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EL 1274

DUNN HILL

PROGRESS AND SURRENDER REPORTS FOR THE PERIOD 19/2/85 TO 18/5/88

Submitted by

Carpentaria Exploration Co. Pty Ltd
1988

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 6089

TENEMENT: E.L. 1274 - Dunn Hill.

TENEMENT HOLDER: Carpentaria Exploration Company Pty. Ltd.

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED MAY 18, 1985

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna.

2. EXPLORATION

No field work has been carried out during this quarter. N. Burn, an honours student at Adelaide University, visited our store at Streaky Bay to collect samples of drill cuttings from the Narlaby Palaeochannel. He will use these samples to carry out a study of the thermoluminescence of quartz of pre-Tertiary basement rocks. Samples of quartz from near uranium mineralization in the Tertiary sediments will also be checked. Results of this work may assist in determining prospective areas for 'sandstone' uranium mineralization.

3. EXPENDITURE

A Statement of Expenditure is attached.

R Richards
....
for P.J. Binks

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDED MAY 18, 1985

	$	$
Equipment Charges	365	
Field Base Operations	163	
Outside Services	184	
Operating Labour	328	
TOTAL - THIS PERIOD		$1040
Previously Reported		-
Total Project Expenditure to Date		$1040

....
A.E. Covacich
Administration Superintendent

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED AUGUST 18, 1985

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

Mr. N. Burn of Adelaide University has examined most of the samples which he collected from the drill cuttings from the Narlaby Palaeochannel for radiation damage by the thermoluminescence technique. He is still interpreting these data and will present his conclusions in due course.

3. EXPENDITURE

A Statement of Expenditure is attached.

J. Richardson
for P.J. Binks

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDED AUGUST 18, 1985

	$	$
TOTAL - THIS PERIOD		NIL
Previously Reported - Current Term		
Quarter ended May 18, 1985		1040
Total Project Expenditure to Date		$1040

A.E. Covacich
Administration Superintendent

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED NOVEMBER 18, 1985

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

Mr. N. Burns of Adelaide University is still working on samples from the Narlaby Palaeochannel which he is studying by thermoluminescence techniques for radiation damage. A summary of his work will be submitted when he has finished this project.

3. EXPENDITURE

A Statement of Expenditure is attached.

....
for P.J. Binks

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDED NOVEMBER 12, 1985

	$	$
Field Base Operations	28	28
TOTAL - THIS PERIOD		$ 28
Previously Reported - Current Term		
Quarter ended May 18, 1985	1040	
Quarter ended August 18, 1985	-	$1040
Total Project Expenditure to Date		$1068

A.E. Covacich
Administration Superintendent

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED FEBRUARY 18, 1986

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

A report on thermoluminescence studies on samples from the Narlaby Palaeochannel is presented in Appendix 1. This work was carried out by Mr. N. Burn as part of an Honours degree at the University of Adelaide.

A total of 25 samples from carbonaceous sands and clays near "redox fronts" at the Yarranna I and Yarranna IV prospect was analysed at AMDEL for the following suite of elements : Au, Pt, Pd, Ag, As, Bi, Cd, Ce, Co, Cu, Fe, La, Mo, Nb, Ni, Pb, S, Se, Sb, Sn, Sr, Ta, Te, Th, Ti, U, V, W, Y, Zn and Zr. All results were low and uninteresting. Results are presented in Appendix 2.

3. EXPENDITURE

A Statement of Expenditure is attached.

Richardson
....
for P.J. Binks

9A

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDED FEBRUARY 18, 1986

	$	$
Field Base Operations	668	
Freight	70	
Travelling Expenses	305	$1043
TOTAL - THIS PERIOD		$1043
Previously Reported - Current Term		
Quarter ended May 18, 1985	1040	
Quarter ended August 18, 1985	-	
Quarter ended November 18, 1985	28	$1068
Total Project Expenditure to Date		$2111

A.E. Covacich
Administration Superintendent

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APPENDIX 1

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THERMOLUMINESCENCE STUDIES OF A URANIFEROUS TERTIARY PALAEOCHANNEL, EYRE PENINSULA, SOUTH AUSTRALIA.

by

Nicholas R. Burn, B.Sc.

Submitted as partial fulfilment of the
Honours Degree of Bachelor of Science in Geology,
Department of Geology and Geophysics
at the University of Adelaide,
November, 1985.

National Grid Reference SH 53-14 (1:250,000) Childara
SI 53-2 (1:250,000) Streaky Bay

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ABSTRACT

The uraniferous Narlaby Palaeochannel occurs along the northwestern flank of Eyre Peninsula, southwest of the Gawler Ranges. Uranium mineralization is associated with the extensive "Upper Sand" unit within the Eocene channel fill.

Artificial TL applied to 162 samples revealed all channel sediments have suffered major radiation damage due to at least 10 ppm U. Cross-channel traverses defined zones of maximum radiation damage (ie. protore movement). Longitudinal traverses down-channel toward larger orebodies showed increasing cumulative radiation effects indicative of a accretionary buildup and migration of U.

Underlying paleochannel basement shows two distinct TL glow curves; (1) radiogenic type, and (2) early Proterozoic type.

The Hiltaba Granite is known to be enriched in uranium. Microscope studies and TL results indicate the Eocene channel fill is derived from this U-rich granite, thus receiving high inherent radiation damage as well as the likely uranium source.

A genetic model where mineralization is a result of multi-stage U enrichment is proposed. Original uranium accumulations have been remobilised by oxidising Pliocene aquifers with precipitation occurring in suitable reducing or less permeable environments ie. along lateral margins. The relative lack of impermeable barriers and large areal extent suggest low grade concentration of uranium solutions.

1. INTRODUCTION

Thermoluminescence (TL) is a result of thermal untrapping of electrons captured by defects and recombination of electrons and electron-deficient sites (holes). During recombination of the electron and hole at a luminescent centre the release of stored energy causes luminescence and the emission of a quantum of light.

The study of TL kinetics and solid-state physics has been intensive since the early 1950s, but most recent work is concerned with the application of TL to dating of archaeological artifacts, palaeoclimate determination, dating of igneous and other rocks, stratigraphy and ore exploration.

Recent work by Hochman and Ypma (1984,1985) has applied TL techniques to Tertiary sandstone-hosted uranium deposits in South Australia, ie.Beverley. TL is based on the principle that charging or filling of available traps is related to ionizing radiation, with increasing TL intensity proportional to increasing radiation dose, and the advantage that changes in the number of available traps reflects the total dose to which quartz has been subjected, ie. a record of past and present cumulative radiation which does not require the actual cause of the TL anomalies to be present. The use of this tool has allowed them to trace the movement of uranium within subsurface palaeochannels and to determine proximity to mineralization even if there is no corresponding geochemical or radiometric anomalies, or a general lack of outcrop. An increase in total radiation effects toward an orebody may be used as evidence for an accretionary mechanism similar to Colorado Plateau roll-front deposits.

The aims of this project are twofold. Firstly, to apply TL techniques to the uraniferous Narlaby Palaeochannel, compare the results to previous work and determine whether accretionary migration is a workable hypothesis. The evaluation of U potential of the Narlaby channels is complicated by disequilibrium conditions due to highly acidic and saline groundwaters which could inhibit economic mineralization. Giblin (1985) proposes complexing by carbonaceous material and clay adsorption are the dominant mechanisms of uranium retention, notwithstanding groundwater acidity.

The second objective is a study of the granitic palaeochannel basement as being a possible source of uranium solutions and/or U deposits. These results can then be compared to geochemically similar granites within the Gawler Craton, which may be useful in determining potential for further sandstone uranium deposits.

The Narlaby Palaeochannel was discovered during a drilling program conducted by Carpentaria Exploration Company (CEC) in the period 1979-82. This site was selected because of two reasons; (1) the Hiltaba Granite had above average U values, and (2), the presence of Tertiary fluviatile sediments in the Corrobinnie Depression which were considered to have potential to host uranium. The Narlaby Palaeochannel thus exhibited some similarities to the uranium deposits within Tertiary palaeochannels of the Lake Frome Embayment, eg.Beverley (Haynes,1975),Honeymoon (Brunt,1978).

2. GEOLOGY

2.1 Location

The Narlaby Palaeochannel is located on the north-western side of Eyre Peninsula, along the south-west flank of the Gawler Ranges (see Fig. 1). Mineralization is concentrated in the western end of the palaeochannel, within the Yarranna Grid Area. This is an area of 1500 km^2 situated approximately 90 km north of Streaky Bay.

2.2 Regional Geology

Eyre Peninsula forms the southern edge of the Gawler Block which has undergone Early-Mid Proterozoic orogenic evolution to terminate into a stable crystalline platform. The Gawler Range Volcanics and comagmatic Hiltaba Granite are the final stages of this Mid-Proterozoic tectonic evolution leading to consolidation of the basement. There has been little deformation since the Mid-Proterozoic (1400 Ma) with the only deformational effects being epeirogenic block faulting and jointing. Early Proterozoic sequences are represented by the metasedimentary Hutchinson Group and the igneous Lincoln Complex. Within the crystalline basement Archaen relics (ie.Sleaford Complex) have been located but Rutland et al (1981) has suggested that the majority of Archaen relics have been reworked to form the Lincoln Complex.

Inside the Yarranna Grid Area outcrops are isolated and consist mainly of non-foliated granites thought to be the same age as the Hiltaba Granite. Rare outcrops of foliated gneisses occur to the southwest of the Gawler Ranges (Blisset,1977) and are designated part of the Lincoln Complex (Binks & Hooper,1984).

North of the palaeochannel Gawler Range Volcanics (GRV) form a series of hills and escarpments. These acid volcanics consist of calc-alkaline assemblages ranging in composition from rhyolite to dacite with occasional basic lavas.The rocks originally erupted as ignimbrite sheets, lava flows or domes with minor airfall tuffs and volcanic breccias.

Yardea Dacite, the GRV member, outcrops along the eastern end of the palaeochannel, but within Yarranna Grid the Hiltaba Granite has intruded the western edge of the GRV and dominates outcrop lithology (see map in back pocket).

The area south of the Gawler Ranges has a cover of Quaternary and Recent aeolian sands and lacustrine clays. Following mapping by South Australian Geological Survey, Blisset (1977) and Forbes (1982) have interpreted two formations; (1) Bridgewater Fm., consisting of calcreted Quaternary aeolianites, and, (2) Moornaba Sands composed of Recent inland dune fields. Within the incised palaeochannel, infilling Eocene and Pliocene fluviatile sands and clays lie unconformably on the granitic basement.

2.3 Channel Description

2.3.1 Morphology

Narlaby Palaeochannel is a relatively linear channel of approximately 170 km in length and up to 10 km wide. Headwaters are located east of Minnipa, with channel flow in a northwesterly direction following the Corrobinnie Depression. At the western edge of the GRV there is a sudden change in channel orientation toward the southwest (see Fig.1).

Binks &Hooper (1984) propose this abrupt change in direction is due to a NNE-trending fault related to the western boundary of the GRV. The appearance of a major NNE-trending tributary at this right-angled bend is probably under fault control. Another major tributary joins the palaeochannel north of Poochera. Minor tributaries occur all along the channel and many more possibly undiscovered because of a low drilling density in certain areas. Little is known of the downstream extension in the Smoky Bay region due to sparse drilling.

2.3.2 Stratigraphy

The Narlaby Palaeochannel is infilled by Lower Tertiary fluviatile sediments of varying thickness. Binks & Hooper (1984) have constructed a stratigraphic framework based on down-hole logging and petrological analysis of cuttings (see Fig.2).

At the base of the sequence reduced Eocene channel sands, up to 80 m thick, lie unconformably on a stable crystalline basement. This upward fining sequence consists of coarse to fine-grained uncemented sands with minor interbedded clay bands. Most quartz grains are angular to subrounded with a grey-black colour due to carbonaceous staining. Also included are traces of Fe-oxides, rutile, zircon, tourmaline, staurolite, andalusite, kyanite, sillimanite, pyrite, and carbonaceous material. The "Upper Sand" unit of fine to medium-grained sands is the main host for uranium mineralization. The nature of this unit will change depending on the redox conditions. When in the reduced state it is grey-black in colour with pyrite and carbonaceous material, which contrasts with the clean, pink to brown colour when oxidised.

Overlying these sands is a thin, carbonaceous clay layer which, based on palynological evidence (Binks & Hooper, 1984), defines the top of the Eocene succession. This sequence has been correlated with the Pidinga Fm. of Eucla Basin and the Eyre Fm. of Lake Frome Embayment.

Major Pliocene channels composed of oxidised, yellow to brown sands, silts and clayey silts occur throughout the region. This sequence lies unconformably upon the Eocene succession and in the Yarranna Area has incised into the underlying sands to form Eocene "mesa-like" structures. Interbedded lignitic clays which form thin, extensive horizons have been dated as Early Pliocene (Binks & Hooper, 1984).

2.4 Mineralization

Uranium mineralization forms thin extensive horizons up to 3 km², ranging in grade from 0.01 to 0.03% eU_3O_8. No U minerals are present with uranium probably held by ionic bonding. Th, V, Mo and base metal contents are low.

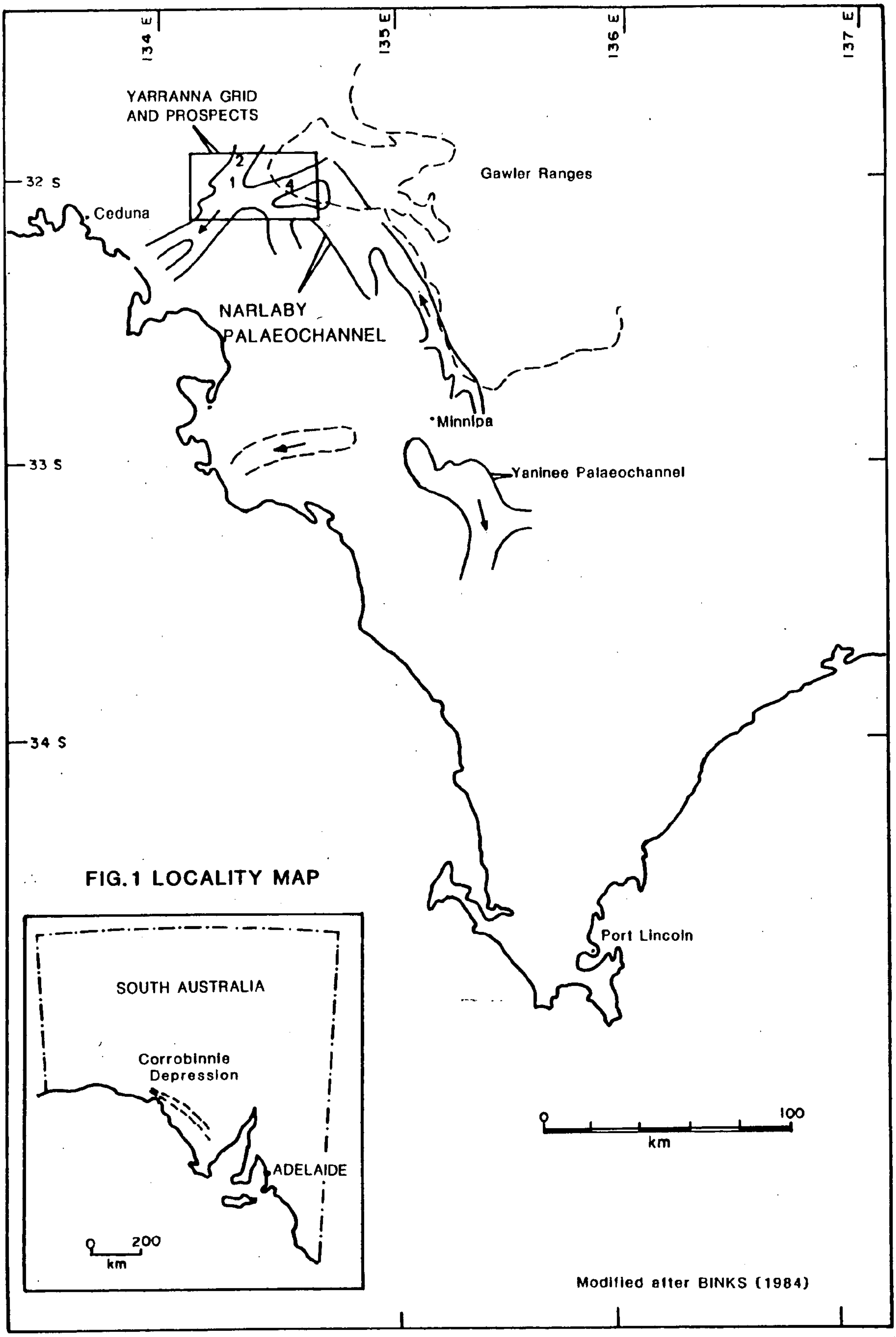

FIG.1 LOCALITY MAP

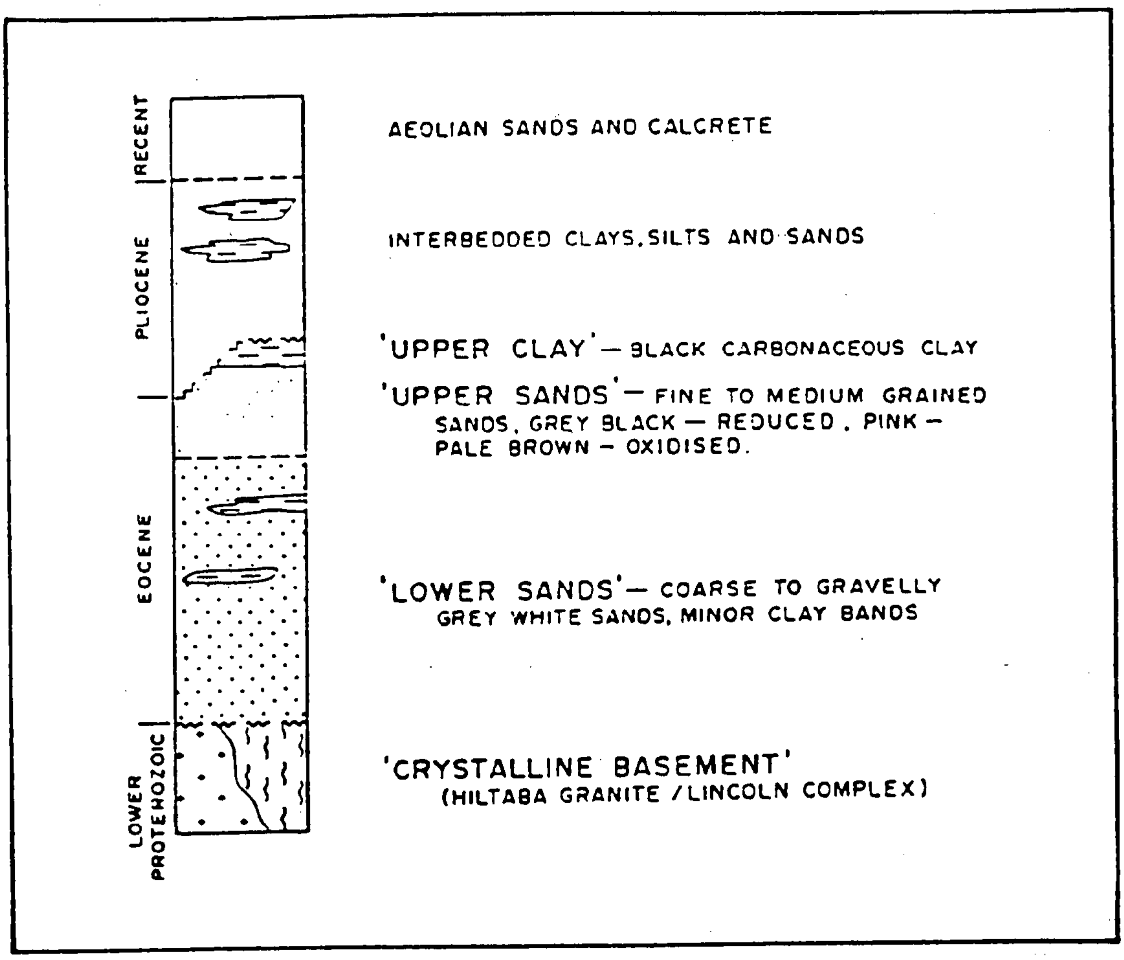

FIG. 2 – Simplified stratigraphic column, Narlaby Palaeochannel.

from Binks & Hooper (1984)

3. PREVIOUS EXPLORATION

The search for sedimentary uranium deposits in South Australia was initiated in the late 1960's. Exploration was concentrated in the Lake Frome Embayment where Tertiary sandstone U deposits within palaeochannels are related to the U-rich Willyama and Mt. Painter Complexes. Examples include the Yarramba Channel and related Honeymoon deposit (Brunt,1978), Billeroo and Curnamona Channels (Ellis,1980) and the Beverley deposit (Haynes,1976). Since there were no surface expression or radiometric anomalies, reconnaissance was carried out using resistivity and gravity techniques to define basement "lows" or palaeochannels. This was followed by rotary drilling to further delineate channel morphology and to determine stratigraphic relationships. Down-hole gamma logging was then conducted to estimate ore grades, assuming equilibrium.

Exploration work on the Narlaby Palaeochannel was conducted along similar lines. Rotary hole drilling and down-hole radiometric logging was backed by resistivity surveys to determine channel outline and stratigraphy. As with the Lake Frome Embayment, airborne and ground radiometric surveys met with little success. The major problem encountered during drilling was disequilibrium between gamma logs and the amount of U assayed.

Analysis of present-day groundwaters, Dickson et al (1984) and Giblin (1985), has shown high salinities (up to 82500 mg/litre, dissolved solids), high U content (up to 12300 ug/litre), high Ra, low pH and Eh, with high dissolved fluorine values. According to Dickson et al (1983), U and Ra are highly soluble in acidic groundwaters and there is transfer of Ra from U-rich areas of mineralization to U-poor areas, resulting in severe disequilibrium. Dickson et al (1984) have evaluated groundwater samples as an indicator of uranium mineralization. This isotopic technique, involving dissolved uranium and the four naturally occurring radium isotopes 226Ra, 224Ra, 228Ra, and 223Ra, has been applied to the Narlaby Palaeochannel and compared to previous work.

Problems due to lack of reliability of gamma logging were overcome by switching to reverse circulation "air-core" drilling and assaying of the cuttings by XRF methods.

4. THEORY OF TL APPLIED TO U EXPLORATION

The theory of TL and it's application to uranium exploration has been described in great detail within many recent papers by Hochman & Ypma (1982; 1984,a,b; 1985) and Ypma & Hochman (1985). In this section TL theory will be discussed briefly.

TL can be applied to uranium exploration in two ways. One method uses the dosimetry aspect of natural TL which is the natural radiation resulting from exposure to radioactive minerals in the geological environment. The second method uses permanent radiation effects in the crystal lattice which result in altered electron trap densities. These develop from accumulated radiation over large time periods (10^6's yrs) and can be demonstrated by artificial radiation (60Co) doses. Interaction of gamma rays with the crystal lattice causes electron ionization where an electron is excited to the conduction band and leaves a vacancy in the valence band (=hole). These migrate through the lattice until they recombine or are trapped on defects.

When the radiated (natural or artificial) crystal is thermally activated the electron-hole pairs are released over a range of temperatures and may recombine at luminescent centres where the untrapped electron undergoes a series of energy level changes resulting in photo-emission. This is measured by a photo-multiplier and recorded as a glow peak. Since electron-hole pairs are trapped in quartz in different sites with varying activation energies, glow peaks will occur at separate temperatures and thus coalesce to form a glow curve. These peaks can be described in terms of total thermal untrapping kinetics (1st order kinetics) or in terms of partial (50%) retrapping kinetics (2nd order kinetics). Recent work by Levy (1984) has shown; (1) that different retrapping ratios (0-99%) are possible, and (2) that charge transfer to other traps is possible ie. interactive kinetics.

The shape and intensity of a glow curve is dependent on the number and types of traps and their relative charge occupancy, the latter a function of ionizing radiation. Natural TL acts as a dosimeter, recording the occupancy rate of traps from which the amount of incident radiation can be calculated. Exposure to large doses can result in the formation of new defects, causing permanent changes in trap density and therefore the intensity and shape of a glow curve for a fixed artificial dose. Artificial TL can then be used to estimate the formation of new chargeable defects in the irradiated crystal. As noted in the introduction, artificial TL will reflect changes in trap density and occupancy rate with increased radiation doses, thus forming a record of the total cumulative dose.

Quartz is the most widely used mineral in TL investigations of uranium deposits. The dominant hole traps are silicon sites where Al^{3+} has substituted for $Si4+$ while electrons may be trapped on vacant oxygen sites where the O^{2-} charge is missing. The effect of increasing radiation dosage on quartz TL glow curves is seen in Fig.3. In summary; Fig.3a shows quartz, subjected to minor amounts of radiation, with three major glow peaks. At approximately $5x10^5$ rads sensitization (stage where quartz lattice is affected) begins and LT peak intensity increases due to improved efficiency of the electron-hole trapping mechanism (Fig.3b). When the number of electron traps equals number of hole traps (optimal ratio) further radiation will cause a drop in TL intensity as seen in Figs.3c,d. Levy (1983) calculated this ratio at approx. $2x10^8$ rads. Exceeding this dose results in decay of the LT and MT peaks while the HT peak continues to increase (see Figs.3d,e). Annealing by thermal influence (Fig.3f) may occur after major radiation damage but is geologically rare.

Irradiation effects on glow curves can also be demonstrated by dosimeter minerals such as LiF TLD-100. Fairchild et al (1978) exposed TLD-100 samples to doses ranging from 800 to $3x10^7$ rads, from which systematic changes in the glow curves were observed. Although TLD-100 is complicated by at least nine glow peaks, an anomalous 190°C peak within the 3.01-eV emission band can be described by 1st order kinetics and used as a model for TL variations.

In the range 800 to $3x10^5$ rads the peak intensity increases proportional to radiation dose, after which the peak decays until it disappears at $6.7x10^6$ rads and higher temperature glow peaks dominate. They concluded that total emission increases with increasing radiation up to $3x10^5$ rads, and gradually decreases for larger exposures.

Experimental study of LiF crystals and their systematic changes in glow peaks can then be extrapolated to quartz glow curves. This is necessary because quartz requires larger radiation doses than other dosimeter minerals, and at the present time, experimental techniques have been unable to measure TL responses for these high doses.

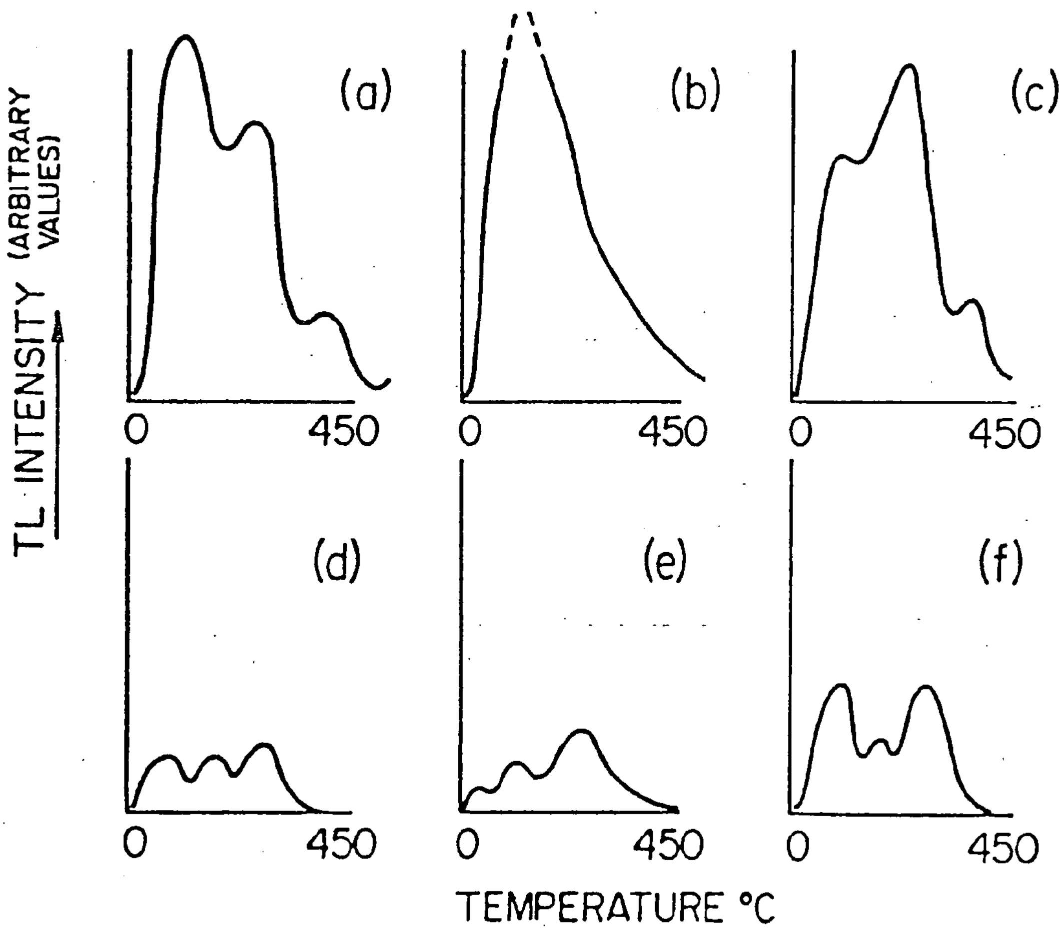

FIG.3 Variation in quartz TL glow curves with increasing radiation. (From Hochman, 1984)

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5. RESULTS

5.1 Procedure and Interpretation

Experimental TL methods were applied to quartz grains separated from cuttings obtained at 72 different drillholes. Using gamma and lithological logs, 162 samples were collected from four distinct horizons within the Eocene succession. These are defined as; (a) mineralized horizon, (b) six metres above mineralization, (c) six metres below mineralization, and (d) basal sands. (see Appendices 1&2)

Within Yarranna Grid mineralization is concentrated in two locations; (1) the main palaeochannel (yarranna 4 prospect), and (2) the NNE-trending tributary (see Fig.1). These two channels are treated separately so as not to confuse any radiation trends and possible genetic models. Each channel has been sampled by a number of transverse sections from which areas of maximum radiation damage (interpreted as zones of uranium protore movement) are defined. This is followed by a longitudinal traverse down the channel towards the orebody, through the orebody and past it. Samples chosen for the longitudinal traverses were chosen from areas of uranium movement as deduced in the cross-sections.

All samples measured in the study were characterised by a reduced low temperature (LT) peak, a near optimal middle temperature (MT) peak which may overshadow the LT peak, and a proportionally increased high temperature (HT) peak.

Variations in peak intensites along the transverse sections are shown in Figs.6a,7a,9a,10a,11a. Since all samples have suffered major radiation damage, reduced TL intensities show smaller variations in absolute TL values and order of magnitude. This is comparable to Westmoreland (Hochman,1984) where reduced intensities show only small-scale variation and contrasts with the classical Tertiary deposits (eg.Beverley;Hochman & Ypma,1985) which show large variations in absolute TL intensity.

Comparison of the three peak intensities across all traverses show relatively uniform traces with LT and HT peaks having similar absolute values while MT peaks show the greatest variation. Overall, general trends may show a decrease in TL intensities when approaching mineralization (eg. IR1183 in Fig.7a, IR1005 in Fig.10a) but intensities alone are of doubtful use as indicators of proximity to mineralization ie. there is decrease in intensity toward IR966a, but an increase when approaching IR961, both being mineralized holes (see Fig.9a). Also the use of absolute MT intensities correlated to ore grade (ie. inversely proportional) is of no use, eg. in Fig.6a mineralized sample IR1218 has MT peak intensity in range 3900-4000 while non-mineralized sample IR1215 has MT value in range 4100-4200.

To overcome fluctuations caused by local conditions or sample variation effects on absolute TL responses, the use of intensity ratios of glow peaks may be a suitable indicator because fluctuations in intensities alone are cancelled out. HT/MT and HT/LT ratios can be used as a measure of radiation damage and have been tentatively correlated with zones of protore movement. An increase in these ratios implies decrease in LT and MT intensities and increase in HT intensity due to greater radiation damage. The validity of this approach can be demonstrated in Fig.4 which shows an overall trend toward increasing ratios with increasing ore grade.

An apparent low temperature shift of glow curves when approaching ore bodies was noticed by Hochman as a major feature of the Westmoreland deposit. This apparent LTS of the HT glow peak may in actual fact be a high temperature shift (HTS) of charges from lower temperature traps. Levy (1984) has theorized that leakage of MT traps to higher temperatures with larger radiation doses (ie. interactive kinetics) causes an apparent LTS of the HT peak due to high electron retrapping probabilities. This decrease in HT peak temperature was observed at Westmoreland and used as a reliable indicator of mineralization. Fig.5 gives a frequency histogram showing three major peaks at 140°C, 220°C and 335°C. Development of a minor peak at 320°C was observed although this evidence for LTS of the HT peak is inconclusive because of low sample numbers.

Ypma & Hochman (1985) have suggested the emergence of a extra HT peak (over 400°C) with large radiation doses. Experimental evidence for this peak was hidden by "oven glow" and measuring equipment limits.

5.2 Results for Main Palaeochannel

Assessment of cross-channel traverses was based on three methods; (1) absolute peak intensity, (2) HT/MT and HT/LT ratios, and (3) HT peak temperature (°C), all plotted against geographical location. Longitudinal sections were characterised by MT intensity vs. HT peak % (of total glow curve) plots where increasing sensitization is represented by positions from upper left hand corner to the lower right hand corner.

5.2.1 Cross-channel Traverses

The main palaeochannel within the Yarranna Grid has been traversed by three sections (Appendix 1). Results and relative trends found within sections B-B' and C-C' are discussed in the following.

a. Traverse B-B' (Fig.6a,b)

This cuts the palaeochannel where a minor tributary joins the SW-trending channel. Variations in absolute TL intensities show two zones of decreased values ie. IR1239-1215 and IR1217-1219. Corresponding with IR1239-40 is a sudden increase in both ratios and decrease in HT peak temperature. This zone of high radiation damage could be explained as actual mineralization at redox interfaces within the tributary (current values are 0.01% eU_3O_8). Similarly, a rapid decrease in absolute intensity at IR1217 accompanied by HT peak temp. decrease indicates high cumulated radiation damage (0.01%eU_3O_8). Between IR1215 and IR1217 high absolute values and ratios, implying a lesser degree of sensitization, which may be explained by the close proximity of incised Pliocene channels or the anomalous Hiltaba Granite forming a basement 'high' at the tributary-channel junction. These may have inhibited solution/protore movement.

b. Traverse C-C' (Fig.7a,b)

Section C-C' cuts the Yarranna 4 prospect at the junction of the palaeochannel and a minor tributary. Absolute MT intensities show three zones where sudden decreases can be geographically correlated to actual mineralization (ie.IR391,1183,1171). Variations in intensity ratios reveal four peaks of high cumulated radiation effects at IR391-1167,IR1183-1169,IR1184 and IR1265. This coincides with sudden decreases in the HT temperature. High ratios and temperatures at IR1167,1169,1184 and 1265 suggest regions of protore movement with lateral migration to IR391,1183 resulting in actual mineralization. These high ratio values can be related to the incised Pliocene channels.

In general, results obtained from HT/MT and HT/LT ratios are more consistent than either absolute intensity or HT peak temperature plots for the reasons discussed previously.

5.2.2 Longitudinal Traverse (Fig.8)

Following the determination of zones of protore movement, a longitudinal section down channel toward the main orebody will show if there is any increase in cumulated radiation effects due to accretionary migration.

Traverse results show an increase in sensitization effects toward the Yarranna 4 prospect. This is consistent with the hypothesis of an accretionary buildup of uranium solutions and a rapid decrease in cumulated radiation damage past the orebody (ie.IR388,1080). Complications in this trend are due to small bodies of mineralization within the upper reaches of the channel eg.IR1240. These orebodies are probably related to clay adsorption or lateral migration away from zones of protore movement into marginal, less permeable sands.

5.3 Results for NNE-trending tributary

A total of four traverses were conducted and results for three sections (E-E',G-G' and H-H') are discussed.

5.3.1 Cross-channel Traverses

a. Traverse E-E' (Fig.9a,b)

This cuts across the headwaters of the tributary where minor streams form a deep incised channel. Fig.9a indicates two zones where absolute intensities decrease (ie.IR973-970 and IR966a-964). Increased absolute values at IR976 and IR961 suggest local fluctuations due to less sensitization within minor tributaries. Intensity ratios forming peaks at IR972 and IR964 support the decreased absolute values. Samples found within these highly damaged zones are characterised by actual mineralization. HT temperature trends reveal sudden drops in temperature (eg.to 315°C at IR967a) along the margin of IR970-973 which could be mineralization caused by lateral migration of oxidising solutions. Therefore, data indicates two zones of protore movemment related to the incised Pliocene channels.

b. Traverse G-G' (Fig.10a,b)

This traverse cuts across the Yarranna 1 prospect where uranium ore grade is largest. Decreases in absolute peak values at IR1021,633,1005 seem to correspond with actual mineralization while larger MT values at IR655 and IR1001 suggest relatively less sensitized zones. Intensity ratios show two regions of high radiation damage at IR633-1005 and IR1021 related to actual mineralization (0.02%eU_3O_8). HT temperature trends for those two regions are consistent with zones of protore movement. Generally low HT temperatures ($T<340°C$) imply close proximity to an extensive ore horizon.

c. Traverse H-H' (Fig.11a,b)

This cuts the NNE-trending tributary between Yarranna 1 and 4 prospects. In cross-section, Pliocene channels have incised into the underlying Eocene sequence to form a "mesa" (ie. between IR504-507). Variation in absolute intensities show three major reduced TL zones at IR402a,403-506 and 404. The increase in both HT/MT and HT/LT ratios in the zone IR505-403, corresponding decrease in HT temperature toward IR506a and actual mineralization at IR403 confirms maximum radiation damage. IR402a shows greatly reduced total TL intensity and resultant high ratios, thus suggesting maximum radiation damage due to past uranium concentration.

Inconsistent data for IR521 may be the result of a differing stage of sensitization found within a minor tributary running parallel to the channel.

5.3.2 Longitudinal Traverse (Fig.12)

Fig.12 shows a discernable trend toward increasing radiation damage when approaching the orebodies. Complications arise due to the extensive nature of mineralization within the channel, clay adsorption and lateral migration away from oxidised zones, eg. mineralized sample IR967a shows increased sensitization similar to samples in Yarranna 1 prospect. When the traverse has past the oreodies samples show a rapid return to background TL values ie. IR350,351,352.

5.4 Discussion

The application of TL to Tertiary sandstone-hosted uranium deposits was first developed as an exploration tool, but a recent study by Hochman & Ypma(1985) has produced evidence for the accretionary migration of uranium protore. Their work at Beverley has shown a progressive increase in cumulated radiation effects when approaching the orebody. Since total radiation dose is a function of residence time and uranium concentration, the increase in damage is related to an increase in uranium concentration if we assume travel time down the channel is relatively constant. Such an increase in uranium is consistent with the accretionary mechanism of uranium movement proposed for some Western USA deposits.

Data from Beverley recognized three types of TL signals; (1) background TL with very little radiation effects, (2) marginal TL with reduced LT and MT intensity, and (3) ore-type TL with further reduced LT and MT peaks and an increasing HT intensity indicative of uranium mineralization. From this, they proposed a genetic model of accretionary migration by oxygenated groundwater within a semi-confined aquifer of thin sandstone bands, resulting in mineralization at a redox interface ie. clay adsorption.

Analysis and comparison of data obtained from the Narlaby Palaeochannel with the Beverley model show several areas where the two differ.

All samples within the Narlaby channels have undergone major radiation damage similar to the marginal TL type of Beverley. Binks & Hooper(1984) have examined these channel sediments and concluded that they are all derived from the Hiltaba Granite (up to 20 ppm U), with little or no input from the Gawler Range Volcanics (GRV). Possible loss of any GRV-derived quartz during sample preparation (Gostin, pers.com.) was checked. TL measurements were taken on the v.fine-grained quartz fraction (-150 +240#mesh) of random samples located within the upper reaches of the two palaeochannels. Resultant glow curves showed major radiation damage similar to the coarser fraction, with a slightly reduced MT intensity. However, work by Hochman (pers.com.) on the GRV has shown the TL signature for Childara Dacite has a similar glow curve to the Hiltaba Granite, which leads to the possibility of an obscured minor GRV component. Also the location of Childara Dacite outcropping above the NNE-trending tributary headwaters could be used as evidence for a small volume input. This aside, the dominant provenance of channel sediments seems to be the Hiltaba Granite.

High inherent radiation damage within Hiltaba-derived sands has complicated any sensitization trends and differs from Beverley where the host rock has undergone little or no radiation damage and any increases in sensitization are relatively clear. Another difference between the two deposits is the vertical homogenization within the Narlaby channels. Possible reasons include this high inherent radiation damage which has obscured any vertical trends or the relatively unconfined nature of the separate Pliocene aquifer.

Although application of the Beverley accretion model to the Narlaby Palaeochannel uranium mineralization is complicated by its extensive, low grade nature and host rock provenance, results for the two longitudinal traverses, especially down the main palaeochannel, show an accretionary buildup of uranium solutions at the larger orebodies.

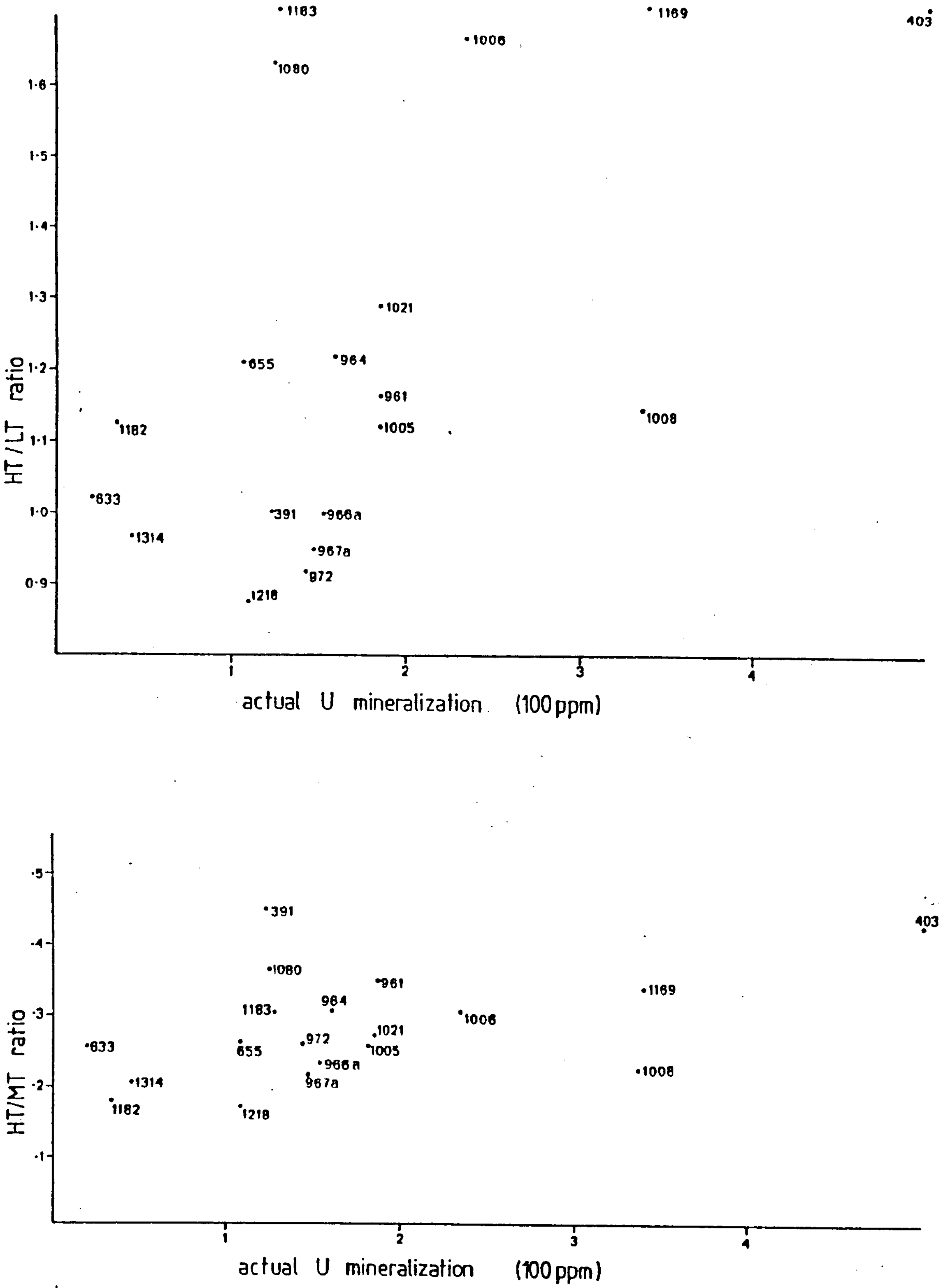


FIG.4

Intensity ratios vs. actual mineralization

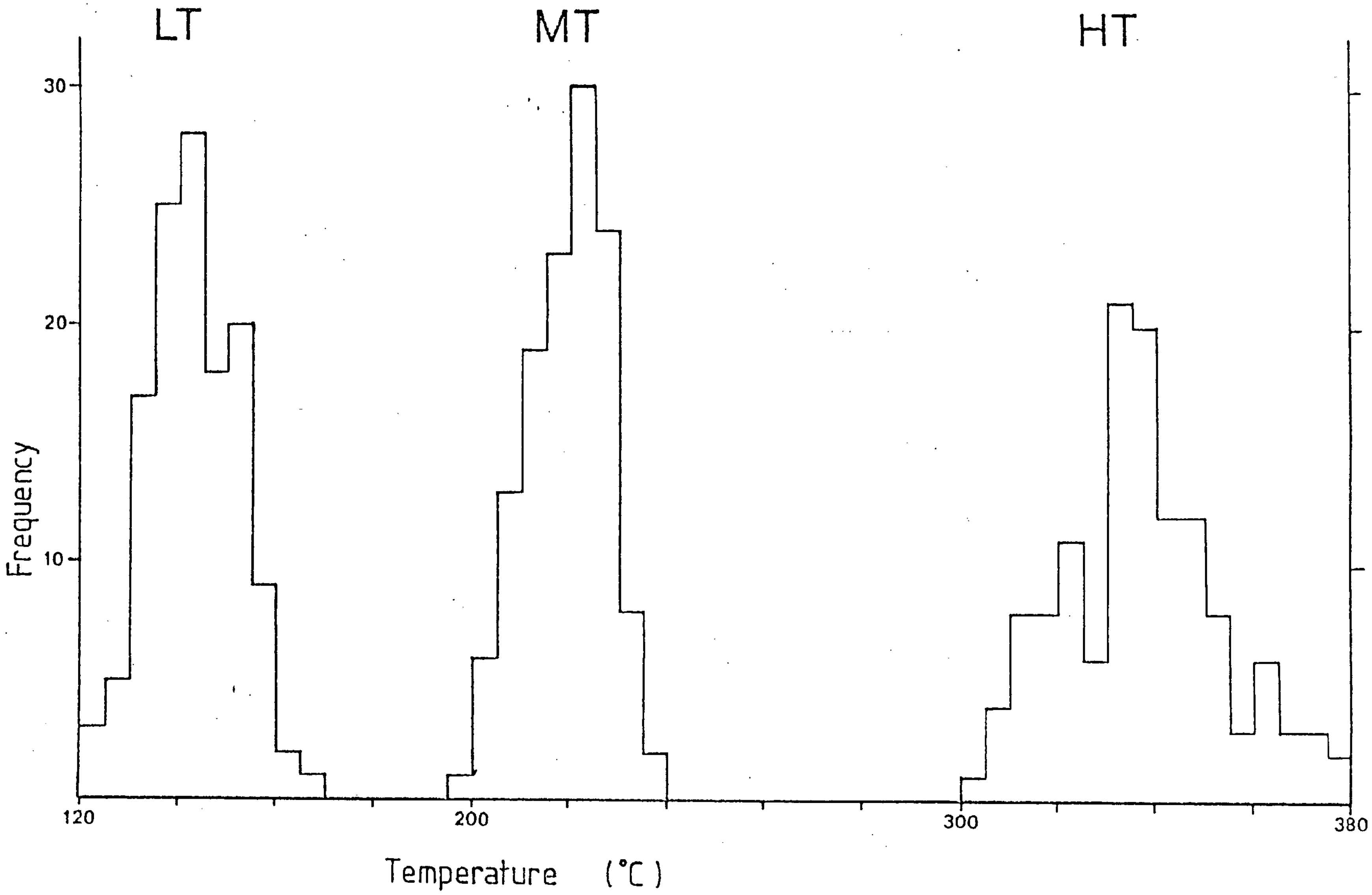
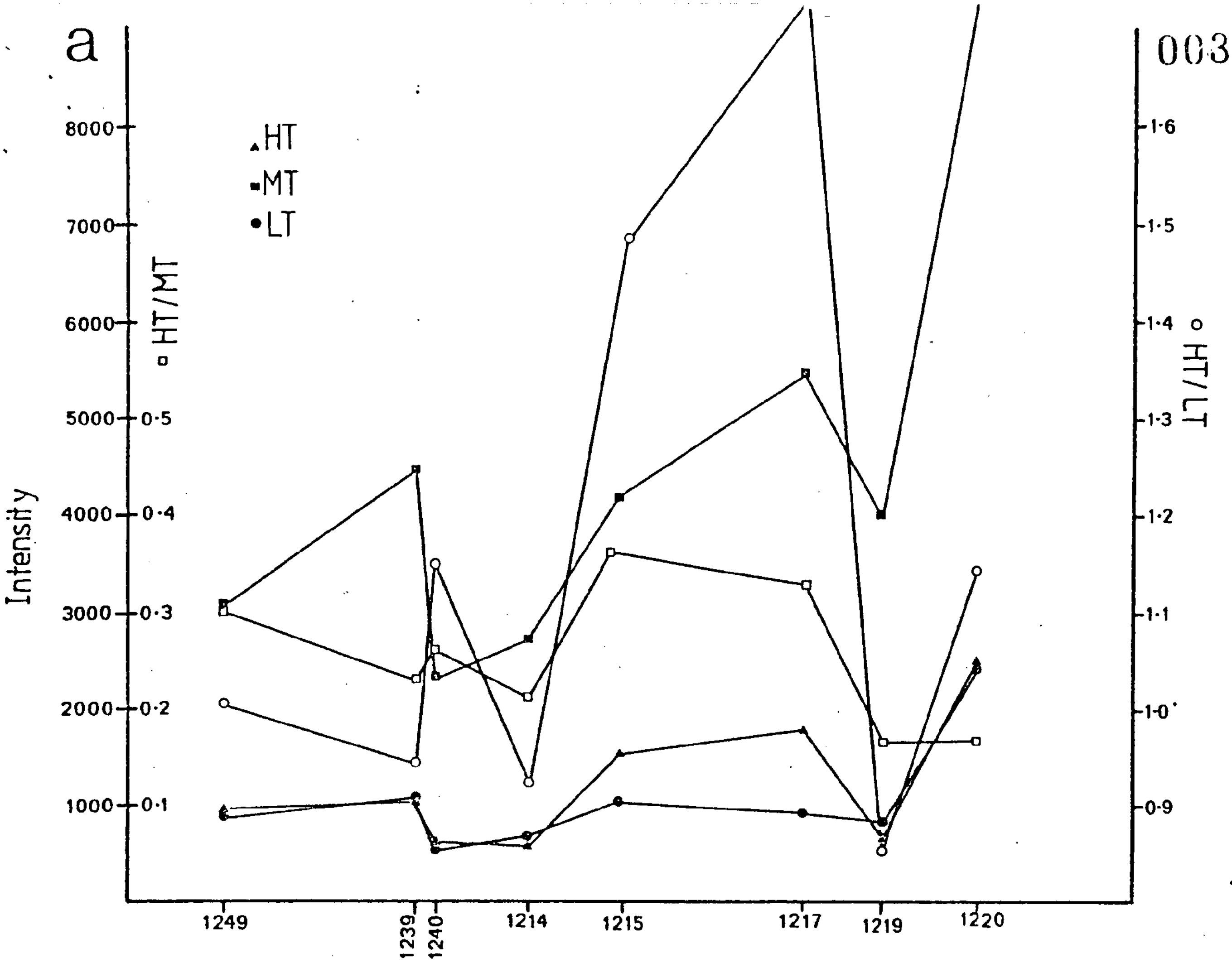


FIG.5

Frequency histogram for Eocene channel sands



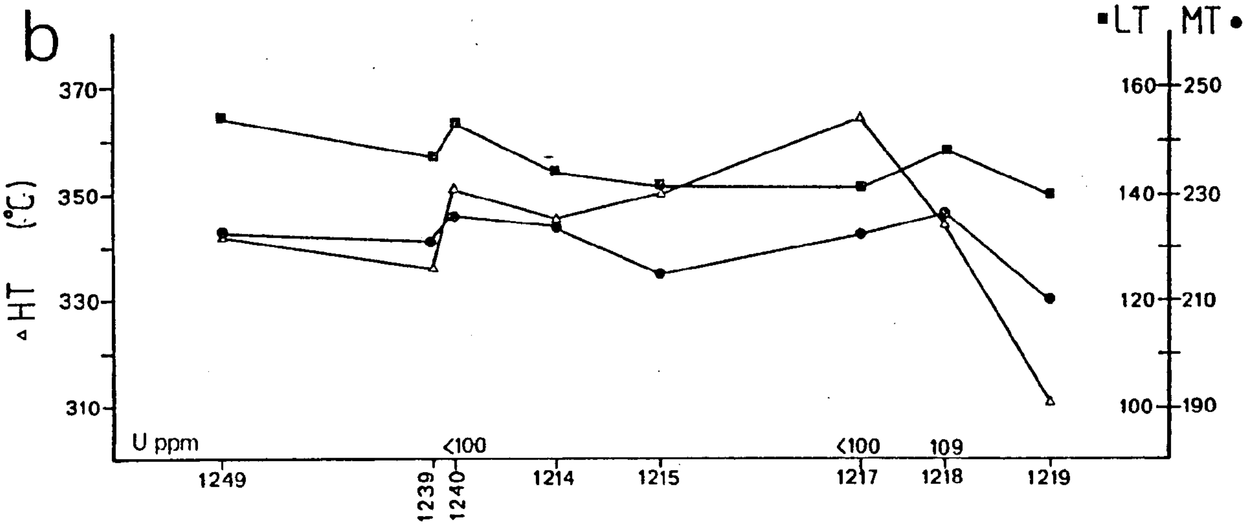


FIG.6 Results for Traverse B-B'

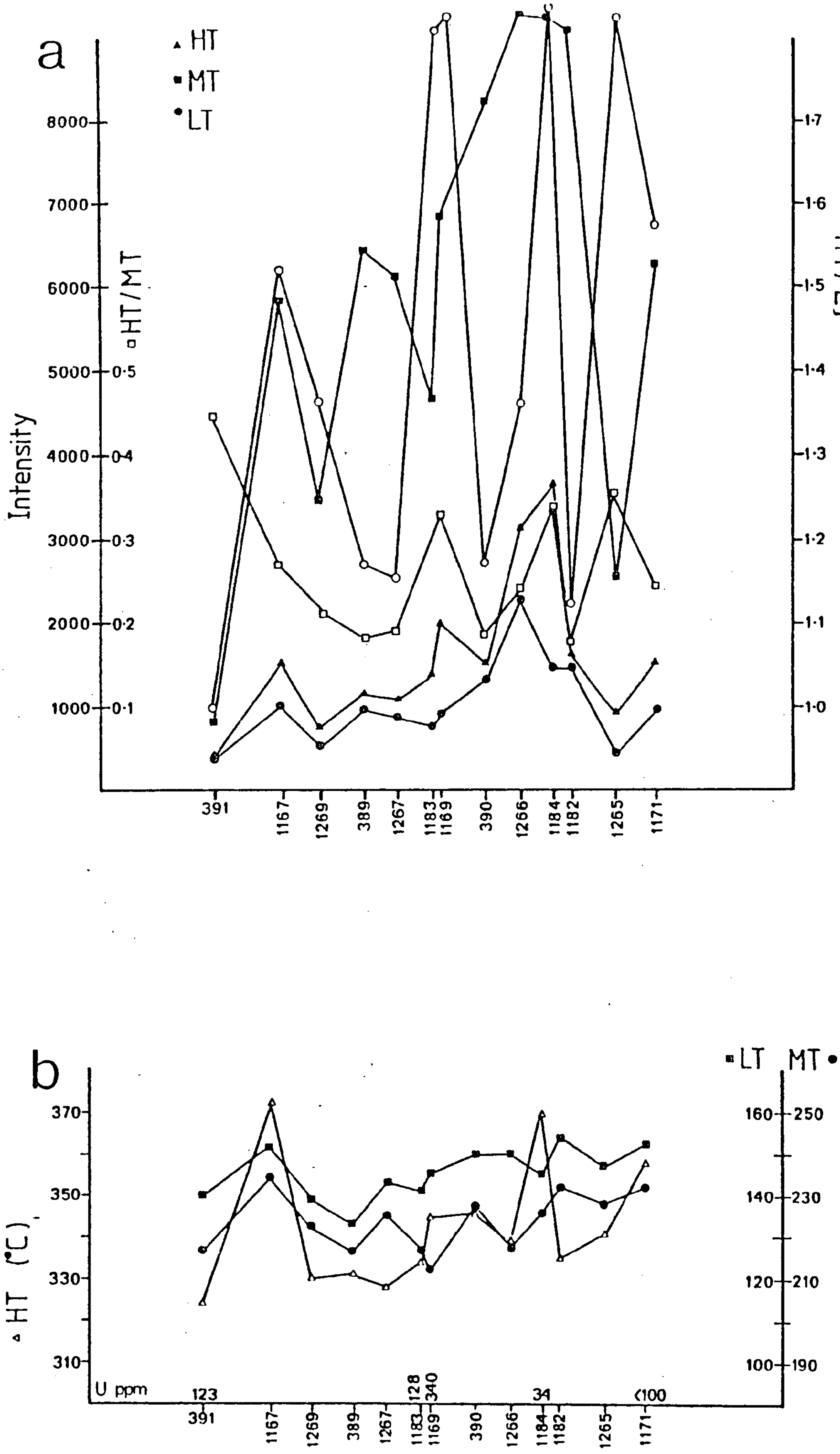
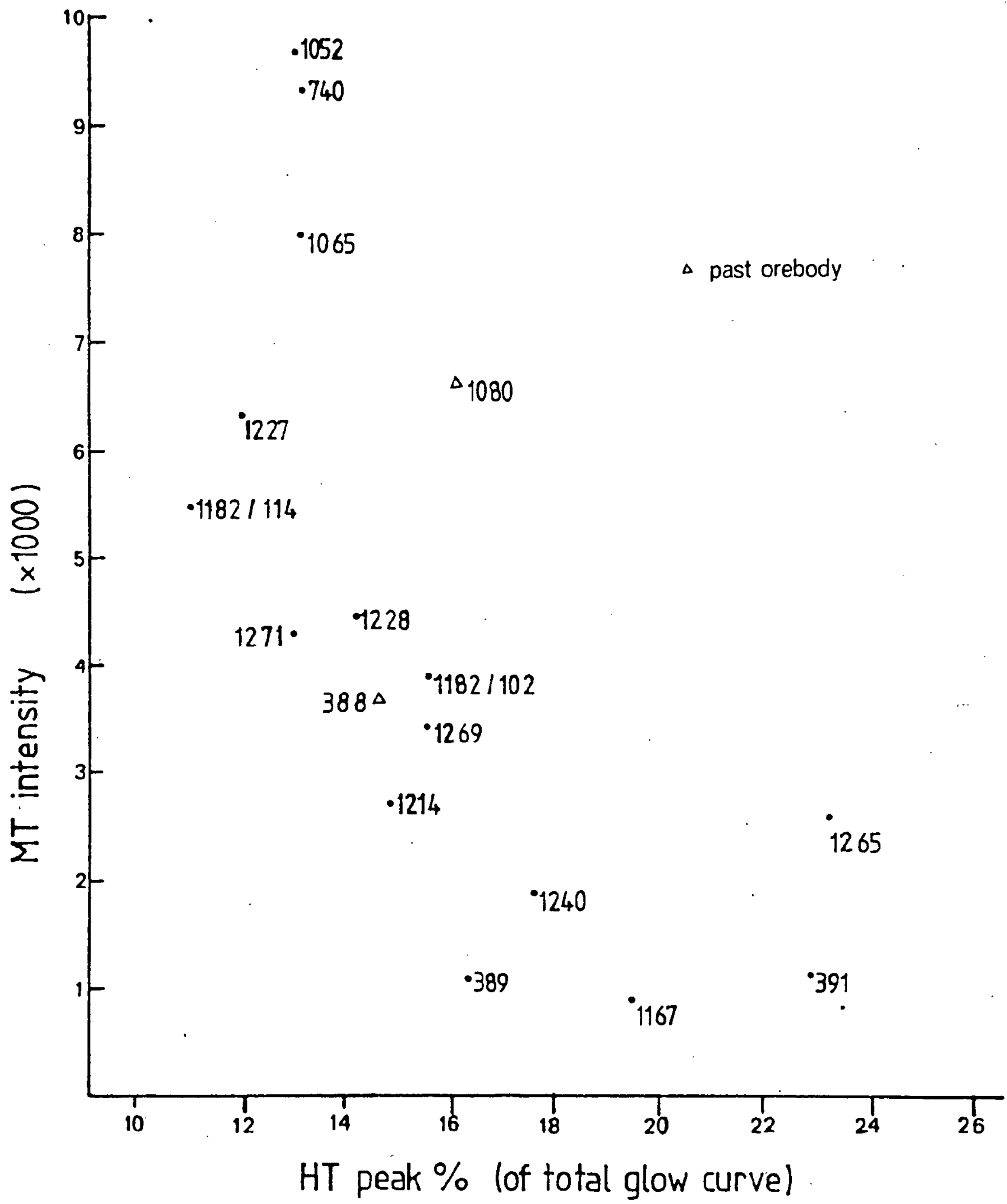
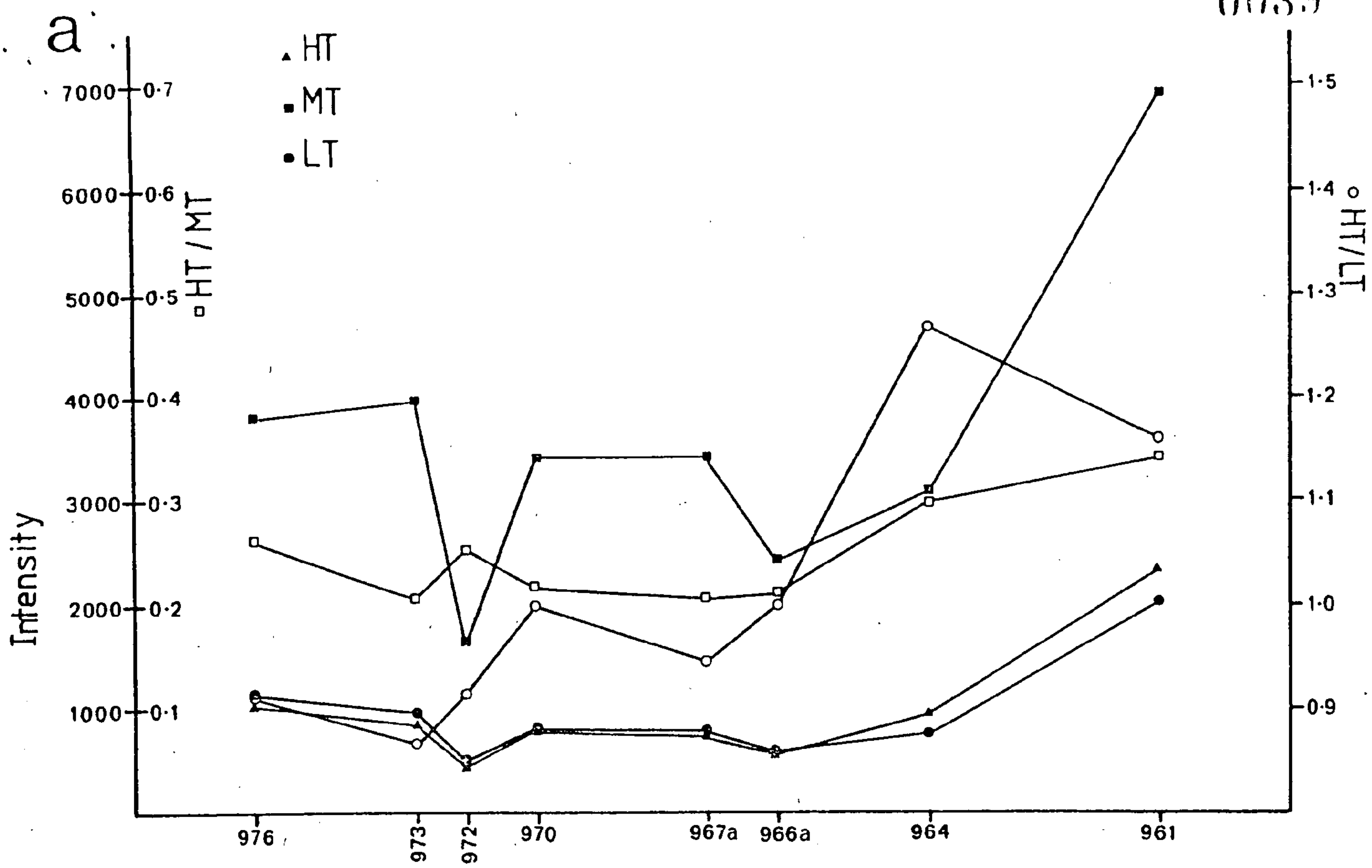


FIG.7 Results for Traverse C-C'

FIG.8 Longitudinal Traverse for Main Palaeochannel





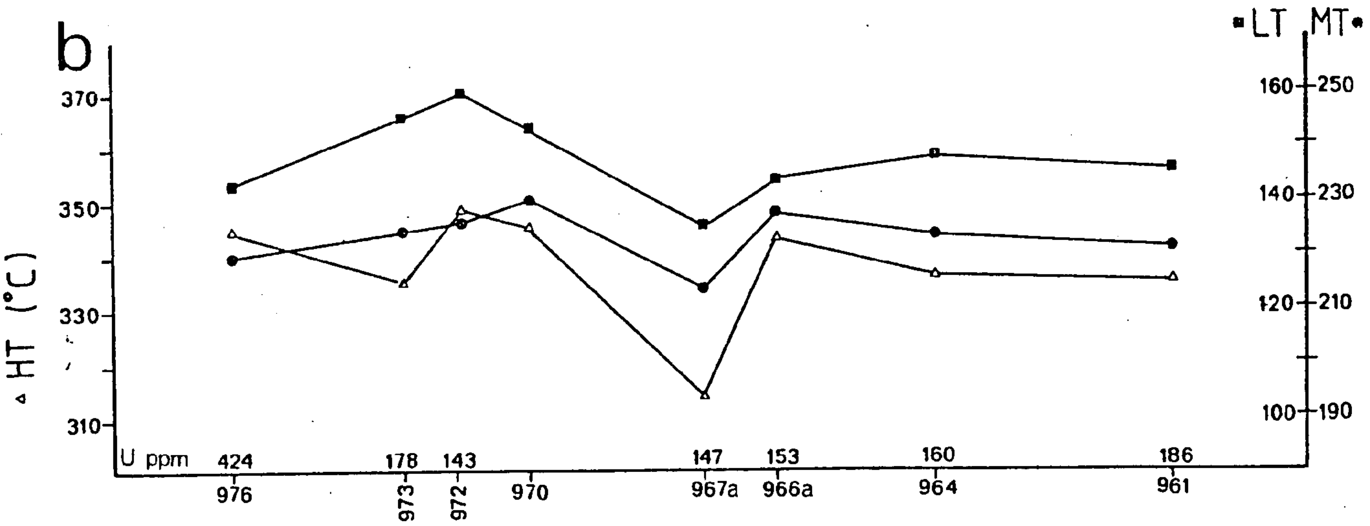


FIG.9 Results for Traverse E-E'

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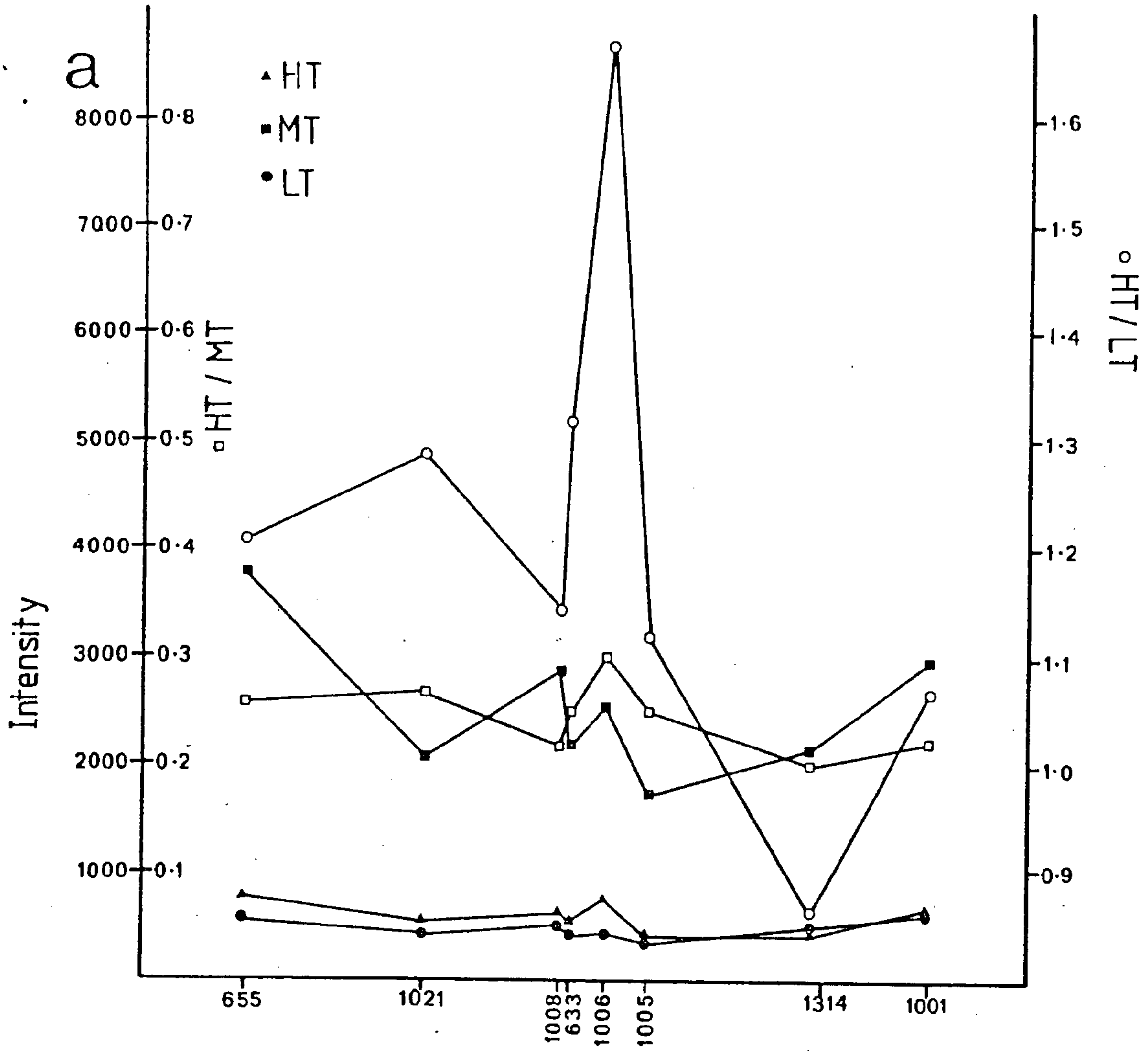


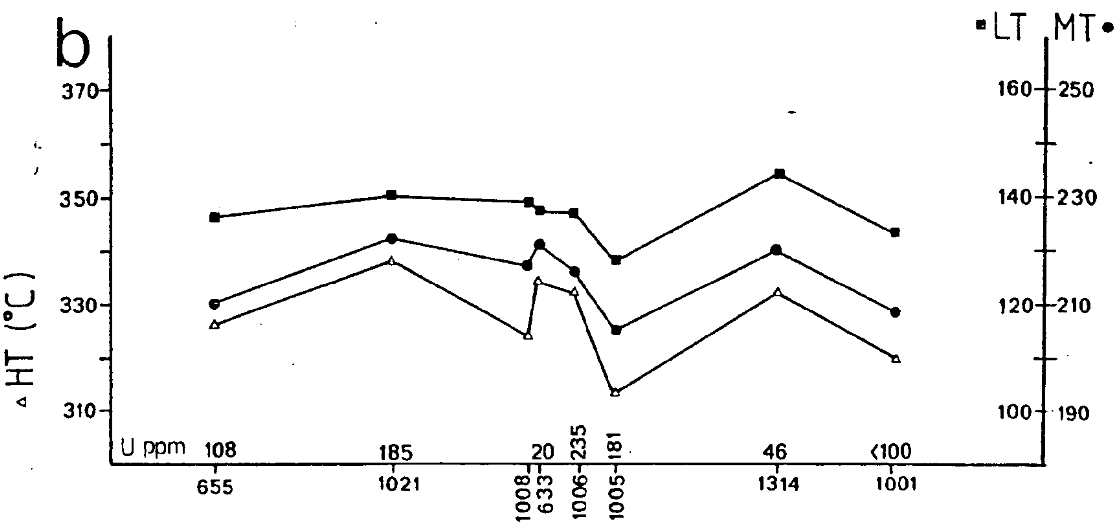


FIG. 10 Results for Traverse G-G'

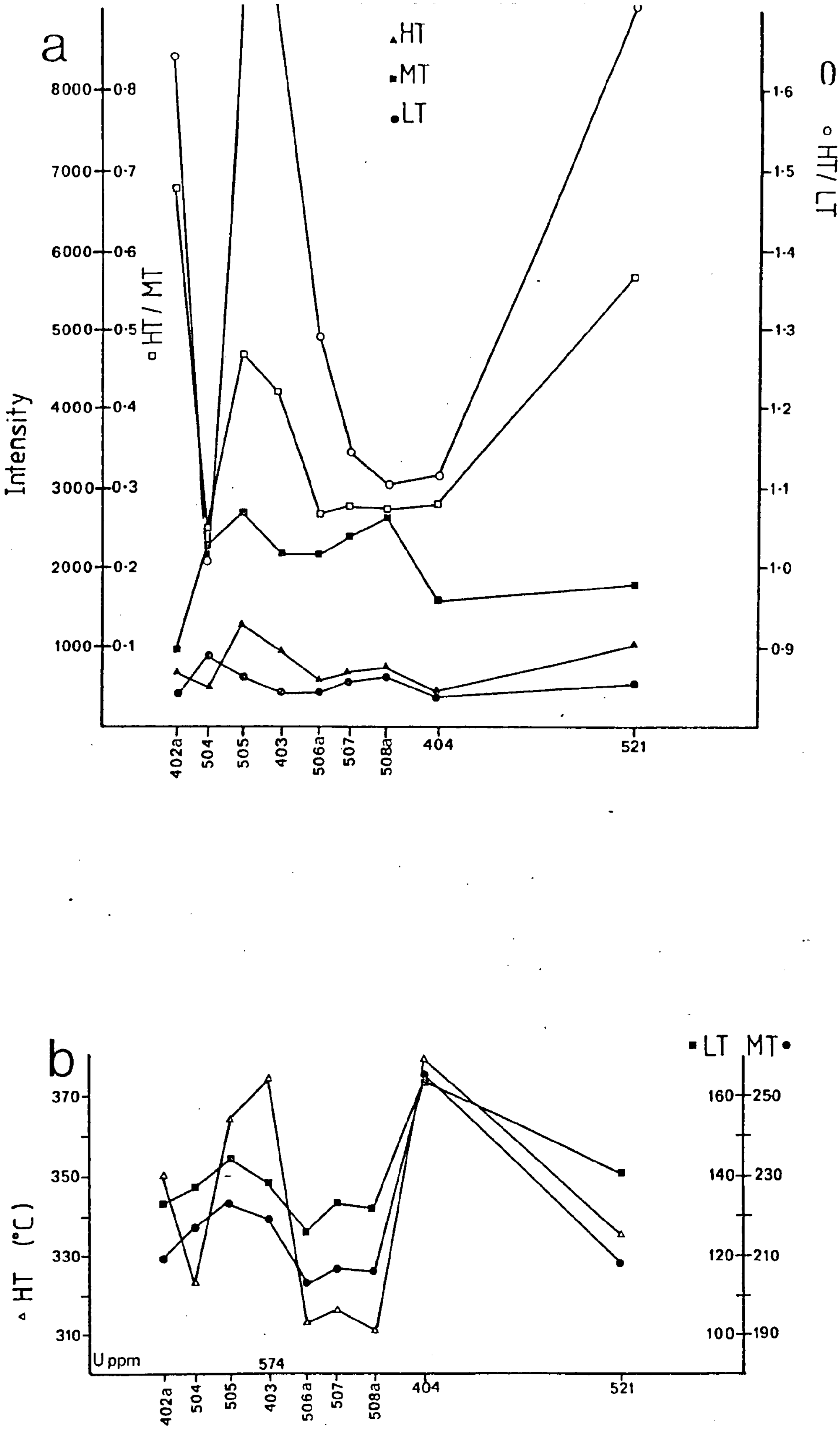
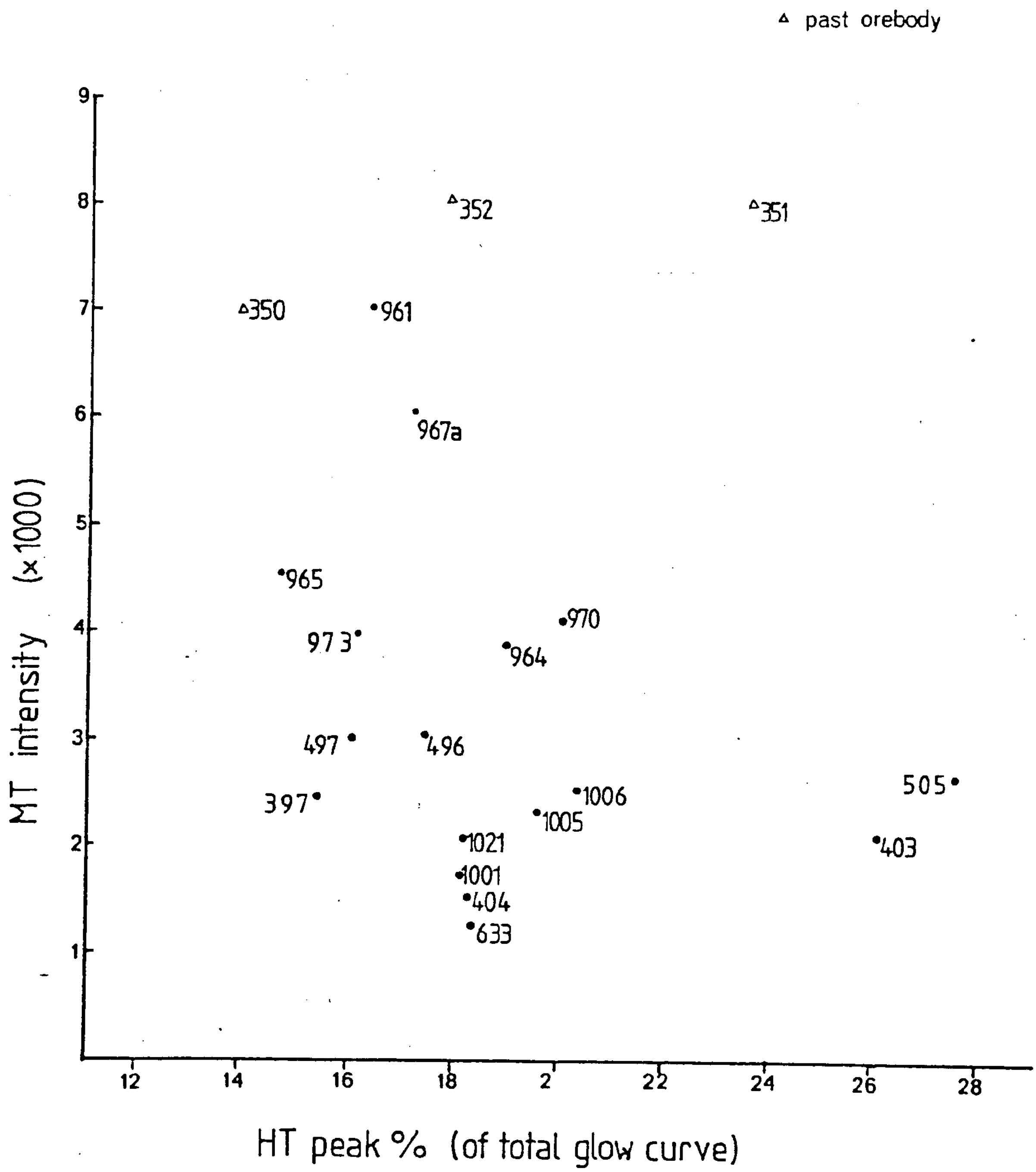


FIG.11 Results for Traverse H-H'

FIG. 12 Longitudinal Traverse for NNE-trending tributary



6. BASEMENT STUDY

6.1 Introduction

The use of TL is not confined to exploration and targeting of uranium mineralization. Application of TL to stratigraphic and palaeogeographic studies (Charlet,1971) has greatly enhanced delineation of subsurface geology and aids provenance determination Another important application concerns geothermal energy systems and the possible extraction of geothermal heat from anomalous high heat flows for electricity generation. Following a proposal by Ypma & Hochman (1984), study of abnormal heat flows within South Australia was instigated. This work has important ramifications for coal and hydrocarbon maturation in the Cooper Basin.

Classification of abnormal heat flows can be divided into two source types; (1) magmatic heating due to recent intrusive activity, and (2) radiogenic heating by U-rich granites. The location of a anomalous high-heat production zone (ranging from 3.3-19.5 HGU) near Wudinna (Sass et al,1976) and lack of recent magmatic activity on Eyre Peninsula implies a possible radiogenic heat source. Additional factors such as the known occurrence of the radiogenic Hiltaba Granite in this region and a general lack of basement data suggest the need for a detailed study by TL techniques.

Previous geological investigations of the Archaen-Proterozoic basement southwest of the Gawler Ranges have been hindered by an extensive cover of Quaternary-Recent alluvium. Interpretation was based on a small number of isolated outcrops and correlations with the well exposed eastern side of Eyre Peninsula. Blisset (1977) proposed large areas were underlain by Hiltaba Granite. Petrological analysis (Binks & Hooper,1984) revealed non-foliated granites thought to be Hiltaba Granite, with foliated granitic gneisses of the Lincoln Complex forming the palaeochannel basement. This led to their suggestion that the palaeochannel was preferentially developed in the less competent gneissic basement.

Experimental TL methods were applied to 41 basement samples collected along the previously noted traverses (see Appendix 1).

6.2 Results

TL measurement of samples resolved two distinct glow curves. These can be classified as;

(1) radiogenic type, with large MT intensity and proportionally increased HT intensity typical of major radiation damage (see Fig.13a).

(2) early Proterozoic type, dominated by a LT peak indicating little or no radiation damage (see fig.13b).

When the radiogenic type samples are plotted on MT intensity vs. HT peak % graphs, the variable intensity of cumulated sensitization within the Hiltaba granite can be observed (Fig.14).

Samples that exhibited increased sensitization (ie. decreased MT and LT intensities with high HT peak %) were studied to determine their relative position to uraniferous channels. Results were mixed with samples IR1206,401,420,1168,349 and 498 all related to basement 'highs' within channels or channel sides, while IR353 and IR1072 are located in shallow tributaries. One feature of these samples is their exposure or close proximity to oxidising conditions found within Pliocene sands. The exception (IR403) occurs at deeper levels in the NNE-trending tributary between early Proterozoic samples.

Overall there seems to be no geographical correlation between these anomalous Hiltaba Granite samples and the Yarranna prospects. Possible reasons for increased sensitization may be either higher uranium concentrations and/or longer residence time, the accumulation of uranium near granite margins by hydrothermal activity or that some parts of the Hiltaba Granite have had higher uranium concentrations.

Early Proterozoic TL responses show a lack of radiation damage with resultant large LT intensities overshadowing all other peaks (Fig.15). Exceptions (IR497,1167) show a relatively larger HT intensity which may be due to differences in lithology within the Lincoln Complex, the migration of uranium from bottom channel sands, or metamorphic effects that occurred during granite intrusion. All early Proterozoic samples are located within deeper sections of the palaeochannels but there was not enough data to corroborate Binks & Hooper'(1984) suggestion of preferential development within these rock types.

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6.3 Microscope Investigation (Appendix 6)

Microscope study of basement samples has identified five major quartz types; (1) monocrystalline or clear, (2) saccharoidal (3) milky, (4) smoky grey-yellow, and (5) iron stained.

Subdivision of basement results into two separate classes dominated by either monocrystalline or polycrystalline quartz was analogous to TL glow curves ie. radiogenic type is characterised by monocrystalline (unstressed) quartz while early Proterozoic samples have a high percentage of saccharoidal quartz. The presence of iron-stained quartz is probably due to drillhole contamination but seems to have no effect on TL responses.

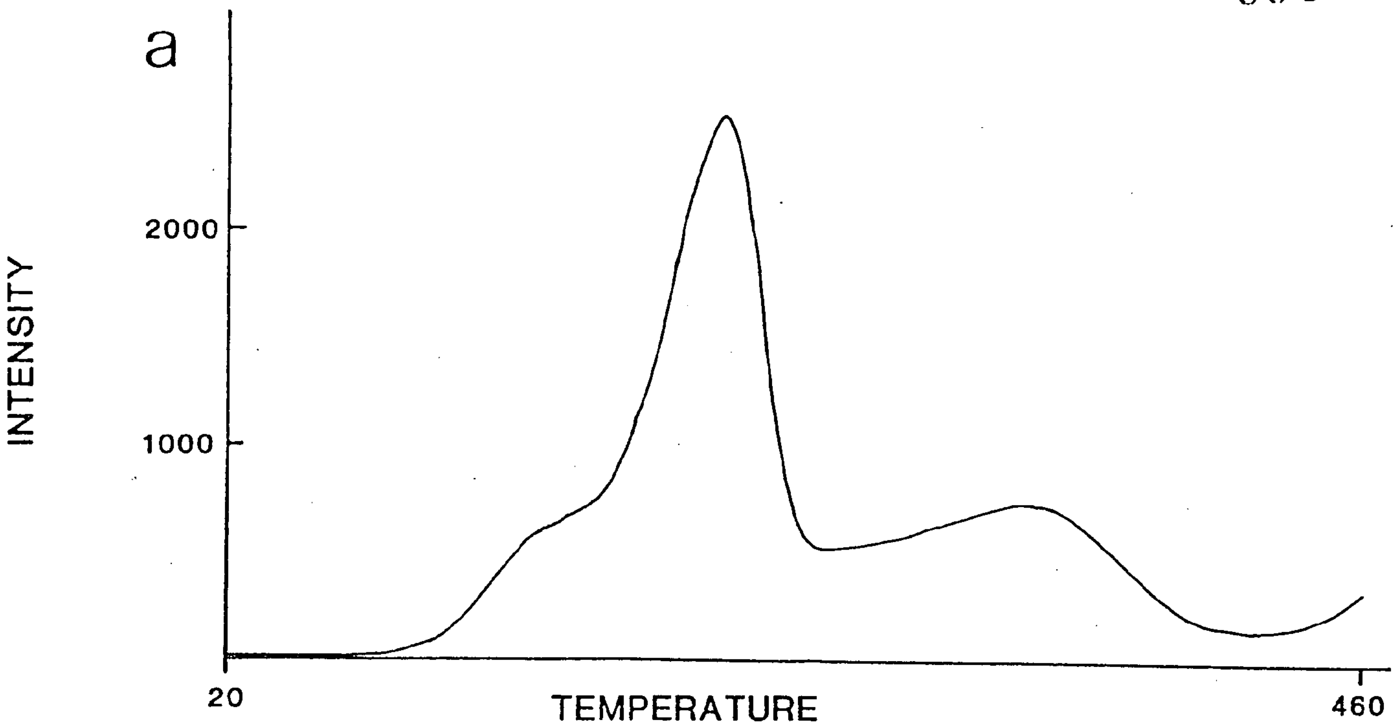
6.4 Discussion

Results show the Hiltaba Granite has suffered major radiation damage. According to Durrani et al(1977b) total radiation dose needed to cause this damage is in the order of $2\times10^{8}-10^{9}$ rads. This total dose can be calibrated to the equivalent ppm U by the equation; total dose $(\alpha+\beta+\gamma)$ = age x dose rate/yr x ppm U

The age of the Hiltaba Granite has been set at 1478±38 Ma (Webb et al,1982). If 1 ppm U contributes 0.312 rads/yr to the environment then the equivalent U content of the granitoid is approximately 2 ppm. But under geological conditions annealing takes place at low temperatures and a U content of 10 ppm or more is needed to overcome the radiation damage threshold and activate the HT peak (Shekhmametev,1973). Therefore minimum U concentration for the granitoid is 12 ppm. However, if we take into account the less penetrative nature of alpha radiation and only assume gamma radiation, a dose rate of 0.1 rads/yr implies U content greater than 16ppm.

This value compares favourably with previous work on the U content of the Hiltaba Granite. Within Yarranna Grid, Binks & Hooper (1984) obtained an average value of 7 ppm, ranging up to 15 ppm U. Ypma & Hochman(1985) found U contents up to 50 ppm within Hiltaba Granite bedrock.

Early Proterozoic TL responses show very little radiation damage, consistent with a low U content. Earlier work by Hochman (pers.com.) on the Donington Granitoid Suite (2ppm U) within the Lincoln Complex produced a similar response to that in Fig.13b.



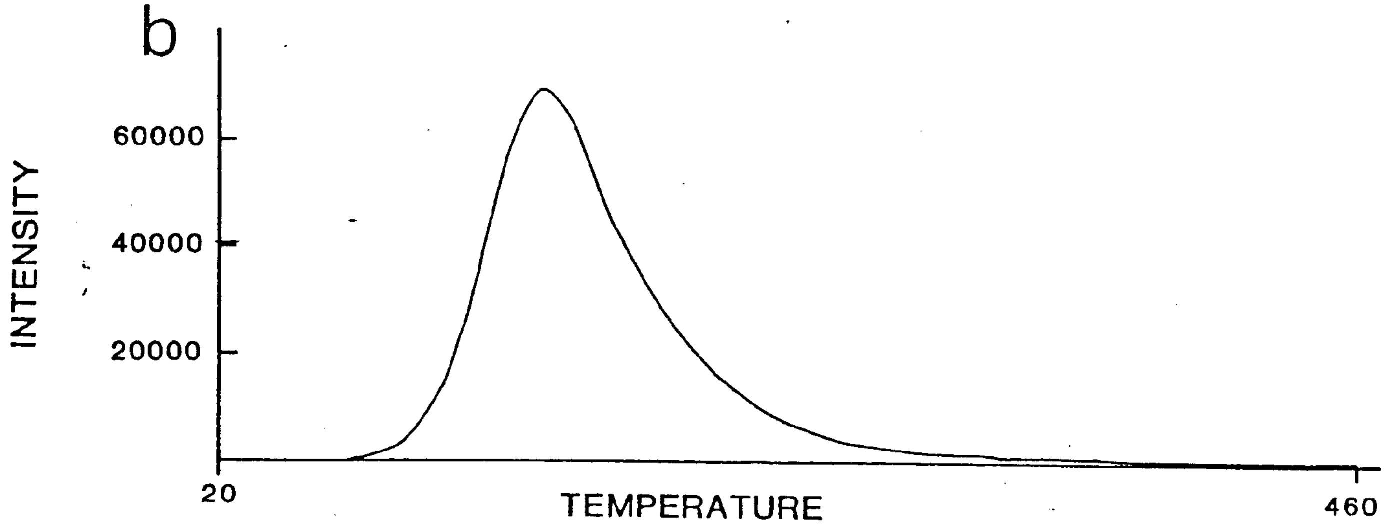


Fig. 13 Typical basement glow curves

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Fig. 14

Hiltaba Granite MT intensity vs. HT peak %

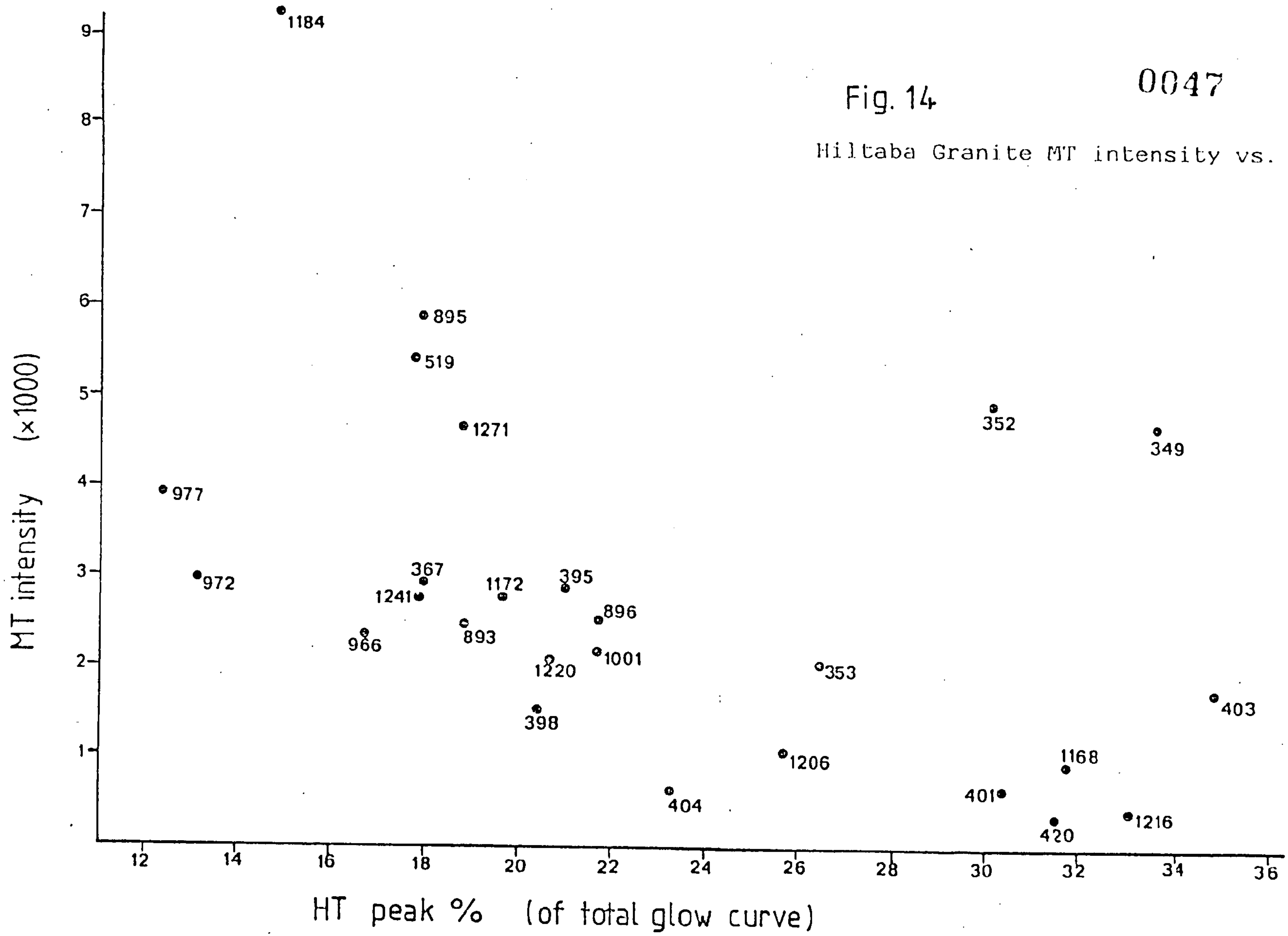
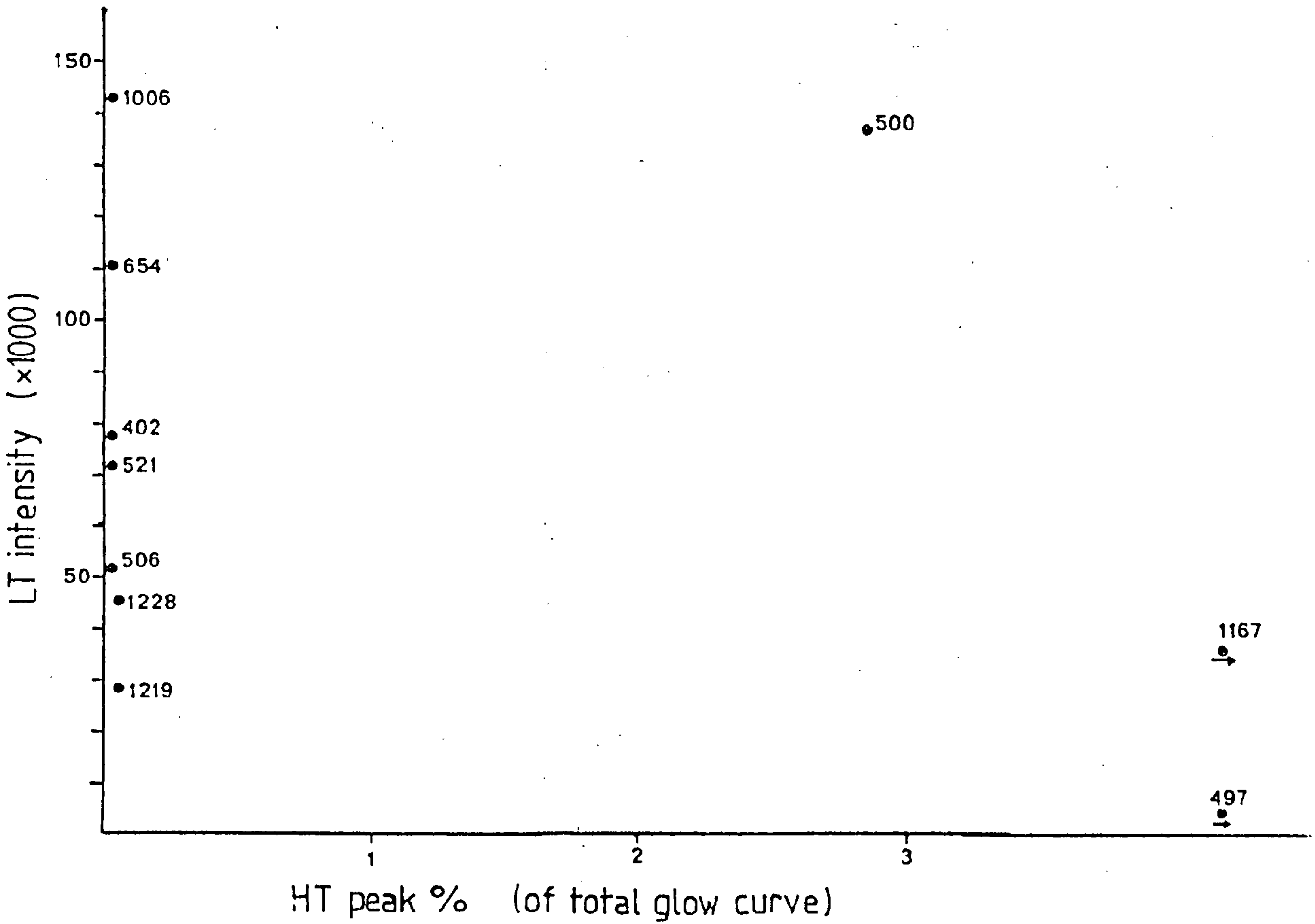


Fig.15 Early Proterozoic LT intensity vs. HT peak %



7. GENESIS OF YARRANNA PROSPECTS

All Eocene sediments within the Narlaby Palaeochannel show TL glow curves consistent with major radiation damage (ie.> 10 ppm U). Microscope analysis of channel sediments (Binks & Hooper,1984) and TL measurements of both channel and basement samples imply this high radiation damage value may be attributed to high inherent uranium concentrations withnin the source rock provenance. It is unlikely that this radiation damage is due to Tertiary uranium concentrations since the small volume and low grade of mineralization would be unable to initiate the radiation threshold or achieve vertical homogenization throughout the channel. Studies of the Hlitaba Granite and GRV (Giles,1980; Ypma & Hochman,1985) show abnormally high U concentrations, and when accompanying previous TL results, indicate the probability that uranium is derived by leaching of the Hiltaba Granite.

Original deposition of fluvial sediments occurred as a response to early Tertiary uplift of the Gawler Block and contemporaneous change to a subtropical palaeoclimate (Wopfner et al,1974). Channel incision and rapid erosion of large volumes of source rock in a originally high energy environment resulted in the release of uranium from refractory minerals (eg.allanite,zircon) A gradual decrease in hydrological gradient caused the deposition of an upward fining sequence with abundant plant material in a swamp-like environment (Giblin,1985). Decay of this plant material produced reducing conditions and the precipitation of diagenetic pyrite.

Transport of uranyl complexes by acidic groundwaters during this fluvial cycle is thought to be by fluorine or hydroxide complexes (Langmuir,1978; Giblin,1985). Retention of original uranium concentrations within the Eocene sequence is by carbonaceous complexing or clay adsorption (Binks & Hooper,1984;Giblin,1985)

Remobilization of uranium occurred as a result of oxygenated Pliocene channels incising the underlying Eocene sequence. These meteoric waters contained a small %U in solution leached from the hinterland but most uranium is likely to be dissolved from the host Eocene sands. Movement of oxidising solutions through the uraniferous Eocene sands resulted in accretionary build up of uranium concentrations as seen by TL sensitization trends.

Precipitation of uranium from oxidised solutions occurs at reducing interfaces (eg.clay bands) or by lateral migration into less permeable, marginal sands.

Narlaby Palaeochannel mineralization can be characterised by a two stage U enrichment process; (1) original U accumulation by mechanical stream processes and carbonaceous complexing, and (2) remobilisation of U by oxidised Pliocene solutions (ie. causing accretionary migration).

The relatively low grade of mineralization at Yarranna prospects, as compared to Beverley, Honeymoon etc., could be due to the large areal extent of the permeable "Upper Sand" unit with a lack of impermeable barriers to restrict lateral movement. Dissolution by acidic groundwaters (Giblin,1985) is another feature that may have inhibited deposition of economic ore grades.

8. CONCLUSIONS

(1) TL has detected increasing radiation effects down the Narlaby palaeochannels toward Yarranna Grid and it's prospects.

(2) This trend is indicative of accretionary buildup and migration of uranium.

(3) Accretionary mechanism controlled by Pliocene channel location ie. zones of maximum radiation damage.

(4) All channel sands have undergone major radiation effects due to high inherent damage within source rock ie. Hiltaba Granite, not as a result of Tertiary mineralization.

(5) High inherent damage has obscured both radiation damage due to present uranium accumulation and any vertical trends within the Eocene sequence.

(6) Differences in sensitization found within the Hiltaba Granite indicate the variable U content within the granitoid.

(7) Multi-stage U enrichment within the Narlaby Palaeochannel
   a. Original U deposition by stream processes and fixation by carbonaceous complexing.
   b. Remobilization by oxidising Pliocene solutions.

(8) Low grade mineralization is a result of the large areal extent of Eocene sands, lack of impermeable barriers and possible dissolution by acidic groundwaters.

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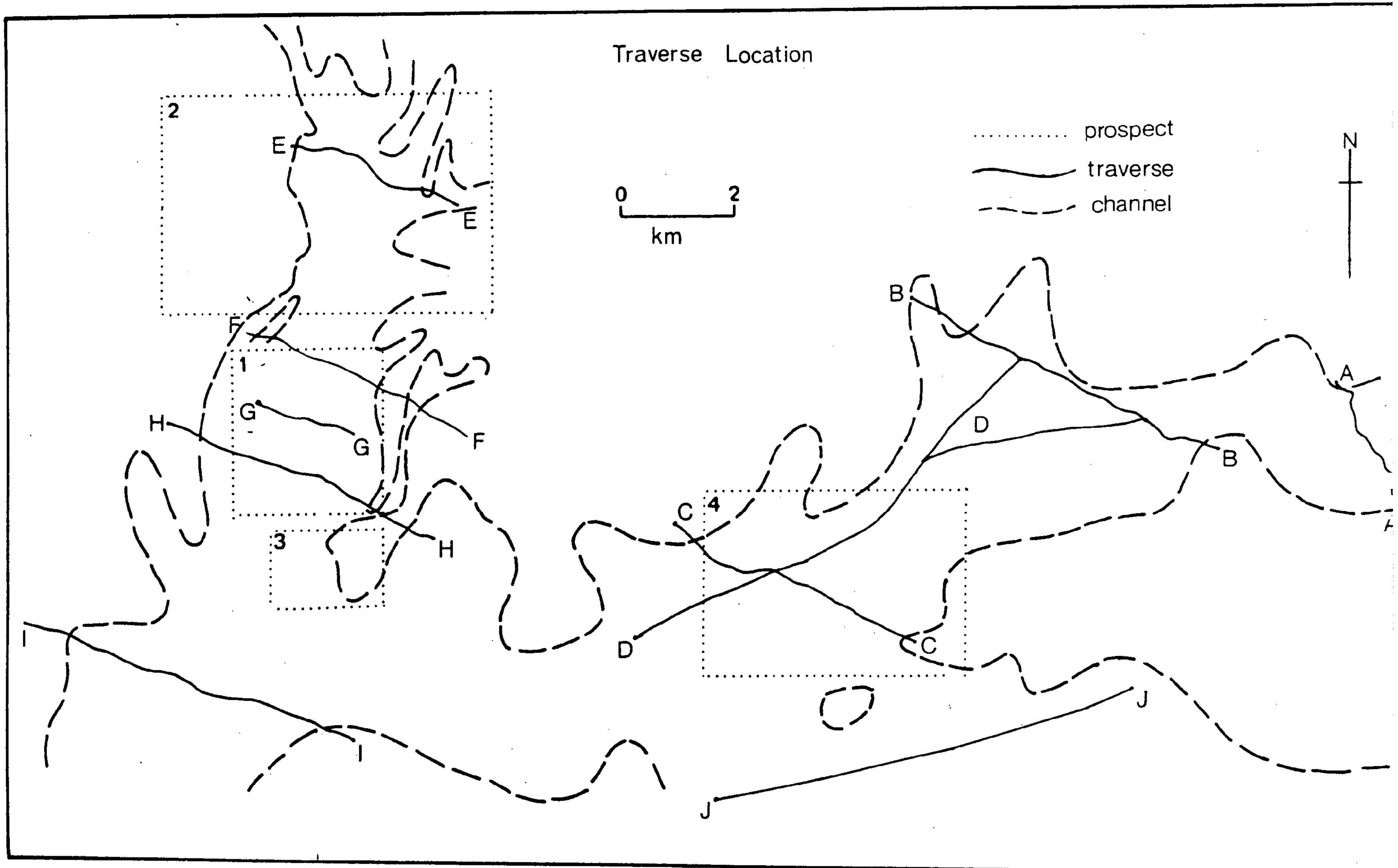
APPENDIX 1

Traverse and Drillhole Locality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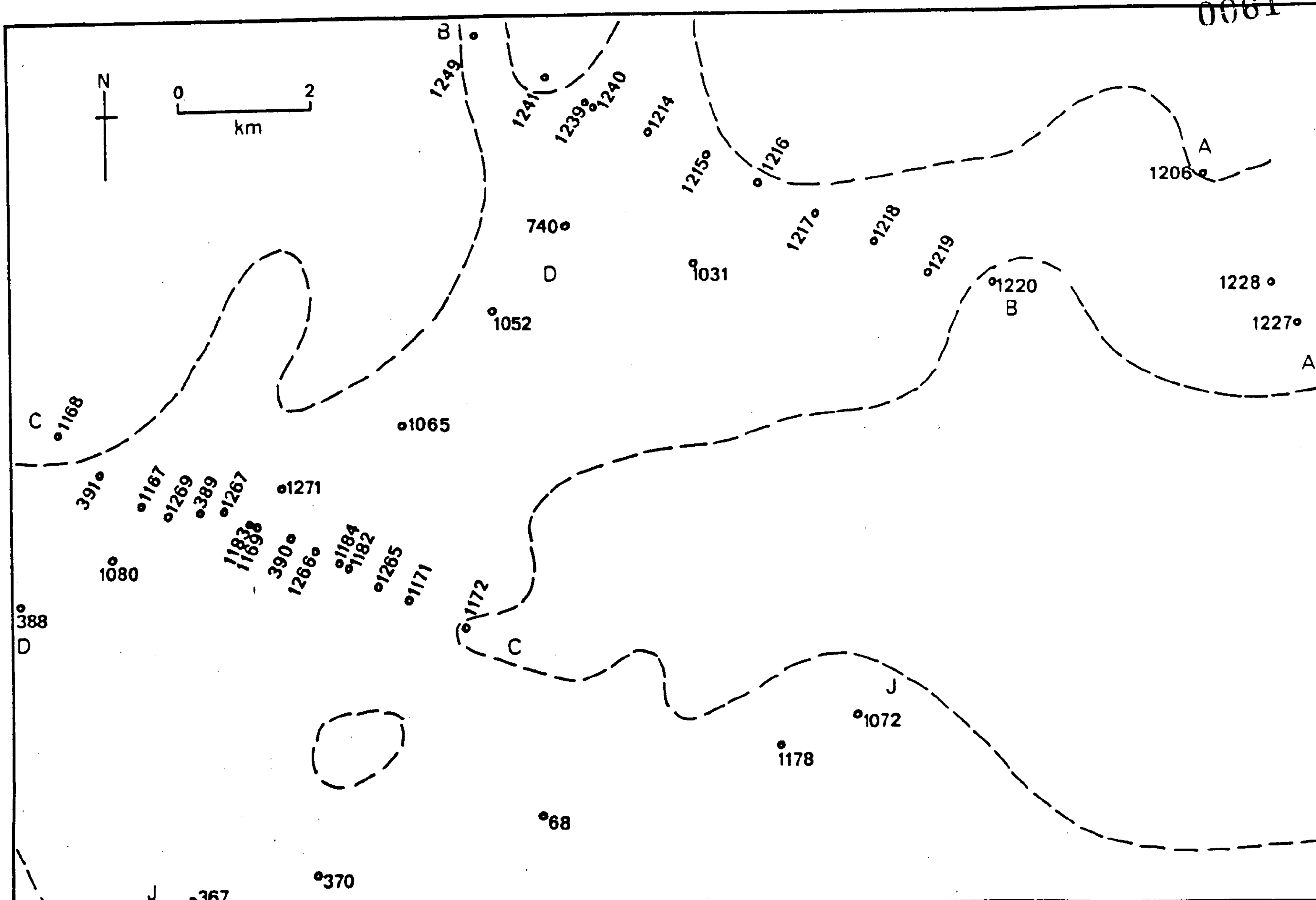
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1220
B
1228
1227
A
1052
C
1168
1065
391
1167
1269
389
1267
1271
1080
390
1266
1184
1182
1265
1171
1172
388
D
C
J
1072
1178
68
370
J
367

APPENDIX 2

Sample Description

Traverse A-A'

Drillhole	Interval	Description	Ox	Red	Mineral (ppm)
1227	70-72	E.sand		*	
	94-96	basal E.		*	
1228	66-68	E.sand		*	
	114-116	granite			
1206	10-12	granite			

Traverse B-B'

Drillhole	Interval	Description	Ox	Red	Mineral (ppm)
1249	60-62	E.sand	*		
1241	60-62	granite			
1239	54-56	E.sand	*		
1240	58-60	+6 above	*		
	64-66	mineral.	redox		<100
	70-72	-6 below		*	
1214	60-62	E.sand	*		
	94-96	basal E.		*	
1215	66-68	E.sand		*	
1216	78-80	granite			
1217	82-84	E.sand	*		
1218	72-74	E.sand	*		
	84-86	mineral.		*	109
	90-92	-6 below		*	
	114-116	basal E.		*	
1219	76-78	E.sand	*		
	88-90	granite			
1220	14-16	granite			

Traverse C-C'

Drillhole	Interval	Description	Ox	Red	Mineral (ppm)
1172	90-92	granite			
1171	108-110	+6 above		*	
	114-116	mineral.		*	<100
	120-122	-6 below		*	
	158-160	basal E.		*	
1265	94-96	E.sand		*	
	150-162	basal E.		*	
1182	102-104	+6 above	*		
	108-110	mineral.	redox		34
	114-116	-6 below		*	
	124-126	basal E.		*	
1184	106-108	E.sand	*		
	136-138	granite			
1266	108-110	E.sand	*		
390	98-100	+6 above	*		
	110-112	-6 below		*	
	124-126	basal E.		*	
1169	88-90	+6 above	*		
	94-96	mineral.	*		340
	100-102	-6 below	redox		115
1183	90-92	mineral.		*	128
	96-98	-6 below		*	
	124-126	basal E.		*	
1267	84-86	E.sand	*		
	92-94	E.sand	redox		
	98-100	mineral.(basal)			<100
389	84-86	E.sand		*	
	98-100	basal E.		*	
1269	82-84	E.sand		*	
1167	68-70	E.sand	*		
	98-100	E.sand		*	
	112-114	granite			
391	80-82	+6 above	*		
	86-88	mineral.	redox		123
	92-94	-6 below		*	
	94-96	basal E.		*	

1168	56-58	granite
	60-62	granite

Traverse D-D'

Drillhole	Interval	Description	Ox	Red	Mineral
388	76-78	E.sand	*		
	88-90	E.sand		*	
	116-118	granite			
1080	60-62	+6 above	*		
	66-68	mineral.	redox		125
	86-88	basal E.		*	
1267	done in traverse C-C'.				
1271	84-86	E.sand		*	
	108-110	granite			
1065	98-100	E.sand	*		
	104-106	E.sand		*	
	124-126	granite			
1052	74-76	E.sand	*		
	84-86	E.sand		*	
	124-126	basal E.		*	
740/1166	66-68	+6 above	*		
	72-74	mineral.	redox		228
	78-80	-6 below		*	
1214	as done in traverse B-B'.				
1031	78-80	E.sand	*		
	124-126	basal E.	*		
1218	as done in traverse B-B'.				

Traverse E-E'

Drillhole	Interval (m)	Description	Ox	Red	Mineral. (gamma log) (ppm)
977	82-84	granite			
976	76-78	+6 above	*		
	82-84	mineral.		*	424
	88-90	-6 below		*	
	96-98	basal E.			
973	82-84	+6 above	*		
	88-90	mineral.	*		178
	94-96	-6 below	*		
	124-126	basal E.			
972	108-110	+6 above		*	
	114-116	mineral.		*	143
	120-122	-6 below		*	
	130-132	basal E.		*	103
	138-140	granite			
970	96-98	+6 above	*		
	102-104	mineral.	*		544
	108-110	-6 below	redox		
	138-140	basal E.		*	
968	124-126	basal E.		*	
967A	90-92	+6 above		*	
	96-98	mineral.		*	147
	102-104	-6 below		*	
966A	62-64	+6 above	*		
	68-70	mineral.	*		
	74-76	-6 below	*		
	96-98	E.sand		*	
	130-132	granite			
965	98-100	E.sand		*	
964	72-74	+6 above	*		
	78-80	mineral		redox	160
	84-86	-6 below		*	
961	66-68	+6 above	*		
	72-74	mineral.	*		186
	78-80	-6 below	*		
	92-94	basal E.		*	

Traverse F-F'

Drillhole	Interval	Description	Ox	Red	Mineral
896	96-98	E.sand	*		
	106-108	basal E.		*	
	108-110	granite			
895	98-100	granite			
894	94-96	E.sand		*	
	120-122	basal E.		*	
893	96-98	E.sand		*	
	112-114	granite			
398	98-100	granite			
496	88-90	E.sand		*	
	94-96	E.sand		*	
	128-130	basal E.		*	
497	68-70	E.sand	*		
	86-88	E.sand	*		
	92-94	granite			
397	78-80	E.sand		*	
	92-94	basal E.		*	
498	68-70	E.sand	*		
	80-82	granite			
500	66-68	granite			
395	40-42	granite			

Traverse G-G'

Drillhole	Interval	Description	Ox	Red	Mineral
655	68-70	E.sand	*		
654	124-126	basal E.		*	
	132-134	granite			
1021	60-62	+6 above	*		
	66-68	mineral.	*		185
	72-74	-6 below	*		
1008	78-80	E.sand	*		
	124-126	basal E.			
633	64-66	+6 above	*		

	70-72	mineral.	*		20
	76-78	-6 below	*		
1006	72-74	E.sand		*	
	130-132	granite			
1005	66-68	+6 above			
	72-74	mineral.			
	78-80	-6 below			
1314	77-78	E.sand		*	46
1001	74-76	+6 above		*	
	80-82	mineral.		*	
	86-88	-6 below		*	
	114-116	basal E.		*	
	118-120	granite			

Traverse H-H'

Drillhole	Interval	Description	Ox	Red	Mineral
401	80-82	granite			
402a	84-86	E.sand		*	
	98-100	granite			
504	64-66	E.sand	*		
	78-80	E.sand	*		
505	64-66	E.sand	*		
	82-84	E.sand		*	
403	68-70	+6 above		*	
	74-76	mineral.		*	574
	80-82	-6 below		*	
	106-108	basal E.		*	
	114-116	granite			
506a	78-80	E.sand		*	
	134-136	basal E.		*	
	140-142	granite			
507	90-92	E.sand		*	
	126-128	basal E.		*	
508a	88-90	E.sand		*	
404	80-82	E.sand		*	
	96-98	basal E.		*	
	106-108	granite			
519	50-52	granite			
521	70-72	E.sand		*	
	80-82	granite			

Traverse I-I'

Drillhole	Interval	Description	Ox	Red	Mineral (ppm)
420	60-62	w.granite			
353	80-82	+6 above	*		
	86-88	mineral.		*	<100
	92-94	-6 below		*	
	98-100	granite			
352	100-102	E.sand		*	
	124-126	granite			
351	80-82	E.sand		*	
	100-102	E.sand		*	
	138-140	basal E.		*	
350	98-100	basal E.		*	
349	72-74	granite			

Traverse J-J'

Drillhole	Interval	Description	Ox	Red	Mineral
367	72-74	basal E.		*	
	80-82	granite			
370	78-80	E.sand		*	
68	64-66	E.sand		*	
	90-92	basal E.		*	
1178	58-60	E.sand		*	
1072	80-82	granite			

E.sand = 'Upper' Eocene sand unit

basal E = basal Eocene sand

+6 above = sample six metres above mineralization

mineral. = mineralized sample

-6 below = sample six metrés below mineralization

APPENDIX 3

Sample Preparation and Measurement

Appendix 3

Sample Preparation and Measurement

a. PREPARATION

1. Collect approx. 5g from selected drill cuttings.
2. Crush grains, using disc grinder, to less than 1mm.
3. Sieve to collect mesh size # -30+150.
4. Wash sample in distilled water, using ultrasonic cleaner to remove dust and clean grains.
5. Wash with acetone and dry in fume cupboard for 20 minutes.
6. Use Frantz No.1 isodynamic magnetic separator to remove any impurities and separate quartz (due to it's diamagnetic properties).
7. Cover to prevent further bleaching by UV light.

Since all drill cuttings have been exposed to natural light, artificial TL has to be applied.

b. MEASUREMENT

1. Place 2g in gelatin capsule.
2. Irradiate in 60 Co source for 140 minutes (total radiation dose of 5 x 105 rads).
3. Remove and cover with aluminium foil to prevent bleaching by UV light.
4. Leave for 24-72 hours to allow phosphorescence to decay.
5. Place 10-16mg on stainless steel disc and spray with silicone lubricant.
6. Place in thermomultiplier.
7. Use standard TL equipment (calibrated to heating rate = 1.23°C/sec) with high-purity nitrogen to prevent chemiluminescence.
8. Measure of total glow curve by integrator (model used was Hewlett-Packard 3380-A).

APPENDIX 4

Absolute Intensity and Intensity Ratios

Intensity Values for Traverse A-A'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
1227	70-72	991	6344	991	.156	1	.156	11.9
	94-96	1291	6616	1775	.268	1.375	.195	18.33
1228	66-68	925	4428	876	.198	.974	.209	14.06
	114-116	45014	-	2165	-	.048	-	.046
1206	10-12	717	1055	612	.58	.854	.68	25.67

Intensity Values for Traverse B-B'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
1249	60-62	882	3085	937	.304	1.062	.286	19.11
1241	60-62	798	2761	777	.281	.974	.289	17.92
1239	54-56	1098	4457	1034	.232	.942	.246	15.69
1240	58-60	1916	2375	891	.375	.465	.807	17.19
	64-66	529	2328	608	.261	1.149	.227	17.55
	70-72	547	1863	513	.275	.938	.294	17.55
1214	60-62	629	2717	579	.213	.921	.232	14.75
	94-96	681	3784	761	.201	1.117	.18	14.56
1215	66-68	1019	4167	1512	.363	1.484	.245	22.57
1216	78-80	302	431	362	.84	1.198	.7	33.06
1217	82-84	894	5451	1787	.328	1.999	.164	21.97
1218	72-74	2030	12457	2584	.207	1.273	.163	15.14
	84-86	808	4121	687	.167	.85	.196	12.23
	90-92	971	5298	1060	.2	1.092	.183	14.46
	114-116	828	6004	1035	.172	1.25	.138	13.16
1219	76-78	2500	17140	2857	.167	1.143	.146	12.7
	88-90	28219	-	1512	-	.054	-	.051
1220	14-16	636	2066	706	.342	1.11	.308	20.72

Intensity Values for Traverse C-C'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
1172	90-92	921	2763	899	.325	.976	.333	19.62
1171	108-110	761	2763	1161	.42	1.526	.275	24.78
	114-116	974	6263	1531	.244	1.572	.156	17.46
	120-122	1141	6930	1467	.212	1.286	.165	15.38
1265	94-96	454	2558	908	.355	2	.177	23.16
	150-152	1123	5099	1076	.211	.958	.22	14.74
1182	102-104	825	3892	865	.222	1.048	.212	15.5
	108-110	1458	9260	1629	.176	1.117	.157	13.19
	114-116	866	5479	776	.142	.896	.158	10.9
	124-126	1001	5916	910	.154	.909	.169	11.63
1184	106-108	1498	10733	3661	.341	2.444	.14	23.04
	136-138	2449	9252	2041	.221	.833	.265	14.85
1266	108-110	2286	12986	3109	.239	1.36	.176	16.91
390	98-100	1325	8212	1545	.188	1.166	.161	13.94
	110-112	1324	7803	1543	.198	1.165	.17	14.46
	124-126	870	5289	870	.164	1	.164	12.38
1169	88-90	936	5618	2135	.38	2.28	.167	24.57
	94-96	1095	6834	2243	.328	2.048	.16	22.05
	100-102	1186	7193	1607	.223	1.355	.165	16.09
1183	84-86	485	3040	858	.282	1.769	.16	19.58
	90-92	764	4671	1401	.3	1.834	.164	20.49
	96-98	927	6049	1214	.201	1.31	.153	14.82
	124-126	690	2714	1143	.421	1.657	.254	25.14
1267	84-86	1240	7018	1427	.203	1.151	.177	14.73
	92-94	1186	7188	1366	.19	1.151	.165	14.02
	98-100	874	6115	1103	.18	1.262	.143	13.63
389	84-86	982	6445	1152	.179	1.173	.152	13.43
	98-100	469	1091	304	.279	.648	.43	16.31
1269	82-84	533	3437	726	.211	1.362	.155	15.46
1167	68-70	1029	5831	1565	.268	1.521	.176	18.58
	98-100	339	881	294	.334	.867	.385	19.42
	112-114	35831	11726	5212	.445	.145	3.056	9.88

391	80-82	328	819	353	.431	1.076	.4	23.53
	86-88	361	807	361	.447	1	.447	23.61
	92-94	408	1122	454	.405	1.113	.364	22.88
1168	56-58	225	940	542	.577	2.409	.239	31.75
	60-62	122	371	313	.844	2.566	.329	38.83
	94-96	518	3279	666	.203	1.286	.158	14.92

Traverse D-D'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
388	76-78	1074	5910	2198	.372	2.047	.182	23.94
	88-90	646	3691	738	.2	1.142	.175	14.54
	114-116	3759	16290	4511	.277	1.2	.231	18.37
1080	60-62	1090	6625	1468	.221	1.347	.165	15.99
	66-68	1598	7241	2597	.359	1.625	.221	22.71
	72-74	627	3054	1468	.481	2.341	.205	28.51
	86-88	406	1572	406	.258	1	.258	17.03
1267	as done in traverse C							
1271	84-86	748	4283	748	.175	1	.175	12.94
	108-110	590	4680	1219	.26	2.066	.126	18.79
1065	98-100	1202	7985	1374	.172	1.143	.151	13.01
	104-106	1420	6873	1237	.18	.871	.207	12.98
	124-126	1810	11118	2499	.225	1.381	.163	16.2
1052	74-76	1490	9689	1656	.171	1.111	.154	12.9
	84-86	1645	6840	4589	.671	2.79	.24	35.1
	124-126	2014	7194	1247	.173	.619	.28	11.93
740/1166	66-68	1518	9322	1626	.174	1.071	.163	13.04
	72-74	983	5085	1239	.244	1.26	.193	16.96
	78-80	566	2579	985	.382	1.74	.219	23.85
1214	as done in traverse B							
1031	78-80	1244	5985	1126	.188	.905	.208	13.48
	124-126	1196	6600	1426	.222	1.222	.181	15.79
1218	as done in traverse B							

Intensity Values for Traverse E-E'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
977	82-84	964	3912	689	.176	.715	.246	12.4
976	76-78	607	2978	825	.277	1.36	.204	18.7
	82-84	1136	3802	1037	.273	.913	.298	17.36
	88-90	231	1137	323	.284	1.398	.203	19.1
	96-98	1363	6582	1693	.257	1.242	.207	17.57
973	82-84	833	3521	892	.253	1.071	.237	17
	88-90	979	3968	847	.213	.865	.247	16.15
	94-96	1744	3846	1321	.343	.757	.453	19.19
	124-126	1144	4378	1045	.239	.913	.261	15.9
972	108-110	537	1790	492	.275	.916	.3	17.45
	114-116	458	1647	418	.254	.913	.278	16.57
	120-122	644	1997	612	.306	.95	.322	18.81
	130-132	1118	3289	965	.293	.863	.34	17.96
	138-140	1349	2976	655	.22	.486	.453	13.15
970	96-98	931	5392	1520	.282	1.633	.173	19.38
	102-104	802	3436	802	.236	1	.236	15.91
	108-110	1152	4115	1317	.32	1.143	.28	20.
	138-140	892	4459	981	.22	1.1	.2	15.49
968	124-126	1012	4004	968	.242	.956	.253	16.18
967A	90-92	1455	6061	1556	.257	1.069	.24	17.15
	96-98	779	3434	736	.214	.945	.227	14.87
	102-104	696	2899	676	.233	.971	.24	15.83
966A	62-64	836	3762	794	.211	.95	.222	14.73
	68-70	550	2420	550	.227	1	.227	15.63
	74-76	726	2673	693	.259	.955	.272	16.94
	96-98	602	2384	972	.408	1.615	.253	24.56
	130-132	537	2334	578	.248	1.076	.23	16.76
965	98-100	899	4532	936	.207	1.041	.198	14.7
964	72-74	704	3897	1080	.277	1.534	.181	19.01
	78-80	756	3195	958	.3	1.267	.237	19.52
	84-86	1034	3165	1139	.36	1.102	.327	21.34
961	66-68	1408	7042	1643	.233	1.167	.2	16.28
	72-74	2009	6849	2329	.34	1.159	.293	20.82
	78-80	589	3155	589	.187	1	.187	13.59
	92-94	735	2966	858	.289	1.167	.248	18.82

Intensity Values for Traverse F-F'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
896	96-98	664	3195	747	.234	1.125	.208	16.22
	106-108	828	3947	1316	.333	1.589	.21	21.61
	108-110	580	2560	870	.34	1.5	.227	21.7
895	98-100	903	5896	1487	.252	1.647	.153	17.95
894	94-96	1175	6167	2154	.349	1.833	.191	27.68
	120-122	657	2879	884	.307	1.346	.228	20
893	96-98	629	3014	1730	.574	2.75	.209	32.2
	112-114	554	2455	698	.284	1.26	.226	18.83
398	98-100	459	1508	503	.334	1.096	.304	20.36
496	88-90	541	2204	541	.245	1	.245	16.46
	94-96	572	3052	763	.25	1.334	.187	17.39
	128-130	1021	3810	864	.227	.846	.268	15.17
497	68-70	745	3056	727	.238	.976	.244	16.06
	86-88	709	3012	709	.235	1	.235	16
	92-94	3889	-	641	-	.165	-	14.15
397	78-80	987	2346	466	.199	.472	.421	12.27
	92-94	618	2452	556	.227	.9	.252	15.33
498	68-70	585	3353	663	.198	1.133	.174	14.41
	80-82	118	148	207	1.4	1.754	.797	43.76
500	66-68	136341	-	4010	-	.029	-	2.86
395	40-42	734	2893	964	.333	1.313	.254	21

Intensity Values for Traverse G-G'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
655	68-70	571	2663	689	.259	1.207	.214	17.56
654	124-126	690	3780	792	.21	1.148	.183	15.05
	132-134	110125		1820		.017		.016
1021	60-62	756	3368	871	.259	1.152	.224	17.44
	66-68	428	2058	550	.267	1.285	.208	18.12
	72-74	491	2415	573	.237	1.167	.203	16.47
1008	78-80	549	2863	627	.219	1.142	.192	15.52
	124-126	2888	2861	567	.198	.196	1.009	8.98
633	64-66	288	1276	350	.274	1.215	.226	18.29
	70-72	579	2274	537	.236	.927	.255	15.84
	75-78	415	2186	546	.25	1.316	.19	17.35
1006	72-74	455	2529	759	.3	1.668	.18	20.28
	130-132	143559	-	2950		.021		.017
1005	66-68	542	2349	703	.299	1.297	.231	19.56
	72-74	358	1703	426	.25	1.19	.21	17.13
	78-80	496	2329	544	.236	1.097	.213	16.15
1314	77-78	497	2147	429	.2	.863	.231	13.96
1001	74-76	573	2726	962	.353	1.679	.21	22.58
	80-82	614	2971	654	.22	1.065	.207	15.43
	86-88	414	1735	474	.273	1.145	.239	18.07
	114-116	734	3412	1042	.305	1.42	.215	20.08
	118-120	475	2183	735	.337	1.547	.218	21.66

Intensity Values for Traverse H-H'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
401	80-82	195	643	366	.569	1.877	.303	30.4
402A	84-86	397	965	652	.676	1.642	.411	32.37
	98-100	77648	-	1664	-	.021		0.02
504	64-66	480	2290	499	.218	1.04	.21	15.26
	78-80	886	3765	930	.247	1.05	.235	16.66
505	64-66	627	2675	1254	.469	2	.234	27.52
	82-84	525	2414	630	.261	1.2	.217	17.65
403	68-70	417	2153	930	.419	2.165	.462	26
	74-75	453	2170	525	.242	1.159	.209	16.68
	80-82	524	2683	545	.203	1.04	.195	14.53
	106-108	577	2676	600	.224	1.04	.216	15.57
	114-116	529	1701	1195	.703	2.259	.311	34.89
506A	78-80	447	2151	575	.267	1.286	.208	18.12
	134-136	954	5060	1078	.213	1.13	.189	15.2
	140-142	51838	-	850			.016	.016
507	90-92	578	2375	661	.278	1.144	.243	18.29
	126-128	569	3049	650	.213	1.142	.187	15.23
508A	88-90	640	2608	713	.273	1.114	.245	18
404	80-82	386	1570	435	.277	1.127	.246	18.19
	96-98	895	3706	937	.253	1.047	.242	16.92
	106-108	385	628	304	.484	.79	.613	23.08
519	50-52	1502	5439	1502	.276	1	.276	17.79
521	70-72	512	1769	1001	.567	1.955	.289	30.5
	80-82	72508	165156	2417	.015	0.033	.439	0.01

Intensity Values for Traverse I-I'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
420	60-62	134	363	229	.631	1.709	.369	31.54
353	80-82	2501	6721	2501	.372	1	.372	21.33
	86-88	599	2940	1027	.349	1.715	.204	22.49
	92-94							
	98-100	468	2027	897	.442	1.917	.231	26.44
352	100-102	1254	8025	2006	.25	1.6	.156	17.78
	124-126	968	4928	2552	.518	2.636	.196	30.21
351	80-82	1882	8575	2876	.335	1.528	.219	19.14
	100-102	1459	8026	2736	.341	1.875	.182	23.53
	138-140	3831	7264	1990	.274	.519	.527	15.21
350	98-100	1750	7000	1417	.202	.81	.25	13.94
349	72-74	1104	4671	2930	.627	2.654	.236	33.66

Intensity Values for Traverse J-J'

Drillhole	Interval	LT	MT	HT	HT/MT	HT/LT	LT/MT	HT%
367	72-74	466	3059	565	.185	1.212	.152	13.81
	80-82	454	2928	742	.253	1.634	.155	17.99
370	78-80	1018	7495	1480	.197	1.454	.136	14.81
68	64-66	577	3175	818	.258	1.418	.182	17.9
	90-92	135	-	146	-	1.081	-	
1178	58-60	248	1019	331	.325	1.335	.243	20.71
1072	80-82	297	1413	1165	.824	3.923	.21	40.52

APPENDIX 5

Glow Curve Temperatures (oC)

GLOW CURVE TEMPERATURES. (oC)

Traverse A-A'.

Drillhole	Interval	LT	MT	HT
1227	70-72	149	226	322
	94-96	148	225	344
1228	66-68	154	236	355
	114-116	150	-	-
1206	10-12	144	199	340

Traverse B-B'.

Drillhole	Interval	LT	MT	HT
1249	60-62	154	222	342
1241	60-62	150	226	348
1239	54-56	147	221	336
1240	58-60	153	226	351
	64-66	150	230	343
	70-72	143	215	321
1214	60-62	144	224	345
	94-96	151	223	341
1215	66-68	141	215	350
1216	78-80	134	223	314
1217	82-84	141	222	364
1218	72-74	148	229	338
	84-86	148	226	344
	90-92	146	228	347
	114-116	138	226	338
1219	76-78	140	210	311
	88-90	147	-	-
1220	14-16	152	208	316

Traverse C-C'.

Drillhole	Interval	LT	MT	HT
1172	90-92	157	223	340
1171	108-110	155	226	369
	114-116	152	232	358
	120-122	152	234	358
	158-160	134	213	329
1265	94-96	147	228	365
	150-152	142	219	334
1182	102-104	151	225	341
	108-110	154	232	335
	114-116	142	220	330
	124-126	133	212	325
1184	106-108	145	226	370
	136-138	142	210	315
1266	108-110	150	218	339
390	98-100	132	211	320
	110-112	150	227	346
	124-126	144	225	324
1169	88-90	145	212	345
	94-96	135	212	341
	100-102	153	228	348
1183	84-86	136	208	330
	90-92	132	213	336
	96-98	141	217	334
	124-126	147	228	364
1267	84-86	144	224	346
	92-94	139	215	338
	98-100	143	225	328
389	84-86	133	216	331
	98-100	141	211	316
1269	82-84	139	222	330
1167	68-70	151	234	372
	98-100	138	207	308
	112-114	140	216	317

391	80-82	140	217	324
	86-88	153	211	312
	92-94	157	226	340
	94-96	152	238	352
1168	56-58	146	236	359
	60-62	136	209	326

Traverse D-D'.

Drillhole	Interval	LT	MT	HT
388	76-78	136	212	354
	88-90	129	204	316
	114-116	148	216	338
1080	60-62	151	230	362
	66-68	156	221	362
	72-74	149	229	377
	86-88	157	238	354
1267	done			
1271	84-86	134	207	318
	108-110	135	208	294
1065	98-100	137	206	303
	104 106	148	225	338
	124-126	152	224	359
1052	74-76	136	214	326
	84-86	144	215	362
	124-126	159	225	343
740/1166	66-68	145	218	318
	72-74	157	235	367
	78-80	141	220	352
1214	done			
1031	78-80	143	214	325
	124-126	147	224	332
1218	done			

Traverse E-E'.

Drillhole	Interval	LT	MT	HT
977	82-84	148	220	323
976	76-78	135	224	343
	82-84	143	220	344
	88-90	131	216	336
	96-98	143	216	338
973	82-84	123	197	309
	88-90	155	224	335
	94-96	166	228	345
	124-126	145	212	330
972	108-110	141	214	324
	114-116	160	226	348
	120-122	157	228	350
	130-132	148	212	323
	138-140	164	223	348
970	96-98	137	216	331
	102-104	154	230	345
	108-110	153	222	341
	138-140	133	211	322
968	124-126	132	210	304
967A	90-92	155	223	337
	96-98	135	214	314
	102-104	152	226	334
966A	62-64	134	215	332
	68-70	144	228	343
	74-76	140	223	334
	96-98	144	222	349
	120-122	137	208	313
	130-132	132	206	317
965	98-100	149	229	369
964	72-74	128	220	337
	78-80	148	223	336
	84-86	156	221	336
961	66-68	152	231	347
	72-74	146	221	335
	78-80	142	212	321
	92-94	153	232	346

Traverse F-F'.

Drillhole	Interval	LT	MT	HT
896	96-98	142	221	330
	106-108	143	206	309
	108-110	141	219	344
895	98-100	128	206	316
894	94-96	147	222	341
	120-122	145	211	360
893	96-98	148	216	364
	112-114	135	208	328
398	98-100	139	219	322
496	88-90	140	219	329
	94-96	134	217	332
	128-130	128	202	307
497	68-70	134	211	316
	86-88	138	215	330
	92-94	162	-	316
397	78-80	149	221	338
	92-94	144	203	313
498	68-70	131	218	329
	80-82	135	213	319
500	66-68	138	-	316
395	40-42	134	209	315

Traverse G-G'.

Drillhole	Interval	LT	MT	HT
655	68-70	136	210	326
654	124-126	127	205	315
	132-134	157	-	-
1021	60-62	137	208	323
	66-68	140	222	338
	72-74	139	220	334
1008	78-80	139	217	323
	124-126	140	190	306
633	64-66	137	219	334
	70-72	144	213	316
	76-78	136	221	333
1006	72-74	137	216	332
	130-132	151	-	-
1005	66-68	129	204	313
	72-74	128	205	312
	78-80	139	219	338
1314	77-78	144	220	332
1001	74-76	133	208	320
	80-82	133	206	312
	86-88	124	204	318
	114-116	147	225	341
	118-120	139	221	346

Traverse H-H'.

Drillhole	Interval	LT	MT	HT
401	80-82	133	211	318
402a	84-86	133	209	350
	98-100	141	-	-
504	64-66	137	217	323
	78-80	130	201	309
505	64-66	144	223	364
	82-84	140	218	330
403	68-70	138	219	374
	74-76	147	222	331
	80-82	134	212	319
	106-108	150	220	337
	114-116	138	208	340
506a	78-80	126	203	313
	134-136	131	206	316
	140-142	147	-	-
507	90-92	133	207	316
	126-128	139	220	335
508a	88-90	132	206	311
404	80-82	164	255	379
	96-98	146	223	346
	106-108	135	205	314
519	50-52	150	222	326
521	70-72	141	208	335
	80-82	117	156	-

Traverse I-I'.

Drillhole	Interval	LT	MT	HT
420	60-62	141	224	334
353	80-82	145	212	336
	86-88	136	214	333
	98-100	149	222	355
352	100-102	136	226	348
	124-126	148	233	386
351	80-82	156	225	343
	100-102	153	227	354
	138-140	156	216	330
350	98-100	142	208	324
349	72-74	158	234	381

Traverse J-J'.

Drillhole	Interval	LT	MT	HT
367	72-74	126	207	326
	80-82	143	220	335
370	78-80	138	220	336
68	64-66	122	203	321
	90-92	144	230	334
1178	58-60	134	211	332
1072	80-82	140	206	349

APPENDIX 6

Microscope Description

APPENDIX 6

Microscope Description

1.Early Proterozoic basement

SAMPLE	MONOCRY.(%)	POLYCRY.(%) (saccharoidal)	COMMENTS
1228	rare	100	colourless,milky,smoky yellow with humic staining
1219	rare	100	colourless,milky;minor f/spar
1167	40	60	milky,smoke ; minor iron staining (contamination?)
497	10	90	milky,smoky(minor); inclusions within some crystals
500	rare	98	milky; minor carbonaceous and f/spar, rounded citrine?
654	10	90	colourless,milky,minor smoky; rare citrine
1006	25	75	smoky,minor milky,monocry. are colourless;with humic staining and rare citrine
402a	10	90	milky,minor smoky,monocry, are colourless;some humic and iron staining
506a	5	95	colourless,minor smoky; with iron staining, rare rounded citrine
521	rare	100	colourless(60%),milky(40%)

APPENDIX 6 cont.

2. Hiltaba Granite basement

SAMPLE	MONOCRY.(%)	POLYCRY(%) (saccharoidal)	COMMENTS
1206	100	rare	colourless;minor f/spar and iron staining
1241	100	-	colourless,smoky yellow;minor f/spar,iron staining(5%)
1216	100	-	colourless;"clean",conchoidal, rough surface due to grinding
1220	100	-	colourless; minor f/spar(2%), iron staining present
1172	100	-	colourless,smoky yellow;minor f/spar and humic material,with iron stains
1184	100	-	colourless,rare smoky yellow; minor f/spar, iron stain and pyrite
1168 a.	100	-	colourless,rare smoky yellow;
b.	100	rare	colourless,minor smoky; haem. staining,weathered f/spar(1%) rough surface texture,citrine?
388	98	2	"clean",colourless,rare milky; due to grinding?
1271	98	2	colourless,minor smoky grey; rare humic and iron stains
1065	100	-	colourless,rare smoky yellow; conchoidal,citrine?
977	100	-	colourless,smoky yellow(10%) minor iron staining
972	100	-	colourless,rare smoky yellow; "clean",
966a	100	-	colourless,smoky grey;with iron staining,minor f/spar and rare humic material
896	100	-	colourless,minor smoky yellow; with rare milky (due to grind -ing),carbonaceous material,

			minor f/spar and iron stains
895	100	-	colourless;minor f/spar, iron staining
893	100	-	colourless,smoky yellow,rare milky(grinding?);minor humic and iron staining;f/spar
398	same as 893		
498	75	25	colourless; humic material and minor f/spar
395	100	-	colourless,milky;minor f/spar large component (25%) is iron stained
1001	80	20	colourless,milky(polycry.), minor smoky grey;weathered f/spar,rare iron stain,pyrite
401	95	5	colourless,rare smoky yellow, milky component; minor f/spar and iron staining
403	100	-	colourless,milky,minor smoky; iron staining, citrine?
404	100	-	colourless;"clean",conchoidal
519	100	-	colourless,rare smoky yellow; minor f/spar and iron. stains
420	100	-	colourless,smoky yellow(10%); conchoidal, iron staining
353	90	10	colourless,large smoky yellow component; minor carbonaceous
352	100	-	colourless,minor smoky yellow; iron staining,feldspar(2%)
349	100	-	colourless,smoky yellow; 50% are rounded, iron stained (due to contamination)
367	70	30	colourless,smoky yell.(mono.) milky (polycry.);rare humic and iron staining
1072	80	20	colourless,smoky grey,milky (polycry.); conchoidal,rare iron staining,citrine?

APPENDIX 2

ANALYSIS
g/tonne

SAMPLE MARK	GOLD Au	PLATINUM Pt	PALLADIUM Pd		
657765	<0.05	<0.005	0.010	IR 1313	64-66m
657766	<0.05	<0.005	<0.005		66-68
657769	<0.05	<0.005	<0.005		68-70
658369	<0.05	<0.005	<0.005	IR 1329	68-69m
658369a	0.50	<0.005	0.040	Std	
658370	<0.05	<0.005	<0.005		69-70
658371	<0.05	<0.005	<0.005		70-71
658372	<0.05	<0.005	<0.005		71-72
659958	<0.05	<0.005	<0.005	IR 1378	68-69m
659959	<0.05	<0.005	0.030		69-70
727277	<0.05	<0.005	0.015	IR 1449	82-83m
727278	<0.05	<0.005	0.005		83-84
727279	<0.05	<0.005	<0.005		84-85
727519	<0.05	<0.005	0.015	IR 1421	94-95m
727520	<0.05	<0.005	0.025		95-96
727521	<0.05	<0.005	0.010		96-97
727532	<0.05	<0.005	0.015		107-108
727561	<0.05	<0.005	0.025	IR 1422	93-94m
727562	<0.05	<0.005	0.020		94-95
727563	<0.05	<0.005	<0.005		95-96

Method: A7/3

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ANALYSIS

g/tonne

SAMPLE MARK	GOLD Au	PLATINUM Pt	PALLADIUM Pd		
727581	<0.05	<0.005	<0.005	IR 1422	113-114m
727581a	1.34	<0.005	0.060	Std	
727780	<0.05	<0.005	<0.005	IR1427	91-92m
727781	<0.05	<0.005	0.015		92-93
727782	<0.05	<0.005	<0.010		93-94
727872	<0.05	<0.005	0.015	IR1429	92-93m
727873	<0.05	<0.005	0.010		93-94
727874	<0.05	<0.005	0.005		94-95.

Method: A7/3

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NATA Certificate Results in ppm

Sample	Th	Ba	Ce	Nb	Se	Ta	Te	U
657765	<4	<4	60	16	10	<10	<10	28
657766	<4	<4	120	<4	4	<10	<10	20
657769	12	<4	60	46	2	<10	<10	8
658369	<4	<4	30	4	<2	10	<10	8
658369a	<4	6	50	8	6	<10	<10	<4
658370	18	<4	90	56	68	<10	<10	180
658371	16	<4	65	34	31	<10	<10	160
658372	6	<4	50	46	52	<10	<10	375
659958	8	4	30	28	16	<10	<10	105
659959	26	<4	150	40	175	<10	<10	1340
727277	10	<4	40	14	3	<10	<10	<4
727278	<4	<4	<20	<4	<2	<10	<10	4
727279	<4	6	20	4	3	<10	<10	4
727519	<4	<4	<20	<4	<2	<10	<10	8
727520	<4	<4	<20	<4	<2	<10	<10	14
727521	<4	<4	20	<4	<2	<10	<10	14
727532	<4	<4	50	6	6	<10	<10	<4
727561	<4	<4	30	6	2	<10	<10	24
727562	4	<4	<20	12	3	<10	<10	84
727563	<4	<4	30	<4	<2	10	<10	28
727581	12	<4	60	16	<2	<10	<10	4
727581a	4	<4	25	<4	<2	<10	<10	<4
727780	<4	<4	30	<4	<2	<10	<10	<4
727781	<4	<4	<20	<4	<2	<10	<10	6
727782	<4	<4	<20	<4	<2	<10	<10	4
727872	8	<4	55	24	<2	<10	<10	<4
727873	6	<4	25	16	<2	<10	<10	<4
727874	<4	<4	30	14	<2	<10	<10	10
Detn limit	(4)	(4)	(20)	(4)	(2)	(10)	(10)	(4)

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NATA Certificate Results in ppm

Sample	Y
657765	30
657766	86
657769	44
658369	4
658369a	12
658370	44
658371	36
658372	36
659958	20
659959	68
727277	14
727278	8
727279	10
727519	6
727520	6
727521	6
727532	24
727561	8
727562	14
727563	6
727581	28
727581a	<4
727780	8
727781	6
727782	6
727872	18
727873	18
727874	18
Detn limit	(4)

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NATA Certificate Results in ppm

Sample	Ag	As	Cd	Co	Cu	Fe	La	Mo
657765	<1	5	<5	<5	15	2500	10	5
657766	<1	5	<5	120	5	2600	30	<5
657769	1	<5	5	5	15	4000	5	5
658369	<1	5	<5	<5	15	6000	<5	5
658369a	<1	15	<5	10	4450	2.40%	5	50
658370	6	25	<5	5	40	3500	5	10
658371	2	<5	<5	<5	20	2800	5	<5
658372	2	5	<5	<5	95	2700	<5	<5
659958	<1	5	<5	<5	25	2900	<5	10
659959	4	30	<5	<5	55	1600	50	5
727277	<1	5	<5	<5	15	2200	<5	20
727278	<1	<5	<5	<5	5	2900	<5	10
727279	<1	5	<5	<5	10	2000	<5	10
727519	<1	<5	<5	5	5	2900	<5	<5
727520	<1	<5	<5	5	10	6400	<5	<5
727521	<1	<5	<5	5	15	8000	<5	5
727532	<1	15	<5	10	30	2.75%	10	5
727561	<1	5	<5	<5	10	5500	<5	5
727562	2	20	<5	15	25	2.05%	5	5
727563	<1	20	5	20	35	3.80%	10	5
727581	<1	25	<5	5	35	3.15%	15	5
727581a	6	110	10	5	280	2.65%	10	10
727780	<1	5	<5	<5	5	2600	<5	5
727781	<1	<5	<5	<5	5	2700	<5	<5
727782	<1	<5	<5	<5	5	2800	<5	5
727872	2	10	<5	15	30	2.30%	5	10
727873	<1	<5	<5	<5	10	8600	<5	<5
727874	1	<5	<5	5	15	6400	<5	5
Detn limit	(1)	(5)	(5)	(5)	(5)	(100)	(5)	(5)

Analysis code I1 SPECIAL Report AC 2776/86

NATA Certificate Results in ppm

Sample	Ni	Pb	S	Sb	Sn	Sr	Ti	V
657765	5	10	1150	10	<5	10	1350	55
657766	130	15	1.10%	10	<5	10	390	190
657769	10	25	5000	<5	<5	<5	4300	100
658369	5	<5	1750	<5	<5	<5	380	5
658369a	15	<5	1.18%	30	10	250	860	200
658370	10	30	1750	70	15	15	5500	160
658371	<5	20	1550	5	5	5	2550	120
658372	5	25	3150	5	<5	<5	4300	100
659958	5	15	470	5	<5	10	2650	130
659959	10	25	4500	10	5	25	3650	640
727277	5	<5	220	<5	<5	5	1750	45
727278	5	<5	110	<5	<5	<5	500	15
727279	5	<5	110	10	<5	<5	740	15
727519	10	<5	800	<5	<5	<5	240	<5
727520	10	<5	1500	<5	<5	<5	260	5
727521	10	<5	1750	<5	<5	<5	170	5
727532	15	10	2.96%	30	5	55	1400	60
727561	10	5	2350	10	5	<5	840	35
727562	30	20	8200	10	5	<5	1150	50
727563	30	20	1.30%	20	5	<5	350	25
727581	15	20	1.60%	55	10	10	3000	50
727581a	25	4900	1.64%	90	10	20	420	85
727780	5	5	2850	<5	<5	<5	280	110
727781	<5	<5	560	5	<5	<5	130	20
727782	5	<5	340	10	<5	<5	120	10
727872	20	15	6600	5	5	5	3200	40
727873	<5	10	4650	<5	5	10	2150	40
727874	10	10	9400	<5	<5	20	2150	60
Detn limit	(5)	(5)	(10)	(5)	(5)	(5)	(5)	(5)

Analysis code I1 SPECIAL Report AC 2776/86

NATA Certificate Results in ppm

Sample	W	Zn	Zr
657765	20	15	150
657766	15	5	60
657769	20	180	240
658369	15	5	65
658369a	25	35	<5
658370	5	20	390
658371	10	25	430
658372	15	10	360
659958	20	<5	190
659959	15	5	370
727277	20	5	230
727278	15	<5	75
727279	20	<5	150
727519	5	<5	70
727520	15	5	85
727521	25	<5	50
727532	15	75	40
727561	20	10	150
727562	20	5	260
727563	15	5	100
727581	5	35	60
727581a	100	780	10
727780	30	10	80
727781	10	<5	35
727782	15	<5	25
727872	30	25	440
727873	10	15	370
727874	30	15	380
Detn limit	(5)	(5)	(5)

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ANALYSIS
g/tonne

SAMPLE MARK	GOLD Au	PLATINUM Pt	PALLADIUM Pd		
657765	<0.05	<0.005	0.010	IR 1313	64-66m
657766	<0.05	<0.005	<0.005		66-68
657769	<0.05	<0.005	<0.005		68-70
658369	<0.05	<0.005	<0.005	IR 1329	68-69m
658369a	0.50	<0.005	0.040	Std	
658370	<0.05	<0.005	<0.005		69-70
658371	<0.05	<0.005	<0.005		70-71
658372	<0.05	<0.005	<0.005		71-72
659958	<0.05	<0.005	<0.005	IR 1378	68-69m
659959	<0.05	<0.005	0.030		69-70
727277	<0.05	<0.005	0.015	IR 1449	82-83m
727278	<0.05	<0.005	0.005		83-84
727279	<0.05	<0.005	<0.005		84-85
727519	<0.05	<0.005	0.015	IR 1421	94-95m
727520	<0.05	<0.005	0.025		95-96
727521	<0.05	<0.005	0.010		96-97
727532	<0.05	<0.005	0.015		107-108
727561	<0.05	<0.005	0.025	IR 1422	93-94m
727562	<0.05	<0.005	0.020		94-95
727563	<0.05	<0.005	<0.005		95-96

Method: A7/3

ANALYSIS

g/tonne

SAMPLE MARK	GOLD Au	PLATINUM Pt	PALLADIUM Pd		
727581	<0.05	<0.005	<0.005	IR 1422	113-114m
727581a	1.34	<0.005	0.060	Std	
727780	<0.05	<0.005	<0.005	IR1427	91-92m
727781	<0.05	<0.005	0.015		92-93
727782	<0.05	<0.005	<0.010		93-94
727872	<0.05	<0.005	0.015	IR 1429	92-93m
727873	<0.05	<0.005	0.010		93-94
727874	<0.05	<0.005	0.005		94-95.

Method: A7/3

amdel

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NATA Certificate Results in ppm

Sample	Th	Bi	Ce	Nb	Se	Ta	Te	U
657765	<4	<4	60	16	10	<10	<10	28
657766	<4	<4	120	<4	4	<10	<10	20
657769	12	<4	60	46	2	<10	<10	8
658369	<4	<4	30	4	<2	10	<10	8
658369a	<4	6	50	8	6	<10	<10	<4
658370	18	<4	90	56	68	<10	<10	180
658371	16	<4	65	34	31	<10	<10	160
658372	6	<4	50	46	52	<10	<10	375
659958	8	4	30	28	16	<10	<10	105
659959	26	<4	150	40	175	<10	<10	1340
727277	10	<4	40	14	3	<10	<10	<4
727278	<4	<4	<20	<4	<2	<10	<10	4
727279	<4	6	20	4	3	<10	<10	4
727519	<4	<4	<20	<4	<2	<10	<10	8
727520	<4	<4	<20	<4	<2	<10	<10	14
727521	<4	<4	20	<4	<2	<10	<10	14
727532	<4	<4	50	6	6	<10	<10	<4
727561	<4	<4	30	6	2	<10	<10	24
727562	4	<4	<20	12	3	<10	<10	84
727563	<4	<4	30	<4	<2	10	<10	28
727581	12	<4	60	16	<2	<10	<10	4
727581a	4	<4	25	<4	<2	<10	<10	<4
727780	<4	<4	30	<4	<2	<10	<10	<4
727781	<4	<4	<20	<4	<2	<10	<10	6
727782	<4	<4	<20	<4	<2	<10	<10	4
727872	8	<4	55	24	<2	<10	<10	<4
727873	6	<4	25	16	<2	<10	<10	<4
727874	<4	<4	30	14	<2	<10	<10	10
Detn limit	(4)	(4)	(20)	(4)	(2)	(10)	(10)	(4)

amdel

Analysis code X3 Report AC 2776/86 Page X2

NATA Certificate Results in ppm

Sample	Y
657765	30
657766	86
657769	44
658369	4
658369a	12
658370	44
658371	36
658372	36
659958	20
659959	68
727277	14
727278	8
727279	10
727519	6
727520	6
727521	6
727532	24
727561	8
727562	14
727563	6
727581	28
727581a	<4
727780	8
727781	6
727782	6
727872	18
727873	18
727874	18

Detn limit (4)

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NATA Certificate Results in ppm

Sample	Ag	As	Cd	Co	Cu	Fe	La	Mo
657765	<1	5	<5	<5	15	2500	10	5
657766	<1	5	<5	120	5	2600	30	<5
657769	1	<5	5	5	15	4000	5	5
658369	<1	5	<5	<5	15	6000	<5	5
658369a	<1	15	<5	10	4450	2.40%	5	50
658370	6	25	<5	5	40	3500	5	10
658371	2	<5	<5	<5	20	2800	5	<5
658372	2	5	<5	<5	95	2700	<5	<5
659958	<1	5	<5	<5	25	2900	<5	10
659959	4	30	<5	<5	55	1600	50	5
727277	<1	5	<5	<5	15	2200	<5	20
727278	<1	<5	<5	<5	5	2900	<5	10
727279	<1	5	<5	<5	10	2000	<5	10
727519	<1	<5	<5	5	5	2900	<5	<5
727520	<1	<5	<5	5	10	6400	<5	<5
727521	<1	<5	<5	5	15	8000	<5	5
727532	<1	15	<5	10	30	2.75%	10	5
727561	<1	5	<5	<5	10	5500	<5	5
727562	2	20	<5	15	25	2.05%	5	5
727563	<1	20	5	20	35	3.80%	10	5
727581	<1	25	<5	5	35	3.15%	15	5
727581a	6	110	10	5	280	2.65%	10	10
727780	<1	5	<5	<5	5	2600	<5	5
727781	<1	<5	<5	<5	5	2700	<5	<5
727782	<1	<5	<5	<5	5	2800	<5	5
727872	2	10	<5	15	30	2.30%	5	10
727873	<1	<5	<5	<5	10	8600	<5	<5
727874	1	<5	<5	5	15	6400	<5	5
Detn limit	(1)	(5)	(5)	(5)	(5)	(100)	(5)	(5)

amdel

Analysis code I1 SPECIAL   Report AC 2776/86

NATA Certificate   Results in ppm

Sample	Ni	Pb	S	Sb	Sn	Sr	Ti	V
657765	5	10	1150	10	<5	10	1350	55
657766	130	15	1.10%	10	<5	10	390	190
657769	10	25	5000	<5	<5	<5	4300	100
658369	5	<5	1750	<5	<5	<5	380	5
658369a	15	<5	1.18%	30	10	250	860	200
658370	10	30	1750	70	15	15	5500	160
658371	<5	20	1550	5	5	5	2550	120
658372	5	25	3150	5	<5	<5	4300	100
659958	5	15	470	5	<5	10	2650	130
659959	10	25	4500	10	5	25	3650	640
727277	5	<5	220	<5	<5	5	1750	45
727278	5	<5	110	<5	<5	<5	500	15
727279	5	<5	110	10	<5	<5	740	15
727519	10	<5	800	<5	<5	<5	240	<5
727520	10	<5	1500	<5	<5	<5	260	5
727521	10	<5	1750	<5	<5	<5	170	5
727532	15	10	2.96%	30	5	55	1400	60
727561	10	5	2350	10	5	<5	840	35
727562	30	20	8200	10	5	<5	1150	50
727563	30	20	1.30%	20	5	<5	350	25
727581	15	20	1.60%	55	10	10	3000	50
727581a	25	4900	1.64%	90	10	20	420	85
727780	5	5	2850	<5	<5	<5	280	110
727781	<5	<5	560	5	<5	<5	130	20
727782	5	<5	340	10	<5	<5	120	10
727872	20	15	6600	5	5	5	3200	40
727873	<5	10	4650	<5	5	10	2150	40
727874	10	10	9400	<5	<5	20	2150	60
Detn limit	(5)	(5)	(10)	(5)	(5)	(5)	(5)	(5)

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NATA Certificate   Results in ppm

Sample	W	Zn	Zr
657765	20	15	150
657766	15	5	60
657769	20	180	240
658369	15	5	65
658369a	25	35	<5
658370	5	20	390
658371	10	25	430
658372	15	10	360
659958	20	<5	190
659959	15	5	370
727277	20	5	230
727278	15	<5	75
727279	20	<5	150
727519	5	<5	70
727520	15	5	85
727521	25	<5	50
727532	15	75	40
727561	20	10	150
727562	20	5	260
727563	15	5	100
727581	5	35	60
727581a	100	780	10
727780	30	10	80
727781	10	<5	35
727782	15	<5	25
727872	30	25	440
727873	10	15	370
727874	30	15	380
Detn limit	(5)	(5)	(5)

ANALYSIS
g/tonne

SAMPLE MARK	GOLD Au	PLATINUM Pt	PALLADIUM Pd		
657765	<0.05	<0.005	0.010	IR 1313	64-66m
657766	<0.05	<0.005	<0.005		66-68
657769	<0.05	<0.005	<0.005		68-70
658369	<0.05	<0.005	<0.005	IR 1329	68-69m
658369a	0.50	<0.005	0.040	Std	
658370	<0.05	<0.005	<0.005		69-70
658371	<0.05	<0.005	<0.005		70-71
658372	<0.05	<0.005	<0.005		71-72
659958	<0.05	<0.005	<0.005	IR 1378	68-69m
659959	<0.05	<0.005	0.030		69-70
727277	<0.05	<0.005	0.015	IR 1449	82-83m
727278	<0.05	<0.005	0.005		83-84
727279	<0.05	<0.005	<0.005		84-85
727519	<0.05	<0.005	0.015	IR 1421	94-95m
727520	<0.05	<0.005	0.025		95-96
727521	<0.05	<0.005	0.010		96-97
727532	<0.05	<0.005	0.015		107-108
727561	<0.05	<0.005	0.025	IR 1422	93-94m
727562	<0.05	<0.005	0.020		94-95
727563	<0.05	<0.005	<0.005		95-96

Method: A7/3

ANALYSIS

g/tonne

SAMPLE MARK	GOLD Au	PLATINUM Pt	PALLADIUM Pd		
727581	<0.05	<0.005	<0.005	IR 1422	113-114m
727581a	1.34	<0.005	0.060	Std	
727780	<0.05	<0.005	<0.005	IR1427	91-92m
727781	<0.05	<0.005	0.015		92-93
727782	<0.05	<0.005	<0.010		93-94
727872	<0.05	<0.005	0.015	IR 1429	92-93m
727873	<0.05	<0.005	0.010		93-94
727874	<0.05	<0.005	0.005		94-95.

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NATA Certificate Results in ppm

Sample	Th	Bi	Ce	Nb	Se	Ta	Te	U
657765	<4	<4	60	16	10	<10	<10	28
657766	<4	<4	120	<4	4	<10	<10	20
657769	12	<4	60	46	2	<10	<10	8
658369	<4	<4	30	4	<2	10	<10	8
658369a	<4	6	50	8	6	<10	<10	<4
658370	18	<4	90	56	68	<10	<10	180
658371	16	<4	65	34	31	<10	<10	160
658372	6	<4	50	46	52	<10	<10	375
659958	8	4	30	28	16	<10	<10	105
659959	26	<4	150	40	175	<10	<10	1340
727277	10	<4	40	14	3	<10	<10	<4
727278	<4	<4	<20	<4	<2	<10	<10	4
727279	<4	6	20	4	3	<10	<10	4
727519	<4	<4	<20	<4	<2	<10	<10	8
727520	<4	<4	<20	<4	<2	<10	<10	14
727521	<4	<4	20	<4	<2	<10	<10	14
727532	<4	<4	50	6	6	<10	<10	<4
727561	<4	<4	30	6	2	<10	<10	24
727562	4	<4	<20	12	3	<10	<10	84
727563	<4	<4	30	<4	<2	10	<10	28
727581	12	<4	60	16	<2	<10	<10	4
727581a	4	<4	25	<4	<2	<10	<10	<4
727780	<4	<4	30	<4	<2	<10	<10	<4
727781	<4	<4	<20	<4	<2	<10	<10	6
727782	<4	<4	<20	<4	<2	<10	<10	4
727872	8	<4	55	24	<2	<10	<10	<4
727873	6	<4	25	16	<2	<10	<10	<4
727874	<4	<4	30	14	<2	<10	<10	10
Detn limit	(4)	(4)	(20)	(4)	(2)	(10)	(10)	(4)

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NATA Certificate | Results in ppm

Sample	Y
657765	30
657766	86
657769	44
658369	4
658369a	12
658370	44
658371	36
658372	36
659958	20
659959	68
727277	14
727278	8
727279	10
727519	6
727520	6
727521	6
727532	24
727561	8
727562	14
727563	6
727581	28
727581a	<4
727780	8
727781	6
727782	6
727872	18
727873	18
727874	18

Detn limit (4)

Amdel

Analysis code I1 SPECIAL   Report AC 2776/86

NATA Certificate   Results in ppm

Sample	Ag	As	Cd	Co	Cu	Fe	La	Mo
657765	<1	5	<5	<5	15	2500	10	5
657766	<1	5	<5	120	5	2600	30	<5
657769	1	<5	5	5	15	4000	5	5
658369	<1	5	<5	<5	15	6000	<5	5
658369a	<1	15	<5	10	4450	2.40%	5	50
658370	6	25	<5	5	40	3500	5	10
658371	2	<5	<5	<5	20	2800	5	<5
658372	2	5	<5	<5	95	2700	<5	<5
659958	<1	5	<5	<5	25	2900	<5	10
659959	4	30	<5	<5	55	1600	50	5
727277	<1	5	<5	<5	15	2200	<5	20
727278	<1	<5	<5	<5	5	2900	<5	10
727279	<1	5	<5	<5	10	2000	<5	10
727519	<1	<5	<5	5	5	2900	<5	<5
727520	<1	<5	<5	5	10	6400	<5	<5
727521	<1	<5	<5	5	15	8000	<5	5
727532	<1	15	<5	10	30	2.75%	10	5
727561	<1	5	<5	<5	10	5500	<5	5
727562	2	20	<5	15	25	2.05%	5	5
727563	<1	20	5	20	35	3.80%	10	5
727581	<1	25	<5	5	35	3.15%	15	5
727581a	6	110	10	5	280	2.65%	10	10
727780	<1	5	<5	<5	5	2600	<5	5
727781	<1	<5	<5	<5	5	2700	<5	<5
727782	<1	<5	<5	<5	5	2800	<5	5
727872	2	10	<5	15	30	2.30%	5	10
727873	<1	<5	<5	<5	10	8600	<5	<5
727874	1	<5	<5	5	15	6400	<5	5
Detn limit	(1)	(5)	(5)	(5)	(5)	(100)	(5)	(5)

Analysis code I1 SPECIAL   Report AC 2776/86

Results in ppm

NATA Certificate

Sample	Ni	Pb	S	Sb	Sn	Sr	Ti	V
657765	5	10	1150	10	<5	10	1350	55
657766	130	15	1.10%	10	<5	10	390	190
657769	10	25	5000	<5	<5	<5	4300	100
658369	5	<5	1750	<5	<5	<5	380	5
658369a	15	<5	1.18%	30	10	250	860	200
658370	10	30	1750	70	15	15	5500	160
658371	<5	20	1550	5	5	5	2550	120
658372	5	25	3150	5	<5	<5	4300	100
659958	5	15	470	5	<5	10	2650	130
659959	10	25	4500	10	5	25	3650	640
727277	5	<5	220	<5	<5	5	1750	45
727278	5	<5	110	<5	<5	<5	500	15
727279	5	<5	110	10	<5	<5	740	15
727519	10	<5	800	<5	<5	<5	240	<5
727520	10	<5	1500	<5	<5	<5	260	5
727521	10	<5	1750	<5	<5	<5	170	5
727532	15	10	2.96%	30	5	55	1400	60
727561	10	5	2350	10	5	<5	840	35
727562	30	20	8200	10	5	<5	1150	50
727563	30	20	1.30%	20	5	<5	350	25
727581	15	20	1.60%	55	10	10	3000	50
727581a	25	4900	1.64%	90	10	20	420	85
727780	5	5	2850	<5	<5	<5	280	110
727781	<5	<5	560	5	<5	<5	130	20
727782	5	<5	340	10	<5	<5	120	10
727872	20	15	6600	5	5	5	3200	40
727873	<5	10	4650	<5	5	10	2150	40
727874	10	10	9400	<5	<5	20	2150	60
Detn limit	(5)	(5)	(10)	(5)	(5)	(5)	(5)	(5)

Analysis code I1 SPECIAL   Report AC 2776/86

NATA Certificate   Results in ppm

Sample	W	Zn	Zr
657765	20	15	150
657766	15	5	60
657769	20	180	240
658369	15	5	65
658369a	25	35	<5
658370	5	20	390
658371	10	25	430
658372	15	10	360
659958	20	<5	190
659959	15	5	370
727277	20	5	230
727278	15	<5	75
727279	20	<5	150
727519	5	<5	70
727520	15	5	85
727521	25	<5	50
727532	15	75	40
727561	20	10	150
727562	20	5	260
727563	15	5	100
727581	5	35	60
727581a	100	780	10
727780	30	10	80
727781	10	<5	35
727782	15	<5	25
727872	30	25	440
727873	10	15	370
727874	30	15	380
Detn limit	(5)	(5)	(5)

ANALYSIS

g/tonne

SAMPLE MARK	GOLD Au	PLATINUM Pt	PALLADIUM Pd		
657765	<0.05	<0.005	0.010	IR 1313	64-66m
657766	<0.05	<0.005	<0.005		66-68
657769	<0.05	<0.005	<0.005		68-70
658369	<0.05	<0.005	<0.005	IR 1329	68-69m
658369a	0.50	<0.005	0.040	Std	
658370	<0.05	<0.005	<0.005		69-70
658371	<0.05	<0.005	<0.005		70-71
658372	<0.05	<0.005	<0.005		71-72
659958	<0.05	<0.005	<0.005	IR 1378	68-69m
659959	<0.05	<0.005	0.030		69-70
727277	<0.05	<0.005	0.015	IR 1449	82-83m
727278	<0.05	<0.005	0.005		83-84
727279	<0.05	<0.005	<0.005		84-85
727519	<0.05	<0.005	0.015	IR 1421	94-95m
727520	<0.05	<0.005	0.025		95-96
727521	<0.05	<0.005	0.010		96-97
727532	<0.05	<0.005	0.015		107-108
727561	<0.05	<0.005	0.025	IR 1422	93-94m
727562	<0.05	<0.005	0.020		94-95
727563	<0.05	<0.005	<0.005		95-96

Method: A7/3

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Page 2

ANALYSIS

g/tonne

SAMPLE MARK	GOLD Au	PLATINUM Pt	PALLADIUM Pd		
727581	<0.05	<0.005	<0.005	IR 1422	113-114m
727581a	1.34	<0.005	0.060	Std	
727780	<0.05	<0.005	<0.005	IR1427	91-92m
727781	<0.05	<0.005	0.015		92-93
727782	<0.05	<0.005	<0.010		93-94
727872	<0.05	<0.005	0.015	IR 1429	92-93m
727873	<0.05	<0.005	0.010		93-94
727874	<0.05	<0.005	0.005		94-95.

Method: A7/3

Analysis code X3   Report AC 2776/86   Page X1

NATA Certificate   Results in ppm

Sample	Th	Bi	Ce	Nb	Se	Ta	Te	U
657765	<4	<4	60	16	10	<10	<10	28
657766	<4	<4	120	<4	4	<10	<10	20
657769	12	<4	60	46	2	<10	<10	8
658369	<4	<4	30	4	<2	10	<10	8
658369a	<4	6	50	8	6	<10	<10	<4
658370	18	<4	90	56	68	<10	<10	180
658371	16	<4	65	34	31	<10	<10	160
658372	6	<4	50	46	52	<10	<10	375
659958	8	4	30	28	16	<10	<10	105
659959	26	<4	150	40	175	<10	<10	1340
727277	10	<4	40	14	3	<10	<10	<4
727278	<4	<4	<20	<4	<2	<10	<10	4
727279	<4	6	20	4	3	<10	<10	4
727519	<4	<4	<20	<4	<2	<10	<10	8
727520	<4	<4	<20	<4	<2	<10	<10	14
727521	<4	<4	20	<4	<2	<10	<10	14
727532	<4	<4	50	6	6	<10	<10	<4
727561	<4	<4	30	6	2	<10	<10	24
727562	4	<4	<20	12	3	<10	<10	84
727563	<4	<4	30	<4	<2	10	<10	28
727581	12	<4	60	16	<2	<10	<10	4
727581a	4	<4	25	<4	<2	<10	<10	<4
727780	<4	<4	30	<4	<2	<10	<10	<4
727781	<4	<4	<20	<4	<2	<10	<10	6
727782	<4	<4	<20	<4	<2	<10	<10	4
727872	8	<4	55	24	<2	<10	<10	<4
727873	6	<4	25	16	<2	<10	<10	<4
727874	<4	<4	30	14	<2	<10	<10	10
Detn limit	(4)	(4)	(20)	(4)	(2)	(10)	(10)	(4)

Analysis code X3 Report AC 2776/86 Page X2

NATA Certificate Results in ppm

Sample	Y
657765	30
657766	86
657769	44
658369	4
658369a	12
658370	44
658371	36
658372	36
659958	20
659959	68
727277	14
727278	8
727279	10
727519	6
727520	6
727521	6
727532	24
727561	8
727562	14
727563	6
727581	28
727581a	<4
727780	8
727781	6
727782	6
727872	18
727873	18
727874	18
Detn limit	(4)

Analysis code I1 SPECIAL Report AC 2776/86 Page I1

NATA Certificate Results in ppm

Sample	Ag	As	Cd	Co	Cu	Fe	La	Mo
657765	<1	5	<5	<5	15	2500	10	5
657766	<1	5	<5	120	5	2600	30	<5
657769	1	<5	5	5	15	4000	5	5
658369	<1	5	<5	<5	15	6000	<5	5
658369a	<1	15	<5	10	4450	2.40%	5	50
658370	6	25	<5	5	40	3500	5	10
658371	2	<5	<5	<5	20	2800	5	<5
658372	2	5	<5	<5	95	2700	<5	<5
659958	<1	5	<5	<5	25	2900	<5	10
659959	4	30	<5	<5	55	1600	50	5
727277	<1	5	<5	<5	15	2200	<5	20
727278	<1	<5	<5	<5	5	2900	<5	10
727279	<1	5	<5	<5	10	2000	<5	10
727519	<1	<5	<5	5	5	2900	<5	<5
727520	<1	<5	<5	5	10	6400	<5	<5
727521	<1	<5	<5	5	15	8000	<5	5
727532	<1	15	<5	10	30	2.75%	10	5
727561	<1	5	<5	<5	10	5500	<5	5
727562	2	20	<5	15	25	2.05%	5	5
727563	<1	20	5	20	35	3.80%	10	5
727581	<1	25	<5	5	35	3.15%	15	5
727581a	6	110	10	5	280	2.65%	10	10
727780	<1	5	<5	<5	5	2600	<5	5
727781	<1	<5	<5	<5	5	2700	<5	<5
727782	<1	<5	<5	<5	5	2800	<5	5
727872	2	10	<5	15	30	2.30%	5	10
727873	<1	<5	<5	<5	10	8600	<5	<5
727874	1	<5	<5	5	15	6400	<5	5
Detn limit	(1)	(5)	(5)	(5)	(5)	(100)	(5)	(5)

Analysis code I1 SPECIAL Report AC 2776/86 Page 12

NATA Certificate Results in ppm

Sample	Ni	Pb	S	Sb	Sn	Sr	Ti	V
657765	5	10	1150	10	<5	10	1350	55
657766	130	15	1.10%	10	<5	10	390	190
657769	10	25	5000	<5	<5	<5	4300	100
658369	5	<5	1750	<5	<5	<5	380	5
658369a	15	<5	1.18%	30	10	250	860	200
658370	10	30	1750	70	15	15	5500	160
658371	<5	20	1550	5	5	5	2550	120
658372	5	25	3150	5	<5	<5	4300	100
659958	5	15	470	5	<5	10	2650	130
659959	10	25	4500	10	5	25	3650	640
727277	5	<5	220	<5	<5	5	1750	45
727278	5	<5	110	<5	<5	<5	500	15
727279	5	<5	110	10	<5	<5	740	15
727519	10	<5	800	<5	<5	<5	240	<5
727520	10	<5	1500	<5	<5	<5	260	5
727521	10	<5	1750	<5	<5	<5	170	5
727532	15	10	2.96%	30	5	55	1400	60
727561	10	5	2350	10	5	<5	840	35
727562	30	20	8200	10	5	<5	1150	50
727563	30	20	1.30%	20	5	<5	350	25
727581	15	20	1.60%	55	10	10	3000	50
727581a	25	4900	1.64%	90	10	20	420	85
727780	5	5	2850	<5	<5	<5	280	110
727781	<5	<5	560	5	<5	<5	130	20
727782	5	<5	340	10	<5	<5	120	10
727872	20	15	6600	5	5	5	3200	40
727873	<5	10	4650	<5	5	10	2150	40
727874	10	10	9400	<5	<5	20	2150	60
Detn limit	(5)	(5)	(10)	(5)	(5)	(5)	(5)	(5)

Analysis code I1 SPECIAL   Report AC 2776/86

NATA Certificate   Results in ppm

Sample	W	Zn	Zr
657765	20	15	150
657766	15	5	60
657769	20	180	240
658369	15	5	65
658369a	25	35	<5
658370	5	20	390
658371	10	25	430
658372	15	10	360
659958	20	<5	190
659959	15	5	370
727277	20	5	230
727278	15	<5	75
727279	20	<5	150
727519	5	<5	70
727520	15	5	85
727521	25	<5	50
727532	15	75	40
727561	20	10	150
727562	20	5	260
727563	15	5	100
727581	5	35	60
727581a	100	780	10
727780	30	10	80
727781	10	<5	35
727782	15	<5	25
727872	30	25	440
727873	10	15	370
727874	30	15	380
Detn limit	(5)	(5)	(5)

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED MAY 18, 1986

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

A series of reverse circulation holes will be drilled within the next few weeks to collect samples of kaolinite from an area approximately 30 km north of Nunjikompita. White clay had been found in this area several years ago during the search for sandstone type uranium mineralization. It is planned to drill five shallow holes and test the clay for its suitability as a paper coating clay.

3. EXPENDITURE

A Statement of Expenditure is attached.

[signature]
....
for P.J. Binks

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDED MAY 18, 1986

	$	$
Administration	497	
Assaying	879	
Field Base Operations	940	
Outside Services	300	
Operating Labour	503	
Rents - Mining Tenements	4053	$7172
TOTAL - THIS PERIOD		$7172
Previously Reported		$2111
Total Project Expenditure to Date		$9283

A.E. Covacich
Administration Superintendent

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED AUGUST 18, 1986

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

Three reverse circulation drill holes were drilled in mid-July, approximately 30 km north of Nunjikompita, to collect samples of kaolinite. These samples have been submitted to AMDEL for sizing and brightness tests. Drilling was carried out by SADME and the project was supervised by consultant I. Youles.

Geological logs of these holes have not been completed yet. These logs, together with a location plan and results of AMDEL's testing, will be included with the next quarterly report.

3. EXPENDITURE

A Statement of Expenditure is attached.

J. Richards
....
for P.J. Binks

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDING AUGUST 18, 1986

	$	$
Outside Services	1171	$ 1 171
TOTAL - THIS PERIOD		$ 1 171
Previously Reported - Current Term		
Quarter ended May 18, 1986	7172	$ 7 172
TOTAL - CURRENT TERM		$ 8 343
Previously Reported		$ 2 111
Total Project Expenditure to Date		$10 454

A.E. Covacich
Administration Superintendent

0128

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED NOVEMBER 18, 1986

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

Drill logs of five shallow reverse circulation holes drilled in July to collect samples of kaolinite for testing for paper coating are presented in Appendix 1. These logs were prepared by the consultant geologist I. Youles who supervised the drilling. Data from these logs have been used to prepare standard C.E.C. logs which are given in Appendix 2. The holes are located approximately 30 km north of Nunjikompita and a plan showing their location in relation to holes drilled earlier for uranium is included in Appendix 1. Accurate locations of these uranium holes are shown on a plan (Drawing No.15 906) previously submitted to SADME.

A total of nineteen of the whitest clay samples was sent to AMDEL for testing for brightness, yellowness, chloride content and sizing. Results of this testing are given in Appendix 3 and a discussion of the results by I. Youles is included in Appendix 1. Samples of the two brightest clays (QS 17298 and QS 17970) have recently been sent to the CSIRO Minerals and Geochemistry Division in Perth for viscosity testing of the -2 micron fraction. No results have been received yet.

3. <u>EXPENDITURE</u>

A Statement of Expenditure is attached.

J. Richardson

....

for P.J. Binks

APPENDIX 1

Ian P. Youles
Consulting Geologist
Burgar Road, Middleton, S.A.5213
Tel: 085-554046

Mr.P. Binks,
Exploration Manager,
Carpentaria Exploration Co. Pty. Ltd.,
80 Leader Street,
Forestville 5035.

22nd July, 1986

Dear Peter,

DRILLING PROGRAMME
NUNGIKOMPITA

Summary

5 holes were drilled for a total of 92 metres. 3 holes, Nos. C-1, C-2 & C-5 penetrated kaolin thicknessess of 12+m., 8m. and 12m., with overburdens of 18m., 11m. and 17.5m. respectively. C-3 & C-4 were abandoned due to hole collapse in calcrete. The kaolin was white to cream with occassional minor iron staining.

General

Drilling & Engineering Services of the South Australian Mines Department carried out a reverse circulation airdrilling programme, 15th-16th July, 1986, on the Ilkina E.L., north of Nungikompita. Holes were drilled to a maximum depth of 30m. or to hard basement. Drillhole geological logs are attached, together with a plan showing locations relative to your previous drilling.

Sampling & Testing

At kaolin intersections, the drill penetrated up to 0.5m. to clean the drillpipe to obtain uncontaminated samples. Kaolin samples were collected over one metre intervals and all the returns were bagged. All samples were ultimately despatched to Adelaide.

In Adelaide, the samples will be split and 5kg. portions forwarded to Amdel for yield and brightness determinations of the -2micron fraction.

Yours sincerely,

Ian Youles
Consulting Geologist

DRILLING PROGRAMME
15th-16th July, 1986
NUNGIKOMPITA

DRILLHOLE LOGS

C-1	0-0.5	Topsoil
	0.5-1.5	Calcrete & calcareous sand
TD 30m.	1.5-3	Sandstone, fine to medium , partly silicified, white to pink.
	3-4.5	As above, but yellow to brown to red-brown.
	4.5-6.5	Sandstone, fine ,minor siltstone, red-brown to brown.
	6.5-7.5	Sandstone, fine , heavily ferruginized.
	7.5-10	Sandstone, very fine , lesser siltstone, slightly kaolinitic, white.
	10-14	Sandstone, fine to very fine, minor siltstone,partly silicified, light to dark brown, red-brown.
	14-15	Sandstone, fine , kaolinitic, light to dark brown.
	15-18	Sandstone, very fine, kaolinitic, ferruginized, 10% thin kaolin bands.
	18-19	KAOLIN - C1/1, white, trace light brown minor fine quartz grains throughout kaolin interval.
	19-20	KAOLIN - C1/2, white, mr. qtz.
	20-21	KAOLIN - C1/3, white, light brown, light mauve.
	21-26	KAOLIN - C1/4 to C1/8, mainly white with very light brown.
	26-27	KAOLIN - C1/9, cream.
	27-30	KAOLIN - C1/10, cream with minor light brown.
C-2	0-2	Calcrete - nodular.
	2-4.5	Sandstone, fine, hard, ferruginous, yellow to dark brown.
TD 19m.	4.5-6	Sandstone, sand, fine, yellow to white.
	6-9.5	Sandstone, fine, partly silicified, becoming ferruginous, kaolinitic.
	9.5-10.7	KAOLIN, very ferruginous, not sampled.
	10.7-11	KAOLIN, cream to white.
	11-12	KAOLIN, C2/1, white with minor light brown.
	12-13	KAOLIN, C2/2, white.
	13-14	KAOLIN, C2/3, white, minor light brown.
	14-15	KAOLIN, C2/4, cream.
	15-16	KAOLIN, C2/5, white, trace light brown.
	16-17	KAOLIN, C2/6, cream.
	17-18	KAOLIN, C2/7, cream to very light grey.
	18-19	KAOLIN, C2/8, cream, weathered granite at 18.7.

C-3 TD 3m.

0-2	Calcrete, nodular.
2-3	Sandstone, fine, silicified in part, yellow to cream.

Hole abandoned due to collapse of calcrete zone.

C-4 TD 10m.

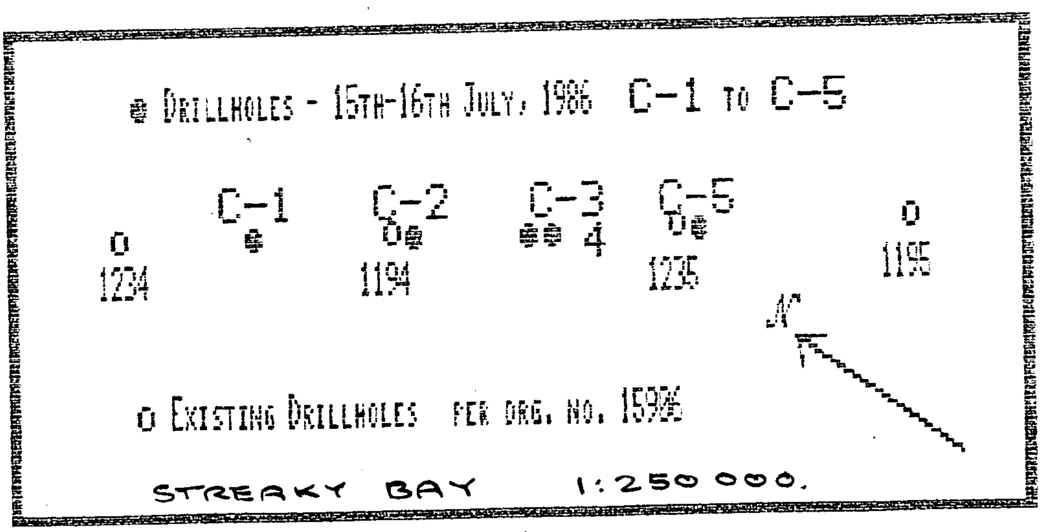
0-0.5	Topsoil
0.5-2	Calcrete, nodular.
2-4	Sandstone, fine, brown to white.
4-10	Sandstone, fine, kaolinitic, silicified in part, yellow to brown.

Hole abandoned due to collapse of calcrete zone.

C-5 TD 30m.

0-4.5	Sand, very fine, minor calcrete nodules, very light brown.
4.5-7	Sandstone, fine, silicified, white to light yellow brown.
7-11	Sandstone, fine, slightly kaolinitic, siltstone, kaolinitic, white to very light brown.
11-12	Sandstone, medium to coarse, light brown.
12-13	Sandstone, fine, kaolinitic, light brown to light red-brown.
13-17.5	Sandstone, fine, kaolinitic, brown to red-brown.
17.5-18	KAOLIN, off-white.
18-23	KAOLIN, C3/1 to C3/5, white, minor quartz grains throughout kaolin interval.
23-24	KAOLIN, C3/6, white to light brown.
24-26	KAOLIN, C3/7 to C3/9, white.
26-29	KAOLIN, C3/10 to C3/12, white with light red-brown.
29-30	KAOLIN, C3/13, white, with weathered granite from 29.7m.

Note:- very hard drilling from 24m.to TD.



Ian P. Youles
Consulting Geologist
Burgar Road, Middleton, S.A. 5213
Tel: 085-554046

Mr. P. Binks,
Exploration Manager,
Carpentaria Exploration Co. Ltd.,
80 Leader Street,
Forestville, S.A. 5035

27th August, 1986

Dear Peter,

REPORT ON TESTING OF KAOLIN

DUNN HILL, E.L. 1274

Summary

Kaolin in drill hole no. PD 5, between 18 - 22 metres, averaged 85 brightness and yielded 30% -2micron fraction; brightness increased as yellowness and chloride content decreased. Further testing for paper-coating properties is recommended for this interval.

In drill holes PD 1 & 2, only one sample had a high brightness and a moderate yield; further testing might be warranted if the results from PD 5 are positive.

Results

The kaolin test results, figure 1 & Appendix A, clearly show that drilllhole no. PD 5 has kaolin with the highest brightness, 81.6-88.6 averaging 85, and the best -2micron yield, 22 - 24% averaging 30%. PD 1 & 2 have -2micron yields that are generally too low for profitable extraction, although some of the brightness values are encouraging.

Figures 2 & 3 show the PD 5 results in more detail and demonstrate that, at brightnesses over 80, the brightness values increase as the chloride and yellowness decrease. This strongly suggests that upgrading of the brightness to 86, for paper-coating requirements, would be achieved by washing to remove the (average 1%) chlorides and bleaching to remove secondary iron staining.

As PD 5 is located 1 km. east-south-east of PD2, there is good potential for a large deposit of high brightness kaolin. It is worth noting that no calcrete was intersected in PD 5, but was present in PD 1 & 2. This may be a significant surface indication of the best quality kaolin.

Viscosity Testing Facilities.

The next stage is to determine whether the kaolin has the right viscosity properties for coatng paper. In Australia, the only independant testing facilities available are at CSIRO, Perth. The officer concerned is Mr. Peter Darragh, telephone 09-3874233, and he has advised that they would be willing to test one sample at no charge. This would determine whether the viscosity properties were likely to be suitable for paper-coating, and is part of CSIRO's service to assist in locating high quality kaolin deposits.
If the results were satisfactory, CSIRO would expect to contract out to you one of their officers; he/she would carry out a detailed investigation on a suite of samples to determine whether a satisfactory product could be achieved. The annual cost for an officer is $50,000, and contracts are usually on two to three monthly intervals.

Some of the major kaolin users will test samples for suitability in their own plants, such as Australian Pulp and Paper Manufacturers, Australian China Clays...

The nearest commercial laboratory is New Zealand China Clays Limited, which has a turn-around time of about 4 weeks on sample testing. Costs are about $A500 per raw sample and about 2.5kg of sample is required (Appendix B).

Recommendations

I strongly recommend that kaolin from drillhole no. PD 5, 18-20m. sample nos. QS17970 & QS17971, be tested for viscosity to determine paper-coating qualities. If the results are satisfactory, further drilling would be required to delineate the extent and quality of the deposit; in addition, viscosity testing of sample no. QS17298, PD 2 16-17m., should be undertaken to determine whether the PD 1 - PD 2 area would be prospective.

Ian P. Youles
Consulting Geologist

AMDEL TEST RESULTS

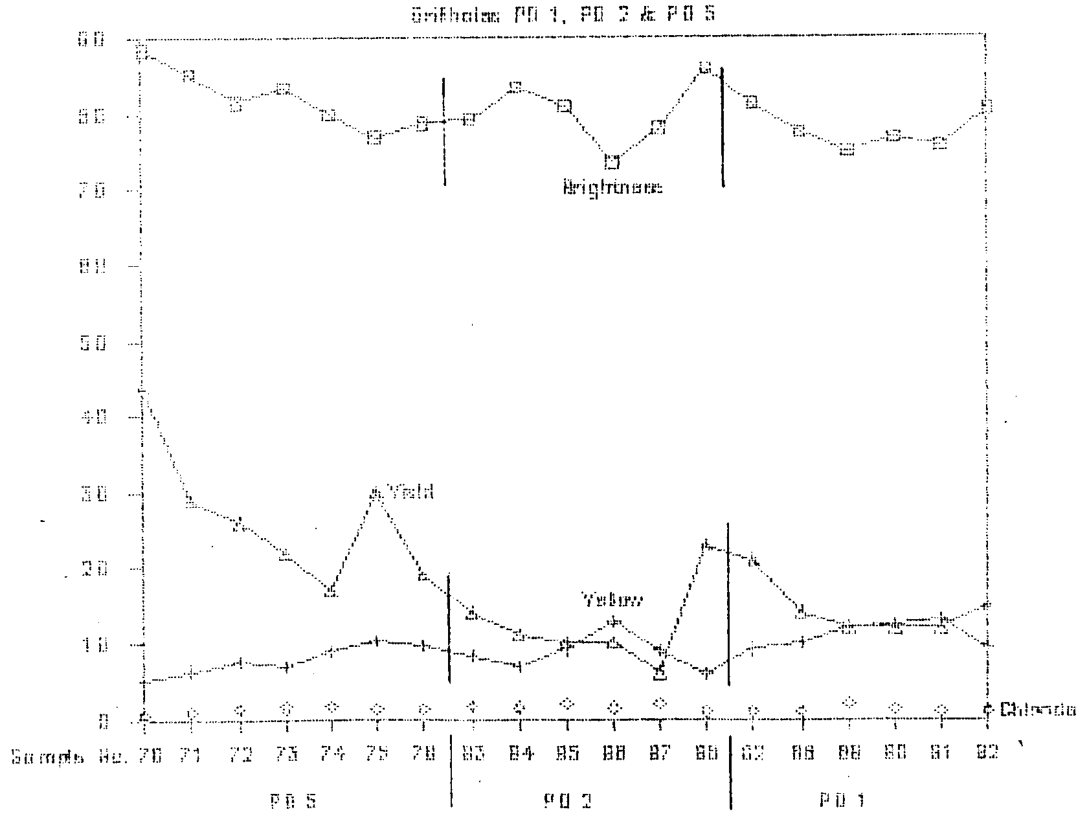
Extract from Report M7525/87

Sample	Hole	Depth	Brightness	Yellowness	Chloride %	Yield % -2micron
✗ QS17970	PD 5	18-19m.	88.6	5.2	0.48	44
QS17971		19-20	85.2	6.3	0.8	29
QS17972		20-21	81.6	7.7	1.31	26
QS17973		21-22	83.6	7	1.48	22
QS17974		22-23	79.9	8.9	1.71	17
QS17975		23-24	77	10.3	1.15	30
QS17976		24-25	78.8	9.6	1.29	19
QS17293	PD 2	11-12	79.4	8.2	1.52	14
QS17294		12-13	83.6	6.8	1.41	11
QS17295		13-14	81.1	9.2	2.03	10
QS17296		14-15	73.5	12.8	1.41	10
QS17297		15-16	78	9	1.87	6
✓ QS17298		16-17	85.9	5.7	0.76	23
QS17282	PD 1	19-20	81.3	9.2	0.88	21
QS17286		23-24	77.6	10.1	0.82	14
QS17289		26-27	75.1	12	1.99	12
QS17290		27-28	76.8	12.5	1.22	12
QS17291		28-29	75.9	13	0.89	12
QS17292		29-30	80.5	9.4	1.04	15

KAOLIN TEST RESULTS

Figure 1

Drillholes PD 1, PD 2 & PD 5



TEST RESULTS

HOLE No. PD5

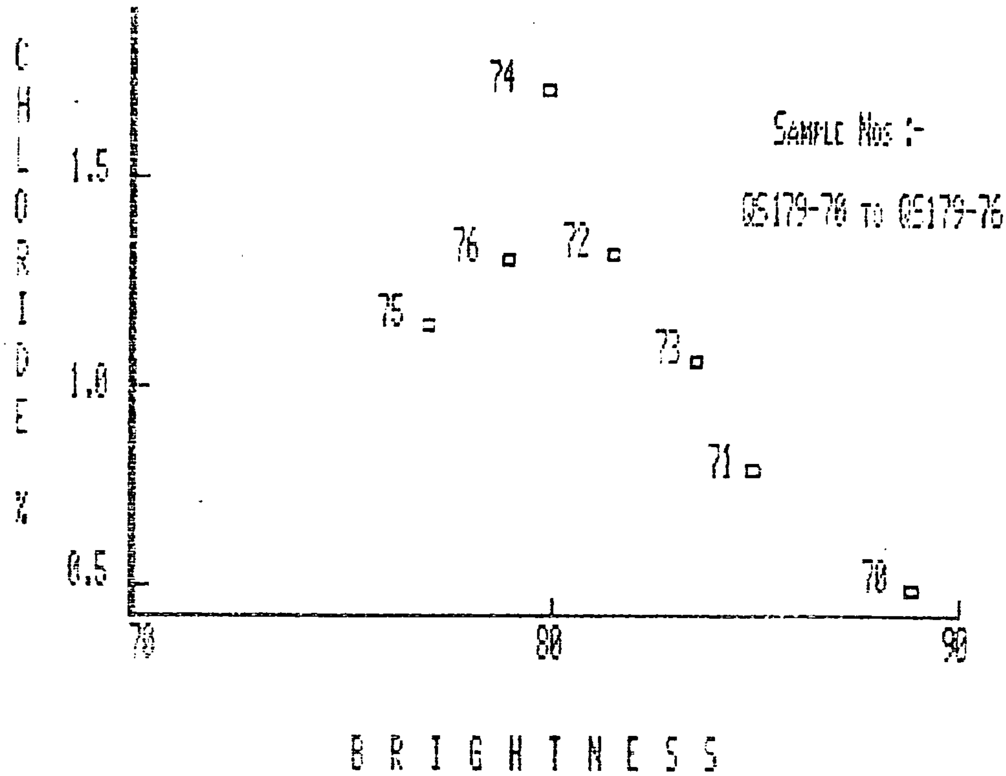


Figure 2

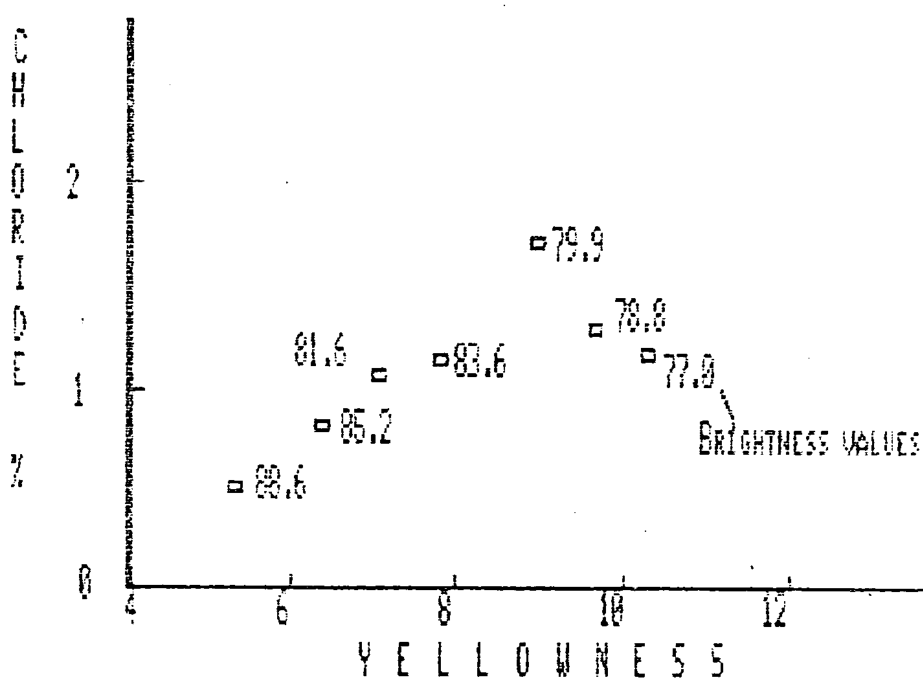


Figure 3

BRIGHTNESS INCREASES AS CHLORIDE CONTENT AND YELLOWNESS DECREASE

APPENDIX 2

HOLE No. PD 1

CARPENTARIA EXPLORATION COMPANY PTY. LTD.

ROTARY PERCUSSION DRILL HOLE LOG

PROSPECT: Dunn Hill EL 1274

LOCATION: ~30 km N Nunjikompita.

CO-ORDS: 460400E 6458700N AMG

ROTARY: FROM 0 TO 30 m.

HAMMER: FROM .... TO ....

RL. COLLAR: .... m.

INCLINATION: 90 °.

DIRECTION: V °.

SAMPLE No.	ANALYSES p.p.m/%	DEPTH METRES	DESCRIPTION	REMARKS	WATER
			Topsoil	0139	
			Calcrete		
			Sand - fine to med gr, partly silicified white to pink.		
			- yellow br to red br.		
		5	Sand - fine gr, minor silt. red br to br.		
			Sand - fine gr, heavily ferruginised		
			Sand - V fine gr. lesser silt, slightly kaolinitic. white		
		10	Sand - fine to v fine gr. partly silicified, light to dk br + red br.		
		15	Sand - v. fine gr, kaolinitic. light to dk br.		
			Sand - v. fine gr, kaolinitic, ferruginised, 10% thin kaolin bands.		
QS 17281			Clay - kaolin, white, trace light br. minor fine gr qtz grains throughout clay.		
82					
83		20	- white to light br + mauve		
84			- mainly white with trace light br.		
85					
86					
87		25			
88					
89			- cream		
90			- cream with trace light br		
91					
92					
		30	EOH		

REASON FOR HOLE: To collect samples of white clay.

OTHER DETAILS:

DRILL TYPE: Investigator Mk

DRILLER: SADME

SCALE: 1:250

LOGGED BY: I. Voules

DATE DRILLED: 15-7-86

DRG/CODE No:

PROSPECT: Dunn Hill EL 1274

CARPENTARIA EXPLORATION COMPANY PTY. LTD.

ROTARY PERCUSSION DRILL HOLE LOG

HOLE N° PD 2.

LOCATION: ~30 km N Nunjikompita

CO-ORDS: 460 800 E 6 458 450 N AMG

ROTARY: FROM 0 TO 19 m

HAMMER: FROM .... TO ....

RL. COLLAR: .... m.

INCLINATION: 90°

DIRECTION: V

SAMPLE N°	ANALYSES p.p.m/%					DEPTH METRES	LOG	DESCRIPTION	REMARKS	WATER
								Calcrete - nodular	0140	
							Fe	Sand - fine gr, hard, ferruginous yellow to dk br.		
						5		Sand - fine gr, yellow to white		
							Fe	Sand - fine gr, partly silicified + ferruginised, kaolinitic		
					9.5	10	Fe	Clay - kaolin - v. ferruginous		
					10.7			- white		
OS 17293								- white with trace light br		
94								- white		
95								- white with trace light br		
96						15		- cream		
97								- white with trace light br		
98								- cream		
99								- cream to v light grey		
17300								- cream, weathered granite at 18.7		
						20		EOH 19 m		

REASON FOR HOLE: To collect samples of white clay

OTHER DETAILS:

DRILL TYPE: Investigator

DRILLER: SADME

SCALE: 1:250

LOGGED BY: I. Youles

DATE DRILLED: 15-7-86

DRG/CODE No:

CARPENTARIA EXPLORATION COMPANY PTY. LTD.

ROTARY PERCUSSION DRILL HOLE LOG

HOLE Nº PD 3

PROSPECT: Dunn Hill EL 1274

LOCATION: ~30 km N Nunjikompita

CO-ORDS: 461 200 E 6458 150 N AMG

ROTARY: FROM 0 TO 3 m

HAMMER: FROM ...... TO ......

RL. COLLAR: ...... m.

INCLINATION: 90 °

DIRECTION: ✓ °

SAMPLE Nº	ANALYSES p.p.m/%	DEPTH METRES	LOG	DESCRIPTION	REMARKS	WATER
				Calcrete - nodular		
				Sand - fine gr, silicified, yellow to cream		
				Abandoned at 3m due to collapse of calcrete zone.	0141	

REASON FOR HOLE: To collect samples of white clay

OTHER DETAILS:

DRILL TYPE: Investigator

DRILLER: SADME

SCALE: 1:250

LOGGED BY: I Youles

DATE DRILLED: 15-7-86

DRG / CODE No:

HOLE Nº PD 4

CARPENTARIA EXPLORATION COMPANY PTY. LTD.

ROTARY PERCUSSION DRILL HOLE LOG

PROSPECT: Dunn Hill EL 1274
LOCATION: ~ 30 Km N Nunjikompita
CO-ORDS: 461200E 6458150N AMG
ROTARY: FROM 0 TO 10m
HAMMER: FROM .... TO ....
RL. COLLAR: .... m.
INCLINATION: 90°
DIRECTION: V

SAMPLE Nº	ANALYSES p.p.m/%	DEPTH METRES	LOG	DESCRIPTION	REMARKS	WATER
				Topsoil		
				Calcrete - nodular		
				Sand - fine gr; brown to white	0142	
		5		Sand - fine gr - silicified in part, kaolinitic, yellow to br.		
		10		Hole abandoned at 10m due to collapse of calcrete zone.		

REASON FOR HOLE: To collect samples of white clay.
OTHER DETAILS:

DRILL TYPE: Investigator
DRILLER: SADME
SCALE: 1:250
LOGGED BY: I. Youles
DATE DRILLED: 16-7-86
ORG/CODE No:

PROSPECT: Dunn Hill EL 1274
CARPENTARIA EXPLORATION COMPANY PTY. LTD.
ROTARY PERCUSSION DRILL HOLE LOG
HOLE No. PD 5

LOCATION: ~30 Km N. Nunjikompita
CO-ORDS: 461600 E 6457800 N AMG
ROTARY: FROM 0 TO 30 m
HAMMER: FROM ... TO ...
RL. COLLAR: ... m
INCLINATION: 90°
DIRECTION: V

0143

SAMPLE No.	ANALYSES ppm/%	DEPTH METRES	LOG	DESCRIPTION	REMARKS	WATER
		0–5		Sand - v. fine gr, minor calcrete nodules, v. light br.		
		5		Sand - fine gr, silicified, white to yellow br.		
				Sand - fine gr, slightly kaolinitic, white to v. light br.		
		10		Sand - med. to coarse gr, light br.		
				Sand - fine gr, kaolinitic, light br. to pale red br.		
				Sand - fine gr, kaolinitic, brown to red br.		
	17.5	15				
QS 17970				Clay - kaolin, off white		
71				- white, minor qtz grains throughout clay.		
72		20				
73						
74						
75				- white to light br.		
76				- white		
77		25				
78				- white with trace light red-br.		
79						
80						
	29.7	30		- white, weathered granite at 29.7m		

REASON FOR HOLE: To collect samples of white clay.
OTHER DETAILS:

DRILL TYPE: Investigator
DRILLER: SADME
SCALE: 1:250
LOGGED BY: I. Youles
DATE DRILLED: 16-7-86
DRG/CODE No:

APPENDIX 3

The Australian
Mineral Development
Laboratories

Head Office
Flemington Street, Frewville,
South Australia 5063
Phone Adelaide (08) 79 1662
Telex AA82520

Please address all
correspondence to
P.O. Box 114 Eastwood
SA 5063
In reply quote:

amdel

0145

8 August 1986

3/3/2/0 - M7525/87

Carpentaria Exploration Company Pty Ltd
PO Box 3
GOODWOOD SA 5034

Attention Mr P Binks

REPORT M7525/87

YOUR REFERENCE	Request - Mr I Youles.
TITLE	Testing of Kaolin.
WORK REQUIRED	Brightness and Yield, Chloride Content.

Investigation and Report by: Lyn J Day.

Manager, Materials Services: Philip J Parry.

for Dr William G Spencer
General Manager
Applied Sciences Group

Copy to Carpentaria Exploration Company Pty Ltd
GPO Box 1042
BRISBANE Qld 4001

Attention Administration Superintendent

Branches:
Operations Division:
Thebarton, S.A. (08) 43 5733
Telex: Amdel AA82725
Melbourne, Vic. (03) 645 3211
Perth, W.A. (09) 325 7311
Telex: Amdel AA94893
Sydney, N.S.W. (02) 428 5033
Telex: Amdel AA20053
Darwin, N.T. (089) 84 3637
Telex: Amdel AA85987
Townsville, Qld. (077) 75 1377
Telex: Amdel AA47363
Wivenhoe, Tas. (004) 31 7799
Brisbane, Qld. (07) 262 8522
Canberra, A.C.T. (062) 48 0157

1. INTRODUCTION

Nineteen samples of kaolin were submitted for testing to determine their brightness and yield, and chloride content, with respect to potential usage as paper coating clays.

2. PROCEDURES

Representative portions of the samples were wet-screened on a 300 mesh (53 μm) screen to separate out their grit fractions. The undersized material was placed in 2 litre measuring cylinders and the amount of minus 2 micron material determined using the sedimentation technique.

The minus 2 micron fractions were siphoned off, dried and milled using a high speed air mill to give finely dispersed powders. Brightness determinations were performed on these fractions using a Zeiss Elrepho electric reflectance photometer. The brightness was determined at 457 nm using the R457 filter. The yellowness was determined using the R57 filter.

The minus 2 micron fractions were tested using standard analytical techniques to determine their chloride contents.

3. RESULTS

See Table 1.

4. DISCUSSION

Paper coating clays require a minimum brightness of 86.0 and paper filling clays a minimum value of 80.0. Of the nineteen samples tested only nine have a brightness value in excess of 80.0. Some samples are promising while others are too low even to consider upgrading. The amount of minus 2 micron material is quite variable with some of the yields being fairly low. The chloride levels are high and the clay would require washing at some stage to remove this contamination were it to be considered for paper coating purposes.

dt.

TABLE 1: TEST RESULTS

	Sample	+53 μm (%)	-2 μm (%)	Brightness (R457)	Yellowness (R57-R457)	Chloride (%)	
QS	17282	34	21	81.3	9.2	0.88	
	17286	43	14	77.6	10.1	0.82	
	17289	39	12	75.1	12.0	1.99	
	17290	43	12	76.8	12.5	1.22	
	17291	50	12	75.9	13.0	0.89	
	17292	54	15	80.5	9.4	1.04	
	17293	61	14	79.4	8.2	1.52	
	17294	66	11	83.6	6.8	1.41	
	17295	65	10	81.1	9.2	2.03	
	17296	70	10	73.5	12.8	1.41	
	17297	72	6	78.0	9.0	1.87	
	17298	61	23	85.9	5.7	0.76	x
	17970	30	44	88.6	5.2	0.48	x
	17971	43	29	85.2	6.3	0.80	
	17972	45	26	81.6	7.7	1.31	
	17973	44	22	83.6	7.0	1.08	
	17974	52	17	79.9	8.9	1.71	
	17975	35	30	77.0	10.3	1.15	
	17976	52	19	78.8	9.6	1.29	

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED FEBRUARY 18, 1987

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

Results of testing by CSIRO on two clay samples from holes drilled approximately 30 km north of Nunjikompita are not encouraging (see Appendix). The viscosity of both samples is far too high for paper coating and the brightness is not high enough for high quality porcelain. Details of the samples submitted for testing were given in the previous Progress Report.

3. EXPENDITURE

A Statement of Expenditure is attached.

....

for P.J. Binks

149

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDED FEBRUARY 18, 1987

	$	$
Assaying	150	
Field Base Operations	74	
Rents - Mining Tenements	4388	4 612
TOTAL - THIS PERIOD		4 612
Previously Reported - Current Term		
Quarter ended May 18, 1986	7172	
Quarter ended August 18, 1986	1171	
Quarter ended November 18, 1986	5424	13 767
TOTAL - CURRENT TERM		$18 379
Previously Reported		$ 2 111
Total Project Expenditure to Date		$20 490

A.E. Covacich
Administration Superintendent

RECEIVED
10 MAR 1987
DEPT. OF MINES AND ENERGY SECURITY
6089

APPENDIX

CSIRO
Division of Minerals and Geochemistry
Underwood Avenue, Floreat Park,
WA, Australia

A Division of the Institute of Energy and Earth Resources
Private Bag, PO, Wembley, WA, Australia 6014
Telephone (09) 387 4233 Telex AA 92178

0151

12 December 1986

Mr P Binks
Carpentaria Exploration Co Pty Ltd
PO Box 3
GOODWOOD SA 5034

Dear Peter

Enclosed are rheograms for the samples submitted. Unfortunately neither sample is any where near the low viscosity requirement for a paper coating kaolin even after considerable washing. Currently there is a demand for extremely white firing kaolins for high grade table ware so we measured the colour of powder samples after firing to 1000°C.

Clay 17970 showed the highest brightness but the fired colour is distinctly pink so this end use is not applicable.

Altogether the results are not encouraging.

Yours sincerely

P J DARRAGH

enc

CKC 2

CARPENTARIA EXPLORATION C° S. AUST. 8/12/82

NARLABY CLAY 17298

-2μm WASHED

TEMP 25.5°C
B BOB
100,000 DYNES CM/CM SPRING

0.2% TSPP DISP
69.97 ~~69.97~~ % SOLIDS

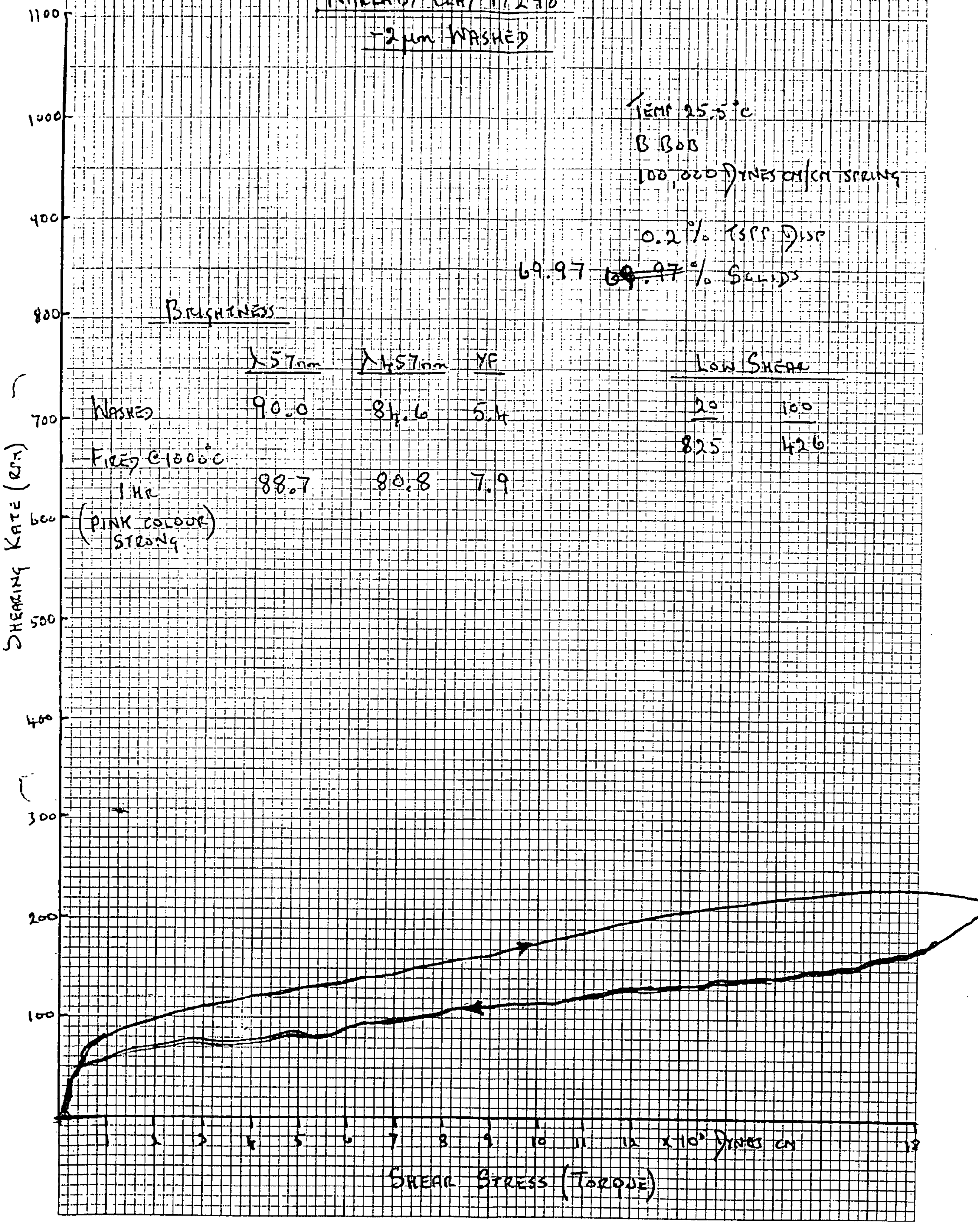
BRIGHTNESS

	λ 457nm	λ 457nm	YF
WASHED	90.0	84.6	5.4
FIRED @1000°C 1 HR	88.7	80.8	7.9

(PINK COLOUR STRONG)

LOW SHEAR

20	100
825	426



CEC 1

27/11/86

CARPENTARIA EXPLORATION C° S. AUST.

NARLABY CLAY 17970

-2μm WASHED

TEMP 24.5°C
B. BOB
100,000 DYNES CM/CM SPRING

0.3 % TSPP DISP.
65.60 % SOLIDS

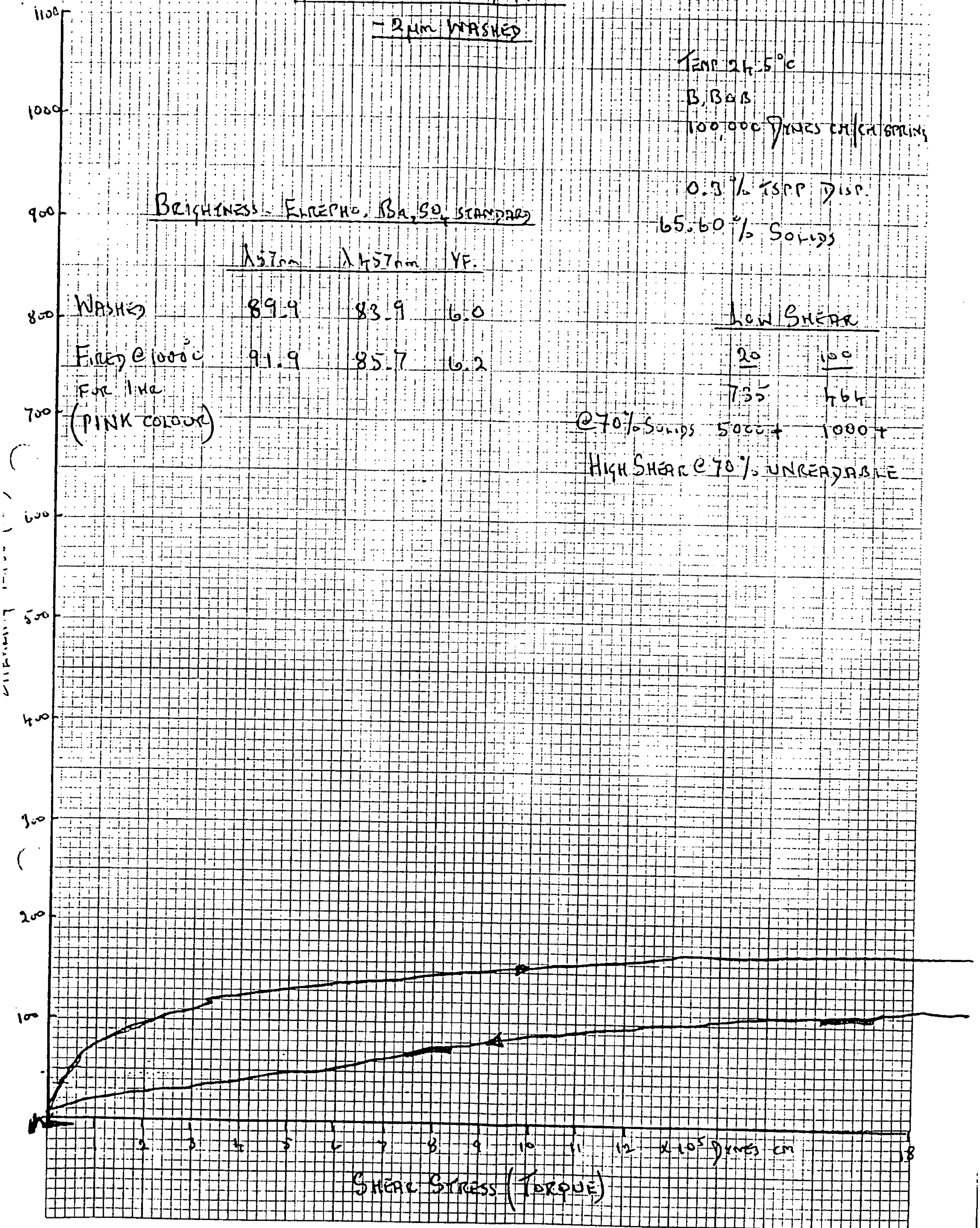
BRIGHTNESS - ELREPHO, $BaSO_4$ STANDARD

	λ 57nm	λ 457nm	YF.
WASHED	89.9	83.9	6.0
FIRED @ 1000°C FOR 1 HR (PINK COLOUR)	91.9	85.7	6.2

LOW SHEAR

	20	100
	735	464
@ 70% SOLIDS	5000+	1000+

HIGH SHEAR @ 70% UNREADABLE



MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED MAY 18, 1987

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

No work has been carried out on this Licence during the last quarter.

3. EXPENDITURE

A Statement of Expenditure is attached.

J. Richardson
....
for P.J. Binks

154A

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR THREE MONTHS ENDED MAY 18, 1987

	$	$
Field Base Operations	28	28
TOTAL - THIS PERIOD		$ 28
Previously Reported		$20 490
Total Project Expenditure to Date		$20 518

A.E. Covacich
Administration Superintendent

0155

Carpentaria Exploration Company Pty. Ltd.
INCORPORATED IN QUEENSLAND
(A MEMBER OF THE M.I.M. HOLDINGS LIMITED GROUP OF COMPANIES)
SUITE 7, "ROCKTON", CNR. MALLON & JEAYS STREETS, BOWEN HILLS, Q. 4006.
POSTAL ADDRESS: G.P.O. BOX 1042, BRISBANE, Q. 4001
TELEX: AA 145466 "CECBNE"
TELEPHONE: (07) 228 1122
DIRECT ENQUIRIES: (07) 228-1422

AEC:SF:Tenement

September 8, 1987.

The Director-General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD. S.A. 5063.

Dear Sir,

EXPLORATION LICENCE NO.1274 "DUNN HILL"
REPORT FOR QUARTER ENDED AUGUST 18, 1987

No exploration has been carried out on this Licence during the last quarter.

A Statement of Expenditure is attached.

Yours faithfully,
CARPENTARIA EXPLORATION COMPANY PTY. LTD.

A.E. Covacich
Administration Superintendent

Attach.

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDED AUGUST 18, 1987

	$	$
Administration	95	
Field Base Operations	204	
Operating Labour	238	$ 537
TOTAL - THIS PERIOD		$ 537
Previously Reported - Current Term		
Six Months ended May 18, 1987		$ 28
TOTAL - CURRENT TERM		$ 565
Previously Reported		$20 490
Total Project Expenditure to Date		$21 055

A.E. Covacich
Administration Superintendent

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED NOVEMBER 18, 1987

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. Exploration is carried out by Carpentaria Exploration Company Pty. Ltd. on behalf of Mount Isa Mines Limited. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

Dr. D. Lock of the A.N.U. has collected a suite of samples from pyrite-rich sections of drill core collected from the Narlaby palaeochannel. He is interested in alunite in these samples and has carried out sulphur isotope studies on them. He is currently preparing a report on this work and a copy will be forwarded to the Department with the next quarterly report.

3. EXPENDITURE

A Statement of Expenditure is attached.

....

for P.J. Binks

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDED NOVEMBER 18, 1987

	$	$
TOTAL - THIS PERIOD		Nil
Previously Reported - Current Term		
Quarter ended May 18, 1987	28	
Quarter ended August 18, 1987	537	$ 565
TOTAL - CURRENT TERM		$ 565
Previously Reported		$20 490
Total Project Expenditure to Date		$21 055

A.E. Covacich
Administration Superintendent

CARPENTARIA EXPLORATION COMPANY PTY. LTD.

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED FEBRUARY 18, 1988

1. TERMS AND CONDITIONS

Exploration Licence No.1274 "Dunn Hill" was granted to Carpentaria Exploration Company Pty. Ltd. on February 19, 1985, for a period of two years. It was extended for a further year on December 21, 1987. The Licence is located approximately 30 km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel. Previous work by Carpentaria Exploration Company Pty. Ltd. revealed extensive zones of low grade uranium mineralization in Eocene sands within this palaeochannel.

2. EXPLORATION

Discussions have been held with Dr. D. Lock of the ANU about carrying out a programme of sampling of drill core and cuttings from the Narlaby Palaeochannel. These cuttings were to be assayed for trace metals and checked for the presence of alunite and/or jarosite to determine the presence of metallic ores in pre-Eocene basement rocks. Unfortunately, it has been decided not to proceed with this programme because of the low prospectivity of the basement rocks in this area.

All drill cuttings from holes drilled during the search for uranium in the Narlaby Palaeochannel have been brought back from storage at Streaky Bay and submitted to the Core Library of SADME.

3. EXPENDITURE

A Statement of Expenditure is attached.

Richardson
....
for P.J. Binks

CARPENTARIA EXPLORATION COMPANY PTY. LTD.

EXPLORATION LICENCE NO.1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED FEBRUARY 18, 1988

	$	$
Administration	107	
Field Base Operations	450	
Freight	1201	
Outside Services	24	
Operating Labour	615	
Rents - Mining Tenements	4827	7 224
TOTAL - THIS PERIOD		$ 7 224
Previously Reported		$21 055
Total Project Expenditure to Date		$28 279

A.E. Covacich
Administration Superintendent

MOUNT ISA MINES LIMITED

EXPLORATION LICENCE NO. 1274 "DUNN HILL"

PROGRESS REPORT FOR QUARTER ENDED MAY 18, 1988

Exploration Licence No. 1274 "Dunn Hill" was granted to Mount Isa Mines Limited on February 19, 1985, for a period of two years. It was extended for a further year on December 21, 1987. Exploration is carried out by Carpentaria Exploration Company Pty Ltd on behalf of Mount Isa Mines Limited. The Licence is located approximately 30km east of Ceduna and covers the most prospective portion of the Narlaby Palaeochannel.

The Dunn Hill Licence is the last of a group of Exploration Licences which were held over the Narlaby Palaeochannel to search for "sandstone" uranium mineralisation. Intensive drilling over several years in the early 1980s revealed a major Tertiary palaeochannel system. Interesting uranium mineralisation was found in the Yaranna area, approximately 30km north of Nunjikompita, and this was followed up by core and air-core drilling. A summary of the exploration, geology and uranium mineralisation of the area was presented in a paper in the Proceedings of the AIMM in 1984 (Uranium in Tertiary Palaeochannels "West Coast Area" South Australia, Proceedings AIMM No 289: pp 271-275 by Binks and Hooper).

Because of the low grades of uranium mineralisation intersected in the Yaranna area and the probability that higher grades may not exist because of the extremely acidic groundwater, it has been decided to surrender this Licence.

Consideration has been given on several occasions to exploring for base and precious metals in the basement rocks beneath the younger sediments. Unfortunately, existing aeromagnetic cover of the area was not good enough to allow detailed interpretation and subsequent recognition of possible mineralised environments. Also, the depth of Cainozoic cover (30 to 120m) precludes cheap reconnaissance RAB drilling.

A statement of expenditure is attached.

P J BINKS
Senior Geologist

0162

CARPENTARIA EXPLORATION COMPANY PTY. LTD.

EXPLORATION LICENCE NO.1274 "DUNN HILL"

STATEMENT OF EXPENDITURE FOR QUARTER ENDED MAY 18, 1988

	$
TOTAL - THIS PERIOD	Nil
Previously Reported - Current Term	
Quarter ended February 18, 1988	$ 7 224
TOTAL - CURRENT TERM	$ 7 224
Previously Reported	$21 055
Total Project Expenditure to Date	$28 279

A.E. Covacich
Administration Superintendent