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REPORT

ON

STAGE 3 - PRELIMINARY DRILLING

OF E.L. 43/70

FOR

KAISER ALUMINUM

MICROFILMED

PXT250
JUNE 1981

LONGWORTH & MCKENZIE PTY. LIMITED



81-1573

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LONGWORTH & MCKENZIE PTY. LIMITED
CONSULTING ENGINEERS



REF: PXT250/RJC/sed
24th June, 1981

The General Manager,
Finance and Planning,
Kaiser Aluminum & Chemical Corp. (Aust.) Ltd.,
7th Floor, A.M.P. Centre,
50 Bridge Street,
SYDNEY NSW 2000

Attention: Mr. C. W. Blandy

Dear Sir,

RE: REPORT ON STAGE 3 - PRELIMINARY DRILLING PROGRAMME

Please find attached our report on the above.

In summary the exploration programme has shown the prospects drilled (and the Detention Sub-group generally) to have a physically unsuitable weathered zone of variable strength sandstone overlying a limited thicknesses of chemically unsuitable but extremely strong quartzite which in turn overlies beds of inferior rock types such as phyllite and quartz schist.

No further exploration work for silica sources is proposed within E.L. 43/70.

We trust this report meets your requirements, should you require clarification of any feature of the report please do not hesitate to contact us.

Yours faithfully,
LONGWORTH & MCKENZIE PTY. LIMITED

Dr. L. de. AMBROSIS

REPORT
ON
PRELIMINARY DRILLING PROGRAMME
STAGE 3
SILICA PROSPECT E.L. 43/70
TASMANIA
FOR
KAISER ALUMINUM

REF: PXT250
JUNE, 1981

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1.0 SUMMARY

Stage's 1 and 2 have previously been reported. This report contains the findings of Stage 3 (Preliminary Drilling Programme at Dip Range No. 1 North and Quartzite Peak).

The quartzite units were found to be interbedded with mica schists, siliceous fine grained beds, and poor quality silicified limonitic sandstone units.

The quartzite beds within the prospects drilled were found to be overlain by an extensive weathered zone of variable depth. The surface and subsurface weathered beds are composed of white variably cemented (laterally and vertically) units of relatively pure ($\text{Al}_2\text{O}_3 < 1\%$) sandstone. The sub-weathered zone quartzite appears in drill core as a light brown to blue grey, glassy, extremely strong quartzite which frequently is thinly bedded. These bedding planes are prone to contain a variable thickness of micaceous material and the quartzite showed a general trend to decrease in silica quality with depth. From chemical analyses only a small percentage of this quartzite may be considered to have ($\text{Al}_2\text{O}_3 < 1\%$).

2.0 INTRODUCTION

This report provides the details of the Stage 3 Preliminary Drilling Programme on silica deposits within the northern half of Exploration Licence 43/70 near Wynyard in northern Tasmania.

The area (known as the Agreement Area) covered by this multi-staged investigation is shown in Figure No. 1 and is the subject of an agreement between Mineral Holdings Australia (MHA) the holder of the E.L. 43/70 and Kaiser Aluminum (KA) who have undertaken the investigation of silica deposits within the Agreement Area. Longworth & McKenzie Pty. Limited (L&M) have been engaged by Kaiser Aluminum to proceed with the investigation programme.

Within this part of northern Tasmania the occurrence of very large reserves of high grade quartzite have been reported in various official publications.

A number of quartzite prospects had been identified during preliminary investigations of this area by personnel associated with MHA. Surface samples had been collected, but only on one prospect (Maynes Creek) had any subsurface investigation been carried out. At the Maynes Creek deposit, BHP collected a bulk sample from surface outcrops and performed some percussion drilling, the cuttings of which were chemically analysed.

A preliminary visit by J.H. Callender (KA), C.L. Adamson (L&M) and K. Pinner (MHA) in January 1981, identified the Dip Range No. 1 area as the prime prospect for the Stage 2 investigation. During the Stage 2 investigation (11th March to 5th April, 1981) the Agreement Area was investigated by a reconnaissance mapping survey to identify other promising prospects in addition to those already identified by MHA; while the prime prospect (Dip Range No. 1 area) was investigated in detail by costeaning, blasting and percussion drilling. Surface samples were also collected from other sites (Quartzite Peak and Mt. Sunshine) by blister blasting.

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The major conclusions contained within the Stage 2 report may be summarized as follows:-

- 1) Although the surface chemical characteristics of the quartzites are promising from the surface and limited subsurface exploration it had not been possible to establish the likely stratigraphic variations in chemical and physical properties.
- 2) On the basis of surface and near sub-surface exploration Quartzite Peak and Dip Range No. 1 North were identified as the prime sites for further work.

As a result of the recommendation in the Stage 2 report and subsequent site visit by Dr. J.J. Deric and J.H. Callender (KA) a limited drilling programme was mobilized to drill cored holes at Dip Range No. 1 North and Quartzite Peak (locally known as Shakespear). The object of this programme was to:-

- 1) Define physical and chemical variations with depth in the quartzite/sandstone.
- 2) Provide a basis for realistic estimates of reserves.

3.0 GEOLOGIC SETTING

3.1 General Geology

The eastern half of the Agreement Area has been mapped on a scale of 1:63,360. This mapping is published in the Table Cape and Burnie geological maps, both of which are covered in reports by R.D. Gee (1971 and 1977).

Apart from Quaternary alluvium and Tertiary basalt and sediments, some of which have been converted to silcrete, the rocks of the Agreement Area are predominantly composed of relatively undeformed Precambrian clayey, silty and sandy sediments. These contain the quartzite and sandstone units which are the targets of the exploration programme.

Gee (1971 p.9) in his report on the Table Cape 1:63,360 geological map summarises the Proterozoic sequence as follows:

| | |
|---------------------|--------------|
| KEITH METAMORPHICS | Not relevant |
| ROCKY CAPE GROUP | |
| Jacob Quartzite | 1130 m |
| Irby Siltstone | 760 m |
| Detention Sub-group | |
| Cave Quartzite) | |
| Port Slate) | 1400 m |
| Bluff Quartzite) | |
| Cowrie Siltstone | 2400 +m |

Initial prospecting established that the rocks of interest are the Jacob Quartzite and the quartzite beds within the Detention Sub-group.

3.2 Geology Of The Agreement Area

The geologic setting shown in Figure No. 1 is a combination of the factual information recorded during the Stage 2 field reconnaissance survey, data from Geological Survey Mapping and the interpreted regional geology based on the above information.

The rock types mapped in the Agreement Area consist of the relatively undeformed Precambrian Keith Metamorphics and the Rocky Cape Group. These are overlain to a large extent by deeply weathered Tertiary basalt, Quarternary sediments and isolated deposits of silcrete (ref. Figure 1).

The units of interest within the Area are the sandy beds of the Detention Sub-group and the Jacob Quartzite. Regionally the strike of these beds is fairly constant at NE - SW. The Jacob Quartzite crops out along strike in the southern and southwestern part of the Area in the Pokes Road Quarry area and again at the Maynes Creek Prospect.

The quartzite of the Detention Sub-group forms the largest unit in the Area, cropping out along strike diagonally across the central portion of the Agreement Area.

Gee (1971, p.10) states, of the Detention Sub-group, that it contains about 10% siltstone, of which the Port Slate is the thickest bed, but that siltstone lenses from a few metres to 80 metres thick occur irregularly. Most of Gee's observations were probably made along the coast but from the current exploration it appears that his general description would apply to the Agreement Area.

Within the Agreement Area the Detention Sub-group has been eroded to produce a rugged topography. The ridge lines are strike controlled but have been dissected at frequent intervals to give a hummocky appearance.

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The ridges show scattered semi-continuous white silicified outcrops of quartzite, but the surface is generally composed of sandy and peaty soils.

From surface exposures of the silicified quartzite the Detention Sub-group appears to be a relatively massive unit with occasional thinly bedded quartzite beds. After the Stage 2 investigation it was considered that the near surface rock was a variably silicified (with depth and along strike) sandstone ranging from a poorly cemented sand to a highly silicified quartzite. However, the drilling undertaken during this stage of the exploration programme showed these surface and near surface variations in physical state to be an effect of weathering resulting in surface leaching of silica and a somewhat erratic secondary silicification of the scattered ridge surface outcrops and valley bluffs reported in the Stage 2 report. The nature of the quartzite below this weathered zone is described in Section 5.

The Jacob Quartzite has been eroded to form a less rugged form with bedding strike outcrop control not being as distinct as with the Detention Sub-group. In the Maynes Creek Deposit this increased susceptibility to erosion in the Jacob Quartzite may be explained by the frequent occurrence of interbedded phyllitic siltstone units.

From the work undertaken on E.L. 43/70 it has not been possible to elucidate the details of the geological structure within the Agreement Area. The general strike of the beds within the E.L. is NE to SW and the majority of the dips measured are to the NW at angles generally between 45° and 70°. Some restricted areas of SW dips have been recorded, but owing to the limited number of outcrops the true significance of these anomalous dips has not been determined. With respect to the Stage 3 drilling programme the areas of particular interest were Dip Range No. 1 North and Quartzite Peak.

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Dip Range No. 1 North lies at the northern end of the Dip Range No. 1 prospect (Ref. Figure No.1). This prospect was seen as the most promising location after the Stage 2 costeaning had located near surface high quality, but physically variable sandstone and quartzite in IS4 close to a massive quartzite bluff on the adjacent valley side.

Quartzite Peak forms part of a high ridge line which lies south of Dip Range No. 1 but runs parallel to it. A prominent quartzite bed is exposed across the top and slopes of Quartzite Peak and adjacent portions of the ridgeline.

This outcrop extends for approximately 1 kilometre and forms the longest outcrop observed within E.L. 43/70. The width of this bed measured from surface outcrop was estimated to have a minimum width of 15m with a maximum probable width of 30 metres. Due to the exposed nature of Quartzite Peak no costeaning was carried on this bed during the Stage 2 investigation however, the resistant nature of this bed to weathering indicated its physical suitability and chemical analyses of blister blasted samples were also encouraging. This bed was called the Shakespeare Quartzite Bed and was the target for drilling on Quartzite Peak. Environmentally, Quartzite Peak is extremely prominent, being visible from tens of kilometres in either direction along the Bass Highway.

4.0 NATURE OF THE INVESTIGATION

4.1 Field Activities

4.1.1 General

The Stage 3 site work was carried out by geologists R.J. Carr (L&M) and T. Rath (KA) between the 8th of April and 8th of June, 1981. The programme consisted of hammer seismograph traverses and the diamond drilling of four cored holes. This work was carried out at and between Dip Range No. 1 North and Quartzite Peak (see Figure No. 2 & 3).

The hammer seismograph programme was undertaken prior to drilling, firstly to provide information on the subsurface conditions to assist in the siting of drill holes and secondly to provide a basis for the lateral extrapolation of units identified by drilling.

Environmentally, due to the visibility of Quartzite Peak and the central portion of Dip Range No. 1 drill site access was limited to existing access tracks and locally to ridge lines. Cuts for drill site pads were kept to a minimum and restoration was carried out on hole completion.

The field activities were hampered by adverse weather during the seismic work and the latter stages of drilling. DDH No. 4, in particular, was drilled under extremely difficult access conditions caused by continuous rain.

DIAMOND DRILL HOLE AND SEISMIC TRAVERSE LOCATIONS

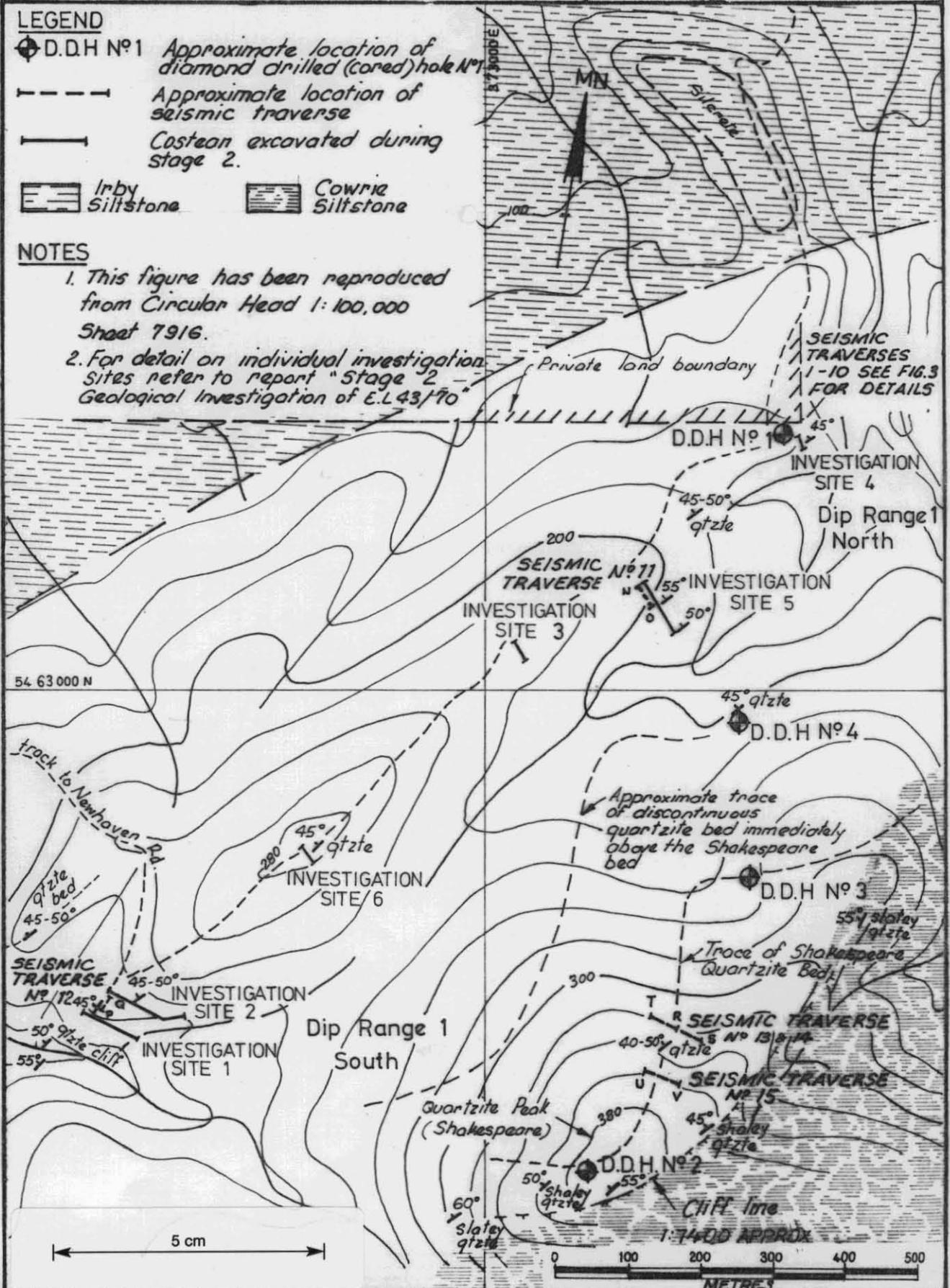
FIGURE NO 2

LEGEND

-  D.D.H No 1 *Approximate location of diamond drilled (cored) hole No 1*
-  *Approximate location of seismic traverse*
-  *Costean excavated during stage 2.*
-  Irby Siltstone
-  Cowrie Siltstone

NOTES

1. This figure has been reproduced from Circular Head 1:100,000 Sheet 7916.
2. For detail on individual investigation sites refer to report "Stage 2 Geological Investigation of E.L43/90"



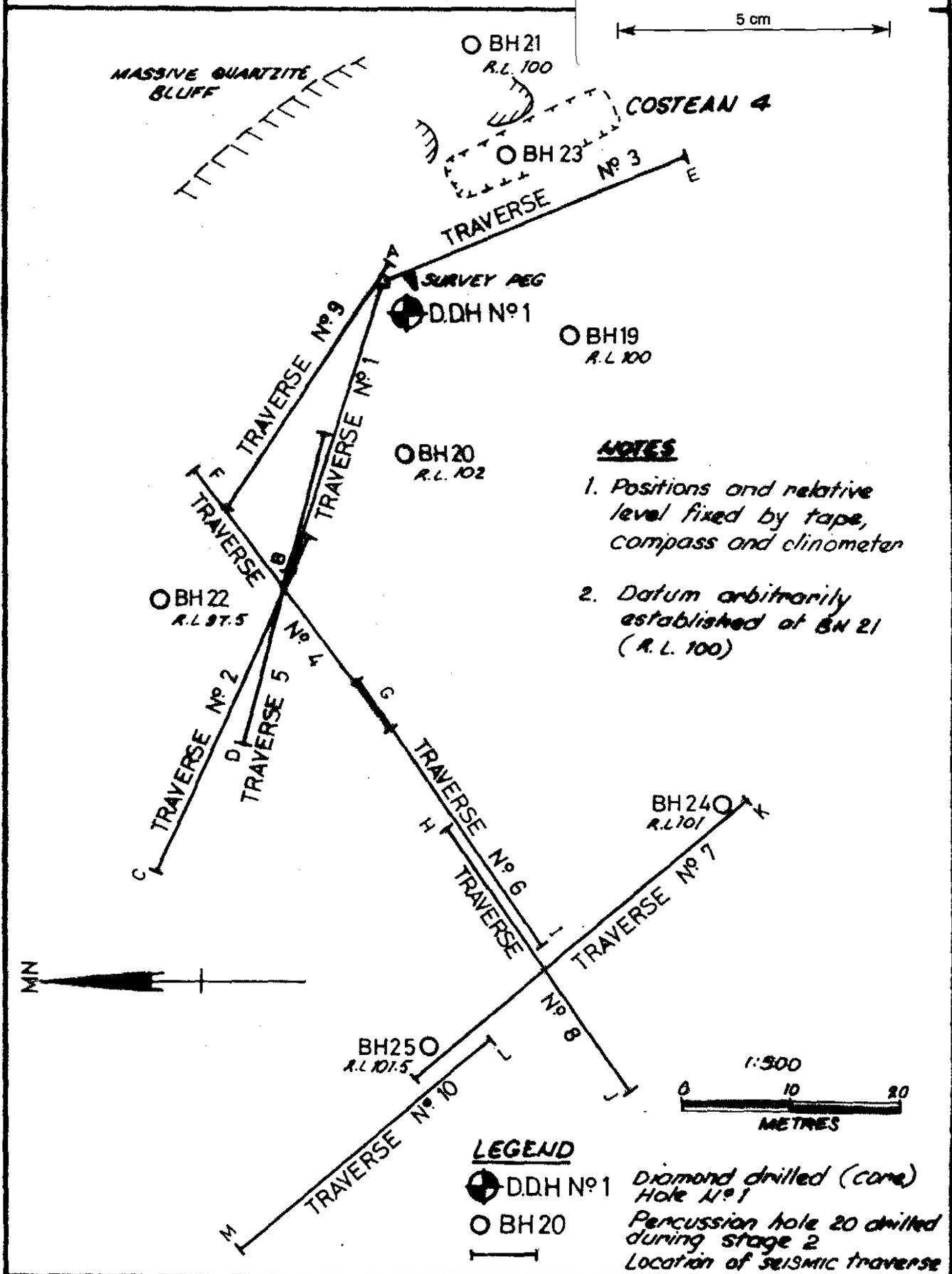
Consulting Geotechnical Engineers
 3 Eden Street, Crows Nest 2065 Telephone: 929 0122
 LONGWORTH & MCKENZIE PTY. LIMITED



Job No
 PXT 250

DIP RANGE N°1 NORTH
SEISMIC TRAVERSE LOCATIONS

FIGURE N° 3



- NOTES**
1. Positions and relative level fixed by tape, compass and clinometer
 2. Datum arbitrarily established at BH 21 (R.L. 100)

- LEGEND**
- ⊕ D.D.H. N°1 Diamond drilled (core) Hole N°1
 - BH 20 Percussion hole 20 drilled during stage 2
 - Location of seismic traverse

Consulting Geotechnical Engineers
3 Eden Street, Crows Nest 2065 Telephone: 929 0122
LONGWORTH & MCKENZIE PTY. LIMITED



Job N°
PXT 250

4.1.2 Seismic Traverses

From shallow subsurface exploration undertaken in Stage 2 and the random surface outcrops, the physical state of the surface cover and rock was known to vary widely. Hammer seismograph traverses were undertaken to attempt to quantify this variation.

The subsurface variations observed during costeaning (see Stage 2 report) indicated that velocity inversions could be expected and in association with the lateral variations in silicification would make interpretation of results difficult.

Some 15 seismic traverses were carried out using a Nimbus seismograph. Ten traverses were run at Dip Range No. 1 North, one at each of Investigation Sites 1 and 5 and three on Quartzite Peak. The length of these traverses varied from 30 to 40 metres with the total meterage being 490 metres.

The field recorded data was computer analysed by the Hawkins method. Where the field data indicated that the subsurface profile differed from the modelled layered case (traverses 3,4, and 6) quantitative analysis was not performed, however field data is presented to allow qualitative interpretation. To facilitate the identification of subsurface quartzite layers the seismic velocity of the surface silicified quartzite was also measured.

The field recorded seismic data and the results of computer analysis are contained within Appendix A.

4.1.3 Diamond Drill Holes

Four diamond drill holes were drilled at the locations shown in Figure No. 2.

The holes were drilled using a Gemco trailer mounted rig towed into position by a D7 Dozer. This type of drill rig is limited to the drilling of vertical holes. Initially the core size drilled was NQ (47.6mm), however in DDH No. 1 the standard NQ diamond bit effectively refused to drill (with the rig fully anchored down) in extremely strong quartzite at a depth of 13.3 metres. Subsequently a thin walled core barrel with impregnated diamond bits was used in the remainder of DDH No. 1 and 2,3 and 4. The core diameter produced by the thin wall system was 35.6 mm.

The use of the thin walled tube and impregnated bit gave drilling rates between 5m/day for the extremely hard quartzite and 13m/day for the interbedded siliceous shists and quartzites.

DDH No. 1 (at Dip Range No. 1 North) was located to intersect quartzite at depth, to correlate with massive quartzites bluff in the adjacent river valleys sides and surface results from IS4 (Stage 2 investigation).

DDH No. 2 (on top of Quartzite Peak) was located at the southern edge of the visible outcrop of the Shakespeare Quartzite Bed.

DDH No. 3 was located to penetrate the Shakespeare Quartzite Bed. The location was chosen to minimise the visual impact of the drilling activities.

DDH No. 4 was located to intersect the next apparent semi-continuous quartzite bed above the Shakespeare Quartzite Bed.

The geological logs and core photographs are contained in Appendix B.

4.2 Laboratory Testing

Representative samples were split from the core of DDH No. 1 and No. 3. These samples were returned to A.C.I. Technical Centre Sydney for testing.

Samples from DDH No. 1 at depths 4.9, 8.9, 11.1, 12.1, 14.16, 16.1, 18.17, 20.17 and 22.17m were chemically analysed by full X-ray fluorescence and thin sections were prepared for petrological analyses.

Samples from DDH No. 3 at depths 10.25, 12.0, 15.0, 17.12, 19.2, 23.9, 27.0, 28.5 and 30.9m were chemically analysed by full X-ray fluorescence. The sample from depth 28.5 metres was also tested by X-ray diffraction to identify the micaceous component.

The results of the above analysis are contained within Appendix C.

5.0 SUMMARY OF FIELD RESULTS AND INTERSECTED STRATIGRAPHY

5.1 Hammer Seismograph

From measurements on the silicified surface quartzite the target, subsurface quartzite velocity was expected to vary between 2500m/sec to 3500 m/sec.

It was expected that the steeply dipping (+45°) bedding of the Detention Sub-group would dominate the seismic response. However, in all traverses the near subsurface weathering effects proved to be the dominant feature detected by the seismograph.

The lateral variations in depth of the first silicified zones within the weathered zone resulted in some traverses being quantitatively un-interpretable based on the conventional layered model. The poor fit of some points on the line of best fit in a number of traverses may also be partly attributable to irregular silicified surfaces.

Correlations between D.D.H. No. 1 (see section 5.2) and the traverses at Dip Range No. 1 indicate that the depth of the first layer picked up by the seismograph did not necessarily correlate to the full depth of the primary weathering. Additionally due to the effect of velocity inversions the first recorded highly silicified largely continuous layer obscured subsequent layers below it.

While the depth of the weathered zone could not be interpreted from the seismograph the traverses did show the weathering to be wide spread.

Hammer seismograph traverses at Quartzite Peak (No's 13,14 and 15) although again masked by the subsurface weathering effects did show that a high velocity material continued at depth to the south east of the Shakespeare Bed outcrop on Quartzite Peak, thus inferring that the Shakespeare Bed may have been thicker than its surface outcrop suggested.

Traverses No. 11 and 12 at Stage 2 Investigation Sites No. 1 and 5 again reinforced the existence of quite deep poorly cemented sandstones (weathered zone) in some locations as previously reported in the Stage 2 report.

5.2 Diamond Drilling

Prior to undertaking the drilling programme, on the basis of the Stage 2 work, the Detention Sub-group quartzite was regarded as a variably silicified sandstone unit.

Diamond drill hole No. 1 at Dip Range No. 1 intersected some 10.56 metres of the white variably silicified sandstone (which typifies surface exposures). Of this 10.56 metres some 0.3 metres was top soil and sand, 4.05 metres was core loss (sand) and 2.465 was classified as having a tactile strength from extremely weak to moderately strong. Collectively these represented some 65% of this 10.56 metres. Immediately below this weathered and leached zone a brown black stained silicified sandstone unit occurs slightly above the water table. This medium grained sandstone contained numerous joint and fracture planes which are infilled with black oxide deposits. Petrological examinations showed the individual interlocking quartz grain boundaries to be etched with a limonitic stain.

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Beneath the sandstone a light brown to grey, glassy, highly silicified thinly bedded, very strong quartzite extends from 11.7 metres to 30.2 metres. Within the bedding planes fine beds of yellow micaceous minerals occurred, these became thicker and more prevalent with depth.

Taking into account the dip of the bedding (approximately 45°) the true thickness of this quartzite bed is approximately 13 metres. The quartzite unit is underlain by an iron oxide stained silicified silty sandstone. The hole was terminated in this rock type at 36.12m.

Having established the general subsurface stratigraphy at Dip Range No. 1 North, the next target, the Shakespeare Quartzite Bed on Quartzite Peak was drilled. DDH No. 2 was drilled on the south eastern edge of the Shakespeare Quartzite Beds surface outcrop to establish its subsurface extent. From the seismic work (see Section 5.1) it was expected that this bed may have been wider than surface outcrop indicated. DDH No. 3 was drilled through the bed to establish its thickness and nature with depth.

The core of DDH No. 2 consisted of 6.75m of white fine to medium grained sandstone underlain by a thinly bedded brown, green, shaley, micaceous sandstone. This borehole was terminated at 17.7m in the above material.

Core from DDH No. 3, which intersected the Shakespeare Quartzite Bed, consisted of some 6.53 metres of white, medium to fine grained, variably silicified sandstone. Of this core approximately 85% of the strata was sand or had its strength appraised at less than moderately strong.

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Below the weathered quartzite layer a light grey glassy, extremely strong quartzite bed extended from 6.53m to 27.6m before grading into an interbedded quartzite and siliceous mica schist. The quartzite was a thinly bedded sequence containing micaceous material within the bedding planes. The true thickness of this quartzite bed would be approximately 15 metres. However, if the leached zone is included (ie. down dip this zone would not be weathered due to the cover of younger sediments) the thickness of this bed increases to 18.4 metres.

DDH No. 4 penetrated the next prominent semi-continuous surface outcrop stratigraphically above the Shakespeare Quartzite Bed. This hole intersected some 1.4 metres of sand and slope wash overlying a black schist to 2.3m. The schist was in turn underlain by a brown grey quartzite with frequent bands of schistose micaceous material. At 9.5 metres another black mica schist bed was intersected. This was underlain at 11.2 metres by a thinly bedded in part micaceous quartzite. This hole was terminated at 36.01 metres where the quartzite had deteriorated to a brown silicified sandstone with a micaceous matrix.

Core from DDH Nos 1 and 3 was sampled for analysis. However, DDH No's 2 & 4 were visibly substandard and not sampled.

DDH Nos 1 to 4 selectively penetrated most of the major quartzite beds of the Dentention Sub-group, viz:- from close to its base (DDH No. 2) adjacent the Cowrie Siltstone south west of Quartzite Peak through to the upper parts of the sequence (DDH. No. 1) adjacent the Irby Silstone (Ref. Figure No. 2).

On the basis of these diamond drill holes the following general observations may be made:-

- 1) The quartzite beds within the Detention Sub-group have suffered deep weathering and variable secondary silicification producing surface rocks which vary from a sandstone with little or no cement to a highly silicified glassy quartzite.

The depth of this primary weathering zone varies in the diamond drill holes from approximately 6.5 to 10 metres. However from Stage 2 percussion hole drilling this sequence is known to extend deeper than 15 metres in other portions of Dip Range No. 1. (Ref. Stage 2 report).

- 2) The quartzite below the leached zone is largely a thinly bedded sequence and much of this bedding structure is lost in surface outcrops through weathering effects and presumably secondary silicification.
- 3) At the sites drilled, quartzite below the leached zone shows a general tendency to decrease in purity with depth. The frequency of micaceous material occurring in bedding planes increases with depth as does the number of thin micaceous beds.

6.0 SUMMARY OF ANALYTICAL RESULTS

The results of full x-ray fluorescence on samples from DDH No. 1 and DDH No. 3 are contained within Appendix C and the relevant chemical trends are shown graphically in Figures No. 4, 5 and 6.

Figure No. 4 is a plot of drill hole depth vs alumina and silica percentage by mass for the samples analysed from DDH No. 1. The range of alumina and silica content in the surface samples collected at Dip Range No. 1 North during Stage 2 and the analysis from percussion hole No. 22 are also plotted.

The cross hatching and shading represent the interpreted expected range of results, while the general trends with depth are shown in heavy dashed lines.

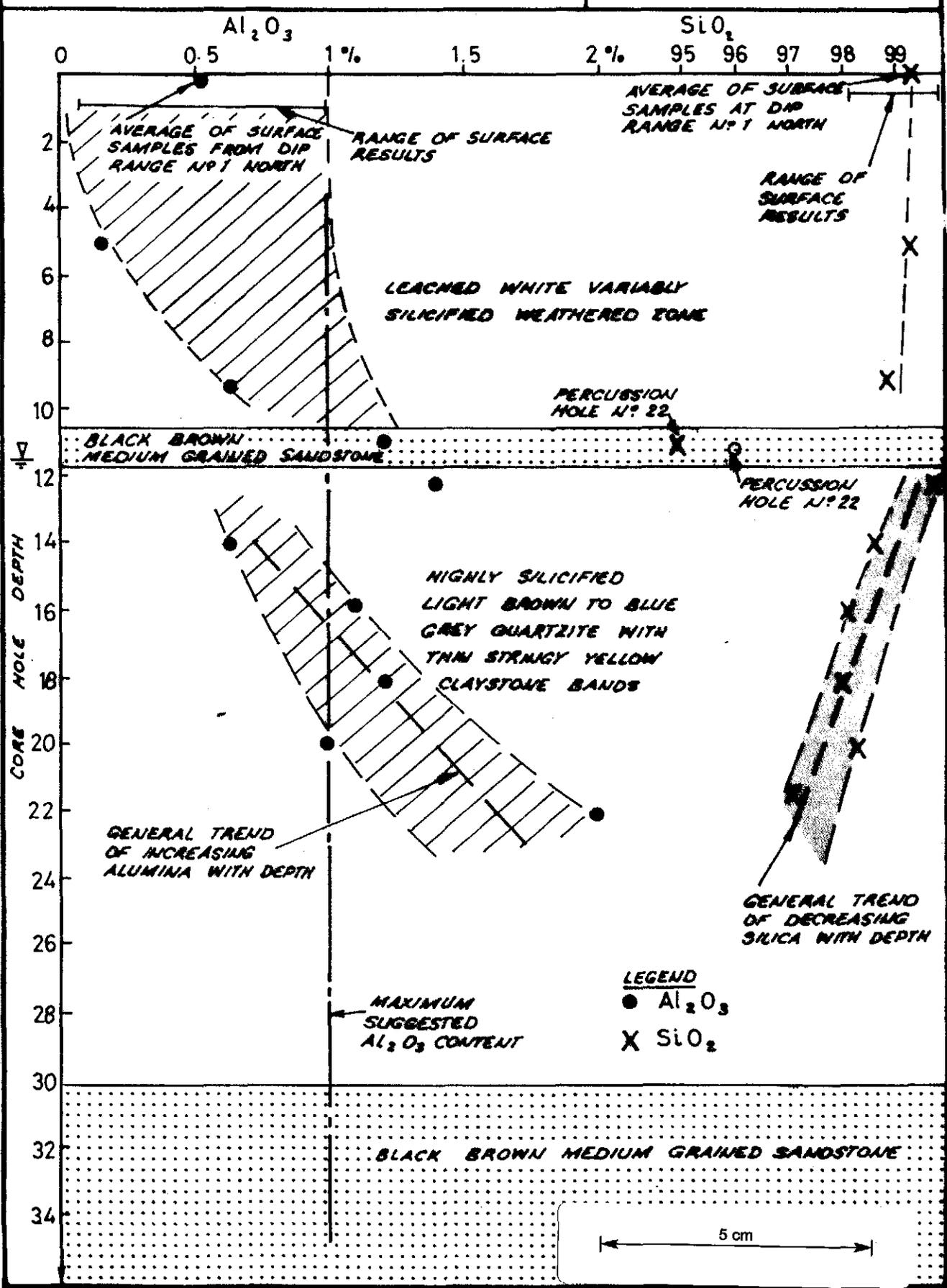
Figure No. 4 shows increasing alumina with depth. Within the upper leached zone the alumina content increases from an approximate average of 0.5% to approximately 1% at ten metres. Again in the lower highly silicified light brown to blue grey quartzite the alumina content increases with depth.

Within the black to brown silicified sandstone which lies just above the water table at 11.7m both the alumina and iron content are high. The high iron content correlates with the limonitic staining observed around grain boundaries during the petrographic analysis and the black to brown joint infill material recorded on the drill hole log.

Figure No. 5 gives a similar plot for the analytical results from DDH No. 3. The general trend again shows an increasing alumina content with depth both in the visually apparent upper leached zone and the lower quartzite unit. Figure No. 5 also shows the expected large increase in alumina in the mica shists which occur at a depth of 27.6 metres. There is also a dramatic increase in the magnesium

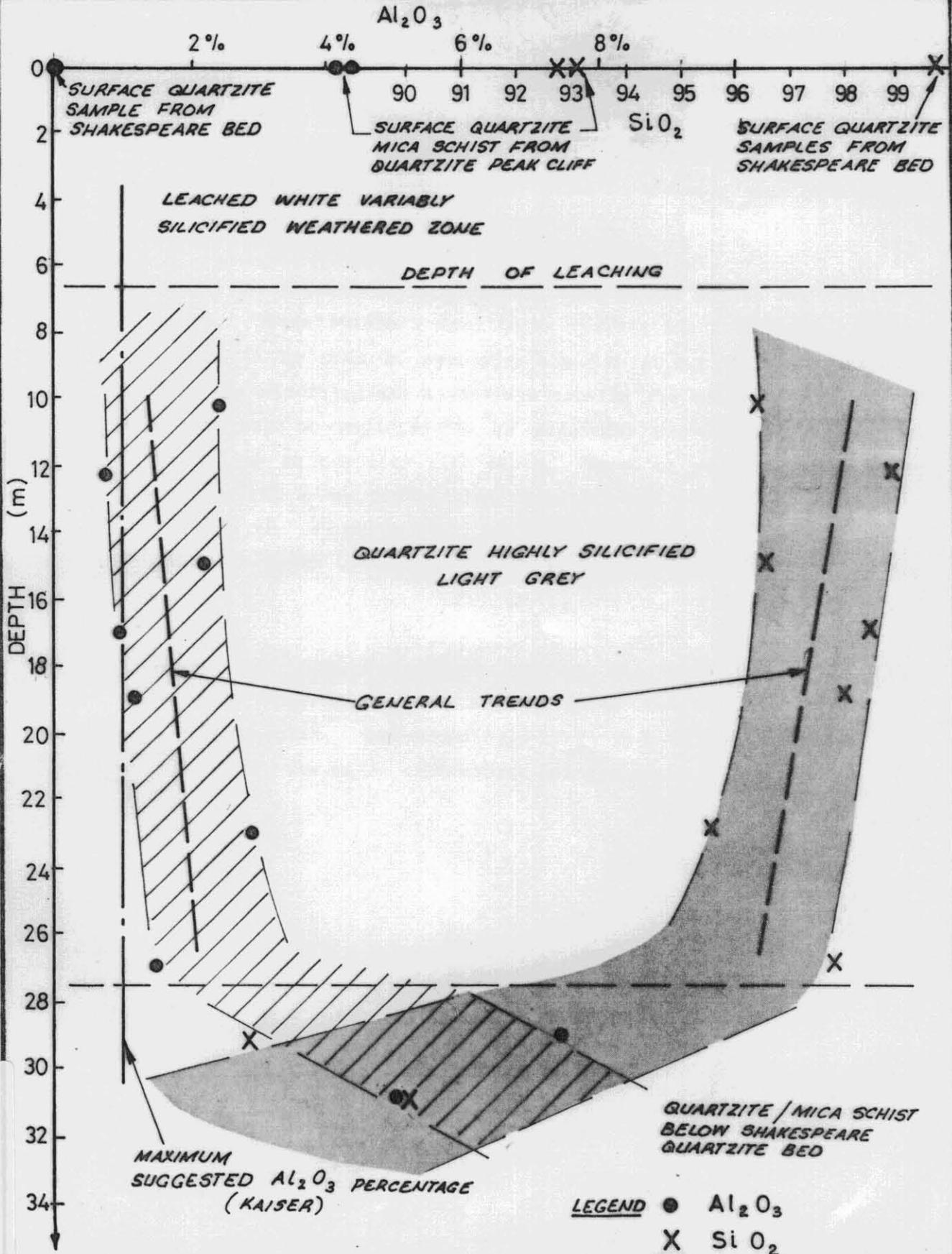
D.D.H N° 1 Al₂O₃ & SiO₂ vs DEPTH

FIGURE N° 4



D.D.H N^o 3 Al₂O₃ & SiO₂ vs DEPTH

FIGURE N^o 5



5 cm



content of the rock below 27.6 metres and this correlates well with the presence of biotite mica in the schist (X-ray diffraction result). It is interesting to note that the alumina content etc. of this lower unit approach that found in the siliceous mica schist on the cliff face at Quartzite Peak.

Figure No. 6 gives gives a plot of alumina and potash for DDH NO. 1 and 3. There exists a continuous correlation between the two in the ratio by mass of approximately 5:1 Al_2O_3 : K_2O respectively. Thus the mineralogical assemblage causing the contamination of the silica may be expected to be generally of the same type, but increasing in quantity with depth. Based on visual, petrographic and limited X-ray diffraction results, this assemblage appears to be made up of muscovite, kaolinite and some feldspars in the quartzite units with the addition of biotite in the lower schistose units.

In summary then the silica content may generally be said to decrease with depth both in the upper leached zone and lower quartzite units. Correspondingly there is a increase in impurities with depth, the major contaminant being alumina.

7.0 DISCUSSION AND CONCLUSIONS

The quartzite of the Detention Sub-group and the Jacob Quartzite within the Agreement Area (based on the results of this multi staged programme) are interbedded with schists and other deleterious siliceous fine grained sediments. Surface outcrops of these sediments are generally obscured by sandy slope wash from the quartzite units. This surface cover, in conjunction with the quartzite outcrops, gives the quartzite the false appearance of being present in massive units.

The results of tactile appraisal and chemical analysis of the near surface quartzite sandstones indicate the near subsurface profile (to a depth in excess of 15 metres in some areas) to be a weathered derivative of deeper quartzite units.

Based on the Stage 2 mapping and costeaning work this variable surface weathering is a widespread feature of the quartzites of the Detention Sub-group and the Jacob Quartzite. As described in the Stage 2 report the rock within this weathered zone varies in character with depth and along strike from a white very poorly cemented sandstone to a white glassy silicified quartzite.

While generally the quality of the silica in the upper zone is good, it is conservatively estimated (based on the Stage 2 costeaning and the diamond drill hole results) that at least 50% of this surface zone would be physically unsuitable for the production of ferro silicon (based on the T.E.M.Co standards ref. Stage 2 report).

Below this leached zone the quartzite proper appears as a light brown to grey glassy, extremely strong, largely thinly bedded unit. The bedding planes and to a lesser extent the rock matrix contain variable quantities of micaceous material. The frequency of the occurrence of the fine micaceous bedding planes within the

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quartzite appears to increase with depth. The chemical analyses are consistent with this observation. The impurities in the quartzite tend to grade from the lighter coloured micas (muscovite) and kaolinite to the darker biotite micas with depth as the quartzite grades into schists.

Chemically, figures 4, 5 and 6 show that only a small percentage of quartzite won from this lower zone would be good quality (< 1% Al_2O_3) material.

Finally, in addition to the poor chemical quality of the quartzite beds drilled by DDH No. 1, 3 and 4 the general thin width of the units detracted from the deposit. Large quantities of overburden (both in terms of rock between the quartzite beds and spoil from the weathered zone) would have to be moved and stockpiled to recover the required tonnage of quartzite.

In summary, the Detention Sub-group quartzites have been shown by drilling in the Dip Range area to be unsuitable, and based upon the Stage 2 reconnaissance survey there exists no reason to believe that conditions elsewhere within the Agreement Area would be different. The surface outcrop of Jacob Quartzite at Maynes Creek was tested by B.H.P. and failed on physical specifications (Stage 2 report) and the reconnaissance mapping showed the central portion of the Maynes Creek deposit to be interbedded with weathered phyllitic schist beds.

Based on the foregoing it is not considered that the quartzite units within the Agreement Area contain a sufficient mineable tonnage of quartzite of the chemical and physical quality required.

8.0 RECOMMENDATIONS

Based on the results from the Stage 3 drilling and subsequent sample analyses no further exploration effort is recommended on the Agreement Area for silica of the specific physical and chemical quality nominated by Kaiser Aluminum

APPENDIX A

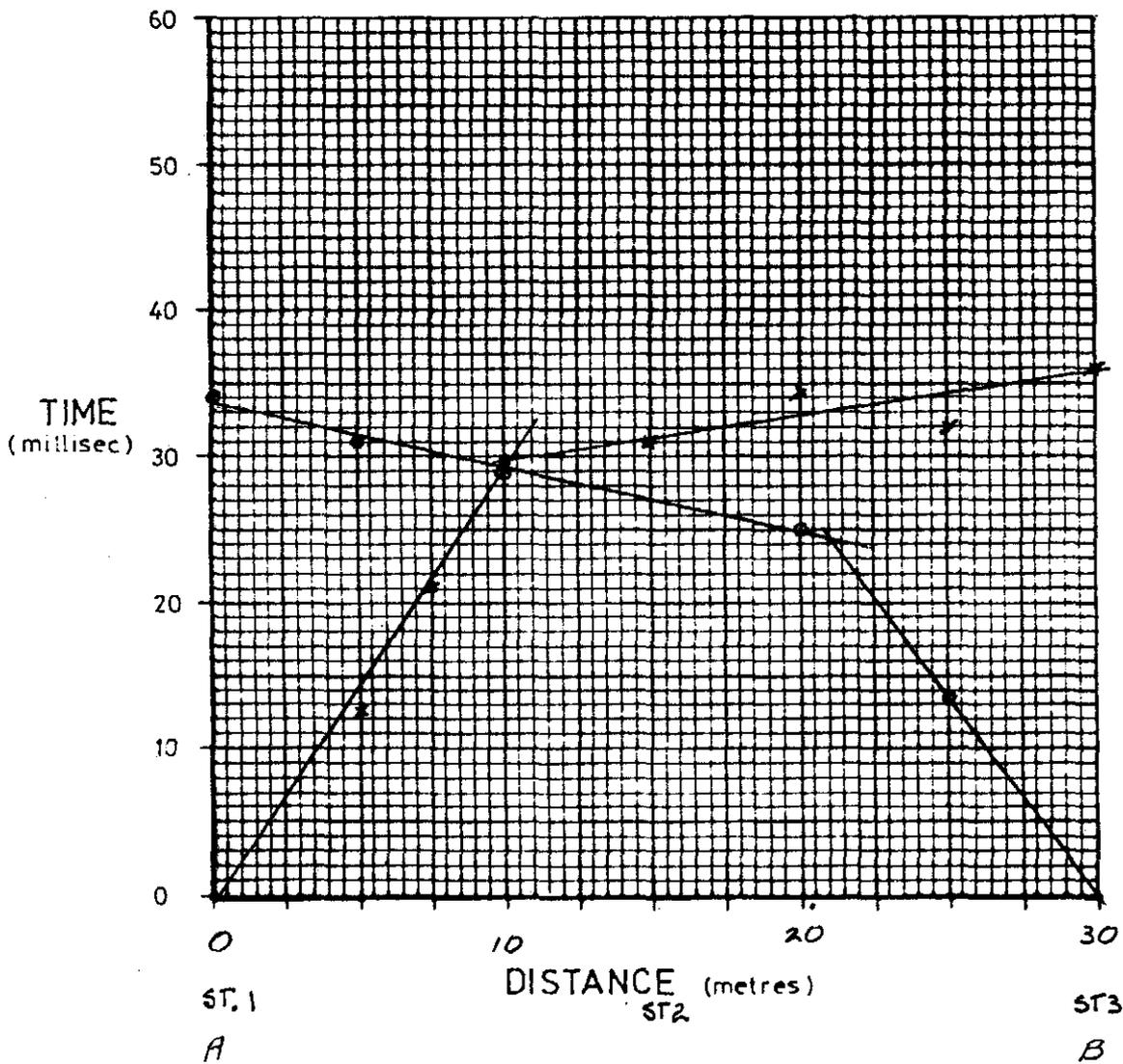
SEISMIC DATA

TRAVERSE N° 1

FROM A TO B

REF. FIG. 3

| | | | | | | | | | | | | | | | | | |
|----------|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | | | | | | | | | |
| FORWARD | | 12.5 | 21.2 | 29.8 | 31.0 | 34.4 | 32.0 | 36.0 | | | | | | | | | |
| REVERSE | 34.2 | 31.1 | | 29.0 | | 25.0 | 13.5 | | | | | | | | | | |



OPERATOR: R.J.C.
 MACHINE: NIMBUS
 DATE:

REFRACTION SEISMIC TRAVERSE

JOB N° PXT 250



FIGURE NO

TRAVERSE NO 1

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 349.18 | 339.00 | 360.00 |
| 2 | 2630.81 | 3333.00 | 2173.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS(m) |
|---------|------------------------|
| 1 | 4.40 |
| 2 | 4.09 |
| 3 | 3.75 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2

NO OF STATIONS ANALYSED= 3

THE APPARENT FORWARD VELOCITIES ARE:

339 3333

THE APPARENT REVERSE VELOCITIES ARE:

360 2173

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

35

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

26.5 31.2 35.8

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

33.5 27 20.5

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Job No

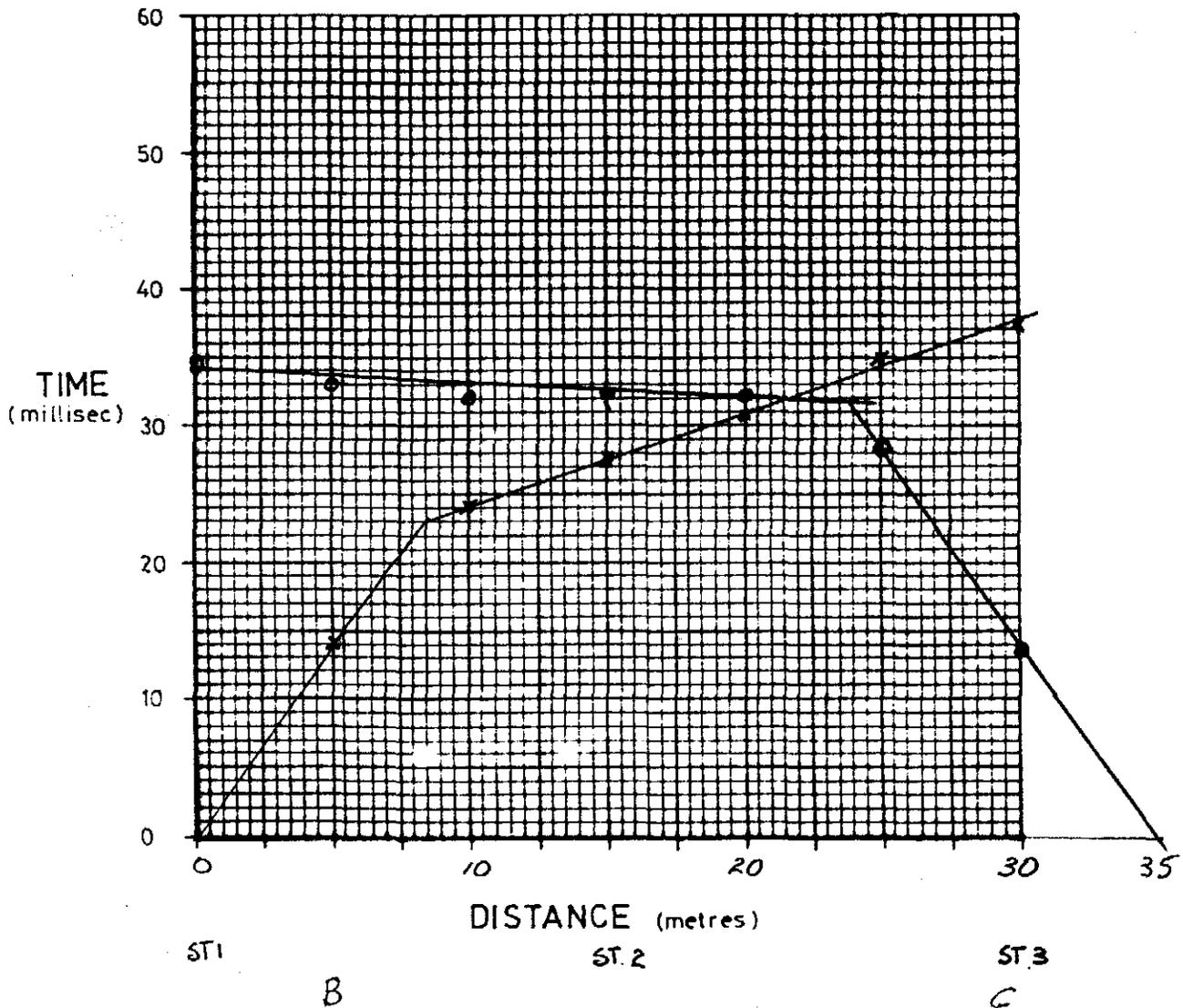
PXT 250

TRAVERSE N° 2

FROM B TO C

REF FIG 3

| | | | | | | | | | | | | | | | | | |
|----------|------|------|------|------|------|------|------|----|--|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | | | | | | | | | |
| FORWARD | | 14.1 | 24.2 | 27.7 | 30.9 | 35 | 37.3 | - | | | | | | | | | |
| REVERSE | 34.7 | 33 | 32 | 32.4 | 32.4 | 28.3 | 13.9 | | | | | | | | | | |



OPERATOR *RJC*
 MACHINE *NIMBUS*
 DATE

REFRACTION SEISMIC TRAVERSE

JOB N° *PXT 250*



FIGURE NO

TRAVERSE NO 2

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 354.99 | 357.00 | 353.00 |
| 2 | 2395.09 | 1428.50 | 7407.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS(m) |
|---------|------------------------|
| 1 | 2.42 |
| 2 | 4.09 |
| 3 | 6.10 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2

NO OF STATIONS ANALYSED= 3

THE APPARENT FORWARD VELOCITIES ARE:

357 1428.5

THE APPARENT REVERSE VELOCITIES ARE:

353 7407

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

37.5

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

17 27.7 41

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

34 32.6 30.5

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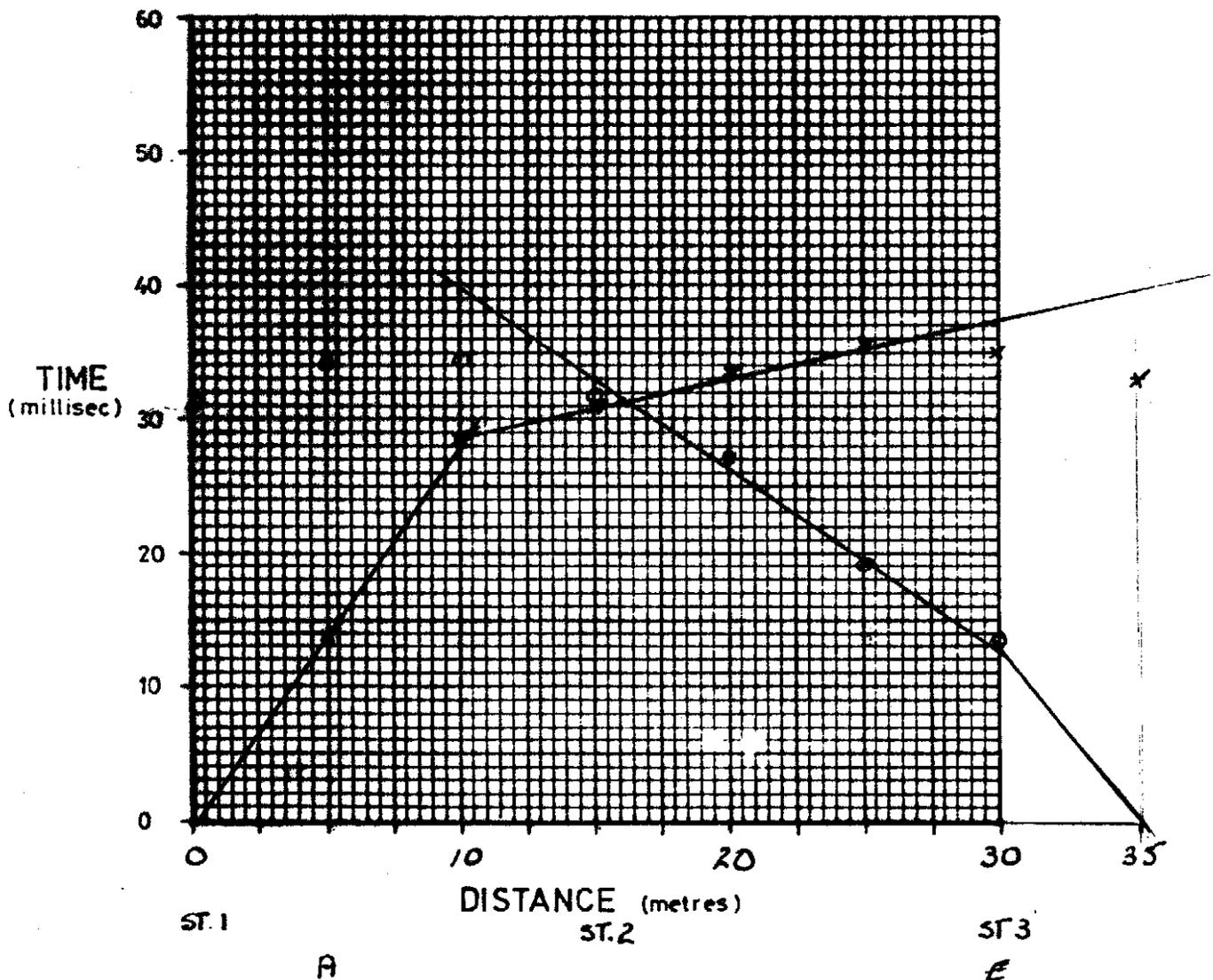
Job No

PXT 250

TRAVERSE N° 3

FROM A TO E
REF. FIG. 3

| | | | | | | | | | | | | | | | | |
|----------|------|------|------|------|------|------|------|----|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | | | | | | | | |
| FORWARD | - | 13.8 | 28.4 | 31 | 33.5 | 35.8 | 35 | 33 | | | | | | | | |
| REVERSE | 31.0 | 34.2 | 34.6 | 31.8 | 27.3 | 19.2 | 13.4 | - | | | | | | | | |



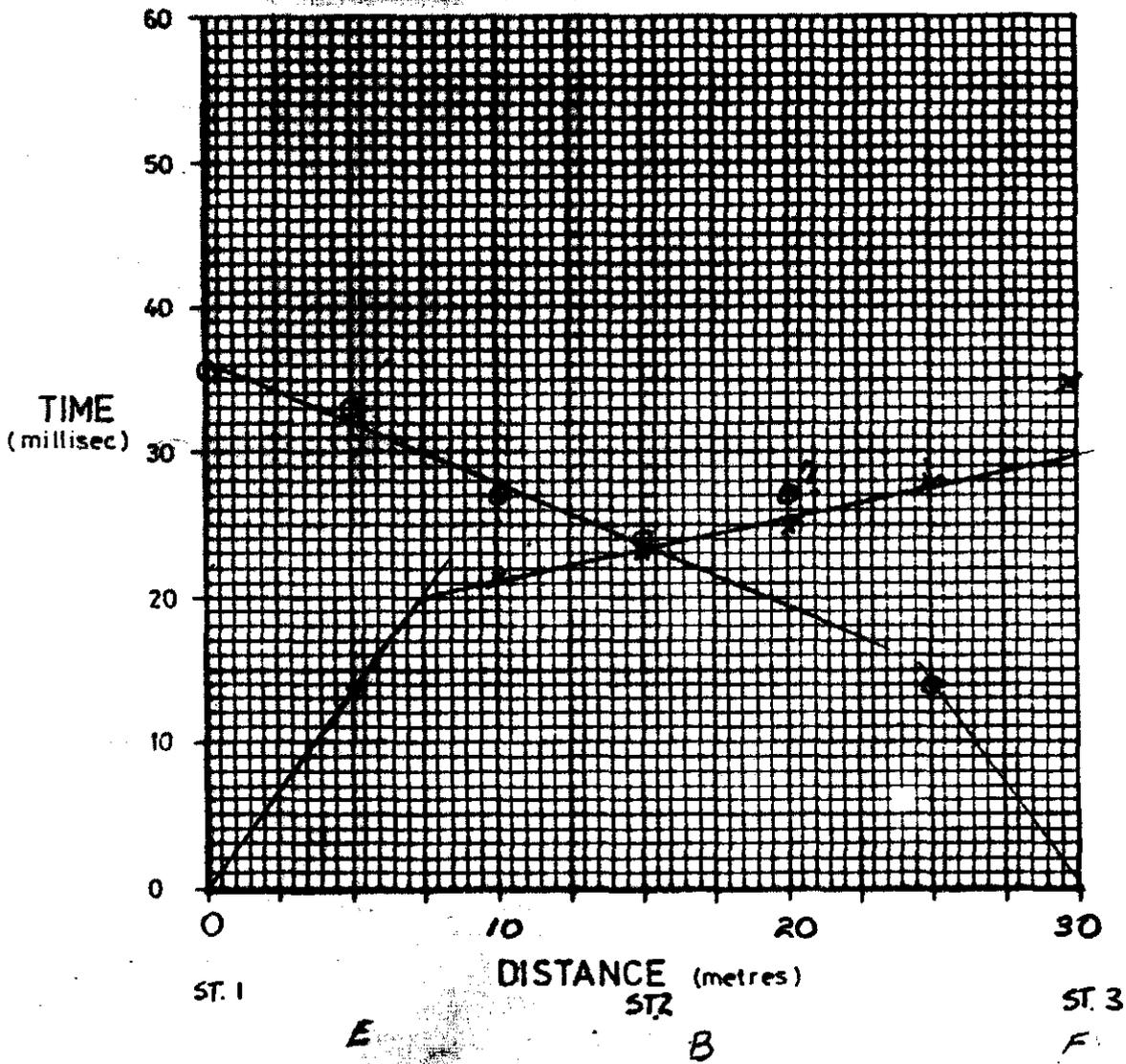
| | | |
|-----------------|-----------------------------|-------------------|
| OPERATOR: RJC | REFRACTION SEISMIC TRAVERSE | JOB N° PXT 250 |
| MACHINE: NIMBUS | | LM |
| DATE: | | |

TRAVERSE N° 4

FROM E TO F

REF. FIG 3

| | | | | | | | | | | | | | | | | |
|----------|------|------|------|------|------|----|------|--|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 30 | | | | | | | | | |
| FORWARD | - | 13.4 | 21.4 | 23.2 | 25.0 | 28 | 35.9 | | | | | | | | | |
| REVERSE | 35.5 | 33 | 27 | 24.0 | 27 | 14 | - | | | | | | | | | |



OPERATOR: RJC
 MACHINE: NIMBUS
 DATE:

REFRACTION SEISMIC TRAVERSE

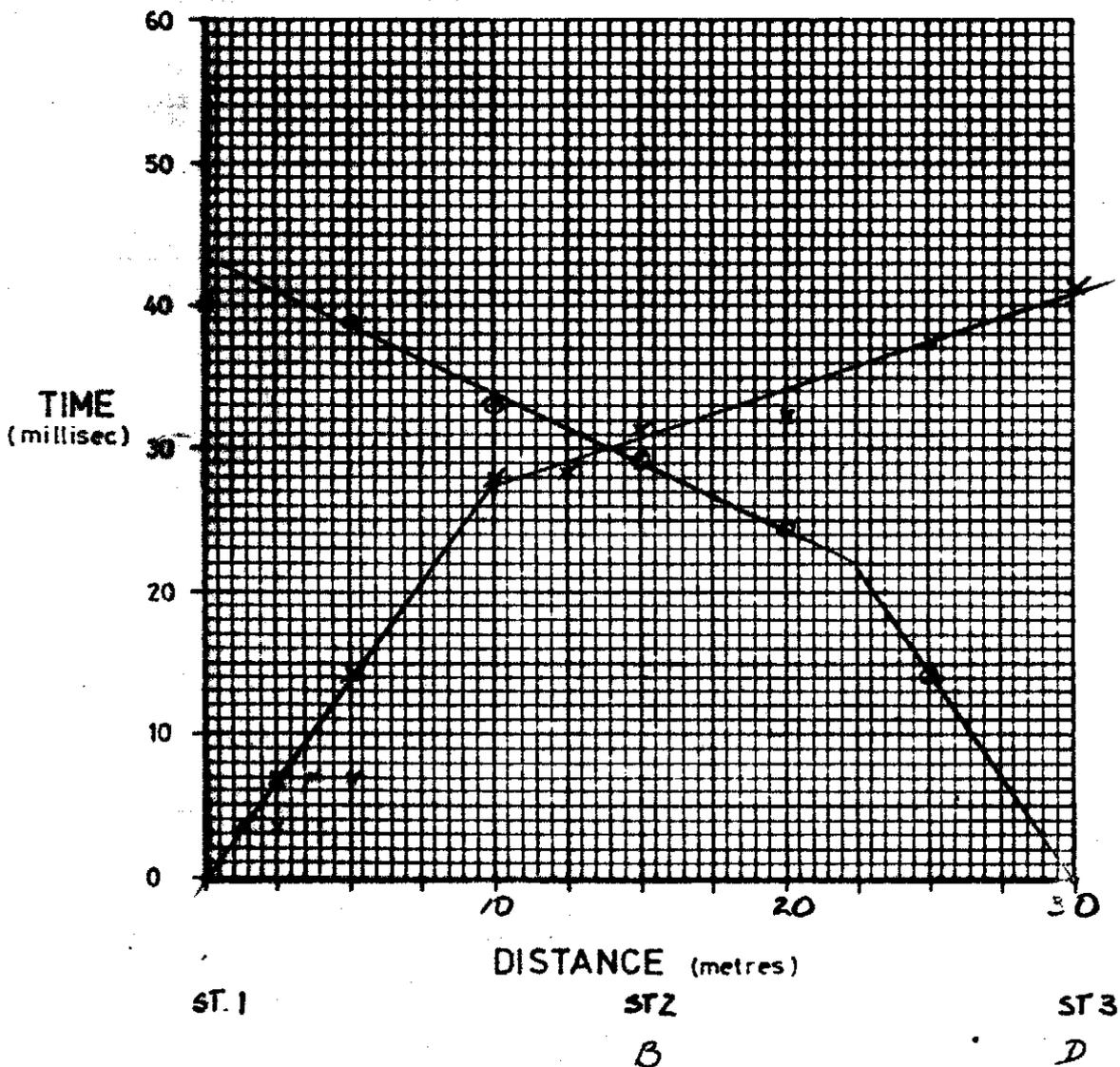
JOB N°
 PXT 250

TRAVERSE N° 5

FROM B TO D

REF FIG 3

| | | | | | | | | | | | | | | | | |
|----------|----|------|-----|------|------|------|------|------|------|------|--|--|--|--|--|--|
| DISTANCE | | 1.25 | 2.5 | 5 | 10 | 12.5 | 15 | 20 | 25 | 30 | | | | | | |
| FORWARD | - | 3.6 | 7.0 | 14.3 | 28.0 | 28.5 | 31.3 | 32.1 | 37.5 | 41.5 | | | | | | |
| REVERSE | 40 | - | - | 38.8 | 33.2 | - | 29.1 | 24.6 | 14.3 | 0 | | | | | | |



OPERATOR: R.J.C.
 MACHINE: MINBUS
 DATE:

REFRACTION SEISMIC TRAVERSE

JOB N°
 PXT 250

FIGURE NO

x

TRAVERSE NO 5

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 352.95 | 357.00 | 349.00 |
| 2 | 1232.00 | 1400.00 | 1100.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS (m) |
|---------|-------------------------|
| 1 | 3.96 |
| 2 | 3.32 |
| 3 | 2.58 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2
 NO OF STATIONS ANALYSED= 3
 THE APPARENT FORWARD VELOCITIES ARE:

357 1400

THE APPARENT REVERSE VELOCITIES ARE:

349 1100

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

42

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

20.5 31 41

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

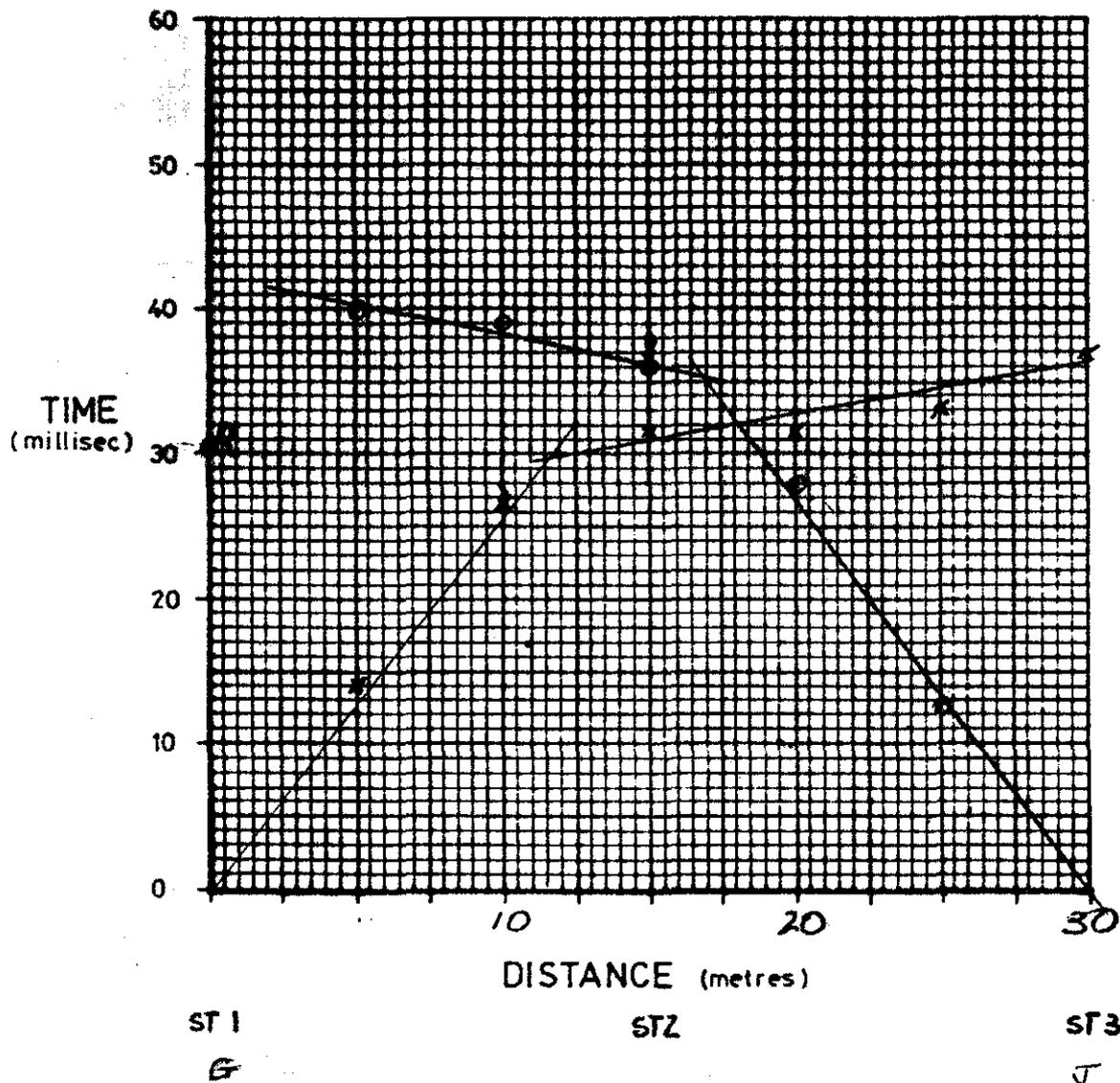
43 29 15

TRAVERSE N° 6

FROM G TO J

REF FIG 3

| | | | | | | | | | | | | | | | | | |
|----------|---|----|------|------|------|------|----|--|--|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 30 | | | | | | | | | | |
| FORWARD | - | 14 | 26.5 | 32.3 | 32.8 | 33 | 37 | | | | | | | | | | |
| REVERSE | - | 40 | 39 | 36 | 28 | 13.5 | 0 | | | | | | | | | | |



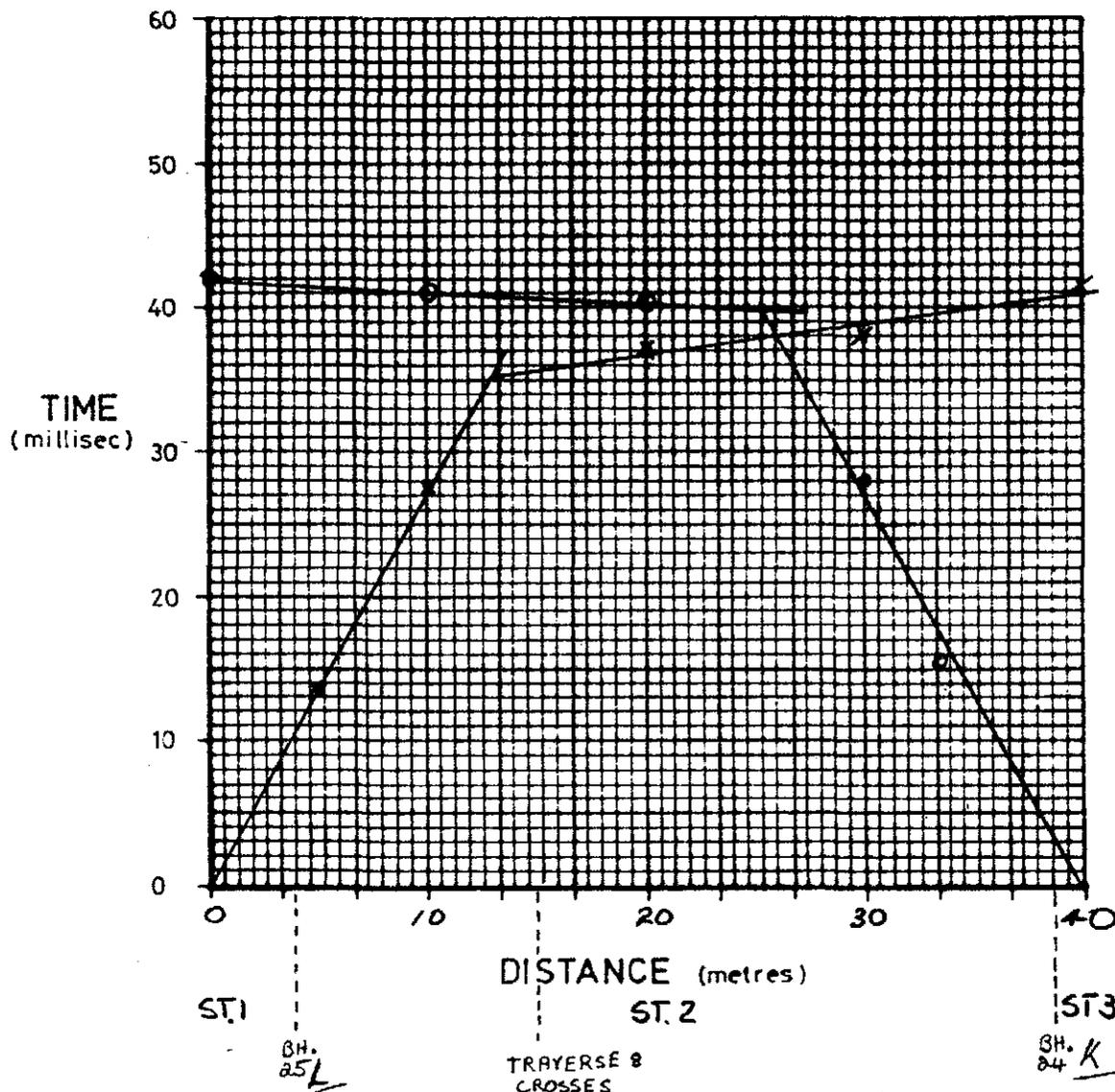
| | | |
|------------------------|-----------------------------|-------------------------|
| OPERATOR: <i>RJC</i> | REFRACTION SEISMIC TRAVERSE | JOB N° <i>PXR250</i> |
| MACHINE: <i>NIMBUS</i> | | LM |
| DATE: | | |

TRAVERSE N° 7

FROM L TO K

REF FIG 3

| | | | | | | | | | | | | | | | |
|----------|----|------|------|------|----|------|------|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 20 | 30 | 35 | 40 | | | | | | | | |
| FORWARD | - | 13.8 | 27.4 | 37.1 | 38 | - | 41.3 | | | | | | | | |
| REVERSE | 42 | - | 41 | 40.2 | 28 | 15.3 | - | | | | | | | | |



OPERATOR: R.J.C.
 MACHINE: NIMBUS
 DATE:

REFRACTION SEISMIC TRAVERSE

JOB N° PXR250

FIGURE NO.

TRAVERSE NO 7

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 368.49 | 367.00 | 370.00 |
| 2 | 6153.42 | 4444.00 | 10000.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS(m) |
|---------|------------------------|
| 1 | 6.13 |
| 2 | 6.55 |
| 3 | 7.11 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2
 NO OF STATIONS ANALYSED= 3
 THE APPARENT FORWARD VELOCITIES ARE:

367 4444

THE APPARENT REVERSE VELOCITIES ARE:

370 10000

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

41

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

32.2 36.5 41

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

42 40 38.5

FIGURE NO

TRAVERSE NO 8

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 335.97 | 339.00 | 333.00 |
| 2 | 2109.38 | 1652.00 | 2917.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS(m) |
|---------|------------------------|
| 1 | 4.51 |
| 2 | 5.21 |
| 3 | 5.87 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2
 NO OF STATIONS ANALYSED= 3
 THE APPARENT FORWARD VELOCITIES ARE:

339 1652

THE APPARENT REVERSE VELOCITIES ARE:

333 2917

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

43

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

26.5 35.6 44.75

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

43 38 32.75

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Job No

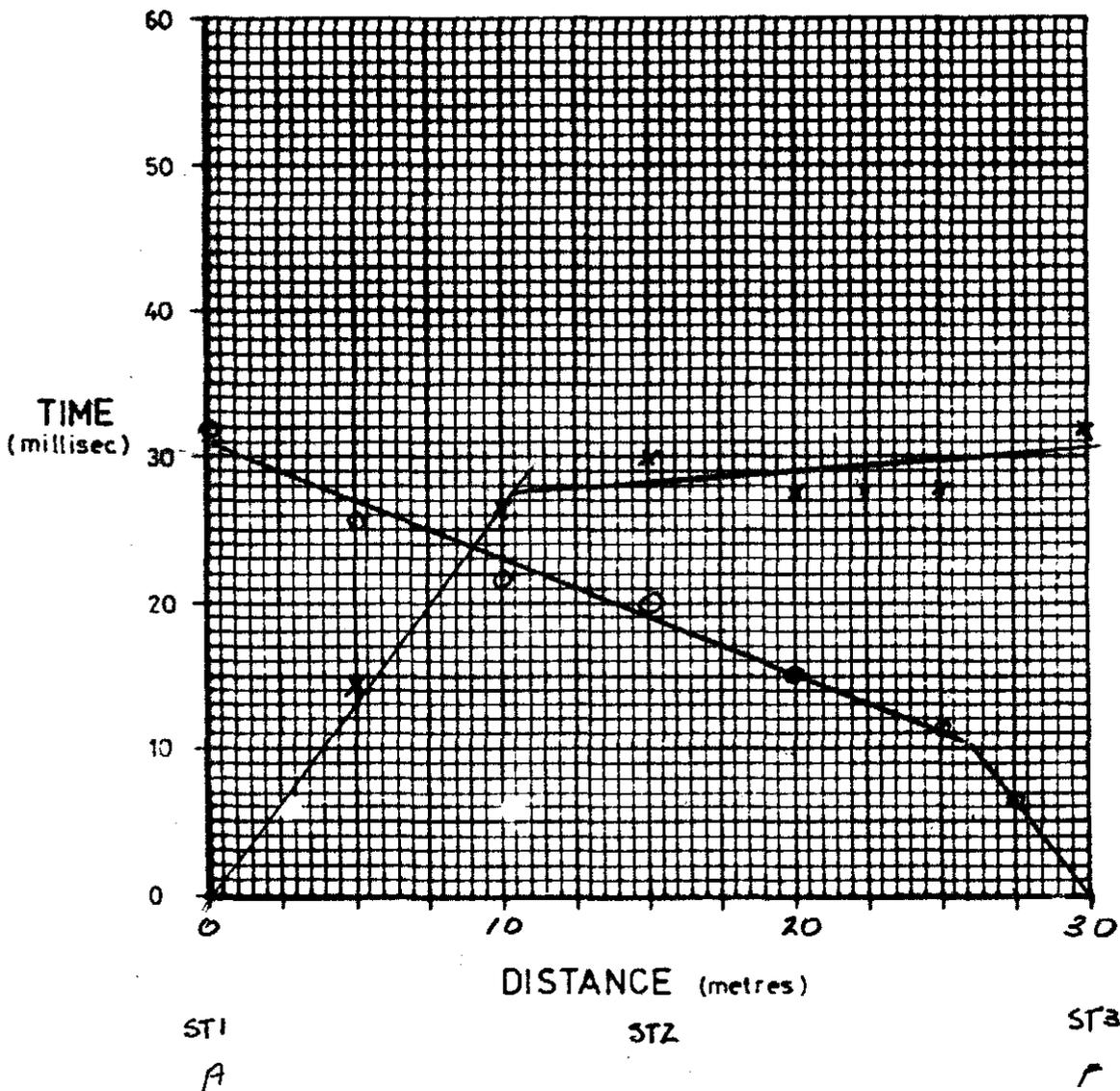
PXT 250

TRAVERSE N° 9

FROM A TO F

REF FIG 3

| | | | | | | | | | | | | | | | | | |
|----------|----|------|------|----|------|------|------|----|--|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 27.5 | 30 | | | | | | | | | |
| FORWARD | | 14.7 | 26.3 | 30 | 27.3 | 27.9 | | 32 | | | | | | | | | |
| REVERSE | 32 | 25.8 | 21.5 | 20 | 15 | 11.3 | 6.6 | - | | | | | | | | | |



OPERATOR: R.J.C
 MACHINE: NIMBUS
 DATE:

REFRACTION SEISMIC TRAVERSE

JOB N°
 PXR250

TRAVERSE NO 9

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 379.50 | 380.00 | 379.00 |
| 2 | 2105.28 | 6667.00 | 1250.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS(m) |
|---------|------------------------|
| 1 | 4.73 |
| 2 | 2.93 |
| 3 | 0.97 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2
 NO OF STATIONS ANALYSED= 3
 THE APPARENT FORWARD VELOCITIES ARE:

380 6667

THE APPARENT REVERSE VELOCITIES ARE:

379 1250

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

32

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

25.5 28.2 30.05

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

31 19 7

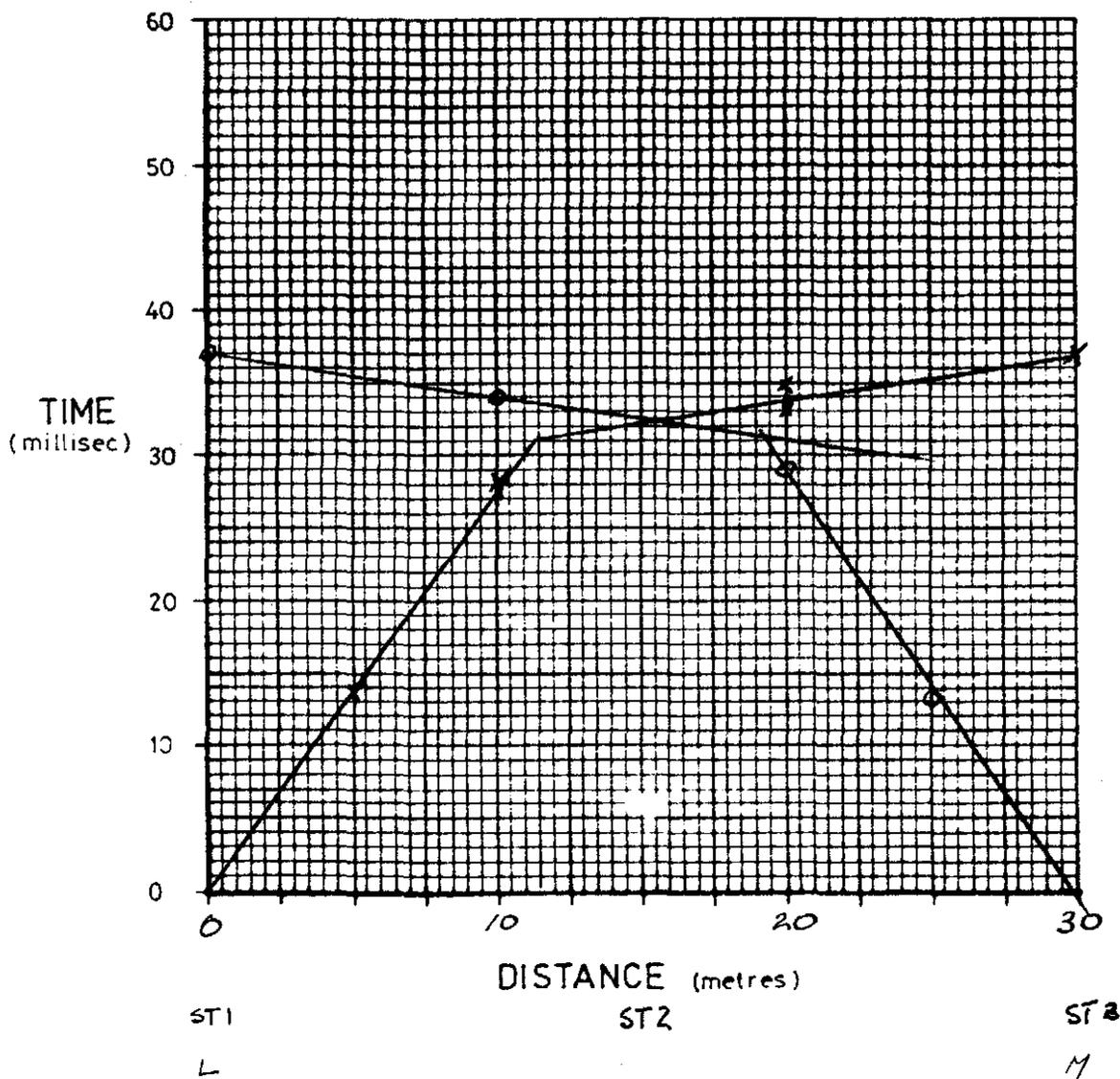


TRAVERSE N° 10

FROM L TO M

REF F163

| | | | | | | | | | | | | | | | |
|----------|----|------|----|----|----|------|----|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 30 | | | | | | | | |
| FORWARD | - | 13.8 | 28 | - | 33 | - | 37 | | | | | | | | |
| REVERSE | 37 | - | 34 | - | 29 | 14.2 | - | | | | | | | | |



OPERATOR: R.T.C.
 MACHINE: NIMBUS
 DATE:

REFRACTION SEISMIC TRAVERSE

JOB N° PXR250

FIGURE NO

TRAVERSE NO 10

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 355.66 | 367.00 | 345.00 |
| 2 | 3203.13 | 3083.00 | 3333.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS(m) |
|---------|------------------------|
| 1 | 4.92 |
| 2 | 4.97 |
| 3 | 5.01 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2
 NO OF STATIONS ANALYSED= 3
 THE APPARENT FORWARD VELOCITIES ARE:

367 3083

THE APPARENT REVERSE VELOCITIES ARE:

345 3333

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

37

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

27.5 32.25 37

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

37 32.5 28

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Job No

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TRAVERSE NO 11

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 400.14 | 395.00 | 405.41 |
| 2 | 2000.00 | 2000.00 | 2000.00 DUMMY LAYER |

FIRST LAYER

| STATION | NORMAL THICKNESS(m) |
|---------|------------------------|
| 1 | 11.84 |
| 2 | 11.84 |
| 3 | 11.84 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2
 NO OF STATIONS ANALYSED= 3
 THE APPARENT FORWARD VELOCITIES ARE:

395 2000

THE APPARENT REVERSE VELOCITIES ARE:

405.41 2000

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

81

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

58 69.5 81

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

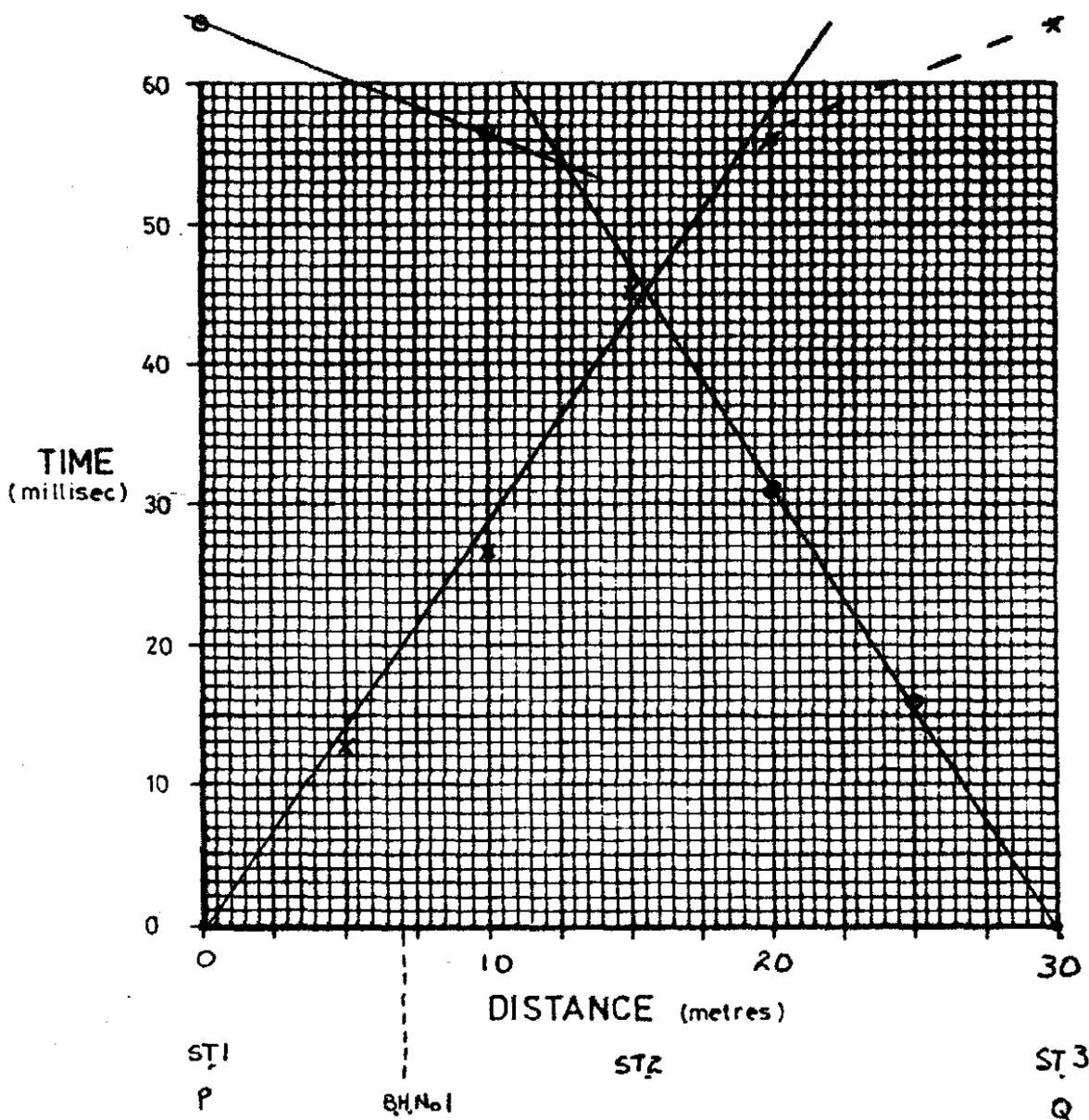
81 69.5 58

TRAVERSE N° 12

FROM P TO Q

REF FIG No 2

| | | | | | | | | | | | | | | | | | |
|----------|------|------|------|------|----|----|----|--|--|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 30 | | | | | | | | | | |
| FORWARD | - | 12.8 | 26.8 | 45.1 | 56 | - | 64 | | | | | | | | | | |
| REVERSE | 64.4 | - | 56.6 | - | 31 | 16 | - | | | | | | | | | | |



OPERATOR: R.J.C.
 MACHINE: NIMBUS
 DATE:

REFRACTION SEISMIC TRAVERSE

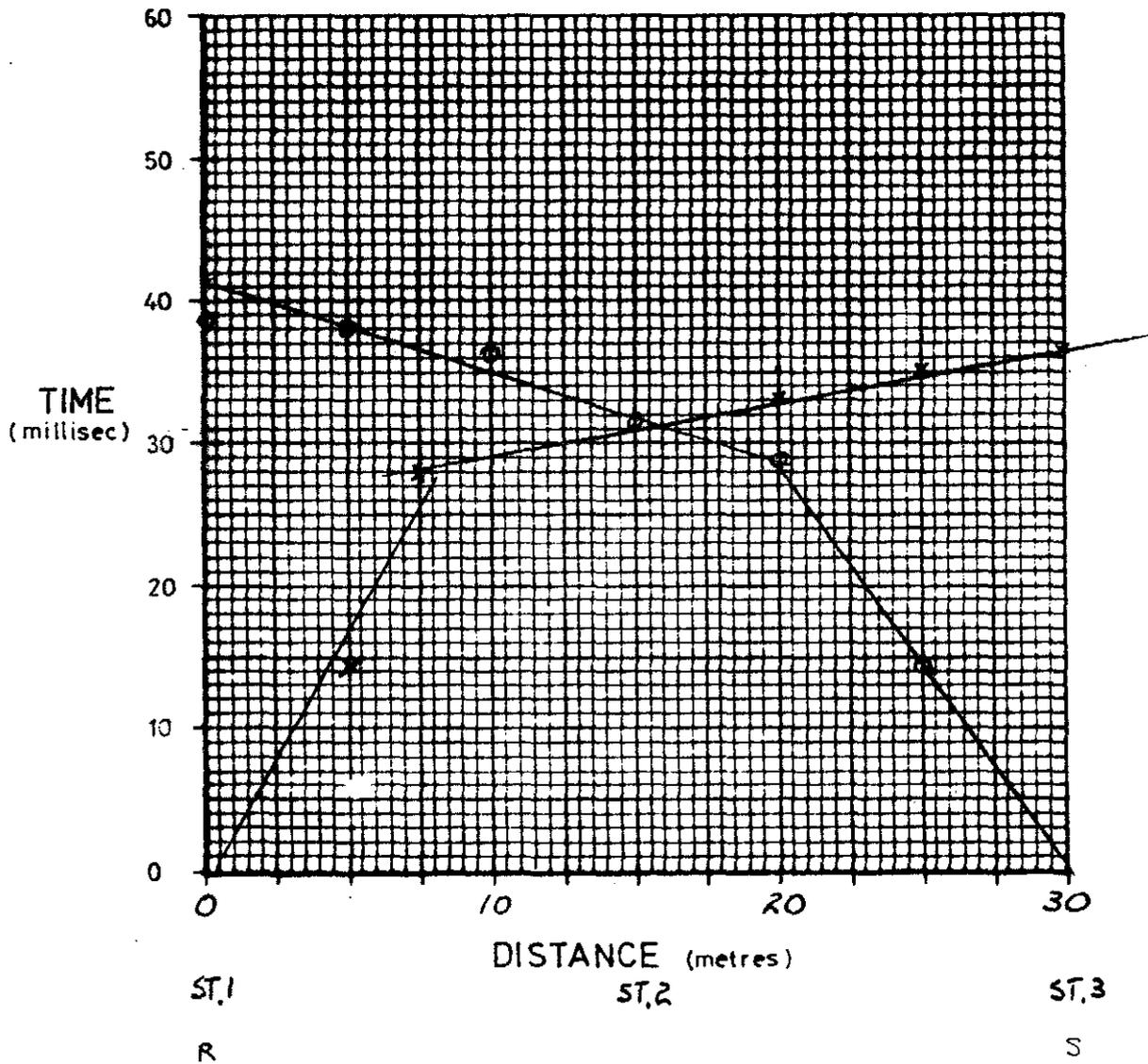
JOB N° PXT 250

TRAVERSE N° 13

FROM R TO S

REF FIG 2

| | | | | | | | | | | | | | | | |
|----------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 30 | | | | | | | | |
| FORWARD | - | 14.5 | 28 | - | 33.2 | 35.1 | 36.7 | | | | | | | | |
| REVERSE | 38.3 | 38.0 | 36.3 | 31.6 | 28.9 | 14.5 | - | | | | | | | | |



OPERATOR: R.J.C
 MACHINE: NIMBUS
 DATE:

REFRACTION SEISMIC TRAVERSE

JOB N° PXT 250

FIGURE NO.

TRAVERSE NO 13

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 320.93 | 300.00 | 345.00 |
| 2 | 1899.82 | 2210.00 | 1666.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS (m) |
|---------|-------------------------|
| 1 | 4.40 |
| 2 | 3.91 |
| 3 | 3.26 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2
 NO OF STATIONS ANALYSED= 3
 THE APPARENT FORWARD VELOCITIES ARE:

300 2210

THE APPARENT REVERSE VELOCITIES ARE:

345 1666

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

39

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

25 31 36.5

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

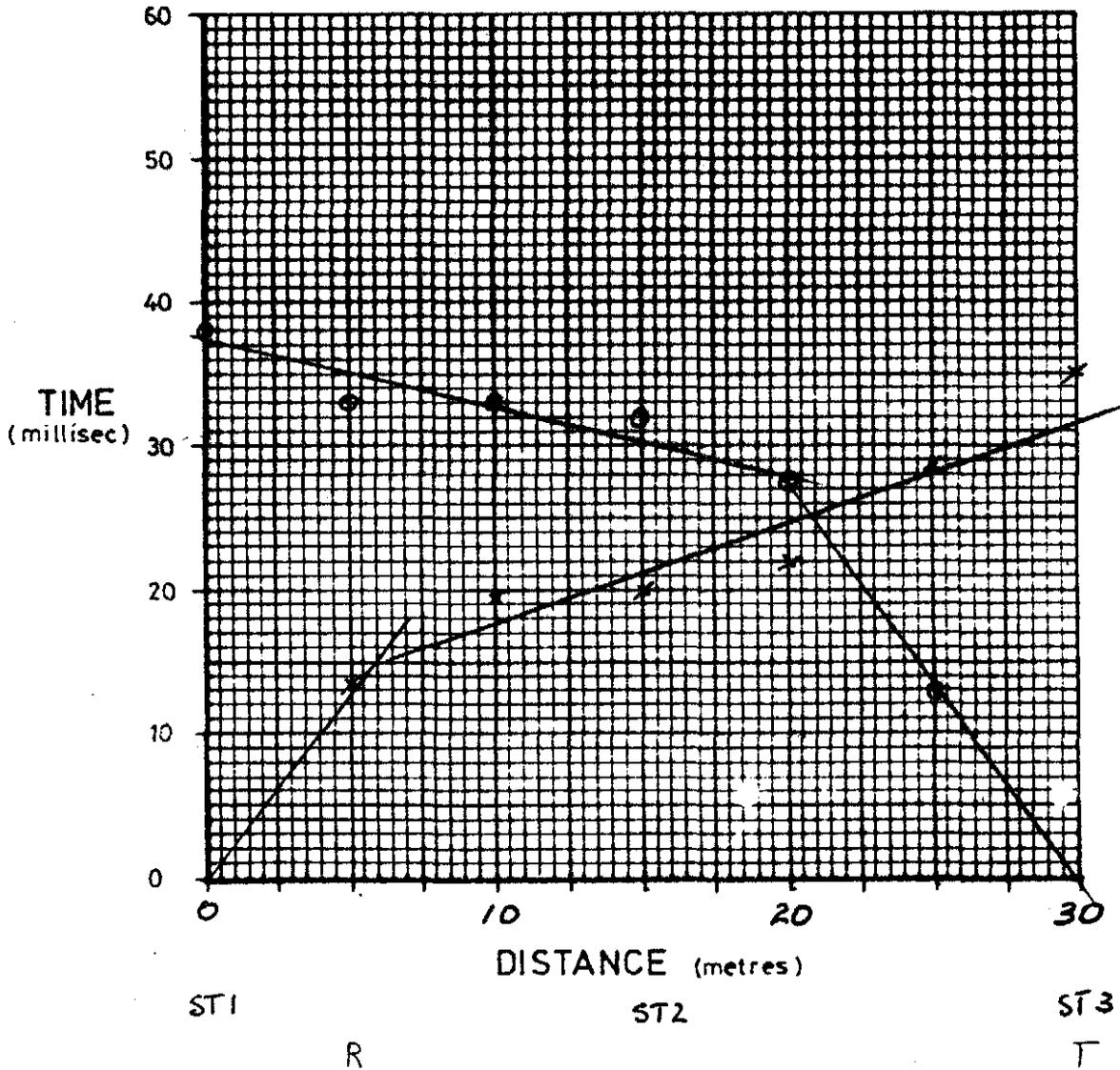
41 32 22.5

TRAVERSE N°14

FROM R TO T

REF FIG 2

| | | | | | | | | | | | | | | | | | |
|----------|----|------|------|----|------|------|------|--|--|--|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 30 | | | | | | | | | | |
| FORWARD | - | 13.5 | 19.5 | 20 | 22 | 28.8 | 35.1 | | | | | | | | | | |
| REVERSE | 38 | 33 | 33 | 32 | 27.3 | 12.8 | - | | | | | | | | | | |



| | | |
|-----------------------|-----------------------------|--------------------------|
| OPERATOR <i>A.J.C</i> | REFRACTION SEISMIC TRAVERSE | JOB N° <i>PXT 250</i> |
| MACHINE <i>NIMBUS</i> | | LM |
| DATE | | |

TRAVERSE NO 14

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 371.62 | 400.00 | 347.00 |
| 2 | 1666.67 | 1428.57 | 2000.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS(m) |
|---------|------------------------|
| 1 | 2.48 |
| 2 | 3.05 |
| 3 | 3.72 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2
 NO OF STATIONS ANALYSED= 3
 THE APPARENT FORWARD VELOCITIES ARE:

400 1428.57

THE APPARENT REVERSE VELOCITIES ARE:

347 2000

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

35

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

10.5 21 31.5

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

37.5 30 23

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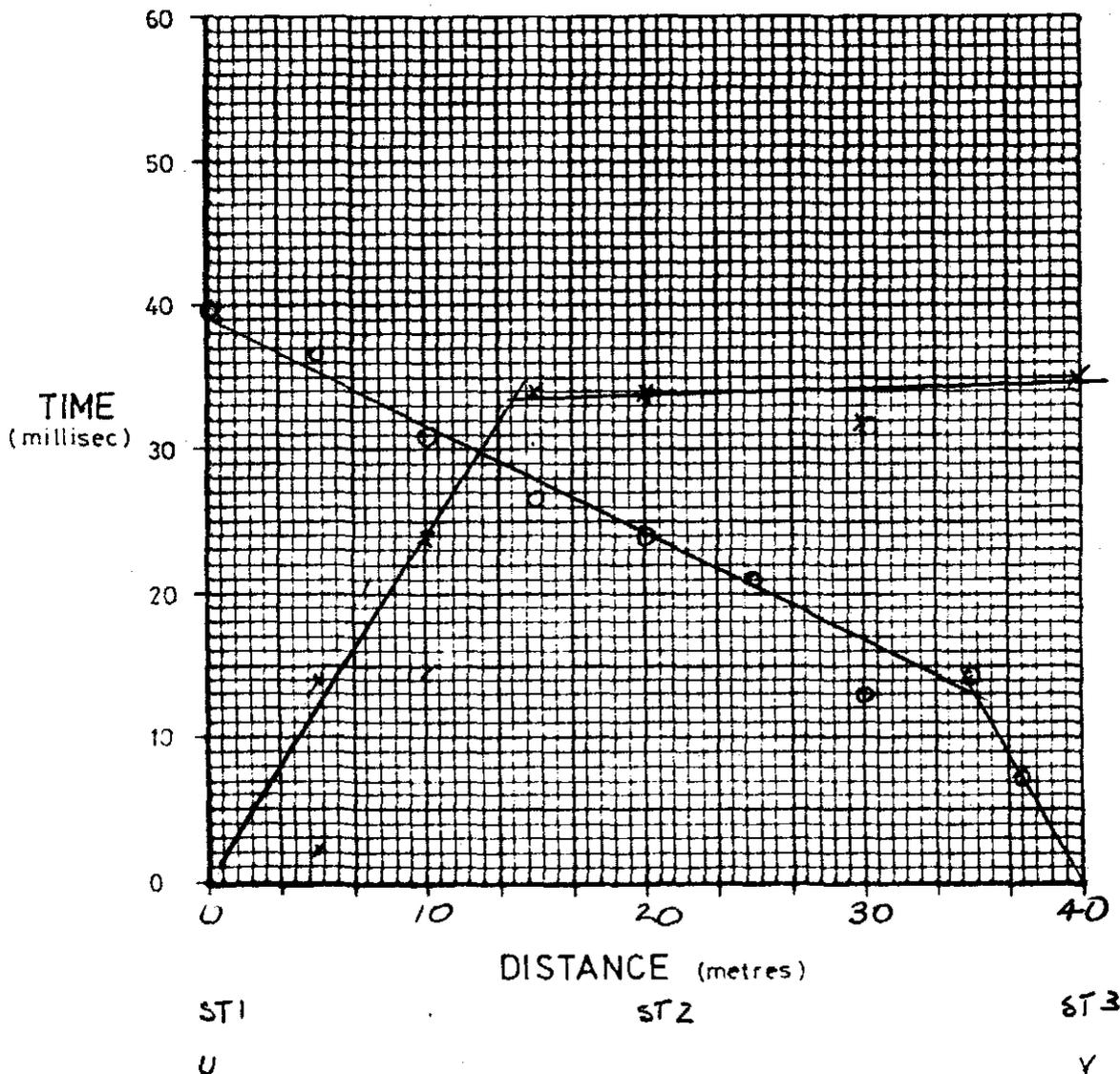
954059

TRAVERSE Nº 15

FROM U TO V

REF FIG 2

| | | | | | | | | | | | | | | | | | |
|----------|------|------|------|------|----|----|------|------|------|----|--|--|--|--|--|--|--|
| DISTANCE | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 37.5 | 40 | | | | | | | |
| FORWARD | - | 14.3 | 24 | 34 | 34 | | 32 | | | 35 | | | | | | | |
| REVERSE | 39.7 | 36.9 | 31.0 | 26.5 | 24 | 21 | 13.2 | 14.2 | 7.1 | | | | | | | | |



| | | |
|-----------------|-----------------------------|------------------|
| OPERATOR: R.T.C | REFRACTION SEISMIC TRAVERSE | JOB Nº PXR250 |
| MACHINE: NIMBUS | | LM |
| DATE: | | |

TRAVERSE NO 15

| LAYER | VELOCITY (m/sec) | FORWARD VEL. (APPARENT) | REVERSE VEL. (APPARENT) |
|-------|---------------------|----------------------------|----------------------------|
| 1 | 391.65 | 416.00 | 370.00 |
| 2 | 2556.33 | 21000.00 | 1361.00 |

FIRST LAYER

| STATION | NORMAL THICKNESS(m) |
|---------|------------------------|
| 1 | 6.64 |
| 2 | 4.16 |
| 3 | 1.49 |

YOUR INPUT DATA IS AS FOLLOWS

NO OF LAYERS= 2

NO OF STATIONS ANALYSED= 3

THE APPARENT FORWARD VELOCITIES ARE:

416 21000

THE APPARENT REVERSE VELOCITIES ARE:

370 1361

THE RECIPROCAL TIMES FOR EACH REFRACTOR ARE:

37

ARRIVAL TIMES, EACH STATION, FIRST FORWARD RUN ARE:

32.5 34 35

REVERSE TIMES, FIRST REFRACTOR, LEFT TO RIGHT, ARE:

38 24 9.5

Consulting Geotechnical Engineers

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LONGWORTH & MCKENZIE PTY. LIMITED



Job No

PXT 250

954061

APPENDIX B

BORE HOLE LOGS

A

BOREHOLE LOG SHEET



Job No. 954063
 CONSULTING GEOTECHNICAL ENGINEERS
 1000 WEST 10TH AVENUE, SUITE 1000
 DENVER, COLORADO 80202

CORE LOG SHEET

5 cm

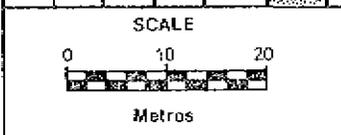
054064

Client: KAISER ALUMINIUM
 Project: SILICA PROSPECT E.L. 43/70
 Location: WYBYARD TASMANIA
 Position: BLP RANGE NO. 1 NORTH REF. FIGURE 2 Surface Elevation: G.L. Angle from Horizontal: 90°
 Rig Type: GEMCO Mounting: TRAILOR Contractor: H. STACPOOL Driller: R.G. LETHBRIDGE
 Casing Diameter: N Barrel (length): 2.445 Bit: NQ/T46 Bit Condition Before: GOOD After: CHANGED
 Date Started: 12-5-81 Date Completed: Logged by: R.J. CARR Date Logged: 16/5/81

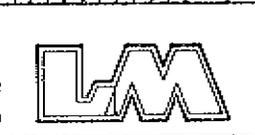
HOLE NO DDH NO 1

SHEET 1 OF 3

| Progress | DRILLING/ CASING | WATER | DRILL DEPTH | SAMPLER/ FIELD TESTS | DEPTH (RL) m | STRATA | DESCRIPTION | Weathering | Strength Is (50) MPa | NATURAL FRACTURES | | | | | ADDITIONAL DATA (joints, veins, seams, faults) Description, dip, smoothness, coating, other. | | |
|----------|---------------------|-------|----------------|-------------------------|--------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------|-------------------|----|----|-----|-----|-------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | | | | | Spacing (mm) | 20 | 40 | 100 | 300 | | 1000 | VISUAL |
| | | | 0.3 | | 0.3 | | SEE BOREHOLE LOG SHEET | | | | | | | | | | |
| 1 | | | 76 | | 0.5 | | SANDSTONE, white, fine grained, quartzose, poorly cemented and friable. | | | | | | | | | | |
| | | | 1.15 | | | | CORE LOSS | | | | | | | | | | |
| 2 | | | 100 | | 1.95 | | CORE LOSS | | | | | | | | | | |
| | | | 1.95 | | | | CORE LOSS | | | | | | | | | | |
| 3 | | | 69 | | 2.11 | | SANDSTONE, white, fine grained, quartzose, poorly cemented and friable. | | | | | | | | | | Bedding dipping approximately at 45° |
| | | | 3.395 | | 3.395 | | CORE LOSS | | | | | | | | | | |
| 4 | | | 0 | | | | SANDSTONE, white and light brown, fine to medium grained, quartzose, minor harder bands generally poorly cemented and porous. | | | | | | | | | | Thinly bedded with solution cavities and clay minerals along bedding planes. Joints at 15° to core. |
| | | | 4.8 | 4.9 | | | | | | | | | | | | | |
| 5 | | | 53 | 5.4 | 5.5 | | | | | | | | | | | | |
| | | | 6.3 | | | | CORE LOSS | | | | | | | | | | |
| 6 | | | 0 | | | | | | | | | | | | | | |
| | | | 7.41 | | | | SANDSTONE, white, fine to medium grained, quartzose, some rose quartz, partially silicified. | | | | | | | | | | Silicification along joint planes |
| 7 | | | 23 | | 8.40 | | As above crossbedded. | | | | | | | | | | |
| | | | 8.71 | | 8.71 | | CORE LOSS | | | | | | | | | | |
| 8 | | | 0 | | | | | | | | | | | | | | |
| | | | 11.1 | | | | SANDSTONE, white to light brown, fine grained, silicified. | | | | | | | | | | |
| 9 | | | 13 | | 10.11 | | | | | | | | | | | | |
| | | | 10.31 | | 10.31 | | CORE LOSS (sand) | | | | | | | | | | |
| 10 | | | 0 | | 10.56 | | As above | | | | | | | | | | |
| | | | 11.63 | | | | SANDSTONE, black brown, iron/alumina, oxide stained, medium grained with micaceous matrix material. | | | | | | | | | | Joints and fractures infilled with black iron oxides etc. |
| 11 | | | 0 | | 11.7 | | | | | | | | | | | | |
| | | | 12.4 | | | | QUARTZITE, light brown, minor micaceous material, fine to medium grained, silicified sandstone. | | | | | | | | | | |
| 12 | | | 0 | | | | | | | | | | | | | | |
| | | | 13.13 | | 13.0 | | | | | | | | | | | | |
| 13 | | | 0 | | | | QUARTZITE, light brown and grey, glassy, fine grained, possible secondary silicification, grains structure obscured by silica cement. Bedding structure still apparent as thin micaceous bands. | | | | | | | | | | At 13.33 NQ bit refused. Changed to thin walled AQ barrel and impregnated bit. |
| | | | 14.16 | | | | | | | | | | | | | | |
| 14 | | | 0 | | 14.63 | | | | | | | | | | | | Joints and fractures infilled with brown black oxides. Joint spacing varies from 150 to 600mm. Two joint sets observed 30° apart both at 10-15° to core. |
| 15 | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | |



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Job No
PXT 250

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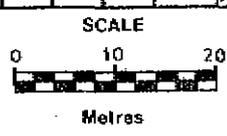
CORE LOG SHEET

5 cm

954066

| | | | |
|-------------------------------------|------------------------|----------------------------------------------|-------------------------------------------|
| Client: KAISER ALUMINUM | | HOLE NO. DDH N°1 | |
| Project: SILICA PROSPECT E.L. 43/70 | | SHEET 2 OF 3 | |
| Location: WYNYARD TASMANIA | | Position: DIP RANGE NO.1 NORTH REF. FIGURE 2 | |
| Surface Elevation: G.L. | | Angle from Horizontal: 90° | |
| Rig Type: GEMCO | Mounting: TRAILOR | Contractor: H. STACPOOL | Driller: R.G. LEIBORG |
| Casing Diameter: N | Barrel (length): 2.445 | Bit: NQ/T46 | Bit Condition Before: GOOD After: CHANGED |
| Date Started: 12-5-81 | Date Completed: | Logged by: R.J. CARR | Date Logged: 14-5-81 |

| Progress | DRILLING/ CASING | WATER | Core loss (run %) | SAMPLES / FIELD TESTS | DEPTH (RL) F | STRATA | DESCRIPTION (Rock type, colour, grain size, structure, texture, mineral composition, hardness, alteration cementation, etc. as applicable) | Weathering | | Strength Is (50) MPa | | NATURAL FRACTURES | | ADDITIONAL DATA (joints, veins, seams, faults) Description, dip, smoothness, coating, other. |
|----------|------------------|-------|-------------------|-----------------------|--------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------|----|----------------------|----|-------------------|----|----------------------------------------------------------------------------------------------------|
| | | | | | | | | EW | HW | VW | MS | VS | ES | |
| | | | | | 16.62 | | | | | | | | | |
| 17 | | | 0 | | 17.0 | | As above with finely interbedded micaceous bands. QUARTZITE grading to earth brown colour as micas increase. | | | | | | | Joints brown oxide filled at 10-15° to core. ⚡ |
| 18 | | | 0 | | 18.17 | | QUARTZITE with abundant micaceous minerals, white to light brown, in part schistose. | | | | | | | Joints and fractures infilled with oxides and micaceous material. |
| 19 | | | 0 | | 18.67 | | | | | | | | | |
| 20 | | | 0 | | 19.67 | | QUARTZITE in part, micaceous, blue grey, fine grained, glassy. | | | | | | | |
| 21 | | | 0 | | 20.17 | | | | | | | | | |
| 22 | | | 0 | | 20.61 | | As above minor micaceous beds. | | | | | | | |
| 23 | | | 0 | | 21.17 | | | | | | | | | |
| 24 | | | 0 | | 22.17 | | | | | | | | | |
| 25 | | | 0 | | 22.67 | | | | | | | | | |
| 26 | | | 0 | | 22.67 | | | | | | | | | |
| 27 | | | 0 | | 24.12 | | | | | | | | | |
| 28 | | | 0 | | 24.6 | | QUARTZITE, grey, fine grained with frequent interbedded fine yellow micaceous beds. | | | | | | | Joints tight and clean, minor infill. |
| 29 | | | 0 | | 25.62 | | | | | | | | | Joint 10-15° to core. ⚡ |
| 30 | | | 0 | | 27.12 | | | | | | | | | Joint, 10-15° to core. ⚡ |
| 31 | | | 0 | | 28.47 | | | | | | | | | Joint, 10-15° to core. ⚡ |
| 32 | | | 0 | | 28.67 | | As above. | | | | | | | Joints, 10-15° to core. ⚡ |
| 33 | | | 0 | | 30.12 | | | | | | | | | Joint |
| 34 | | | 0 | | 30.2 | | | | | | | | | Bit replaced with new impregnated unit. |
| 35 | | | 0 | | 31.62 | | SANDSTONE, dark brown to black, fine grained and silty, silicified. | | | | | | | Joint and fracturing. |
| 36 | | | 0 | | | | | | | | | | | Black oxide in joints, bedding and fracture surfaces. |



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Job No.
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HOLE NO. 000000



Job No. PXT 250



Longworth & McKenzie Pty. Limited
 Consulting Geotechnical Engineers
 2 Lee Street, Crows Nest, N.S.W. (Phone: 259 0222)

E 0128

954072

MARKET MOVERS



MARKET MOVERS



954073

CORE LOG SHEET

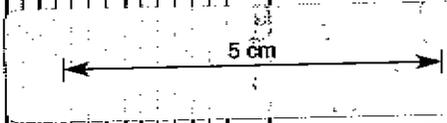
Client: KAISER ALUMINUM
 Project: SILICA PROSPECT EL 43/70
 Location: WYNYARD TASMANIA
 Position: QUARTZITE PEAK REF. FIGURE 2 Surface Elevation: G.L. Angle from Horizontal: 90°
 Rig Type: GENCO Mounting: TRAILER Contractor: H.J. STACPOOL Driller: R.C. LETHBORG
 Casing Diameter: NO Barrel length: 1.955 Bit: IMPREGNATED Bit Condition Before: WORN After: CHANGED
 Date Started: 24/5/81 Date Completed: 26/5/81 Logged by: R.J. CARR Date Logged: 28/4/81

HOLE NO DDH N^o 2

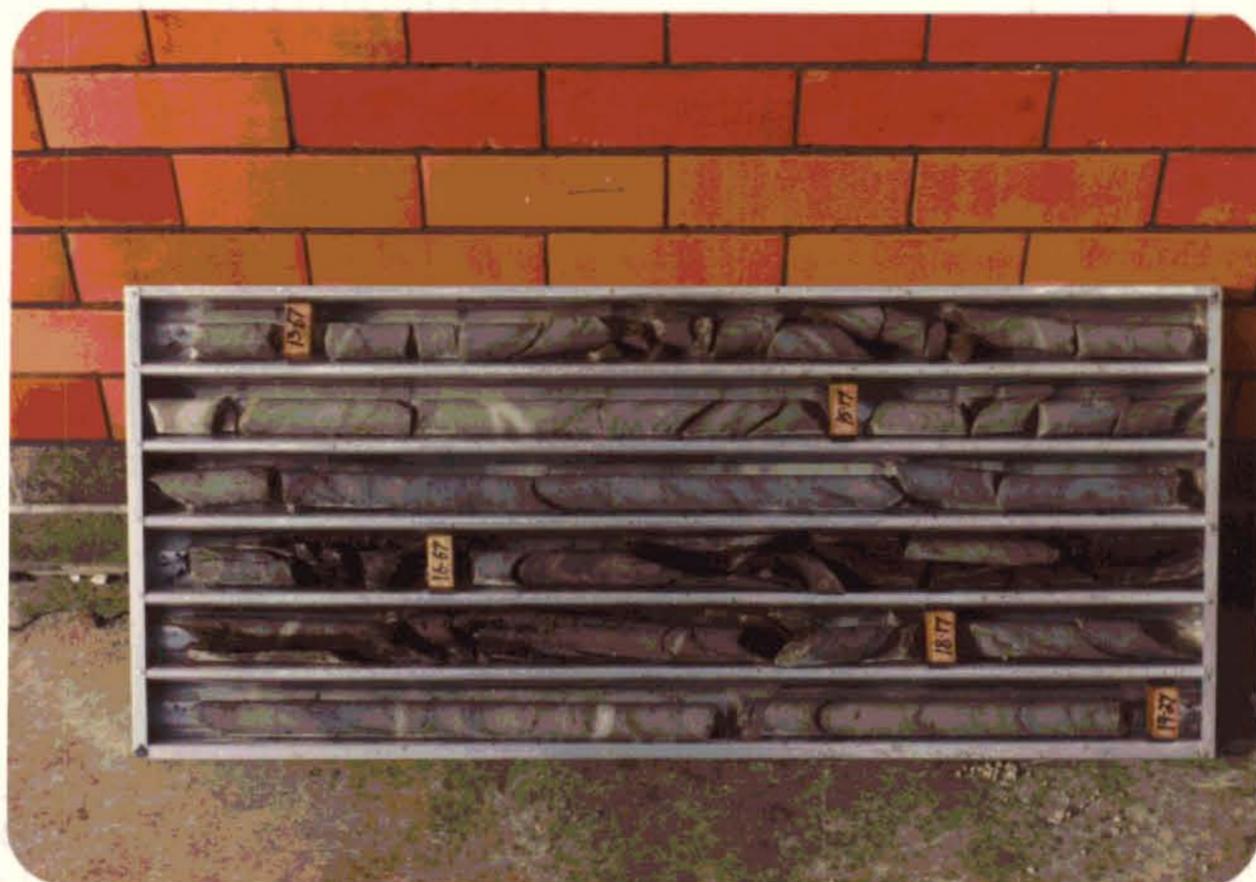
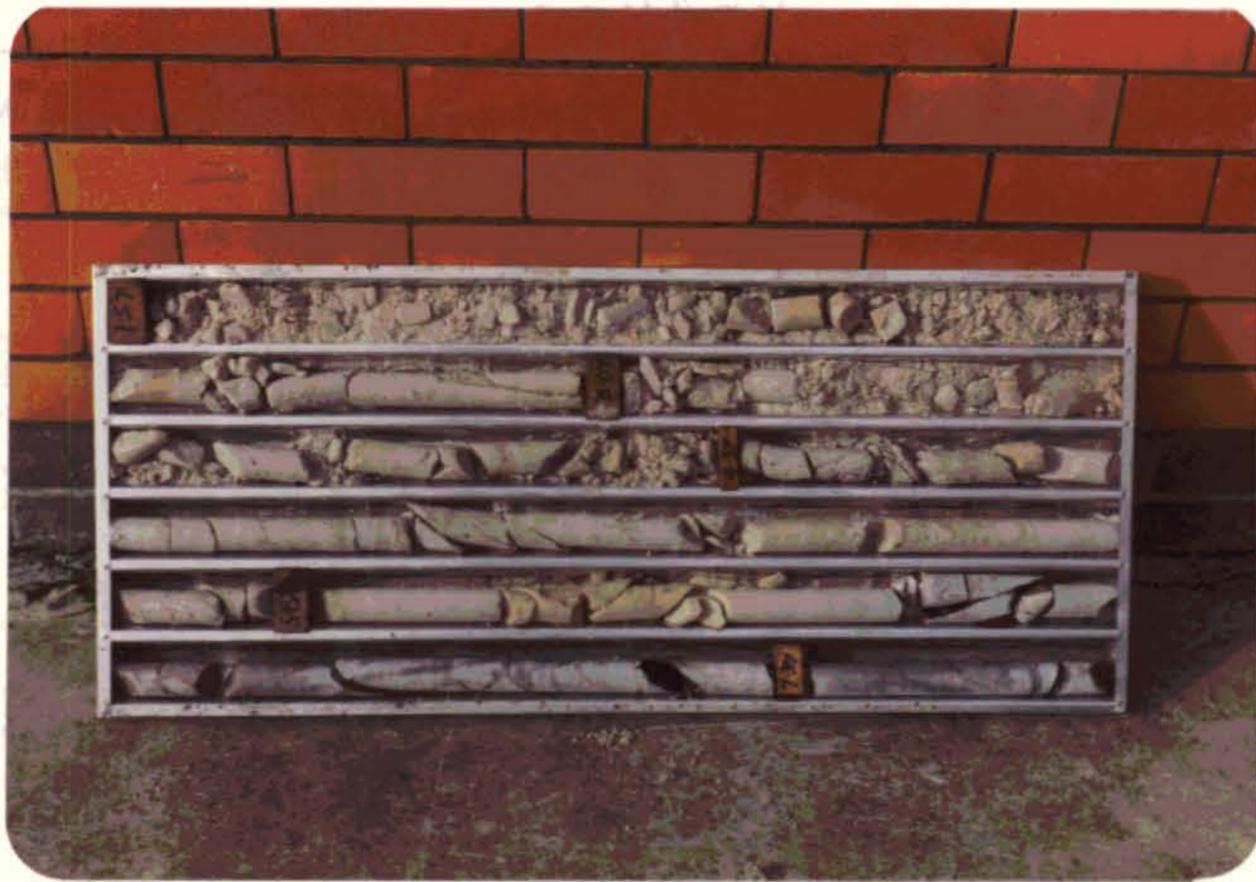
SHEET 2 OF 2

| Progress | | DRILL DEPTH (m) | SAMPLES / FIELD TESTS | DEPTH (RL) m | STRATA | DESCRIPTION ROCK TYPE, Colour, Grain size, Structure [texture, mineral composition, hardness, alteration cementation, etc. as applicable] | Weathering | | Strength Is (50) MPa | | NATURAL FRACTURES | | | | |
|-------------------|-------|-----------------|-----------------------|--------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------|----|-------------------------|----|-------------------|----|----|----|-------------------|
| DRILLING / CASING | WATER | | | | | | EW | FW | HW | SW | EW | FW | MS | VS | ES |
| | | 16.2 | | | | | | | | | | | | | |
| | | 0 | | | | | | | | | | | | | Bedding at 45° to |
| | | 17.7 | | 17.7 | | CORE HOLE TERMINATED | | | | | | | | | |

17
18



F



954074

BOREHOLE LOG SHEET

Client: KAISER ALUMINUM
 Project: SILICA PROSPECT EL 43/70
 Location: WYNYARD TASMANIA

HOLE NO. D.D.H 3

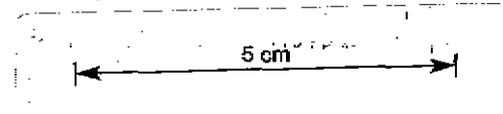
SHEET 1 OF 1

Position: N.N.W. OF SHAKESPEARE (REF. DMC) Surface Elevation: G.L.

Date Started: 27/5/81 Date Completed: 1/6/81 Logged By: R.J. CARR

Rig Type (Mounting): GEMCO (TRAILOR) Contractor: H.J. STACPOOL

| Progress | Sample or Test | Depth (RL) metres | Strata | Description (moisture, colour, consistency, structure, SOIL TYPE, origin) |
|----------|----------------|-------------------|-------------------------|------------------------------------------------------------------------------|
| | | 0.3 | UUUU UUUU UUUU | Wet, black, organic, sandy TOPSOIL. |
| | | 1.0 | | Moist, light grey to white, medium dense SAND. |
| | | 1.5 | | SANDSTONE, white, weak, highly weathered. |
| | | | | SEE ROCK CORE LOG |
| | | | | |
| | | 36.19 | | HOLE TERMINATED |



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Job No
PXT 250

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BOREHOLE LOG SHEET

954070

Client
 Project
 Location
 Position
 Date Start
 Rig Type
 Progress



LOG NO
 PXT 520



LONGWORTH & MCKENZIE PTY LIMITED
 2, Fern Street, Lower Macleay Street, Sydney, NSW 2000
 Geophysics (Geotechnical) Department

HOLE NO. 10000003

DATE: 10/10/00
TIME: 10:00 AM
LOCATION: ...

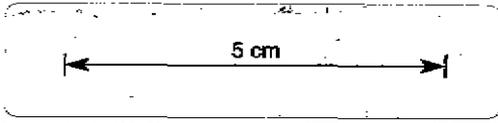
| DEPTH (m) | DIAMETER (cm) | DESCRIPTION |
|-----------|---------------|-------------|
| 0.0 - 0.5 | 10.0 | ... |
| 0.5 - 1.0 | 10.0 | ... |



| DEPTH (m) | DIAMETER (cm) | DESCRIPTION |
|------------|---------------|-------------|
| 1.0 - 1.5 | 10.0 | ... |
| 1.5 - 2.0 | 10.0 | ... |
| 2.0 - 2.5 | 10.0 | ... |
| 2.5 - 3.0 | 10.0 | ... |
| 3.0 - 3.5 | 10.0 | ... |
| 3.5 - 4.0 | 10.0 | ... |
| 4.0 - 4.5 | 10.0 | ... |
| 4.5 - 5.0 | 10.0 | ... |
| 5.0 - 5.5 | 10.0 | ... |
| 5.5 - 6.0 | 10.0 | ... |
| 6.0 - 6.5 | 10.0 | ... |
| 6.5 - 7.0 | 10.0 | ... |
| 7.0 - 7.5 | 10.0 | ... |
| 7.5 - 8.0 | 10.0 | ... |
| 8.0 - 8.5 | 10.0 | ... |
| 8.5 - 9.0 | 10.0 | ... |
| 9.0 - 9.5 | 10.0 | ... |
| 9.5 - 10.0 | 10.0 | ... |

BOREHOLE LOG SHEET

| Client: KAISER ALUMINUM | | HOLE NO. D.H. 4 | | |
|--------------------------------------|----------------|---------------------------|------------------------------|---------------------------------------------------------------------------------------------|
| Project: SILICA PROSPECT EL. 43/70 | | | | |
| Location: WYNYARD TASMANIA | | SHEET 1 OF 1 | | |
| Position: REF. FIGURE 2 | | Surface Elevation: G.L. | | |
| Date Started: 1/6/81 | | Date Completed: 4/6/81 | Logged By: R.J. CARR | |
| Rig Type (Mounting): GEMCO (TRAILOR) | | Contractor: H.J. STACPOOL | | |
| Progress | Sample or Test | Depth (RL) metres | Strata | Description <small>(moisture, colour, consistency, structure, SOIL TYPE, origin)</small> |
| | | | UUUU UUUU UUUU UUUU | Wet, black, organic peaty TOPSOIL. |
| | | 1.4 | [Dotted Pattern] | Moist, white to black, loose cobbly, silty SAND (slope wash) |
| | | | | SEE CORE LOG SHEET |
| | | | | HOLE TERMINATED |
| | | 36.01 | | |





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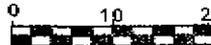
CORE LOG SHEET

5 cm

421084

| | | | |
|-----------------------------------|-------------------------|------------------------------------------------------|----------------------|
| Client: KAISER ALUMINUM | | HOLE NO. DDH N^o 4 | |
| Project: SILICA PROSPECT EL 43/70 | | SHEET 1 OF 3 | |
| Location: WYNYARD TASMANIA | | | |
| Position: REF. FIGURE 2 | Surface Elevation: G.L. | Angle from Horizontal: | |
| Rig Type: GEMCO | Mounting: TRAILOR | Contractor: H.J. STACPOOL | Driller: R. LETHBORG |
| Casing Diameter: NQ ROD | Barrel [length]: 1.955 | Bit: IMPREGNATED Bit Condition Before: 3 USED After: | |
| Date Started: 1/6/81 | Date Completed: 6/6/81 | Logged by: R.J. CARR | Date Logged: 7/6/81 |

| Progress | DRILLING/CASING | WATER | Core loss (run %) | SAMPLES/ FIELD TESTS | DEPTH (RL) m | STRATA | DESCRIPTION (Texture, mineral composition, hardness, alteration cementation, etc. as applicable) | Weathering | | Strength Is (50) MPa | | NATURAL FRACTURES | | | | | | | |
|----------|-----------------|-------|-------------------|----------------------|--------------|--------|-----------------------------------------------------------------------------------------------------------------------------------|------------|----|----------------------|----|-------------------|----|----|----|----|----|----|-----------------------------------------------------------------------------------------------------|
| | | | | | | | | SW | HW | SW | HW | SW | HW | SW | HW | SW | HW | SW | HW |
| 1 | | | 0 | | 1.4 | | SEE BOILS BORE LOG SHEETS | | | | | | | | | | | | |
| 2 | | | 0 | | 2.3 | | SCHIST, black and white, fine grained, very finely bedded. | | | | | | | | | | | | Frequent bedding plane parting |
| 3 | | | 0 | | 3.0 | | QUARTZITE, brown grey with occasional bands of interbedded schist (moderately silicified), finely bedded, medium to fine grained. | | | | | | | | | | | | Bedding at 45° to Micaceous minerals abundant in bedding planes and matrix |
| 4 | | | 0 | | 4.33 | | | | | | | | | | | | | | |
| 5 | | | 0 | | 5.83 | | As above light brown, micaceous QUARTZITE, fine grained, highly siliceous. | | | | | | | | | | | | Frequent closed micro fractures and infilled bedding planes. |
| 6 | | | 0 | | 7.23 | | SCHIST, black and white, fine grained, very finely bedded. | | | | | | | | | | | | Black Oxide coated fractures and near vertical joint. |
| 7 | | | 0 | | 8.7 | | | | | | | | | | | | | | |
| 8 | | | 0 | | 9.5 | | QUARTZITE, light grey, fine grained, highly silicified, micaceous matrix, finely bedded with some quartz veining. | | | | | | | | | | | | Frequent bedding plane partings |
| 9 | | | 0 | | 10.1 | | | | | | | | | | | | | | |
| 10 | | | 0 | | 11.2 | | As above, some brown staining from joint infill material. | | | | | | | | | | | | Shistoze material occasionally forms lam beds in quartzite bedding planes Bedding plane fracture |
| 11 | | | 0 | | 12.3 | | | | | | | | | | | | | | |
| 12 | | | 0 | | 13.8 | | | | | | | | | | | | | | Near vertical joints |
| 13 | | | 0 | | 15.2 | | | | | | | | | | | | | | |

| | | |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <p>SCALE</p>  <p>Metres</p> | <p>Consulting Geotechnical Engineers</p> <p>3 Eden Street, Crows Nest 2065 Telephone: 929 0122</p> <p>LONGWORTH & MCKENZIE PTY. LIMITED</p> | <p>Job No</p> <p>NXT 250</p> |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|



WOODH N° 4
 SHEET 1 OF 1
 DATE
 LOCATION
 PROJECT
 LITHOLOGY
 STRATA
 ACTIVITY
 ADDITIONAL DATA

Core No.
 Project
 Location
 Date
 Core No.
 Date
 Core No.
 Date



954084

CORE LOG SHEET

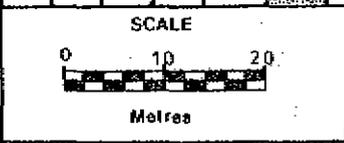
5 cm

Client: KAISER ALUMINUM
 Project: SILICA PROSPECT RL 43/70
 Location: GYNYARD TASMANIA
 Position: REF. FIGURE 2
 Surface Elevation: G.L.
 Angle from Horizontal: 90°
 Rig Type: GEMCO
 Mounting: TRAILOR
 Contractor: H.J. STACPOOL
 Driller: R. LEIBORG
 Casing Diameter: NQ ROD
 Barrel [length]: 1.955
 Bit: IMPREGNATED
 Bit Condition Before: 3 USED After:
 Date Started: 1/6/81
 Date Completed: 6/6/81
 Logged by: R.J. CARR
 Date Logged: 7/6/81

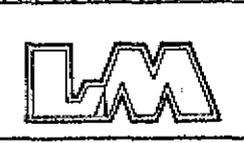
HOLE NO DDHN^o4

SHEET 2 OF 3

| Progress | | DRILL DEPTH (m) | SAMPLER / FIELD TESTS | DEPTH (RL) (m) | STRATA | DESCRIPTION (ROCK TYPE, Colour, Grain size, Structure (texture, mineral composition, hardness, alteration cementation, etc. as applicable)) | Weathering | | | | | | | | | | Strength Is (50) MPa | | | | NATURAL FRACTURES | | | |
|-------------------|-------|-----------------|-----------------------|----------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----|----|----|---------|--------|--------|------|------|-------|----------------------|----|----------------------------------------------------------------|--------|-------------------|--------|----------------------------------------------------------------------------------------------------|--|
| DRILLING / CASING | WATER | | | | | | EW | HW | MW | SW | EW 0.03 | VW 0.1 | MS 0.3 | MS 1 | VS 3 | VS 10 | ES | RS | RS 100 | RS 300 | RS 1000 | VISUAL | ADDITIONAL DATA (joints, veins, seams, faults) Description, dip, smoothness, coating, other. | |
| | | 0 | | | | As above QUARTZITE with occasional schist bands and variable micaceous impurities in matrix | | | | | | | | | | | | | Joint, near vertical, black oxide coated | | | | | |
| | | 16.7 | | | | | | | | | | | | | | | | | Joint, near vertical, black oxide coated | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | 18.05 | | | | | | | | | | | | | | | | | | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | 19.42 | | | | | | | | | | | | | | | | | | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | Joint and bedding planes coated with micaceous minerals | | | | | |
| | | 20.67 | | | | | | | | | | | | | | | | | | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | 22.09 | | | | | | | | | | | | | | | | | Bedding plane fractures | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | 23.59 | | | | | | | | | | | | | | | | | | | | | | |
| | | 0 | | 24.0 | | | | | | | | | | | | | | | | | | | | |
| | | 24.53 | | | | QUARTZITE, fine grained, highly silicified, minimal clay in rock matrix, abundant micaceous minerals in the thinly bedded bedding planes, some thin black or yellow schist beds. | | | | | | | | | | | | | | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | 25.83 | | | | | | | | | | | | | | | | | Near vertical joint showing silica leaching around sand grains | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | 27.29 | | | | | | | | | | | | | | | | | As above | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | 28.72 | | | | | | | | | | | | | | | | | Bedding plane fractures | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | As above | | | | | |
| | | 30.22 | | | | | | | | | | | | | | | | | | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | 30.82 | | | | | | | | | | | | | | | | | | | | | | |
| | | 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | 31.65 | | | | | | | | | | | | | | | | | | | | | | |



Consulting Geotechnical Engineers
 3 Eden Street, Crowe Nest 2065 Telephone: 929 0122
 LONGWORTH & MCKENZIE PTY. LIMITED



Job No
 NXT 250

954086

HOLE NO. 954086

COLE 100 SHEET

954086

Project: ...
 Location: ...
 Date: ...
 Scale: ...

| Section | Material | Remarks |
|---------|----------|---------|
| ... | ... | ... |
| ... | ... | ... |



Five water control pipes
 installed in the brick wall
 during construction of the
 water control structure.

Job No. NKT 250



Engineering Department
 National Water Research Institute
 1, The Mall, Cairo, Egypt



APPENDIX C

SAMPLE ANALYSES

954089

813 Dowling Street, Waterloo, N.S.W. 2017
Postal Address: Box 1, P.O. Waterloo, 2017

Telephone: 698 6611 x..379....

ACI Technical Centre Pty. Ltd.**TEST REPORT****Client:** Longworth and MacKenzie Pty. Ltd.,
3 Eden Street,
CROWS NEST, N.S.W. 2065**No.:** 102587**Date:** 5th June, 1981**Attention: Mr. R. Carr****Client O/No.:****Sample** : 9 drilled cores ex DDH No. 1**Date** : 25th May 1981**Work required** : Full X-ray fluorescence analysis and Thin section preparation.**XRF results in percentage:**

| <u>Drilled Core</u> | <u>4.9-5.4</u> | <u>8.9-9.5</u> | <u>11.10-11.50</u> | <u>12.1-12.6</u> | <u>14.16-14.63</u> |
|--------------------------------|----------------|----------------|--------------------|------------------|--------------------|
| Fe ₂ O ₃ | 0.028 | 0.044 | 0.60 | 0.077 | 0.047 |
| Al ₂ O ₃ | 0.14 | 0.64 | 1.2 | 1.4 | 0.63 |
| TiO ₂ | 0.23 | 0.073 | 0.061 | 0.074 | 0.041 |
| Cr ₂ O ₃ | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| CaO | 0.10 | 0.01 | <0.01 | 0.01 | 0.03 |
| MgO | 0.01 | 0.02 | 0.04 | 0.05 | 0.02 |
| Na ₂ O | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 |
| K ₂ O | 0.02 | 0.19 | 0.31 | 0.40 | 0.18 |
| L.O.I. | 0.12 | 0.17 | 2.26 | 0.26 | 0.45 |
| SiO ₂ (Bal.) | 99.3 | 98.8 | 95.5 | 97.7 | 98.6 |

Approved by **BART CHEN**
Section Leader
Spectrographics

| <u>Drilled Core</u> | <u>16.12-16.62</u> | <u>18.17-18.67</u> | <u>20.17-20.61</u> | <u>22.17-22.67</u> |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|
| Fe ₂ O ₃ | 0.062 | 0.072 | 0.12 | 0.12 |
| Al ₂ O ₃ | 1.1 | 1.2 | 1.0 | 2.0 |
| TiO ₂ | 0.052 | 0.051 | 0.061 | 0.11 |
| Cr ₂ O ₃ | <0.001 | <0.001 | <0.001 | <0.001 |
| CaO | 0.01 | 0.01 | 0.01 | 0.01 |
| MgO | 0.03 | 0.04 | 0.04 | 0.07 |
| Na ₂ O | 0.01 | 0.01 | 0.01 | 0.01 |
| K ₂ O | 0.30 | 0.33 | 0.30 | 0.54 |
| L.O.I. | 0.38 | 0.35 | 0.20 | 0.34 |
| SiO ₂ (Bal.) | 98.0 | 97.9 | 98.2 | 96.7 |

Please Note:

The powder bricquetting technique XRF analysis of Quartz or Sand for Al₂O₃ above 1.0% is not as accurate as the fusion technique. Thin section slides have been sent to you separately.

Barth

954091

813 Dowling Street, Waterloo, N.S.W. 2017
Postal Address: Box 1, P.O. Waterloo, 2017

Telephone: 698 6611 x . . 379. . . .

A CI Technical Centre Pty Ltd**TEST REPORT****Client:** Longworth & McKenzie,
3 Eden Street,
CROWS NEST, N.S.W. 2065**No.:** 102591**Date:** 3rd June, 1981Attention: Mr. R. Carr**Client O/No.:**Sample : 9 RocksDate : 1st June, 1981Work required : Full X-ray fluorescence analysisXRF results in percentage:

| <u>DDDH3</u> | <u>10.25-10.37</u> | <u>12.0-12.17</u> | <u>15-15.17</u> | <u>17.12-17.24</u> | <u>19.2-19.28</u> |
|--------------------------------|--------------------|-------------------|-----------------|--------------------|-------------------|
| Fe ₂ O ₃ | 0.095 | 0.065 | 0.26 | 0.063 | 0.065 |
| Al ₂ O ₃ | 2.4 | 0.67 | 2.2 | 0.97 | 1.2 |
| TiO ₂ | 0.063 | 0.025 | 0.086 | 0.034 | 0.050 |
| Cr ₂ O ₃ | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 |
| CaO | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| MgO | 0.11 | 0.03 | 0.10 | 0.04 | 0.22 |
| Na ₂ O | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| K ₂ O | 0.57 | 0.17 | 0.46 | 0.25 | 0.24 |
| L.O.I. | 0.34 | 0.14 | 0.29 | 0.21 | 0.24 |
| SiO ₂ (Bal.) | 96.4 | 98.8 | 96.5 | 98.4 | 97.9 |

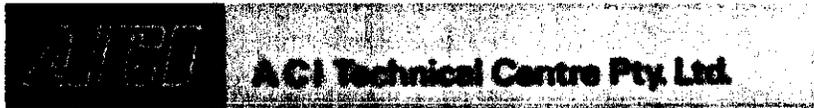
Approved by BART CHEN
Section Leader
Spectrographics

| <u>DDH3</u> | <u>23.9-24.0</u> | <u>27.0-27.07</u> | <u>28.5</u> | <u>30.9-31.0</u> |
|--------------------------------|------------------|-------------------|-------------|------------------|
| Fe ₂ O ₃ | 0.28 | 0.064 | 0.41 | 0.26 |
| Al ₂ O ₃ | 2.8 | 1.5 | 7.4 | 4.9 |
| TiO ₂ | 0.089 | 0.040 | 0.31 | 0.20 |
| Cr ₂ O ₃ | 0.001 | <0.001 | 0.002 | 0.001 |
| CaO | 0.05 | 0.01 | 0.06 | 0.06 |
| MgO | 0.13 | 0.10 | 1.5 | 2.3 |
| Na ₂ O | 0.02 | 0.01 | 0.04 | 0.04 |
| K ₂ O | 0.64 | 0.30 | 1.7 | 1.0 |
| L.O.I. | 0.40 | 0.21 | 1.37 | 1.34 |
| SiO ₂ (Bal.) | 95.5 | 97.7 | 87.2 | 89.8 |

Please Note:

The powder bricquetting technique XRF analysis of Quartzite samples for Al₂O₃ above 1% is not as accurate as the fusion technique.

Bath



813 Dowling Street, Waterloo, N.S.W. 2017
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 Telephone: 699 0055
 Cables & Telegrams: "Carboy" Sydney

332/16

11th June, 1981

Longworth and MacKenzie,
 3 Eden Street,
CROWS NEST, N.S.W. 2065

Attention: Mr. R. Carr

Dear Sir,

This is to confirm our verbal report that sample of quartzite labelled 28.5 metres was examined by X-ray diffraction and petrological microscope. The following minerals were noted:

| | | |
|-----------|---|---------------|
| Biotite | - | moderate |
| Muscovite | - | Low |
| Feldspar | - | V. Low |
| Kaolinite | - | Low to V. Low |

The presence of biotite would correlate with the presence of Al_2O_3 , K_2O , Fe_2O_3 , MgO and TiO_2 (also L.O.I.) as noted in the analytical report.

Yours faithfully,

D. MacKENZIE

