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CRA EXPLORATION PTY. LIMITED.

(82-1705)

REPORT ON THE DRILLING PROGRAMME, STRAHAN COAL EL 47/80

AUGUST - SEPTEMBER, 1981.

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Date: September 10, 1981.

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## 1. SUMMARY

An application for Exploration Licence was made in October 1980 to cover reported lignite and 'coal' occurrences in the Tertiary sediments of the Macquarie Harbour Basin at Strahan. Title to the northern section was granted as EL 47/80 in May 1981, but the environmentally sensitive southern section has remained as a pending application awaiting the outcome of the "Cartland Report" on land use in south west Tasmania.

A programme of diamond and rotary drill holes was planned to evaluate the potential of the area within EL 47/80. Drilling difficulties greatly curtailed the drilling programme which was completed when 547 metres had been drilled at six sites within the EL. No significant carbonaceous horizons were intersected within the Quaternary or Tertiary successions tested. The drilling did not test the entire Tertiary succession, only the upper 100 metres (approximately).

Despite the incomplete nature of the survey, it was sufficient to show that the probability of economically significant carbonaceous deposits within the granted EL is not great. The potential of the southern portion of the Macquarie Harbour Basin is uncertain but is worthy of investigation should title to the area be granted.

## 2. INTRODUCTION

Strahan Coal EL 47/80, covering an area around and to the north of Macquarie Harbour, was applied for on the basis of reports of coal and lignite occurrences within the Tertiary sediments of the Macquarie Harbour Basin.

The Tasmanian Mines Department conducted drilling in the area in 1902, but the only locateable findings from this programme are that the Tertiary sediments are approximately 200 metres thick. The other reports of coal in this area are restricted to records of the use of coal, locally obtained, by the convict settlement in Macquarie Harbour.

Thin horizons (ca 0.1 metres) and discontinuous lenses of brown coal are exposed within the Tertiary sediments at Strahan and Coal Head, and discontinuous Quaternary lignite seams ( $\leq 1.5$  metres) are exposed on Ocean Beach and at Strahan.

Application was originally made for an EL of 1074 square kilometres covering the Tertiary sediments of most of the Macquarie Harbour Basin. Approval was not given to explore the southern part of the area which, being environmentally sensitive, is subject to a mining moratorium. The Director of Mines agreed to hold open a pending EL application over this southern portion whilst awaiting the findings of the "Cartland Report".

A limited programme of diamond and rotary drill holes was designed to evaluate the brown coal/lignite potential of the EL; this report details the results of this programme, and makes recommendations based on these results.

3. CONCLUSIONS

1. Probability of a major carbonaceous horizon existing within the Quaternary or uppermost Tertiary sediments of the northern part of the Basin is low.
2. To continue coal exploration in the current EL 47/80 would require geophysical basin analysis studies followed by the drilling of relatively deep holes. In view of the discouraging results from the recent drilling, this work would not appear to be justifiable.
3. Brown coal is present in sea cliffs within the south (pending) section of EL 47/80 . Should the moratorium in this area be lifted, further investigation would be warranted.

4. RECOMMENDATIONS

- 1. It is recommended that the granted portion of EL 47/80 be dropped.
- 2. The pending application over the southern part of the Macquarie Harbour Basin should be maintained and if granted, ground investigation and a reconnaissance programme of gravity and/or Schlumberger surveys to define the Basin is recommended prior to siting any drilling.

5. GEOLOGY

5.1 Regional Setting and Lithologies

The Macquarie Harbour Basin is defined as the basinal feature within which the Tertiary and Quaternary sediments that lie along the east side of the Macquarie Harbour were deposited. These sediments extend from near Trial Harbour southwards, along an approximately north north west - south south east trending belt, down to the Wanderer River.

The Tertiary sediments within this Basin are non-marine clays, silts, gravels, lignites and poorly consolidated sands. Although the presence of these sediments at some localities in the Macquarie Harbour area at over 350 metres above sea level indicates considerable post depositional fault movement (Williams 1967), generally they are horizontal or only very gently tilted or folded.

The Quaternary sediments are patchily distributed throughout the Basin, the most extensive occurrence being along the coastal area north of the Macquarie Heads. Here extensive unconsolidated dune sands occur.

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## 5.2 Brown Coal/Lignite Occurrences

Most cliff exposures of the Tertiary succession in the Macquarie Harbour area reveal thin "seams" and lenses of brown coal. Usually such horizons are less than 10 centimetres thick and consist of a disarrayed aggregate of carbonised wood fragments within a sandy matrix. The ratio of woody material to sand varies very greatly. It is probable that these horizons represent the site of burial of detrital wood fragments, probably within a fluvial environment. As these brown coals are unlikely to be "in situ" coals, the probability of extensive or continuous seams existing is very low. At Coal Head, south of EL 47/80, on the wave-cut platform at the base of a cliff of Tertiary sands and silts, there occurs a more extensive outcrop of brown coal which appears to be fairly massive with little sandy matrix. Unfortunately the thickness of this occurrence cannot be seen but it could be in excess of 0.5 metres.

Lignite seams up to 1.5 metres thick are exposed at one locality on Ocean Beach within the Quaternary dune sands. These seams can be observed to thin rapidly along strike.

## 6. DETAILS OF INVESTIGATION

### 6.1 Drilling

A programme of six holes was designed to test the Quaternary and Tertiary sediments in the EL. It was intended that all holes should be drilled through to the pre - Tertiary basement and that at least one of these holes would be fully diamond drilled, the others being rotary drilled. This programme had to be revised to suit the difficult ground conditions encountered, only five sites could be drilled and no holes were cored. A total of 547 metres of rotary drilling was completed in six holes (including one re-drill).

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Plan TASH 251 shows the location of the holes drilled. Only one hole, RD 81 ST2, was collared directly in Tertiary sediments, the remainder being collared in Quaternary sands. The unconsolidated sediments encountered at all sites caused extensive hole collapse. Sampling was carried out at 2 metres intervals where water return allowed, and samples were geologically logged.

The Quaternary sands proved to be very uniform, fine - medium grained sands, generally well sorted and with very low heavy mineral content. Thin lignous sands, and possibly lignite horizons were not uncommon but were never of significant thickness. The Quaternary - Tertiary contact proved to be difficult to distinguish from the drill cuttings, however it was usually marked by either a noticeable increase in consolidation or by the presence of coarser, poorly sorted sands or a gravel horizon at the top of the Tertiary. Occasionally, amongst the poorly consolidated Tertiary sands and gravels, well lithified sandstone horizons and consolidated clay-silt horizons up to 10 metres thick were intersected. Only rare fragments of brown coal or lignous material were recovered.

Summarised logs of all holes are given in Appendix 1.

## 6.2 Geophysical Logging

Where possible, holes were geophysically logged. Because of hole instability, logging had to be conducted through drill rods which restricted the logging to natural gamma and density determinations.

Interpretation of the logs obtained showed a possible distinction between Quaternary and Tertiary sediments, but revealed no significant carbonaceous horizons.

A report on this geophysical logging is given in Appendix II.

7. DISCUSSION OF RESULTS

The drilling programme was insufficient to fully evaluate the potential of the EL. However, although the holes were widely spaced, and at best only tested the upper 100 metres of the Tertiary succession, the coverage is good enough to show that there is little potential for the presence of a major lignite or brown coal horizon at shallow depth within the Quaternary or upper Tertiary sediments of the EL. This conclusion is supported by the observation that the brown coal occurrences exposed in the area appear to have been deposited in an environment which is unlikely to have been conducive to the formation of major continuous coal horizons.

Considering the location of the EL, any coal or lignite horizon(s) would have to be very extensive, continuous and at shallow depth to be economically or strategically interesting. The results of this programme strongly suggest that such horizons do not exist within EL 47/80.

To the south of EL 47/80, older Tertiary sediments may be closer to surface and therefore, as the potential of the lower Tertiary has not been tested, this area warrants investigation if the mining moratorium is ever lifted.

I.M.CLEMENTSON

8. REFERENCES

Williams, E. 1967 in Geology and Mineral Resources of Tasmania  
Geol. Bull 50, Tas Mines Dept.

9. LOCATION

Queenstown 1:250 000 sheet SK 55-5

10. KEYWORDS

Brown coal, lignite, drilling, geophysical logging, Tertiary,  
Quaternary.

11. LIST OF APPENDICES

- Appendix I            Drill Logs - CRAE Drillholes 1981.  
Appendix II           Results of Geophysical Logging of Strahan Coal Holes.

12. LIST OF PLANS

- Plan TASH 251    Drillhole Location Plan  
Plan TASH 252    EL Location Plan

APPENDIX I

STRAHAN COAL EL - HOLE DD 81 ST1

Located at the junction of Ocean Beach and Macquarie Heads Roads, (358850E 5332220N) west of Strahan, this hole was diamond drilled for the first 6 metres, as no core could be recovered the remainder of the hole was rotary drilled. The hole was abandoned at a depth of 125 metres due to drilling difficulties.

Summary Log

- 0 - 3 m. Sand (Quaternary)  
Light grey, medium grained and well sorted unconsolidated sand. Panning revealed unusually high proportion of heavy minerals.
- 3 - 4 m Sand (Quaternary)  
Dark brown, medium grained and well sorted. Lignous material and staining producing the dark colouration. Unconsolidated.
- 4 - 12 m Sand (Quaternary)  
Medium brownish grey unconsolidated sand. Slight carbonaceous content. Medium grained and well sorted.
- 12 - 20 m Sand (Quaternary)  
Medium - pale brown, medium grained, well sorted unconsolidated sand. Lignous and woody fragments noticeable ( $\pm 10\%$ ). Possible rare fragments of brown coal or carbonaceous clay. Intermittent gravel/pebble horizons between 14-18m which are not reflected in the samples.
- 20 - 40 m Sand (? Tertiary)  
Unconsolidated grey-brown medium grained sand. Well sorted. Rare feldspathic and argillaceous clasts. Low heavy mineral content. Slight coarsening of grain size downwards.
- 40 - 125 m Sand (Tertiary)  
Unconsolidated, grey-buff sand. Well sorted and medium grained. Generally as 20 - 40 m but with lower Feldspar or argillite content.
- Samples: 986001 - 986072 taken at 1m intervals from surface.  
986072 - 986097 taken at 2m intervals commencing 72-74m.

Geophysical Log: The hole was not logged because of the ground conditions.

STRAHAN COAL EL - HOLE RD 81 ST2

Located at the end of the track (359180E 5329700N) which leads east off the Macquarie Heads road, south west of Strahan. This hole was rotary drilled from surface to completion at 130 metres. The hole was sited further east than originally planned in order to avoid the obvious N-S striking dune feature upon which hole ST1 was located.

Summary Log

- 0 - 6m Cobble gravel (Tertiary)  
An obvious ancient beach deposit. Large (10-20cm) well rounded pebbles and cobbles of various lithotypes (but dominated by arenites) within a matrix of medium coarse grained, poorly sorted gravel sand. Clast: matrix ratio is approximately 65:35. Minor plant matter and recent peat. Low heavy mineral content.
- 6 - 39m Sand (Tertiary)  
Mid grey brown, medium grained, poorly sorted sand. Unconsolidated angular fragments of quartz, felspar and lithic fragments up to 3 mm. Grain size decreases below 18m. Traces (< 5%) of black lignous material throughout, slightly more abundant below 24m. Between 38-39m fairly large ( $\pm$  3mm) lignous fragments are present but are <10% of total sample. This interval, as measured by penetration rate, is significantly more consolidated.
- 39 - 40m Sand (?) (Tertiary)  
Penetration rate greatly reduced indicating a more consolidated horizon. Cuttings show no change from the unconsolidated sand above. Possibly a compacted sand horizon but a clay rich horizon which would not report well in the cuttings is a further possibility. Traces lignous material.
- 40 - 48m Gravel - coarse sand (Tertiary)  
Poorly sorted, light brown-grey. Angular fragments, including argillite clasts up to 4mm. Quite compact as judged by penetration rate. Becomes finer grained and better sorted between 46-48m. Very slight traces lignous material.

- 48 - 64m Sand (Tertiary)  
Unconsolidated, medium grained sand. Mid brown-grey, not well sorted. Low heavy mineral content when panned. At 59m a large rock fragment was encountered. This may represent a thin pebble/cobble horizon. Very slight traces of lignous material.
- 64 - 95m Interbedded sands and coarse gravels. (Tertiary)  
Unconsolidated sands as above but with frequent coarse gravel interbeds. These are thin (all less than 0.5m) and well represented in the cuttings but appear to be composed of angular, poorly sorted fragments with occasional large clasts (not recovered). Between 81 - 82m and 83 - 87m there is an increase in the frequency of large clasts. Low heavy mineral content throughout. Very slight traces of lignous material.
- 95 - 98m Sand (Tertiary)  
More consolidated than usual. Possibly quite clay rich. Minor coarse gravel horizons with large clasts.
- 98 - 103m Sand (Tertiary)  
Unconsolidated, medium grained. Not well sorted. Low heavy mineral content. Occasional large clasts encountered by the bit but not reported in the cuttings.

Samples: 986098 - 986162 taken at 2m intervals from surface.

Geophysical Log: Natural gamma and density logs were run through the HQ rods down to 100m, that being the maximum depth obtainable due to drilling problems.

No logs were carried out in the open hole as, on pulling the rods, the hole collapsed at 4m.

No obvious carbonaceous horizons were discernable on the logs obtained.

STRAHAN COAL EL - HOLE DD 81 S3

Located at 356000E 5326680N on a track west of the Macquarie Heads road, approximately 6km south south west of Strahan. This hole, collared in Quaternary sands, was rotary drilled to a depth of 102m.

Summary Log

- 0 - 8m Sand (Quaternary)  
Unconsolidated fine grained, well sorted dune sand. Very clean, little recent plant material. Very low heavy mineral content.
- 8 - 10m Sand (Quaternary)  
Unconsolidated coarse grained, poorly sorted. Traces of lignous material. Low heavy mineral content.
- 10 - 14m Sand plus gravels and ? lignite? (? Quaternary).  
Unconsolidated fine to medium grained well sorted sand with minor thin gravel bands. Staining and oil film in water return suggests possibility of a thin ( $\pm$  30cm) lignous horizon at 13m.
- 14 - 28m Sand (?Quaternary)  
Very fine grained, well sorted unconsolidated sand. Very low heavy mineral content. Only traces of lignous material.
- 28 - 34m Sand (clay rich) (?Quaternary)  
Significantly darker than that above, especially between 33-34m where it is almost black. Recovered sand is fine - medium grained and very greasy to the touch. Very low lignous or heavy mineral content.
- 34 - 36m Lignous Sand (?Quaternary)  
Very fine grained, well sorted, unconsolidated sand. Stained dark brown by humic material but with very little particulate lignous material.
- 36 - 45m Sand (?Quaternary)  
Very fine grained, well sorted. Unconsolidated. Light buff in colour.

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- 45 - 53m Sand (? Quaternary)  
Dark grey-brown unconsolidated sands with an increased clay content and minor lignous fragments. Less well sorted than above. Abundant shell fragments between 47 - 48m.
- 53 - 56m Pebble Gravel (? Tertiary)  
Poorly consolidated gravel with large clasts, as judged from cuttings, of quartz, quartzite and argillite/phyllite. The sand matrix appears to be quite coarse and poorly sorted. Low heavy mineral and lignous content.
- 56 - 88m Sand and minor gravels (? Tertiary)  
Medium grained, poorly sorted sand. Occassional thin gravel horizons ( $\pm$  20cms). Oil film noticeable on water return at 80m may represent a lignous horizon. Low heavy mineral content.
- 88 - 92m Sand and minor gravels (? Tertiary)  
As above but noticeably more consolidated.
- 92 - 102m Sand (Tertiary)  
Unconsolidated fine - medium grained. Well sorted low heavy mineral and lignous content.

Samples: 986163 - 986211 taken at 2m intervals from surface.

Geophysical Log: Natural gamma and density logs were run through the drill rods down to 100m. Attempts to log in the open hole were unsuccessful due to hole collapse.

No obvious carbonaceous horizons were discernable on the logs obtained.

STRAHAN COAL EL 47/80 - HOLE RD 81 ST4

Located at 357900E, 5341300N on the Strahan - Zeehan road, this hole was rotary drilled to a depth of 18m. At this depth the hole was abandoned due to drilling problems.

Summary Log

- 0 - 15m            Sand (Quaternary)  
Unconsolidated dune sand. Medium grained, well sorted. Low heavy mineral content.. Light buff in colour.
- 15 - 18m            Sand - gravel (? Quaternary)  
Partly consolidated, coarse grained, poorly sorted. No water return and extensive hole callapse at this interval.

Samples :-        986212 - 986220 taken at 2m intervals.

Geophysical Log: No attempt was made to log this hole.

STRAHAN COAL EL 47/80 - HOLE RD 81 ST5

Located at approximately 357900 E, 5341000N on the Strahan-Zeehan road, this hole was rotary drilled to 94m. The hole was collared in Quaternary dune sands and intersected the uppermost Tertiary sediments at approximately 30m. No significant carbonaceous horizons were intersected in the Quaternary-Tertiary succession tested in this hole.

Summary Log

- 0 - 30m            Sand (Quaternary)  
Unconsolidated dune sand. Light buff, medium grained and well sorted. Very low heavy mineral content. Thin horizons of more consolidated sand ("hardpan") between 5-6m and 12-13m. Brown humic staining of return water at 15m. Below 18m the sand is slightly coarser and more consolidated.
- 30 - 32m            Clay, sandy (?Tertiary)  
Mid grey clay with significant sand content (possibly contamination from higher in the hole). Traces of lignous material and carbonised wood. Clay darkens with depth. Soft.
- 32 - 40m            Sand, clayey (?Tertiary)  
Mid grey, medium grained. Poorly sorted. Significant clay content (possibly representing shaley interbeds). Traces of carbonised wood between 36 - 38m. Moderately well consolidated.
- 40 - 48m            Sand.  
Mid grey, coarse grained but quite well sorted. Low clay content. Low heavy mineral content. No carbonaceous material. Quite well consolidated.
- 48 - 52m            Clay, sandy (Tertiary)  
Buff coloured fine grained sediment, dominantly clay but with high proportion of sand. Consolidated.
- 52 - 67m            Sand (Tertiary)  
Buff, medium to coarse grained. Quite well sorted. Becomes greyish with depth. Fine shell fragments quite common. Generally very soft except between 61-63m where a consolidated horizon exists. No difference noted in cuttings from this horizon.

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67 - 88m      Sandstone (Tertiary)  
Consolidated medium to fine grained sandstone.  
Buff to light grey in colour, well sorted. Grains  
well rounded. No carbonaceous material noticeable.  
Low heavy mineral content.

88 - 93m      Sand (Tertiary)  
Very much as above but not well consolidated.

Samples:-      986221 - 986227 at 2m intervals from surface.  
                  986228 - 15 - 16m  
                  986229 - 986266 at 2 m intervals from 16-29m.

Geophysical Log: Natural gamma and density logs were run through  
the drill rods. No carbonaceous horizons were outstanding on the  
logs obtained which were typical of a succession of poorly con-  
solidated sandy sediments.

STRAHAN COAL EL 47/80 - RD 81 ST 6

This hole, located at 358500E, 5364500N, on the junction of the Strahan-Zeehan and Ashford roads, was rotary drilled to a depth of 78m. Further advance was not prevented by loss of the drill rods in the hole. Collared in Quaternary dune sands, the hole intersected the Quaternary-Tertiary contact at approximately 46m.

Summary Log

- 0 - 8m Sand (Quaternary)  
Light buff in colour, unconsolidated dune sands. Medium to fine grained, fairly well sorted. Traces of lignous material at 3m. Low heavy mineral content.
- 8 - 14m Lignous Sand (Quaternary)  
Fine grained, well sorted sand. Mid brown colouration produced by humic staining. Lignous fragments quite common, ca 5%. Unconsolidated.
- 14 - 20m No water return, no samples.
- 20 - 36m Sand (Quaternary)  
Unconsolidated, medium to fine grained, sand. Well sorted, buff coloured but slightly brownish in uppermost 4m, which carries traces of lignous material. Strong humic colouration of return water at 29m and 31m. Low heavy mineral content throughout.
- 36 - 46m Sand and lignous sand (? Quaternary)  
Unconsolidated fine-medium grained sand, buff colour. Well sorted. Frequent thin ( $\pm 0.2m$ ) lignous horizons as gauged by lignous fragments and discolouration of return water.
- 46 - 50m Sand, clay rich (? Tertiary)  
Noticeably more consolidated, medium grained sand. Greyish colouration, not well sorted. Noticeably clay rich.

- 50 - 54m      Sand.  
Unconsolidated, medium grained sand. Fairly well sorted. Low heavy mineral content.
- 54 - 78m      Sand and clay rich sand.  
Generally medium or medium-fine grained sands. Buff or grey in colour and fairly well sorted. Clay content varies, where higher the sediment is noticeably more consolidated. No lignous material and very low heavy mineral content.
- Samples:      986267 - 986272 taken at 2m intervals between 0-14m.  
                 986273 - 986299 taken at 2m intervals between 20-76m.

Geophysical Log: Natural gamma and density logs run through the rods, but only down to 60m, revealed no obvious carbonaceous horizons.

APPENDIX II



## CRA EXPLORATION PTY. LIMITED

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LEVEL 4, BELLERIVE QUAY,  
CAMBRIDGE ROAD, BELLERIVE, 7018, TASMANIA, AUSTRALIAP.O. BOX 138  
BELLERIVE 7018  
TELEGRAMS: CRAEX  
TELEX: AA57144  
TELEPHONE: 44 3533  
AREA CODE: (002)

IN REPLY PLEASE QUOTE

8th September, 1981.

Memorandum To: I.CLEMENTSON

Copy: T.Dickson  
R.J.Smith

From: M.Flis

Results of Geophysical Logging of  
Strahan Coal Holes.INTRODUCTION

Logging of coal holes at Strahan was done in-house using an S.I.E. portable logger equipment. Of the six holes collared four were logged - one being abandoned at an early stage and another abandoned due to problems associated with drill rod recovery.

Ground conditions were extremely unstable with holes collapsing on rod withdrawal. For this reason it was decided that the risk of losing probes due to cave-ins was too great. Logs were thus restricted to natural gamma and gamma-gamma density. A test run to compare the responses of these two logs in an open hole and a 'cased' hole was carried out in hole RD 81 ST3. Figures 1 and 2 are the results of this test: Fig 1 displays the natural gamma log for the uncased hole (left) and cased hole (right). The hole caved at around 29 metres after rod withdrawal. All other parameters being constant (logging speed, direction, time constant etc.) it can be seen that any responses above the general background noise are evident on both logs. An amplitude attenuation appears to be the only real problem when logging through the rods. Fig 2 displays similar data except for the gamma-gamma density tool. The correlation between the two logs is extremely poor and one is hard pressed to identify similar anomalies. This is because the density log is more susceptible to reflecting hole diameter changes and without a caliper log diameter changes cannot be monitored.

INTERPRETATION

As the density log contains too many ambiguous responses interpretational comments will be restricted to the gamma logs.

Holes RD 81 ST3, ST5 and ST6 are all similar in that the top section of each hole is very inactive whilst further down there occurs a distinct transition into relatively active lithologies. This sequence can be directly attributable to the occurrence of Quaternary and Tertiary sediments. These three holes were collared into Quaternary beach dune sands. From the gamma log it is obvious that these sands are very 'pure'; containing no heavy minerals whatsoever. I would expect the sands to be well sorted, rounded and fine to medium grained purely from an environmental point of view. The exception to this is ST3 where the Quaternary contains a number of minor more active horizons (e.g. at 7m, 31m and 38m) thus indicating that we are dealing with a slightly different (more pelagic?) environment of deposition than ST5 and ST6.

The transition into Tertiary sediments is quite abrupt in ST5 and ST6 but slightly more transitional in ST3. The inference is that deposition may have been more continuous in the vicinity of ST3 compared to more "catastrophic" changes around ST5 and ST6.

The Quaternary/Tertiary boundary occurs at a depth of approximately 43 metres in ST3, 29.6 metres in ST5 and 35.2 metres in ST6.

Responses in the Tertiary sections of ST3, ST5 and ST6 and the entire section of ST2, which was collared directly into Tertiary, are typical of sandy/silty interbeds. Gamma count lows may be attributable to clean sand horizons whilst highs may be attributable to more silty sands.

The logs, together with a lithological interpretation are attached.

It should be noted that the full scale deflection on all logs is 50 c.p.s. indicating that any and all responses are very low amplitude. It would be extremely difficult to define any brown coal intersection in the absence of other logs to correlate with.

Drill cuttings did not indicate any significant coal intersections- unfortunately this cannot be confirmed or refuted with this limited data.

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CONCLUSION

No coal horizons have been delineated. The logs are indicative of sand and silty-sand interbeds in both the Quaternary and Tertiary sections.

A handwritten signature in black ink, appearing to read 'M. Flis', with a long horizontal stroke extending to the right.

MARCUS FLIS

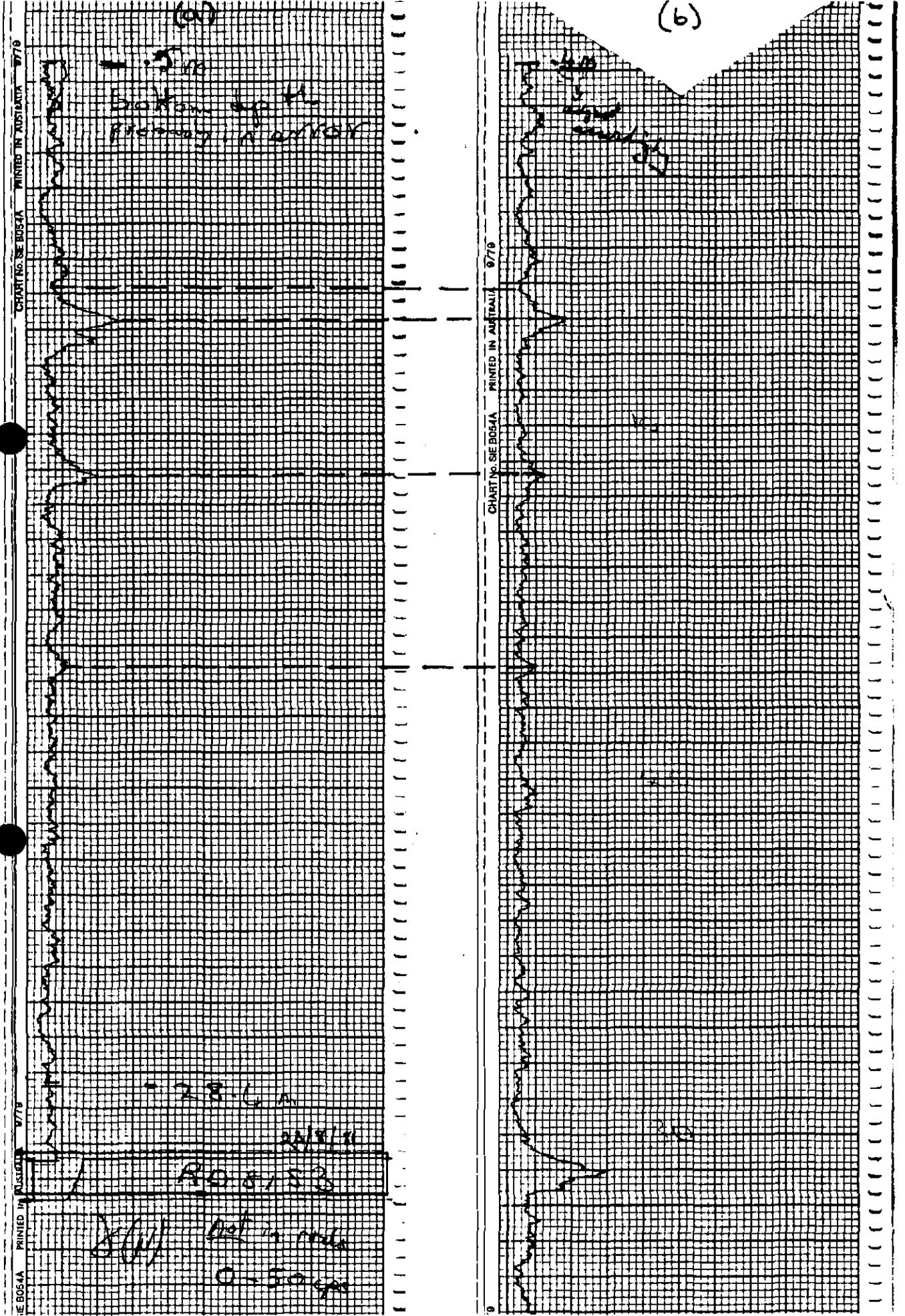
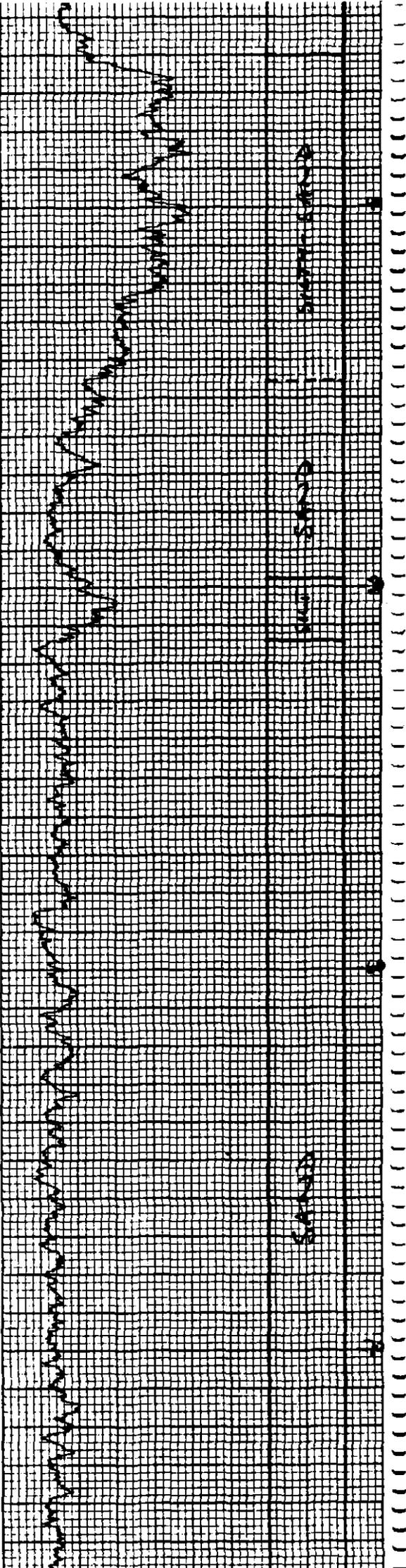
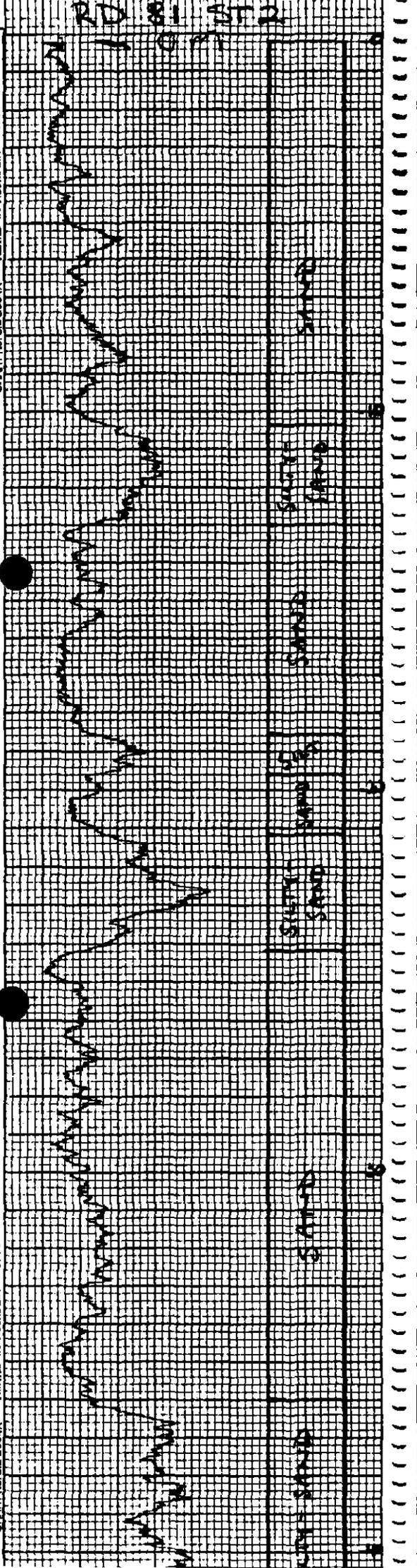


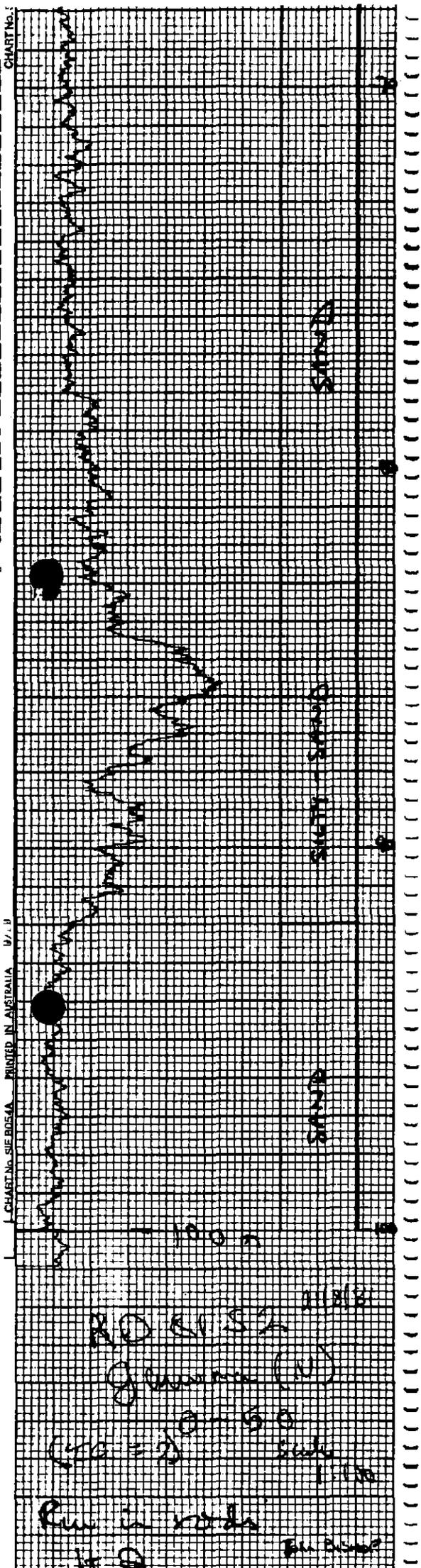
FIG. 1 NATURAL GAMMA LOG RD 81 ST 3





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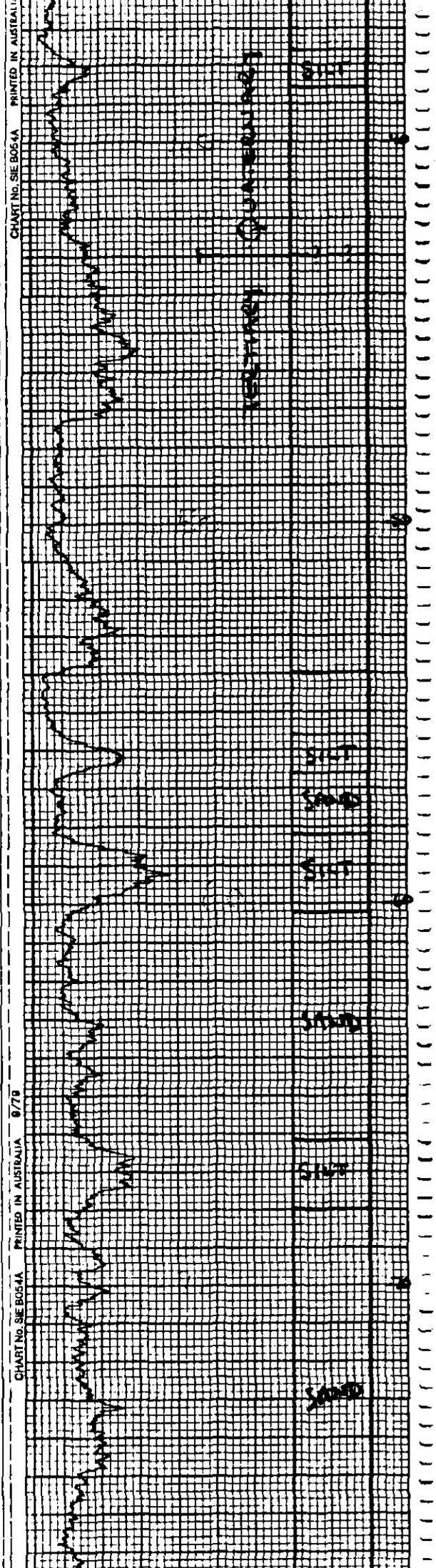
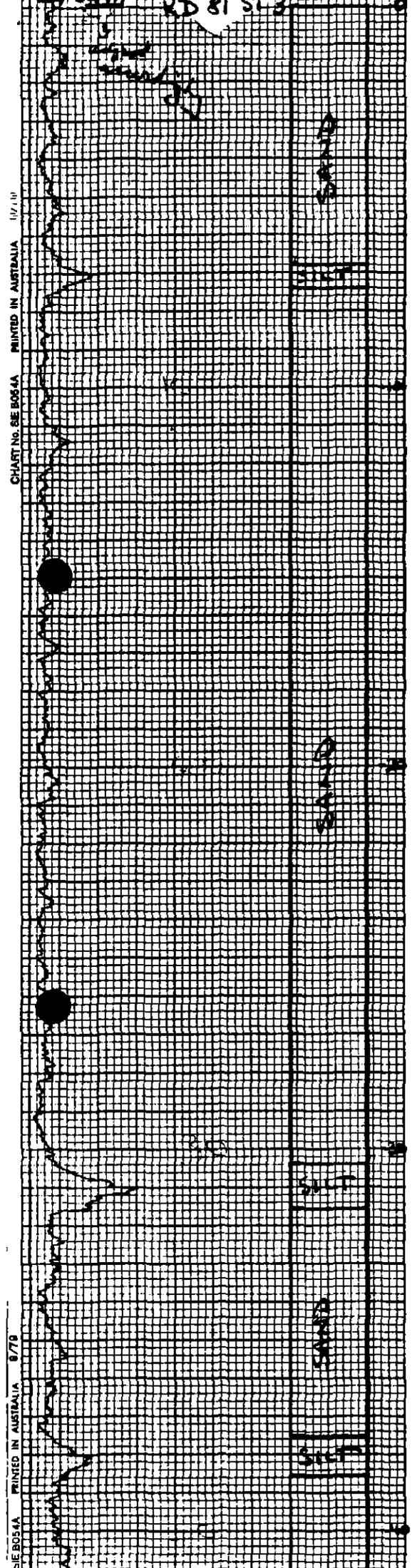
RD 81 ST2

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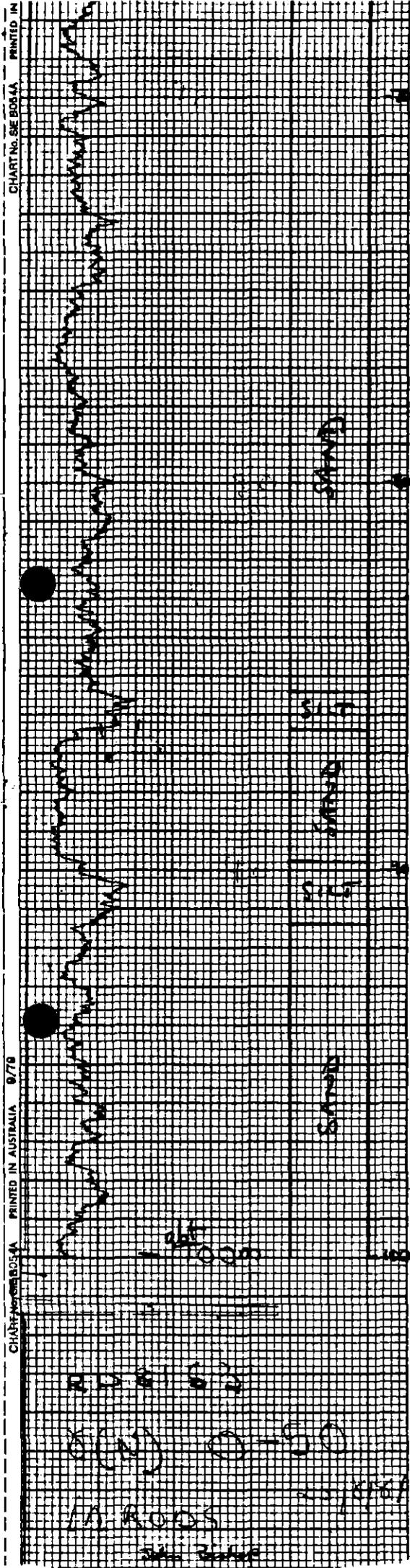
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RD 81 ST2  
 Gauss (U)  
 0-50  
 Run in rods  
 1/10

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 CHART No. 4  
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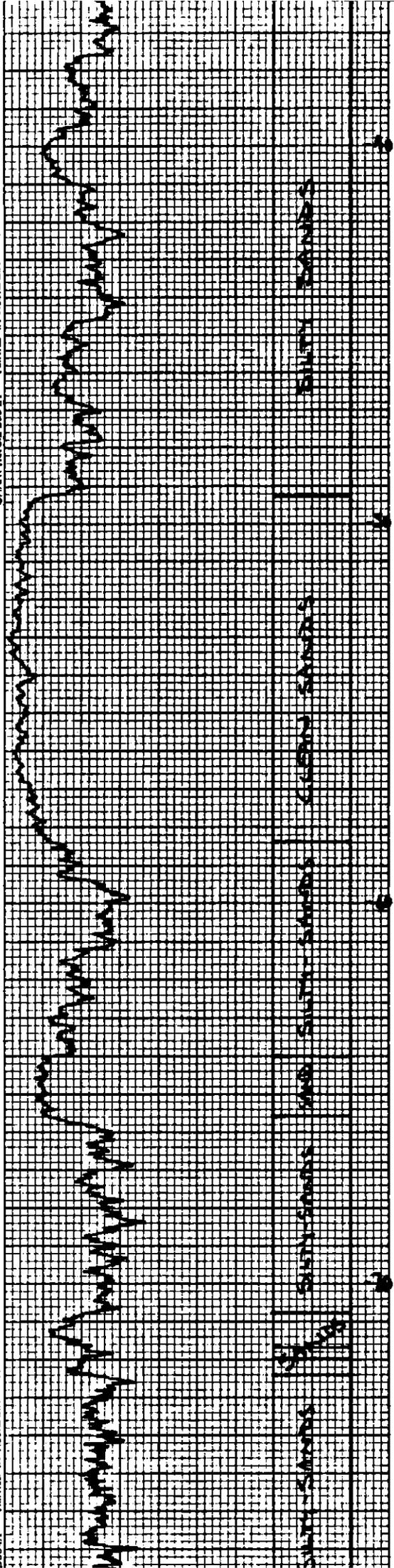
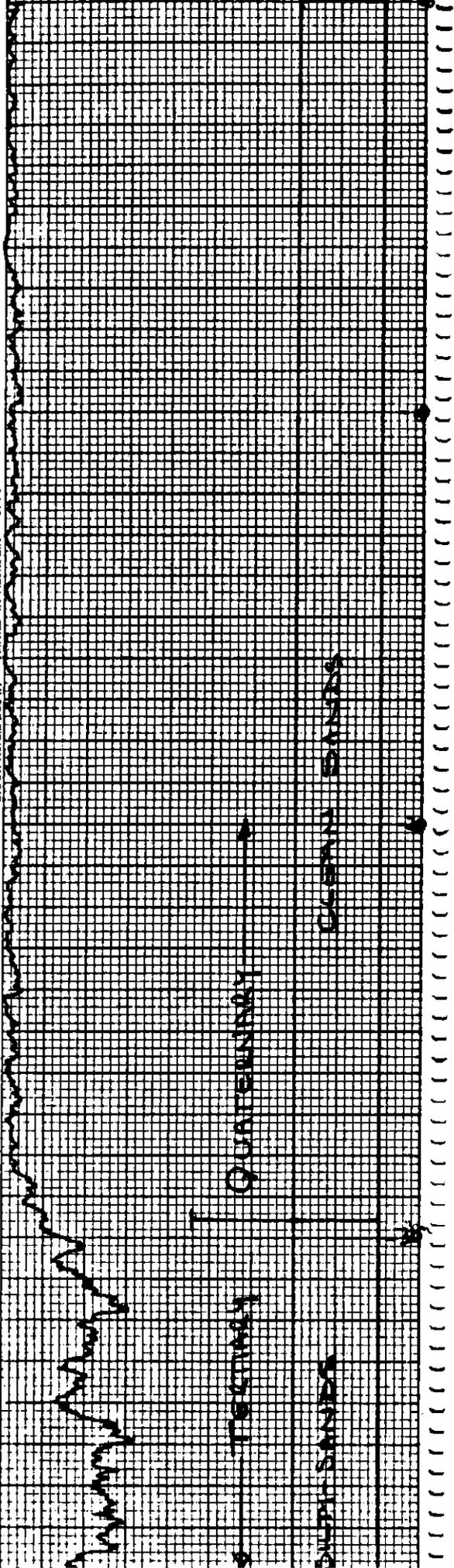


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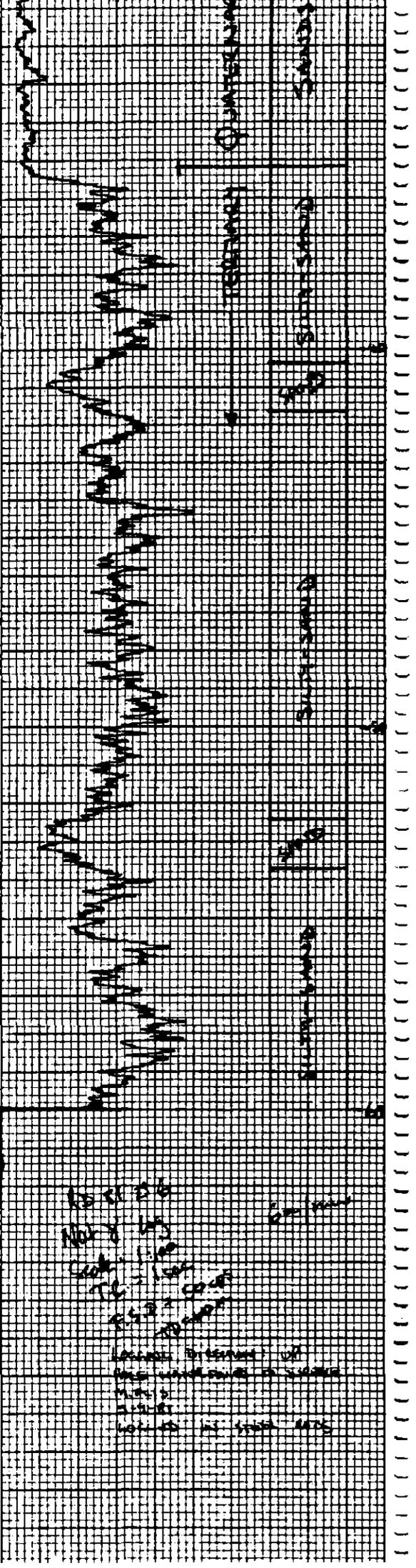
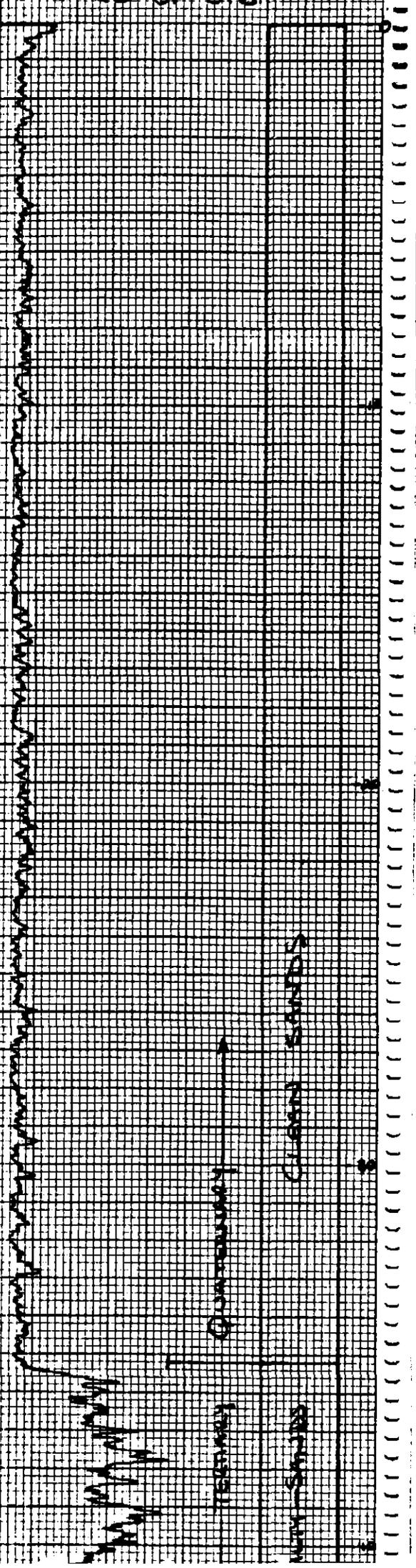
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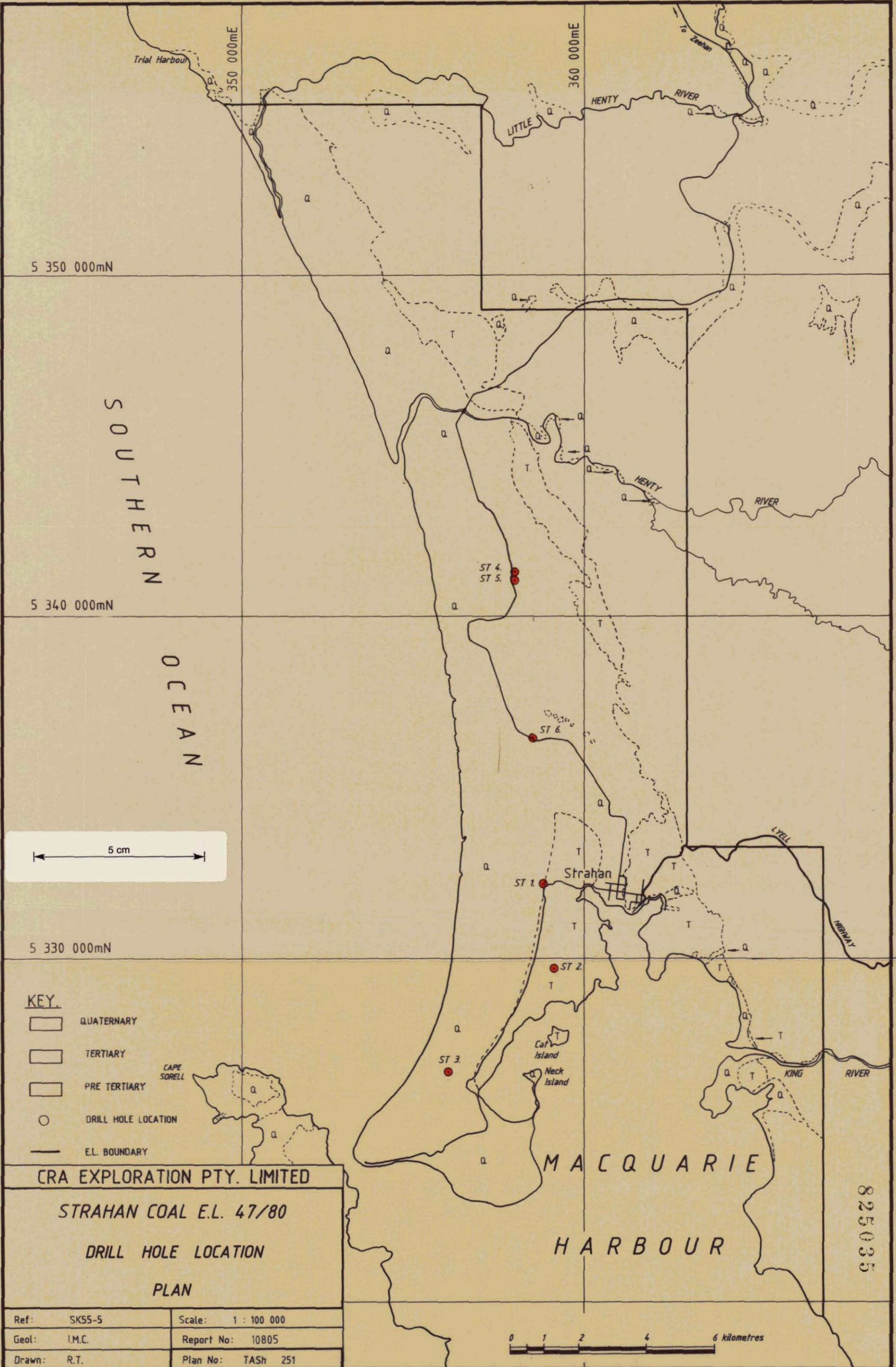
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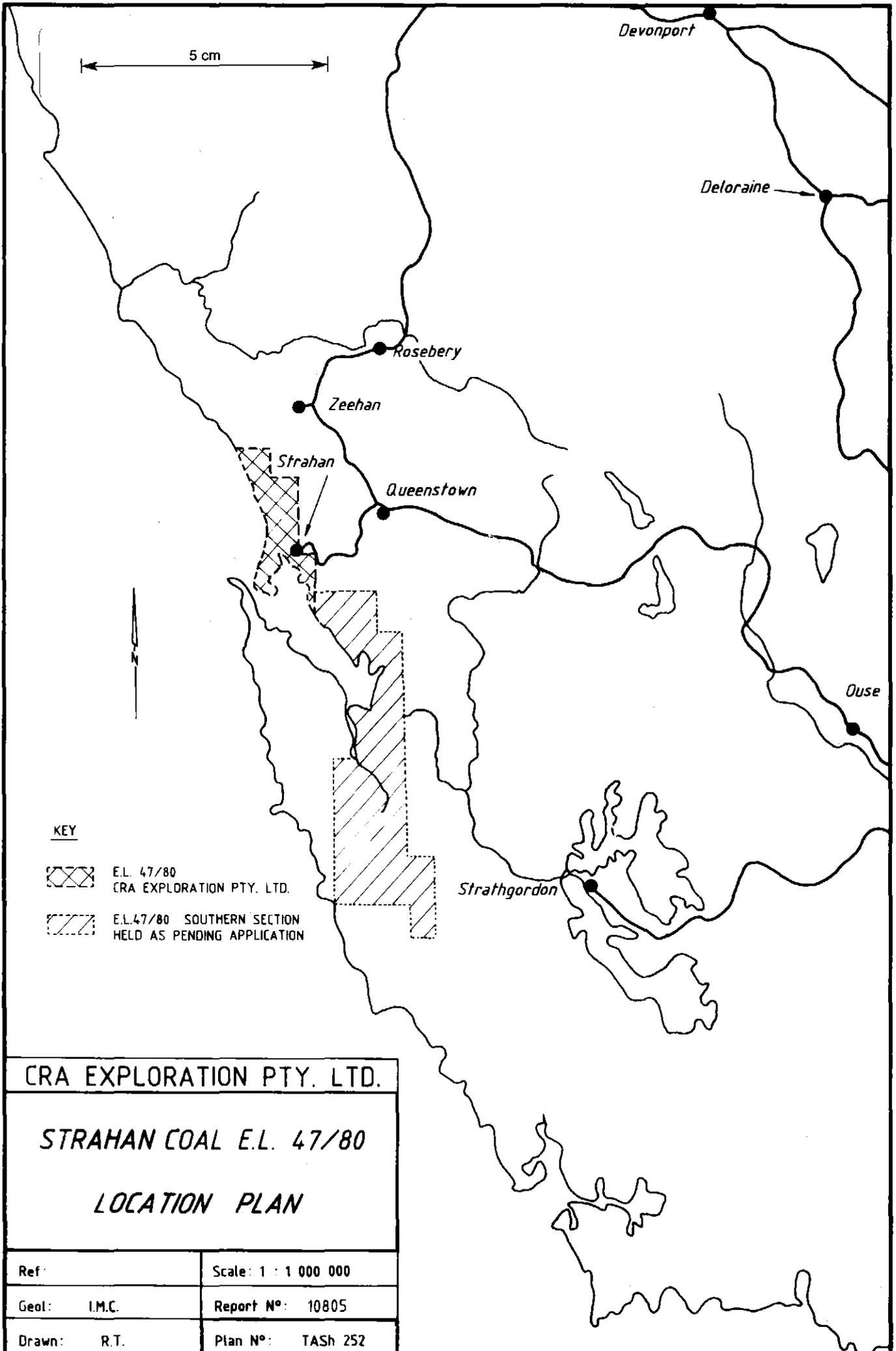
- KEY.**
- QUATERNARY
  - TERTIARY
  - PRE TERTIARY
  - DRILL HOLE LOCATION
  - E.L. BOUNDARY

CRA EXPLORATION PTY. LIMITED	
STRAHAN COAL E.L. 47/80	
DRILL HOLE LOCATION	
PLAN	
Ref: SK55-5	Scale: 1 : 100 000
Geol: I.M.C.	Report No: 10805
Drawn: R.T.	Plan No: TASH 251

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CRA EXPLORATION PTY. LTD.

STRAHAN COAL E.L. 47/80

LOCATION PLAN

Ref:	Scale: 1 : 1 000 000
Geol: I.M.C.	Report N°: 10805
Drawn: R.T.	Plan N°: TASH 252