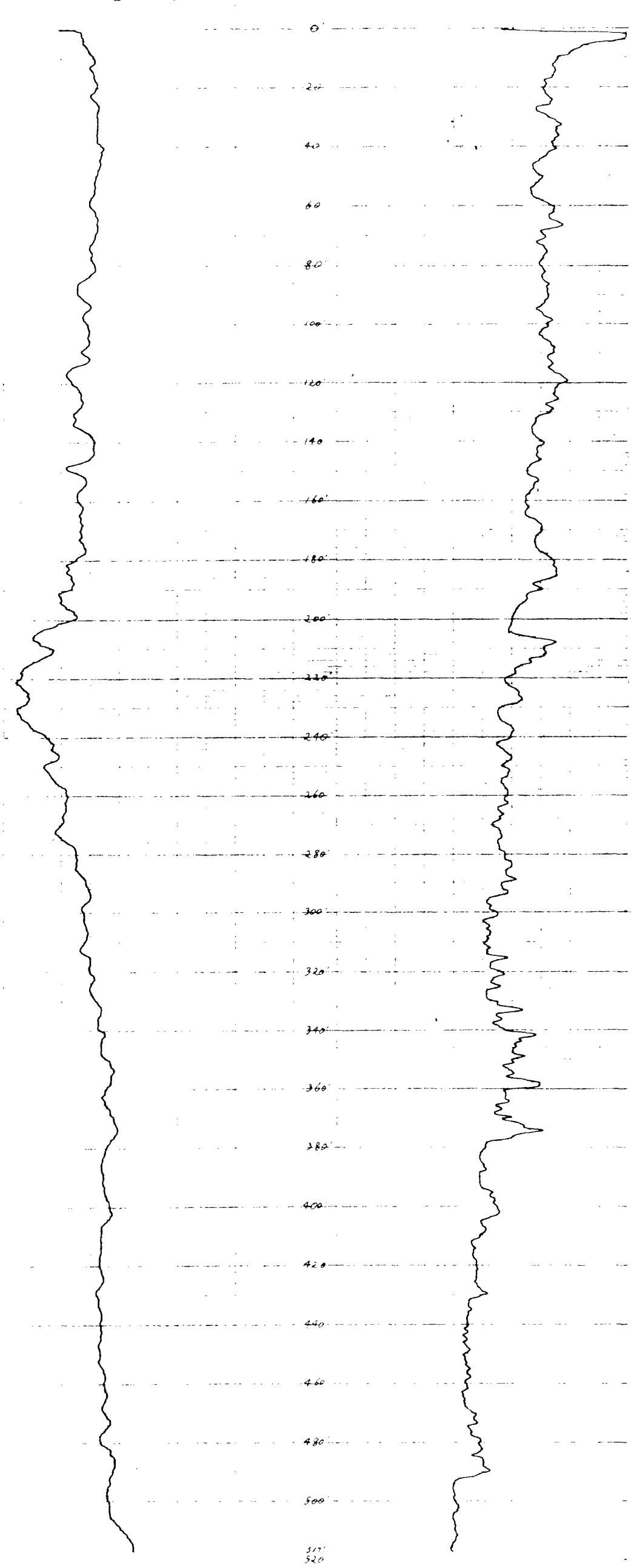


SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S). GAMMA 50 c.p.s.
DATE: 19-6-70 TIME 1930 hrs - 2020 hrs
AREA. WERTALOONA S.A LOCATION: Lat. Long.
WELL W.L.F 11
ELEVATION G.L: K.B: Log from feet above G.L. DEPTH SCALE
RUN NUMBER: 1.
FIRST READING: 517' LAST READING: 0'
CASING SHOE DEPTH ("): LOG 517 feet, DRILL 525 feet, TOTAL DEPTH: LOG feet, DRILL feet
MUD. Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE: " ADDITIONAL CASING (1) " set at feet (2) " set at feet
OPERATING TIME: 50 mins.
RECORDED BY: B.A.C. BRICE
REMARKS:

PLAN No

ENV 1487 VOL-29



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S) Point Resistivity 2Ω & S.P 20mv
DATE 19-6-70 TIME 2045 hrs - 2100 hrs
AREA WERTALOONA - SA LOCATION: Lat. Long.
WELL W.L.F 11
ELEVATION G.L: K.B. Log from' feet above G.L. DEPTH SCALE.
RUN NUMBER 1
FIRST READING 517' LAST READING 0'
CASING SHOE DEPTH ("):LOG feet, DRILL 525 feet, TOTAL DEPTH LOG feet, DRILL feet
MUD Type Density Viscosity Resistivity @°F BHT @°F
pH Fluid Loss cc 30 min Cake 32 R_{mf} @°F R_{mc} @°F
BIT SIZE " ADDITIONAL CASING: (1) "set at feet (2) "set at feet
OPERATING TIME. 5 min.
RECORDED BY. B.A.C. BRICE
REMARKS:

PLAN No

CRA EXPLORATION PTY LIMITED.

CRAE FORM No. 77

ROTARY CUTTINGS LOG

BORE NO W.L.F.11

DRILLING COMMENCED 18/6/70 COMPLETED 19/6/70

LOCATION West Lake Frome South Australia SML 364

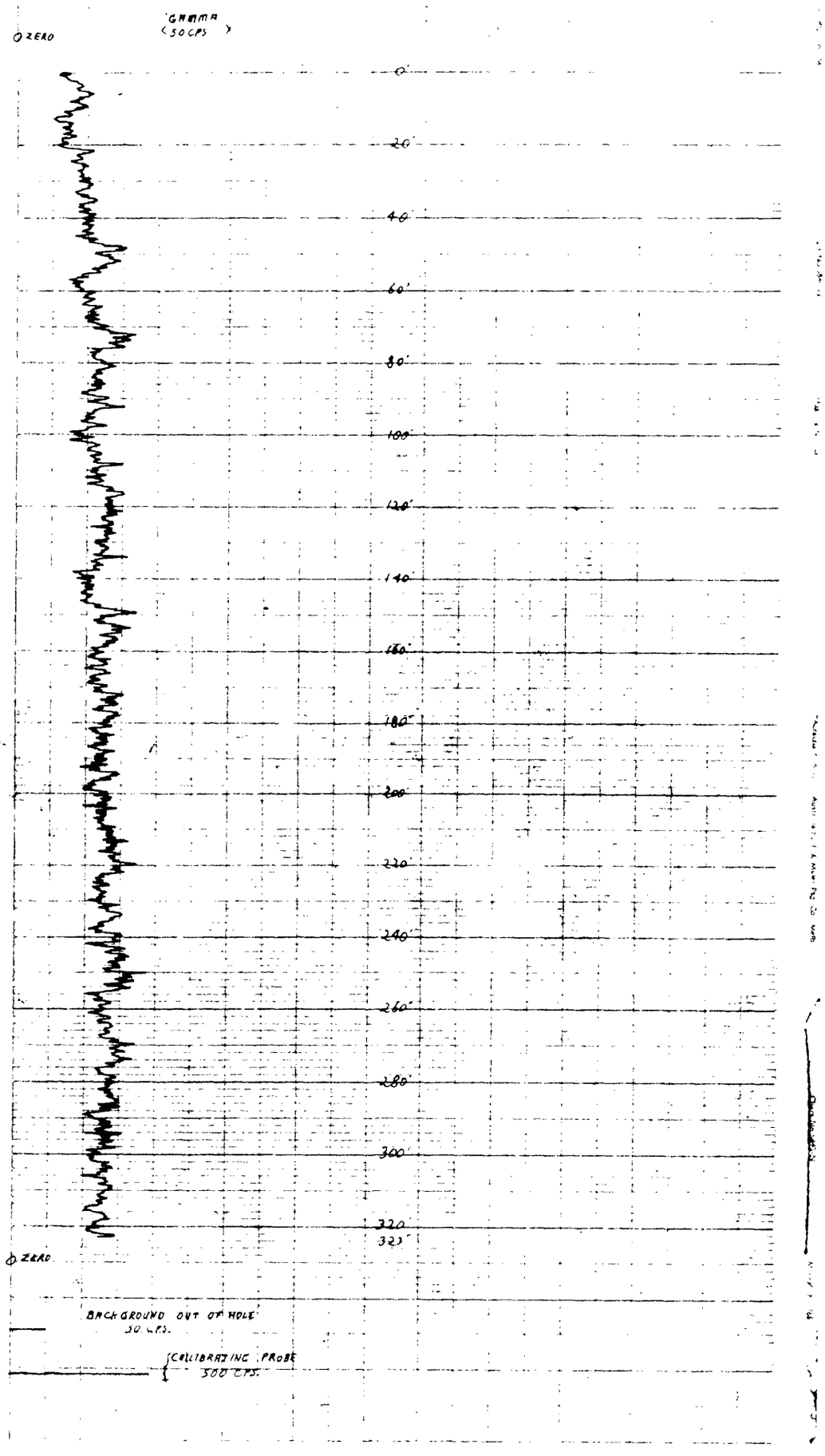
LOGGED BY A.K.H.

RADIATION DETECTOR EMI-1 + GAMMA, SP and Resistivity to 517 feet

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON T	CARBON Nil	PYRITE T	PYRITE Nil	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX Sil	DESCRIPTION OF LITHOLOGY
0	10		✓			✓	500-1000					✓	✓		0-9' Pale brown muddy silt + Kunkar and gypsum. 15%
10	20		✓			✓	"					✓	✓		Brown silty mud. (Sandy layers ± carbon) Kunkar 5%.
20	30		✓			✓	"					✓	✓		As above
30	40		✓			✓	"					✓	✓		As above. Kunkar 5%.
40	50		✓			✓	"					✓	✓		As above less "
50	60		✓			✓	"					✓	✓		As above.
60	70		✓			✓	"					✓	✓		As above more coarse.
70	80		✓			✓	"					✓	✓		As above " "
80	90		✓			✓	"					✓	✓		As above " " Muddy silt. 86-90 sandy.
90	100		✓			✓	"					✓	✓		As above.
100	110		✓			✓	"					✓	✓		As above less coarse.
110	120		✓			✓	"					✓	✓		As above more "
120	130		✓			✓	"					✓	✓		As above.
130	140		✓			✓	"					✓	✓		As above (trace gravel)
140	150		✓			✓	"					✓	✓		As above (muddier)
150	160		✓			✓	"					✓	✓		As above
160	170		✓			✓	"					✓	✓		As above Silty mud.
170	180		✓			✓	"					✓	✓	180	As above (silty layers)
190	190		✓			✓	"					✓	✓		As above (" ")
190	200		✓			✓	"					✓	✓		Red brown sand 60% sample. 194-206?
200	210		✓			✓	"					✓	✓		As above to 206; 206-210 Rd. brn muddy silt. ¶ grey clay
210	220		✓			✓	"					✓	✓		As above, with sandy bands. 215-220 Kunkar!
220	230		✓			✓	"					(✓)	✓		220-222 as above, 227-229 Yellow-grey silt
230	240		✓			✓	"					✓	✓		229-234 grey clay? 234-240 red brown silty mud?
240	250		✓			✓	"					✓	✓		As above 2% gravel (Kunkar)
250	260		✓			✓	"					✓	✓		As above. 280-294 sandy.
260	270		✓			✓	"					✓	✓		As above
270	280		✓			✓	"					✓	✓		As above yellow-grey clay appears. Gravel only trace.
280	290		✓			✓	"					✓	(✓)		As above finer
290	300		✓			✓	"					✓	(✓)	294?	65% Red brown 35% grey clay.
300	310		✓			✓	"					✓	(✓)		50:45:10 — pure white clay, reacts to acid. Crumbly.
310	320		✓			•	"					✓	(✓)		40:50:10
320	330		✓	✓		✓	"					✓	(✓)		T:55:45 + Trace v. dk green clay.
330	340			✓		✓	"					✓			5:95 (difficult to distinguish grey & white clay.)
340	350			✓		✓	"					✓			10:90
350	360			✓		✓	"					✓			15:85.
360	370		(✓)	✓		✓	"					✓			30:45:25 (poss. to distinguish again).
370	380			✓		✓	"					✓		380?	T:55:45 Dark blue clay appears - parts
380	390			✓		✓	"					✓			As above.
390	400			✓		✓	"					✓			As above.
400	410			✓		✓	"					✓			15:85 + 10% Blue clay.
410	420			✓		✓	"					✓			10:75:15 " "
420	430			✓		✓	"					✓			10:70:20
430	440			✓		✓	"					✓			10:60:30
440	450			✓		✓	"					✓			10:50:40 + 10% White (dolomite? see WLF12).
450	460			✓		✓	"					✓			10:45:45
460	470			✓		✓	"					✓			10:30 Grey, 10 white, 5 yellow, Blue 45
470	480			✓		✓	"					✓			As above first? appearance of crumbly sometimes silty clay.
480	490			✓		✓	"					✓			As above. 6" Hard bar at 490. Gamma kick 492-494, 9x bg
490	500 *			✓		✓	"					✓			As above Electric logs suggest lithology change (↑ clay) at 492
500	510			✓		✓	"					✓			As above
510	520			✓		✓	"					✓			As above
520	525.			✓		✓	"					✓			As above.
*			ASSAY	RESULT	1414	U1	ppm U	490-500 feet							525 End of Hole.

T = Trace G = Good F = Fair P = Poor Arg = Argillaceous Calc = Calcareous S = Siliceous

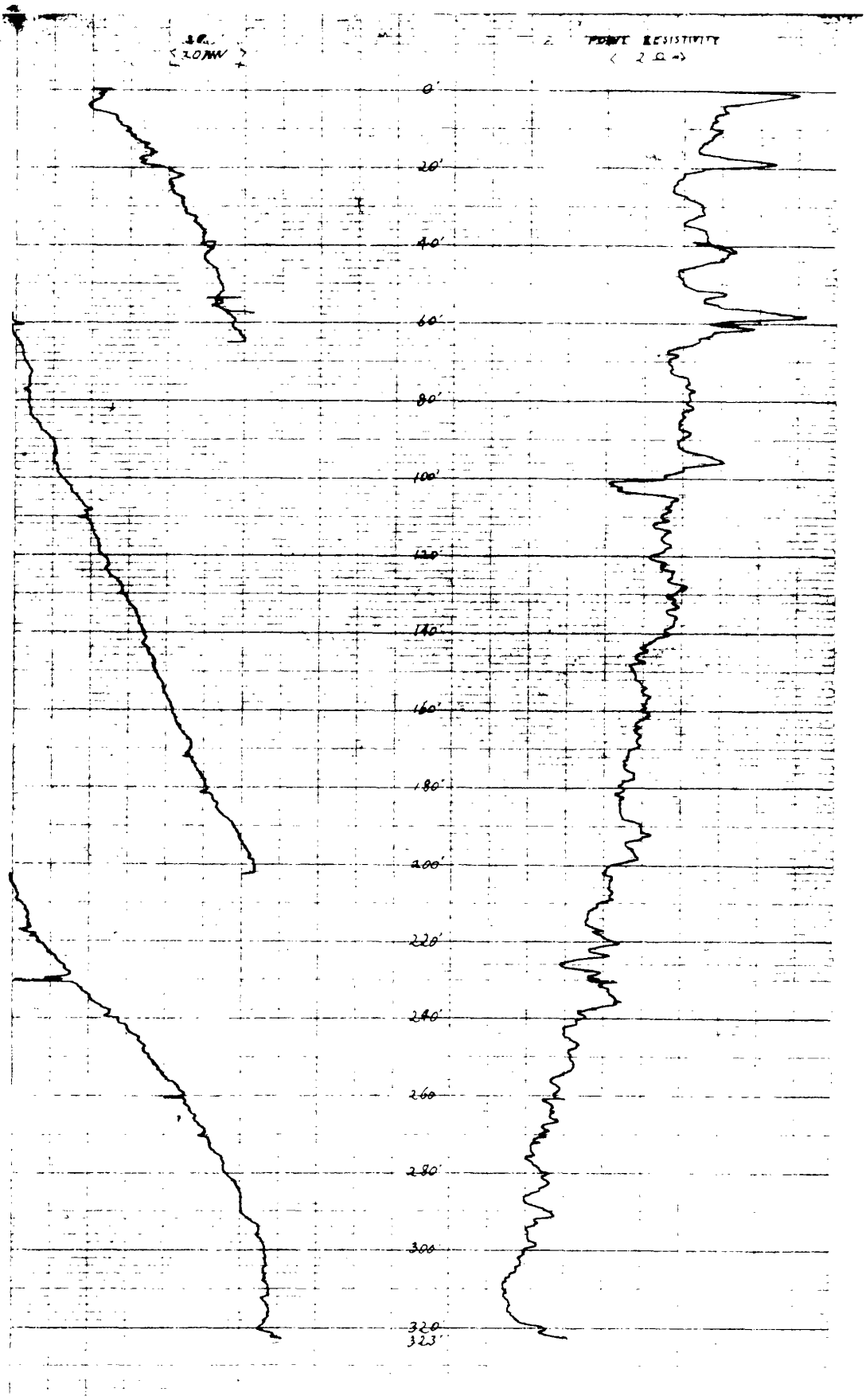
CRAE PLAN No. M211



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG S GAMMA 50 cps
DATE 21-6-70 TIME 1715 hrs - 1745 hrs
AREA WERTALOONA SA LOCATION Lat Long.
WELL W.L.F. 12
ELEVATION G.L. K.B Log from feet above G.L. DEPTH SCALE
RUN NUMBER 1
FIRST READING 323' LAST READING 0'
CASING SHOE DEPTH "LOG 323 feet, DRILL 525 feet, TOTAL DEPTH LOG feet, DRILL feet
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE " ADDITIONAL CASING (1) "set at feet (2) "set at feet
OPERATING TIME 30 min.
RECORDED BY B.A.C. BRICE
REMARKS:

PLAN No



SOUTH AUSTRALIAN DEPARTMENT OF MINES
GEOLOGICAL SURVEY

TYPE OF LOG(S) SP, & Point Resistivity
DATE 21-6-70 20mv 2Ωm. TIME 1755 hrs - 1810 hrs
AREA WERTALOONA - S.A. LOCATION: Lat Long.
WELL W.L.F. 12
ELEVATION G.L: K.B. Log from feet above G.L. DEPTH SCALE.
RUN NUMBER. 1
FIRST READING. 323' LAST READING: 0'
CASING SHOE DEPTH (") : LOG 323 feet, DRILL 525 feet, TOTAL DEPTH: LOG feet, DRILL feet
MUD Type Density Viscosity Resistivity °F BHT °F
pH Fluid Loss cc 30 min Cake 32 R_{mf} °F R_{mc} °F
BIT SIZE. " ADDITIONAL CASING: (1) " set at feet (2) " set at feet
OPERATING TIME. 15min
RECORDED BY. B.A.C. BRICE
REMARKS:

PLAN No

CRA EXPLORATION PTY. LIMITED

CRAE FORM No 77

ROTARY CUTTINGS LOG

BORE NO WLF 12

LOGGED BY AKH

DRILLING COMMENCED 20/6/70 COMPLETED 21/6/70

LOCATION WEST LAKE FROME, S^TH AUST. SML 364

RADIATION DETECTOR TECHNICAL ASSOCIATES PLUG 1 + GAMMA, SP, RESISTIVITY to 321 feet

DEPTH From	DEPTH To	PERCENTAGE LOG	CARBON %	CARBON T	CARBON Nil	PYRITE %	PYRITE T	PYRITE Nil	RADIO ACTIVITY	POROSITY G	POROSITY F	POROSITY P	POROSITY T	MATRIX Arg	MATRIX Calc	MATRIX S	DESCRIPTION OF LITHOLOGY
																	Flat pink-brown muddy silt
0	10				✓			✓	NO ANOMALOUS	—				✓	✓		Red brown sandy and muddy silt, highly calcareous. 5% Gravel, Kunkar, q limestone clasts
10	20			✓	✗			✓	SAMPLES – SCANNED	—				✓	✓		as above 20% Kunkar concretions. Sand is red-coated, silty mud sand. 10% Gravel.
20	30			✓				✓	BUT NOT RECORDED.	·	—			✓	✓		20-21 as above. 21-30 Brown silty mud. Calcareous.
30	40			✓				✓			—			✓	✓		as above 30% Kunkar calcareous matrix. Mud is 70% red-brown 30% pale grey.
40	50			✓				✓			—			✓	✓		as above
50	60			✓				✓			—			✓	✓		as above, 15% Kunkar. more mud, all red-brown. Electric log suggests limestone(?) 54 to 66.
60	70			✓				✓			—			✓	✓		as above; 25% Kunkar. Siltier, as 30-40
70	80			✓				✓			—			✓	✓		as above. (71-76 muddier)
80	90			✓				✓			—			✓	✓		as above
90	100			✓				✓			—			✓	✓	90	90-94 as above. 94-100 Non calcareous sandy, muddy silt, red-brown. 94-98 sandy
100	110			✓				✓			—			✓			as above, 100-105 Clayey? becoming yellow brown.
110	120			✓				✓			—			✓			as above; reappearance of grey muds, overall red-brown
120	130			✓				✓			—			✓			as above
130	140			✓				✓			—			✓			as above, Red-brown.
140	150			✓				✓			—			✓	(✓)		as above 15% sand. Calcareous white clay as flecks in red brown mud & sand
150	160			✓				✓			—			✓	(✓)		as above, ~~75% sand~~. 15% pale grey. 10% yellow brown.
160	170			✓				✓			—			✓	(✓)		as above
170	180			✓				✓			—			✓			as above c/188-199 increase sand. From 190 there is a gradual change to 230+
180	190			✓				✓			—			✓			as above
190	200			✓				✓			—			✓			as above
200	210			✓				✓			—			✓			as above
210	220			✓				✓			—			✓			as above
220	230			✓				✓			—			✓			as above (228 238 increased sand?)
230	240			✓				✓			—			✓			as above Brown silty mud with 20% yellow brown + 10% grey clay.
240	250			✓				✓			—			✓			as above, becoming more & muddy
250	260			✓				✓			—			✓			as above, Electric logs suggest change at 259'
260	270			✓				✓			—			✓			as above.
270	280			✓				✓			—			✓			as above.
280	290			✓				✓			—			✓			as above
290	300			✓				✓			—			✓			as above, Increasing yellow brown (288-290' sticky - drills)
300	310			✓				✓			—			✓			as above.
310	320			✓				✓			—			✓			as above
320	330				✓			✓			—			✓			310 ?change to green grey clays (first appearance) ("Crumbly" - drills) Same comp.
330	340				✓			✓			—			✓			as above white clay appears.
340	350				✓			✓			—			✓			as above
350	360				✓			✓			—			✓			as above White clay dominant = dolomite *
360	370				✓			✓			—			✓			as above
370	380				✓			✓			—			✓			as above
380	390				✓			✓			—			✓			as above
390	400				✓			✓			—			✓			as above
400	410 *				✓			✓			—			✓			390-410 White clay 100%
410	420				✓			✓			—			✓			as above
420	430				✓			✓			—			✓			as above; reappearance of green clays. at 410.
430	440				✓			✓			—			✓			Reappears Mainly green clays.
440	450				✓			✓			—			✓			as above
450	460				✓			✓			—			✓			as above.
460	470				✓			✓			—			✓			as above.
470	480				✓			✓			—			✓			as above.
480	490				✓			✓			—			✓			as above.
490	500				✓			✓			—			✓			as above
500	510				✓			✓			—			✓			as above.
510	520				✓			✓			—			✓			as above.
520	525				✓			✓			—			✓			as above.

* ASSAY Result "white clay" identified as dolomite only + possible mica (AMDEL MP 467-71)

T = Trace, G = Good, F = Fair, P = Poor, Arg = Argillaceous, Calc = Calcareous, Sil = Siliceous

CRAE PLAN No. M743

ENV1487-VdI-34

FOR ENLARGEMENT SEE PLAN A

"Moolawatana"

"Curnamona"

MOUNT PITT + X

+ MOUNT PAINTER

WERTALDONA STATION

LAKE FROME

LAKE CALLABONNA

FLINDERS RANGES

GAMMON RANGES

AUSTRALIA SOUTH

NEW SOUTH WALES

REFERENCE

- M–C MESOZOIC – CAINOZOIC
- P PROTEROZOIC – PALAEOZOIC
- A ARCHAEAN
- Geological boundary
- S No.14 (2·7) Bore water uranium assay in ppb
- 53195(1) Drainage sample number and uranium assay in ppm
- X53172 (16) Rock sample number and uranium assay in ppm
- ○ Rotary drill holes

Oodnadatta

SOUTH AUSTRALIA

Olary

Pt. Augusta

ADELAIDE

LOCALITY

CURDIMURKA | MARREE | CALLABONNA

ANDAMOOKA | COPLEY | FROME

TORRENS | PARACHILNA | CURNAMONA

INDEX TO 1:250,000 SHEETS

C.R.A. EXPLORATION PTY. LIMITED

ROTARY DRILL HOLES
FROME EMBAYMENT S.M.L. 364

Map showing major geological boundaries, geochemical sample locations, numbers and uranium values.

AK HODGKIN Dec'70 | SCALE 1" = 8 m. (approx.) | PLAN S A 140

ENV 1487 - Vol I - 35