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ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED
MINERAL RESOURCES DIVISION

OPEN FILE

PART OF EXPLORATION LICENCE 31/83 'MACQUARIE'

NORA RIVER AREA

PROGRESS REPORT ON EXPLORATION ACTIVITY
1ST OCTOBER, 1983 TO 30TH MARCH, 1984

E.Z. REPORT No. T 186

I.J. MATHISON,
JULY, 1984

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1. INTRODUCTION

1.1. Location and Access

The Gordon Limestone in the Nora River area outcrops in a narrow belt along the Nora River and the Kelly Basin Track. Access is by 4WD vehicle along the Kelly Basin Track. The area is 40km by road south of Queenstown.

1.2. Previous Exploration

No reports of old workings, of systematic exploration or of base metal mineralisation are known. Nevertheless the cuttings for the old Nth Mt. Lyell railway together with incised stream channels provide fairly good exposure throughout the area. It is certain that the area has been closely examined by prospectors in the past.

2. E.Z. EXPLORATION - OCTOBER, 1983-MARCH, 1984

2.1. Work Completed

In February and March, 1984, E.Z. field crews completed a reconnaissance stream sediment sampling and rock chip sampling programme. Geological data were collected from rock sample locations. A total of 28 stream sediment samples, 59 rock samples and 8 panned concentrates were collected.

Rock and stream sediment samples were analysed for Cu, Pb, Zn, Ag, Fe, Mn and Ba by Analabs in Burnie. All elements were determined by A.A.S. techniques.

Panned concentrates were submitted for heavy mineral separation and microscopic identification. Thin sections of 15 rocks were prepared and described.

2.2. Results Received

2.2.1. STREAM SEDIMENT GEOCHEMISTRY (See Appendix & Fig's NR1, 2 & 3)

Results of analysis of stream sediment samples are tabulated in the Appendix and summarised below.

Element	Range	Mean	?Anomalous
Cu	<5 - 15	7	-
Pb	<5 - 55	15	55 (2 samples)
Zn	15 - 115	60	-
Ag	<0.5 - 0.5	<0.5	-
Fe	0.03- 2.20%	1.00%	-
Mn	<5 - 510	210	-
Ba	35 - 319	70	319 (1 sample)

The two slightly anomalous lead values are possibly significant. They were reported from successive samples collected from the Nora River.

Rock chip samples collected nearby contain only 5-15 ppm Pb. The 319 ppm Ba reported from one sample does not appear significant. Rock samples from the area average 320 ppm Ba.

2.2.2. ROCK GEOCHEMISTRY (See Appendix and Fig's NR1, 2 & 3)

Analytical results of rock samples are tabulated in the Appendix. The samples can be separated into three distinct groups, each with their own characteristic geochemistry. These groups comprise recent spring deposits, puggy pyritic clays and 'ordinary' rocks. Results for 'ordinary' rocks are summarised below.

Element	Range	Mean	?Anomalous
Cu	5 - 30	10	- -
Pb	<5 - 160	10	160 (1 sample)
Zn	10 - 395	50	395 "
Ag	<0.5 - 2.0	<0.5	2.0 "
Fe	0.09-13.5%	-	-
Mn	5 -6050	-	-
Ba	<10 - 905	320	-

Three rock samples returned anomalous values. These were collected from widely spaced locations along the Kelly Basin Track and contain no visible mineralisation. Sample 60038 is a calcareous breccia and the others are a siltstone and a dolomitic limestone.

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Elevated base metal values were also reported from puggy clays and limonitic spring deposits. The significance of these has not yet been determined.

2.2.3. PANNED CONCENTRATES - MINERALOGY (See Appendix and Fig. NR4)

The mineralogy of the panned concentrates is similar to that of the Swift Creek and Hazel Creek samples. No obviously significant mineral was detected. Rounded rutile, ilmenite, zircon, tourmaline and rare cassiterite are probably derived from the Owen Conglomerate and associated quartz sandstone. Common limonite as ferricrete and limonitised wood are of recent surficial origin. The common pyritic sulphides described in sample 60033 are almost certainly derived from the puggy pyritic clay with pyrite and marcasite nodules sampled a short way upstream.

2.2.4. GEOLOGY (See Fig. NR5)

In the Nora River area, a 200-300m wide limestone unit lies between an underlying quartz sandstone-siltstone and an overlying flaggy quartz sandstone. Throughout most of the area, dips are steep towards the east. In the south, however, the limestones are folded around a south plunging fold axis against a prominent north-south fault. Dips here are generally much shallower.

Samples submitted for petrology have been described as dolomitic pelites, calc-pelites, massive unfossiliferous laminated limestone and slump brecciated fossiliferous limestone. All limestones and marls are variably dolomitised but no base metal mineralisation was observed.

3. DISCUSSION AND CONCLUSIONS

The limestone unit along Nora River is rather thin with a true thickness between 150m and 250m. The outcrop width of the limestone increases towards the south where the limestone unit is folded around a south plunging anticlinal axis. This may be due to shallower dips or to thickening of the unit against the nearby fault. Soft pebble conglomerates or slump breccias suggest synsedimentary tectonism in the area. A deep basin beside an active fault would be a favourable site for the formation of an Irish-style carbonate hosted lead-zinc deposit.

No mineralisation has been detected on the Nora River side of this fault. However, on the Kelly Basin side of the fault, minor lead-zinc mineralisation occurred in an intensely veined limestone. In addition mildly elevated rock chip and stream sediment geochemistry has been detected on both sides of the fault.

Because of the indications of possible mineralisation around the fault and because of the favourable geological environment further exploration is recommended.

4. PROPOSED EXPLORATION 1984-85

Field work in the carbonate rocks of the Nora River area should be concentrated around the Bird River Fault. It should be carried out in conjunction with exploration on the western side of the fault.

The following programme is proposed:

- * Stream sediment sampling and rock chip sampling along creeks not already sampled.
- * Detailed mapping and rock chip sampling of selected traverses across the limestone belt. A deep sampling portable percussion drill may be needed to complete these traverses.
- * Careful evaluation and classification of any mineralisation detected.

378007

JOHN F. GILFILLAN & ASSOCIATES PTY. LIMITED

MINERAL EXPLORATION AND GEOLOGICAL CONSULTANTS
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Project: Queenstown

MINERALOGICAL EXAMINATION OF
FORTY EIGHT SAMPLES OF HEAVY
MINERAL CONCENTRATES

Report No: E3/81/255

13th April, 1984.

For: Electrolytic Zinc Company of Australasia Ltd.

J. Barron
Dr. B.J. Barron,
Petrologist.

Sample No. 59719 (Nora River)

Description of Concentrate Only sparse grains of silt and fine sand sized particles remain for this sample. Several black grains are magnetic.

Thin Section Grain size variation of this sample is mainly within the range 0.06 mm (very fine sand size), up to about 1 mm (coarse sand), with several grains reaching 1.3 mm across.

The oxide fraction predominates, and comprises approximately 60% of the total grains represented. These include abundant opaque oxides with sparse grains of magnetite (magnetic see above), numerous grains of ilmenite (partly to completely altered to white leucoxene), and common grains of a relatively unaltered oxide which equally may be ilmenite or titaniferous magnetite. This fraction also contains significant rutile, as subrounded to quite well rounded and elongate prismatic small grains (comprising about 10% of the total sample), as well as rare grains of well rounded to irregular shaped cassiterite crystals. Translucent red-brown limonitic oxide-altered and weathered oxide grains also tend to be well rounded and quite common, while several well rounded grains of a red-brown spinal are accessory.

The silicate fraction is dominated by subrounded to well rounded crystals of zircon and almost equally abundant zoned and variegated crystals of blue to yellow-brown and olive green tourmaline. Sparse scattered grains of angular quartz contaminate the sample with this lighter fraction.

Other accessory phases include rare grains and clusters of fine grained carbonate, as well as rare grains of pyrite with

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59719 (Cont.)

narrow oxidised rims, and several rounded clasts of red-brown ferric oxide-stained wood or plant material.

Sample No. 59723 (Nora River)

Description of Concentrate A mid-brown sample of sand sized grains with sparse well rounded grains of granule sized gravel (2 mm to 4 mm across). The sample is not magnetic.

Thin Section This sample contains approximately equal major proportions of a fine grained fraction ranging in size up to about 0.16 mm (fine sand size) with a much coarser grained fraction containing debris up to 3.5 mm across.

Oxides predominate, and make up approximately 70% of the sample. These include mostly red-brown translucent limonitic grains and well rounded limonitic oxide rich quartz-bearing ferricrete as in previous samples. Several individual grains retain subhedral shapes, and most likely pseudomorph previous octahedral magnetite crystals. Elsewhere in the section several large rounded ferric oxide grains retain cellular relict textures of former plant material. Sparse, generally small rounded to irregular shaped grains of rutile together with one grain which is 1 mm across, account for only about 1% of the total sample. Rare grains of goethite pseudomorph cubic crystal sites which probably once contained sulphides, and equally rare grains of a red-brown spinel are present.

The subordinate silicate fraction comprises mostly quartz contaminant as angular and broken, as well as subrounded grains, with sparse scattered grains of very well rounded tourmaline and rare, well rounded grains of zircon.

Sample No. 59725 = ?59925 Nora River - Origin Unknown

Description of Concentrate Only a few sparse, very fine sand sized particles remain.

Thin Section This sample includes a coarse grained fraction which comprises well rounded grains ranging from about 0.4 mm up to more than

59725 (Cont.)

3 mm across. A fine grained fraction includes material with an average grain size of only about 0.1 mm across.

The coarse fraction includes quite massive to concentrically zoned red-brown limonitic oxides, most of which may be classed as ferricrete and which enclose various proportions of fine silt sized angular quartz chips.

The fine grained fraction includes abundant grains of white leucoxene-altered titaniferous oxides, abundant small grains of well rounded to elongate zircon crystals, common subrounded to stumpy prismatic grains of tourmaline, accessory angular grains of garnet, and scattered small grains of red-brown rutile. Small grains of quartz are accessory.

Sample No.

59920 (Nora River)

Description of Concentrate

An overall brownish grey coloured fine grained sample in which nearly half the grains appear to be back oxides, many of which are magnetic.

Thin Section

More than 75% of the grains represented in the present thin section are oxides, and these belong largely to a coarse grained fraction. The finer grained fraction is not very well represented in the present section. The large grains range in size up to 2 mm across, and include quartz-bearing ferricrete and grains of massive red-brown translucent oxides.

The finer grained fraction contains grains ranging up to about 0.5 mm across, and also includes an assemblage of mainly oxides amongst the phases magnetite, leucoxene-altered titaniferous oxides, red-brown limonitic material. Two large (1 mm across) irregular shaped to subrounded grains and sparse small subrounded grains of rutile are also present.

59920 (Cont.)

An accessory silicate fraction includes rare grains of well rounded tourmaline, subhedral to rounded zircon crystals, a single grain of clouded ?sphene and traces of quartz.

Sample No. 59925 (Nora River)

Description of Concentrate A pale brownish grey coloured concentrate of which only traces remain of an exceptionally fine grained fraction. The latter is not magnetic.

Thin Section A coarse grained fraction is represented in this sample by numerous well rounded to subrounded grains within the range 0.6 mm up to more than 3 mm across. This material comprises dense red-brown ferric oxides with dominant hematite (ferricrete), many clasts enclosing scattered angular silt sized quartz chips in various proportions. Several large grains retain concentric zoned structures indicating colloform nodular deposition of this material, while in rare grains poorly preserved cellular structures indicate the presence of former plant material.

A single small grain of tourmaline represents a meagre fine grained fraction.

Sample No. 59928 (Nora River)

Description of Concentrate A mid-brownish grey coloured sample of fine to medium sized sand sized grains, as well as spars. larger well rounded brown grains.

Thin Section As in previous samples the present concentrate contains two separate size ranges of particles. The coarser fraction (within the range 0.7 mm up to more than 2 mm across) comprises mainly ferricrete with various proportions of silt sized angular quartz chips, as well as subordinate well rounded grains of ferric oxide-altered plant material with distinct cellular structures.

The finer grained fraction includes material

59928 (Cont.)

which is generally less than 0.5 mm across, and which consists largely of oxides. These include mostly opaque oxides amongst which are magnetite, oxidised translucent grains, partly altered to red-brown ferric oxides, numerous titaniferous grains which are largely converted to white leucoxene and several grains of a very dark red-brown spinel. Also present is common rutile, as small subrounded grains and rarely including grains up to 0.6 mm across. This phase accounts for approximately 6% to 8% of the finer grained fraction of the sample. Several grains of poorly cleaved cassiterite are accessory.

The silicates of the finer grained fraction include scattered well rounded grains of zircon and tourmaline, and accessory grains of fibrous actinolitic amphibole, sphene and quartz.

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Sample No.

60033 (Nora River)

Description of Concentrate

A red-brown coloured sample containing a very coarse sand to granule sized gravel fraction as well as a fraction of fine sand sized material. Only rare small grains of this material are magnetic.

Thin Section

The coarser fraction of the present sample is represented in thin section by quite well rounded to irregular shaped clasts containing very dense red-brown limonitic oxides enclosing various proportions of angular silt-sized, and more rarely medium sand sized quartz debris. Also present are types which contain dense colloform and concentric zoned red-brown hematite, and lithic fragments of medium grained partly weathered quartz-rich arenite. Sparse large rounded clasts of plant material retain clear outlines of cellular structures.

The finer grained fraction has an average grain size of about 0.3 mm (medium sand size) with the predominant oxide fraction comprising about 60% of the finer fraction.

Opaque oxides are very abundant and generally these include well rounded grains to subhedral cubic shaped crystals. Almost half of the opaque grains include titaniferous types with advanced alteration to white leucoxene. Another third of the opaque grains have patchy red-brown oxidised central cores or else comprise a dark red-brown translucent spinel. Small subrounded to quite well rounded grains of rutile comprise about 5% of the fine grained sand-sized fraction, and rare grains of cassiterite are accessory.

Silicate grains include well rounded tourmaline, almost equally abundant small rounded zircon crystals, rare grains of sphene and traces of quartz contamination.

About 2% of the finer grained sandy fraction consists of partly oxidised pyritic sulphides.

Sample No.

60203 (Nora River)

Description of Concentrate

In this heavy mineral concentrate only the fine sand sized fraction remains, and this includes abundant non-magnetic black oxide grains, equally abundant clear well rounded zircon grains, translucent brown grains and clearly oxidised yellow- and red-brown limonitic materia

Thin Section

Approximately equal major proportions of a coarse fraction and a fine grained fraction are represented in the present thin section. The coarse fraction includes grains which are mainly well rounded and have an average size of about 1.5 mm to 2 mm across. This fraction contains a very large proportion of translucent isotropic ferric oxides, (mostly red-brown hematite), and certain grains exhibit narrow concentric zoning and include abundant small angular quartz chips. Other material comprises cellular plant remains, while in still other degraded (weathered) clasts relict textures are preserved of very fine grained sericitic bearing, sparsely silty host material, as well as fine grained quartz-rich arenite.

The finer grained fraction has an average grain size of approximately 0.2 mm (fine sand size) and most grains have sub-rounded to quite well rounded grain shapes. The oxide fraction predominates,

6023 (Cont.)

and this contains very abundant titaniferous grains which are largely converted to white leucoxene, sparse grains of a dark grey opaque oxide (possibly titaniferous magnetite), as well as scattered grains of rutile and trace proportions of cassiterite.

The fine grained silicate fraction includes abundant well rounded zircon grains, subordinate but common grains of well rounded tourmaline, aggregates of very fine grained sphene ± quartz, as well as minor quartz contamination.

Sample No.

60205 (Nora River)

Description of Concentrate

Only a small proportion of fine sand sized grains remain in this sample which appears to contain abundant black oxides, (including recognisable subhedral octahedral grains), as well as sparse dark brown translucent grains, well rounded colourless zircon grains and numerous slightly coarser grained red-brown limonitic oxide grains. Rare small grains are strongly magnetic.

Thin Section

A coarse grained fraction of rounded to sub-rounded grains is well represented in this thin section, most of which lie within the range 0.5 mm up to 2 mm across (coarse to very coarse sand size). This fraction includes ubiquitous ferric oxides, isotropic red-brown translucent hematite predominating as concentrically zoned colloform grains, commonly enclosing small angular silt-sized quartz chips. Oxidised and degraded lithic clasts include fine grained prismatic vein quartz with common sites of small cubic crystals (previous ?sulphides) pseudomorphed by dense red-brown to opaque limonitic oxides; oxidised clasts with recognisable relict textures of fine grained quartz arenite, and siltstone. Accessory small grains include ?titaniferous opaque oxides and minor well rounded quartz grains.

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MON	WED	THUR	FRI	SAT	SUN
26 MAR 1984					INDUST
MET	ENG	GEOL			

22nd March, 1984

REPORT CMS 84/3/16

YOUR REFERENCE: Order No. 900512
DATE RECEIVED: 8th March, 1984
SAMPLE NOS.: 15 Samples
SUBMITTED BY: I.J. Mathison
WORK REQUESTED: Petrology

H.W. Fander for
H.W. Fander, M. Sc.

REPORT CMS 84/3/16

Fifteen rock samples from the Nora River area were received for petrological examination. Representative thin-sections were prepared, examined in transmitted light and, together with respective offcuts, in oblique incident light. The attached brief tabulated descriptions incorporate microscopic data and results of carbonate staining tests.

Summary

This suite comprises mainly variously massive to laminated microcrystalline limestones and carbonaceous-pyritic pelitic sediments, typically quartzose-micaceous silty shales. Limestones include some clastic types with fossil fragments supplementing the microcrystalline (recrystallized calcareous mud) calcite. Pelitic and limestone facies both include breccias which may be categorised as soft-pebble conglomeratic types, or slump breccias, on textural grounds.

Thus, overall, a relatively distal intermediate depth, low-energy depositional environment, analogous to that reflected in the Bubbs Hill suite (CMS 84/1/15). In comparison, however, this suite appears to reflect relatively marked contemporaneous tectonism, as indicated by the slump breccias.

Several rocks, including limestones, and pelitic types, exhibit dolomitisation entirely analogous in style to that previously noted in Bubbs Hill and Zeehan suites. Syngenetic fine to ultrafine pyrite is essentially ubiquitous in these pervasively carbonaceous sediments, but base metal sulphides are conspicuously absent. Individual samples may, however, warrant mineragraphic examination on the basis of assay data.

D. Cowan, B. Sc.

Sample No.	Classification - Composition	Fabric	Accessories	Comments
59775 (T.S. 49131)	<u>Impure Limestone</u> . Microcrystalline calcite with films of carbonaceous matter, thinly disseminated partly silicified calcitic fossil fragments; minor concordant to discordant discontinuous calcite veinlets.	Finely laminated with a weak concordant tectonic cleavage. "Megaclastic" fossil fragments.	Minor traces fine silt-sized clastic quartz, white mica flakes, ultrafine "syngenetic" pyrite.	Weakly (bivalve and ?crinoid) fossiliferous laminated impure (carbonaceous, weakly silty clastic) limestone with relatively marked low-grade regional metamorphic effects. Un-
59778	<u>Dolomitic Limestone Breccia</u> . Microcrystalline directed calcite (sim. 59775) with frequent sparry calcite-pseudomorphed fossil fragments, locally conspicuous lenses of carbonaceous calc-pelite. Minor zones of fine sparry dolomite.	Laminated to psammitic slump breccia-like, sheared (similar to 59775).	Traces cherty nodular and fossil-pseudomorphous quartz. Minor traces of "syngenetic" pyrite.	Analogous to 59775, but dolomitised, relatively calcarenitic and grading into a (slumped) shale-parted limestone. Only weakly dolomitised.
59783	<u>Dolomitic Calc-Pelite</u> . Semi-sericitic white mica with subordinate microcrystalline calcite, pervasive silt-sized detrital quartz, muscovite flakes, and fine dolomite rhombs. Minor discontinuous films of oxidised fine-grained pyrite.	Massive laminated to contorted (slumped) silty clastic. Weakly sheared, with microcrenulated pyrite films.	Carbonaceous matter, detrital leucoxic semi-opaques.	Moderately dolomitised calc-pelite (quartzose-micaceous silty shale). Fe-staining reflects partial oxidation of syngenetic pyrite and ankeritic dolomite rhombs.
59784	<u>Dolomitic Pelite</u> . Semi- to sericitic white mica with subordinate closely intergrown microcrystalline quartz, disseminated silt-sized detrital quartz, muscovite flakes. Pervasively disseminated ferruginised microscopic carbonate rhombs.	Moderately slumped submillimetric alternation of slightly and relatively silty shale. Weakly sheared.	Carbonaceous matter, minor clastic leucoxic semi-opaques, opaques. Traces oxidised "syngenetic" pyrite.	Close affinities with 59783, but moderately diagenetically dolomitised pelitic rather than calc-pelite. Fe-staining largely reflects oxidation of ankeritic dolomite rhombs.
59786	<u>Dolomitic Limestone</u> . Microcrystalline directed calcite (sim. 59775, 59778) with frequent bedding concordant to low-angle discordant veinlets of sparry calcite partly replaced by dolomite(-ankerite).	Planar to lenticularly microlaminated; concordantly sheared with stressed to recrystallized veinlets.	Carbonaceous matter, minor traces detrital quartz, recrystallized syngenetic pyrite.	Reflects partial selective dolomitisation of early diagenetic calcite veinlets, largely bedding-controlled. Relatively massive, laminated, non-fossiliferous.
59788	<u>Limestone Breccia</u> . Microcrystalline to semi-porcellaneous calcite with pervasive ultrafine carbonaceous matter. Disseminated to conspicuous poorly determinate recrystallized fossil fragments. Sporadic discordant calcite veinlets.	Lenticularly laminated to slump breccia-like with clasts flattened in response to mild shearing.	Traces dolomite as partial replacement of fossil fragments. Traces ultrafine syngenetic pyrite.	Incipiently dolomitised slumped intercalation of clastic fossiliferous and "micritic" limestone. Calcite veinlets are microcrenulated, early diagenetic.
59790	" <u>Dolomite</u> ". Sparry dolomite-ankerite with more or less pervasive marginal and interstitial limonite stainings. Sporadic veinlets, vugs of comb-structured to sparry calcite. Pervasive interstitial carbonaceous matter.	Essentially massive, even-grained, homogeneous apart from stressed twinned calcite veins, vugs.	Sporadic late secondary films of limonite. Traces ill-defined dolomite-interstitial clay ("sericite").	Thoroughly dolomitised "impure" (carbonaceous) limestone. Featureless in terms of primary features. Weakly argillaceous.
59792	<u>Dolomitic Limestone</u> . Microcrystalline/weakly directed calcite with frequent discontinuous calcite veinlets carrying subordinate to minor dolomite-ankerite. Sporadic carbonaceous stylolites and late crosscutting films of calcite.	Weakly laminated. Incipiently sheared with mildly stressed dolomitic calcite veinlets.	Minor traces corroded authigenic quartz, ultrafine "syngenetic" pyrite.	Close affinities with 59786; similarly calcite-veined, weakly dolomitised. Main contrasts are weak bedding, poor bedding control of early calcite veinlets.

Sample No.	Classification - Composition	Fabric	Accessories	Comments
59793	<u>Dolomitic Pelite</u> . Semi-sericitic white mica stained with carbonaceous matter, subordinate intergrown microcrystalline quartz, disseminated silt-sized detrital quartz, muscovite flakes. Pervasive fine subhedral dolomite.	Vaguely slump-brecciated to massive (unbedded) silty shale. Weakly sheared.	Sparse detrital leucoxenic semi-opaques. Relatively conspicuous fine to ultrafine syngenetic pyrite.	Close affinities with 59784. The vague slump brecciation is defined by variations in carbonaceous matter content as the only real manifestation of bedding.
59992	<u>Dolomitic Calc-Pelite</u> . Semi-sericitic white mica with minor intergrown microcrystalline quartz, pervasive carbonaceous matter, conspicuous silt-sized detrital quartz and mica flakes. Pervasive partly dolomitised.	Incipiently microlaminated silty shale with an incipient concordant slaty cleavage.	Traces ultrafine syngenetic pyrite, minor traces detrital leucoxenic semi-opaques.	Similar to 59783, 59784 and 59793; relatively (clastic) micaceous in comparison and including accessory chloritised biotite.
59993	<u>Dolomitic Pelite</u> . Semi-sericitic white mica pervasively stained with carbonaceous matter, disseminated to conspicuous silt-sized detrital quartz and mica flakes; relatively conspicuous weakly recrystallized syngenetic pyrite.	Lenticularly laminated, slump-brecciated, with weak low-angle discordant slaty cleavage.	Pervasively disseminated oxidised microscopic carbonate rhombs, leucoxenic semi-opaques.	Relatively (quartzose, micaceous) silty carbonaceous pelite similar to 59992; moderately (oxidised) dolomitic.
60028	<u>Dolomitic Limestone</u> . Weakly directed microcrystalline calcite and fine granular to sparry dolomite-ankerite in varying proportions. Sporadic dolomite veinlets and carbonaceous/limonitic (oxidised pyritic) stylolites.	Weakly laminated, vaguely "filamentous". Locally slumped, but confused by stylolitisation, weak shearing.	Rare discontinuous fibrous quartz veinlets.	Moderately dolomitised, laminated to locally slumped brecciated limestone with vague algal filamentous microtextures. Dolomitisation relatively marked in slumped zones.
60032	<u>Dolomitic Limestone Breccia</u> . Clasts, zones of microfossiliferous to massive microcrystalline carbonaceous limestone interspersed with zones of dolomitised limestone. Sporadic calcite-dolomite veinlets.	Coarse-scale breccia with sparse dolomitic matrix. Moderately stylolitic.	Minor traces "syngenetic" and carbonate vein-related pyrite.	Extensively dolomitised slump breccia-like composite of clastic (fossiliferous) and relatively massive (dolomitised) limestone. Incipiently stressed.
60039	<u>Silicified Breccia</u> . Cherty microcrystalline quartz with semi-pervasive discontinuous films, small vugs of fine-grained "crystal" quartz.	Randomly sorted, soft-pebble conglomerate-like; clasts of (silicified) pelite, dolomitic and fossiliferous limestone.	Relics of semi-sericitic white mica in silicified pelite clasts.	Detail obscured by silicification, but interpreted as a slump-brecciated composite of limestone, dolomitised limestone and calc-pelite on basis of relict features.
60300 (T.S. 49144)	<u>Dolomitic Pelite "Breccia"</u> . Ovoid clasts of dolomitic quartzose siltstone and carbonaceous silty shale in a matrix of weakly dolomitic/calcitic, slightly silty carbonaceous pelite. Conspicuous "syngenetic" pyrite.	Ovoid, dimensionally orientated sub- to millimetric clasts. Microlaminated, discordantly sheared matrix.	Minor traces detrital leucoxenic semi-opaques.	Quartzose silty ovoids interpreted as infilled burrows, but pelite clasts reflect incipient slumping. Dimensional orientation subparallel to slaty cleavage.

E.Z. Co. of A'Asia Ltd.,
ROSEBERRY, Tasmania

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: GORDON LIMESTONE
LOCALITY: MORR RIVER
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: Stream Sediments
SAMPLE METHOD: Sieved to -2mm
SAMPLED BY: DET. ST. PW. WF. S.M.
DATE: Jan. Feb. 1984

SIZE FRACTION ANALYSED: -80 mesh
ANALYSED BY: ANALABS
METHOD: A.A.S. So. W. by X.R.F.

SAMPLE NUMBER	SAMPLE LOCATION DATA			STREAM DATA			COMPOSITION DATA				Geology	METAL CONTENT (ppm unless specified)								
	GRID LINE NO.	Local A.M.G. CO-ORDINATES		Str. Order Direction of Flow	Width	Active Stream Load	Clay	Sand	Rock Frags	Organic		CONTAM.	Cu	Pb	Zn	Ag	Au	Fe	Mn	Ba
	GRID EASTING	NORTHING	EASTING																	
32	59718				6.0								5	15	35	0.5		4900	145	35
33	59720				6.0			1040	50				10	55	110	0.5		2020	460	65
4	59721				6.0			1550	35				15	55	115	0.5		1750	340	60
5	59722				6.0			3060	10				5	25	80	0.5		1500	330	60
6	59724				6.0			1070	20				10	25	95	0.5		1400	215	319
57	59725				6.0			2060	20				10	20	65	X		1350	245	80
78	59919				5.0			560	40				10	20	80	0.5		1250	390	75
77	59921				0.5			30	70				10	15	80	0.5		1800	60	95
74	59922				0.4			1085	5				10	10	45	0.5		6550	30	45
75	59923				3.0			590	5				10	15	65	0.5		1250	110	90
72	59926				2.5			278	20				10	10	50	0.5		1000	60	55
73	59927				2.5			1080	5	5			5	15	50	X		7700	170	50
76	59930				0.5			2565	10				5	X	25	0.5		2950	X	40
66	60018				4.0			1075	10	5			5	10	45	0.5		6800	230	65
62	60020				4.0			580	5				5	5	45	0.5		4500	125	50
60	60022				4.0			580	10	5			10	15	95	0.5		5800	205	65
60	60027				4.0								5	10	55	0.5		8100	255	60
58	60029				0.5			2060	10	10			X	5	35	0.5		1400	70	55
59	60031				4.0								5	20	95	0.5		1050	310	75
63	60041				0.5								X	5	45	0.5		3900	310	45
79	60045				0.5			595					X	X	15	0.5		400	X	60
68	60047				0.5								X	X	15	0.5		300	5	30
65	60301				4.0			6040					10	25	65	X		1800	510	85
64	60202							6040					5	20	55	X		1450	300	70
67	60204				7.0			7525					5	10	50	X		9650	290	60
69	60206				4.0			3070					10	20	75	X		1400	350	95
70	60207				4.0								5	15	65	X		1350	310	95
71	60208				4.0								10	10	50	X		9650	90	60

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: [REDACTED] CORPORATION: [REDACTED] DISTRICT: [REDACTED]
COLLECTED BY: MAT DATE: Jan, Feb 1984.

Sample Number	A.M.G. Co-ordinates (Local)		Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section			Metal Content (p.p.m. unless specified)							
	N	E				T or P	By	Reference	Rock-type (Microscopic)	Ca	Pb	Zn	Ag	Fe	Mn	Ba
59775			Rk	Dark grey medium grained recrystallized or dolomitic LIMESTONE	LST	T	Common	CMS	silty LST	5	10	20	X	8300	210	19
59776			"	Dark grey fine grained silty LIMESTONE	LST			8/3/16	fine micrite	10	15	15	X	8050	160	111
59777			"	Dark grey medium grained recrystallized or dolomitic micritic LIMESTONE	LST					10	5	395	X	5850	150	119
59778			"	Dark grey partially recrystallized micritic LIMESTONE	LST	T	"	"	dol BX LST slump BX	10	10	20	X	3350	170	29
59779			"	Dark grey micritic LIMESTONE	LST					10	10	45	X	2.05%	1500	16
59780			"	Grey and white sandy LIMESTONE with leached sandy patches	LST					10	5	40	X	2500	25	159
59781			"	Grey marly LIMESTONE which is interbedded with siltstone	LST					10	X	40	X	1.30%	30	570
59782			"	Dark grey silty LIMESTONE	LST					10	10	45	X	2.25%	550	323
59783			"	Dark grey thin bedded silty LIMESTONE	LST	T	"	"	dol calc SLST	10	10	45	X	2.20%	665	202
59784			"	Dark grey weakly cleaved silty LIMESTONE	LST	T			dol SLST	20	5	130	X	3.90%	210	585
59785			"	white and pale green fine - medium grained QUARTZITE	QZT					5	X	10	X	1350	30	133
59786			"	Grey fossiliferous LIMESTONE	LST	T			dol LST lam.	10	5	20	X	4750	250	23
59787			"	Dark grey partly silicified LIMESTONE - calcite veins + concretions	LST					5	X	20	X	4750	560	X
59788			"	Dark grey fine grained LIMESTONE	LST	T			BX LST slump	10	5	20	X	3100	155	19
59789			"	Dark grey fine grained muddy LIMESTONE	LST					10	15	35	X	7400	260	61

378021

320

Electrolytic Zinc Co. of Austral Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: GORDON LIMESTONE LOCALITY: 700A BR

COLLECTED BY: MAT.

DATE: Jan-Feb 1984

Sample Number	A.M.C. Co-ordinates (Local)		Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section			Metal Content (p.p.m. unless specified)							
	N	E				T or P	By	Reference	Rock-type (Microscopic)	Cu	Pb	Zn	Ag	Fe	Mn	Ba
59790			Rk	Dark grey medium grained recryst'd or dol. LIMESTONE with calc. vugs veins	LST	T	Common	CMS	DLST	10	5	20	X	2.25%	1600	50
59794			Vugh	vugh in above.	-					5	5	15	X	1950	260	X
59791			Rk	Dark grey micritic LIMESTONE - minor carbonate veining	LST					5	5	20	X	1550	85	20
59792			"	Grey medium grained Bivaliferous LIMESTONE	LST	T	"	"	DLST	5	5	15	X	1800	105	15
59793			"	Dark grey argillaceous micritic LIMESTONE - minor carbonate vugs	LST	T	"	"	dol SLST	10	15	90	X	4.65%	1550	424
59991			"	Oxidized pale brown SILTSTONE	SLT					15	10	100	X	3.90%	50	619
59992			"	Grey very fine grained argillaceous LIMESTONE	LST	T			dol calc SLST	15	20	75	X	2.70%	310	512
59993			"	Dark grey SILTSTONE	SLT	T			dol SLST	15	10	105	X	2.25%	200	544
59994			"	Oxidized orange SILTSTONE	SLT					10	10	165	X	9.30%	700	509
59995			"	Grey SHALE - well cleaved	SH					10	35	60	X	3.25%	25	715
60019			"	Pale grey fine grained silty SANDSTONE	SST					5	10	15	X	4600	260	386
60021			"	Pale brown fine-medium grained silty SANDSTONE	SST					5	X	55	X	1.80%	45	360
60023			"	Grey SILTSTONE	SLT					15	20	125	X	2.10%	55	484
60024			PYRITE	Botryoidal marcasite/pyrite - occurs in puggy clay below.	PY					5	X	10	X	2.20%	5	98
60025			PUG	Dark grey pyritic CLAY	CLAY					10	X	15	X	7650	10	259

Smith Form No. 51122

378022

20

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

ST: 307 Limestone Locality: N101
COLLECTED BY: MAT DATE: Jan - Feb 1964

Sample Number	A.M.G. Co-ordinates (local)		Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section			Metal Content (p.p.m. unless specified)							
	N	E				T or P	By	Reference	Rock-type (Microscopic)	Cu	Pb	Zn	Ag	Fe	Mn	Ba
60026			Rk	Dark grey SILTSTONE	SLT					20	10	110	X	2.85%	515	512
60028			"	Dark grey fine grained LIMESTONE with calcite veining	LST	T	Carver	CMS 24/3/16	dol LST	5	X	20	X	2700	355	24
60030			"	Dark grey fossiliferous micritic LIMESTONE	LST					5	5	20	X	5350	270	44
60032			"	Dark grey fine grained LIMESTONE	LST	T	"	"	dol BX LST slumped	5	5	20	X	7950	490	39
60034			PUG	Dark grey puggy CLAY	CLAY					135	215	10	0.5	900	15	281
60035			Rk	Pale brown oxidized SILTSTONE	SLT					15	160	20	X	1300	10	597
60036			"	Pale grey oxidized SILTSTONE	SLT					5	10	15	X	3000	15	585
60037			"	Grey ? marly SILTSTONE	SLT					5	20	15	X	2600	10	596
60038			"	Yellow calcareous BRECCIA ? travertine	BX					5	10	100	2.0	5.10%	175	63
60039			"	Pale grey and yellow calcareous BRECCIA ? travertine	BX	T	Carver	CMS 24/3/16	sil LST BX	5	15	10	X	1700	55	153
60040			"	Pale grey and brown siliceous BRECCIA with trace pyrite	BX					5	X	20	X	1.80%	20	106
60042			"	Orange fine grained silty SANDSTONE	SST					5	X	25	X	1.45%	65	290
60043			"	Pale grey fine grained QUARTZITE	QZT					5	25	10	X	1050	25	297
60044			"	Pale yellow fine grained SANDSTONE	SST					5	10	15	X	3700	10	427
60046			"	Oxidized orange micaceous SILTSTONE	SLT					5	10	55	X	2.30%	25	615

Smith Form No. 41122

024

378023

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

ST: ~~XXXX~~ Limestone LOCALITY: NORA RIVER
COLLECTED BY: S.T. DATE: ~~XXXX~~, Feb 1984

Sample Number	A.M.G. Co-ordinates (local)		Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section				Metal Content (p.p.m. unless specified)								
	N	E				T or P	By	Reference	Rock-type (Microscopic)	Cu	Pb	Zn	Ag	Fe	Mn	Ba		
60289			RK	Grey fine grained, slightly silicified argillaceous LIMESTONE	LST							20	10	130	X	2.55%	470	419
60290			"	Grey ARGILLITE, non calcareous	SLT							20	10	50	X	1.60%	105	747
60291			"	Grey dolomitized LIMESTONE - sandy								10	X	145	X	13.5%	2750	323
60292			"	"								5	X	30	X	6.67%	1750	381
60293			"	"								10	X	85	X	4.80%	6050	430
60294			"	"								10	X	35	X	3.65%	650	506
60295			"	"								5	5	70	X	2.80%	365	777
60296			"	Dark grey ARGILLITE, non calcareous	SLT							30	10	20	X	1.85%	35	905
60297			"	Yellowish grey SANDSTONE	SST							5	X	15	X	6.50	10	446
60298			"	Yellowish grey SANDSTONE	SST							5	X	10	X	1.20%	20	362
60299			"	Dark grey ARGILLITE, non calcareous	SAT							30	10	45	X	1.45%	90	675
60300			"	Dark grey ARGILLITE, non calcareous ? fossil pellets.	SLT	T	Common	CMS	del	SLT		10	X	10	X	5250	5	652
59924			VAD	Red brown sediment forming in spring	LIM							10	X	325	X	21.5%	2400	326
59929			VAD	Red brown iron stained cemented sediment around spring	LIM							10	10	935	X	20.5%	1200	275

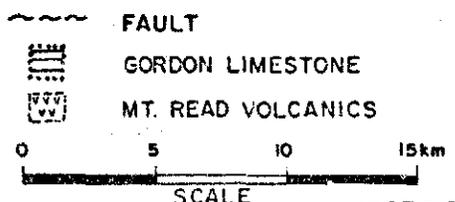
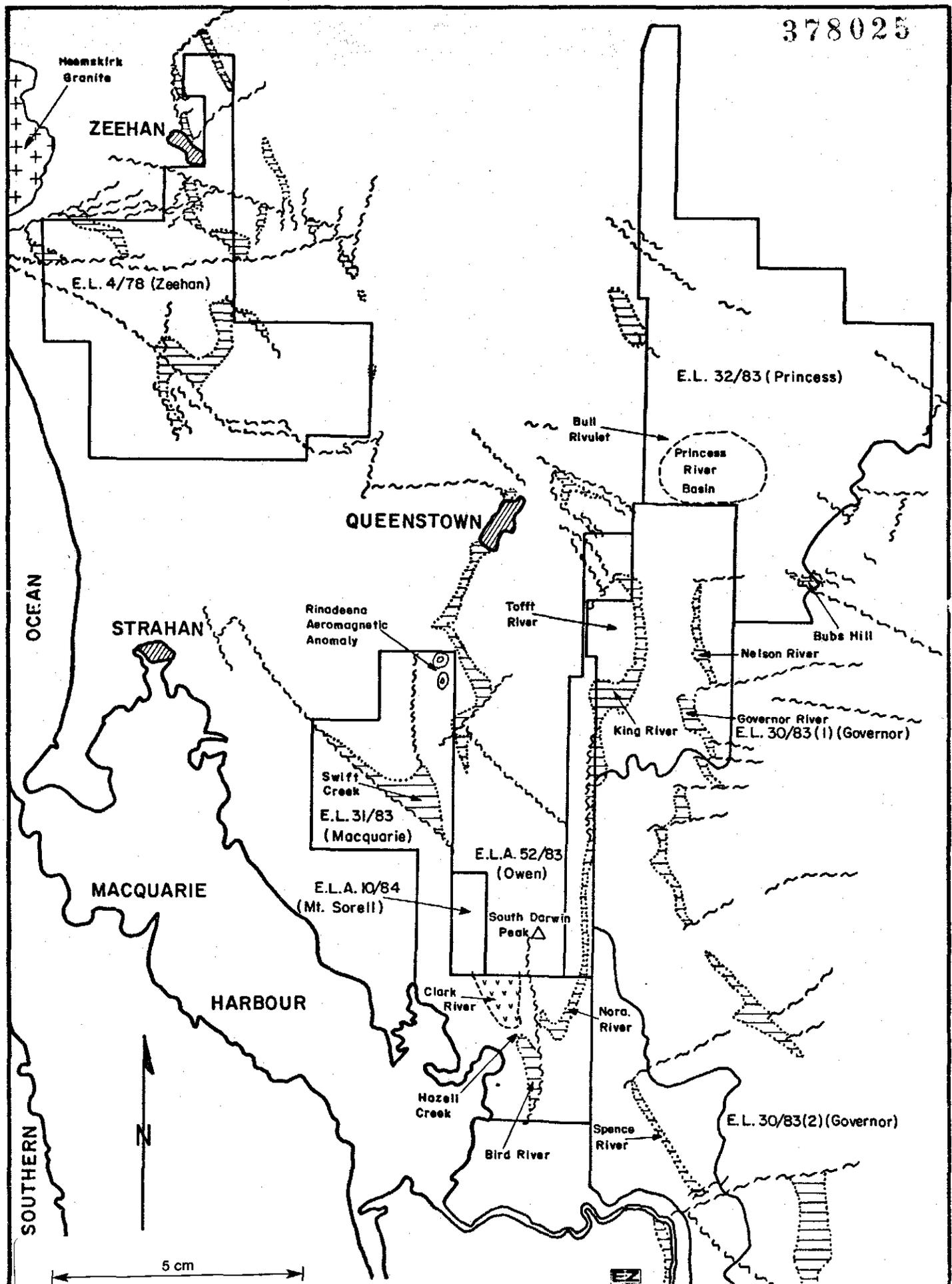
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378024

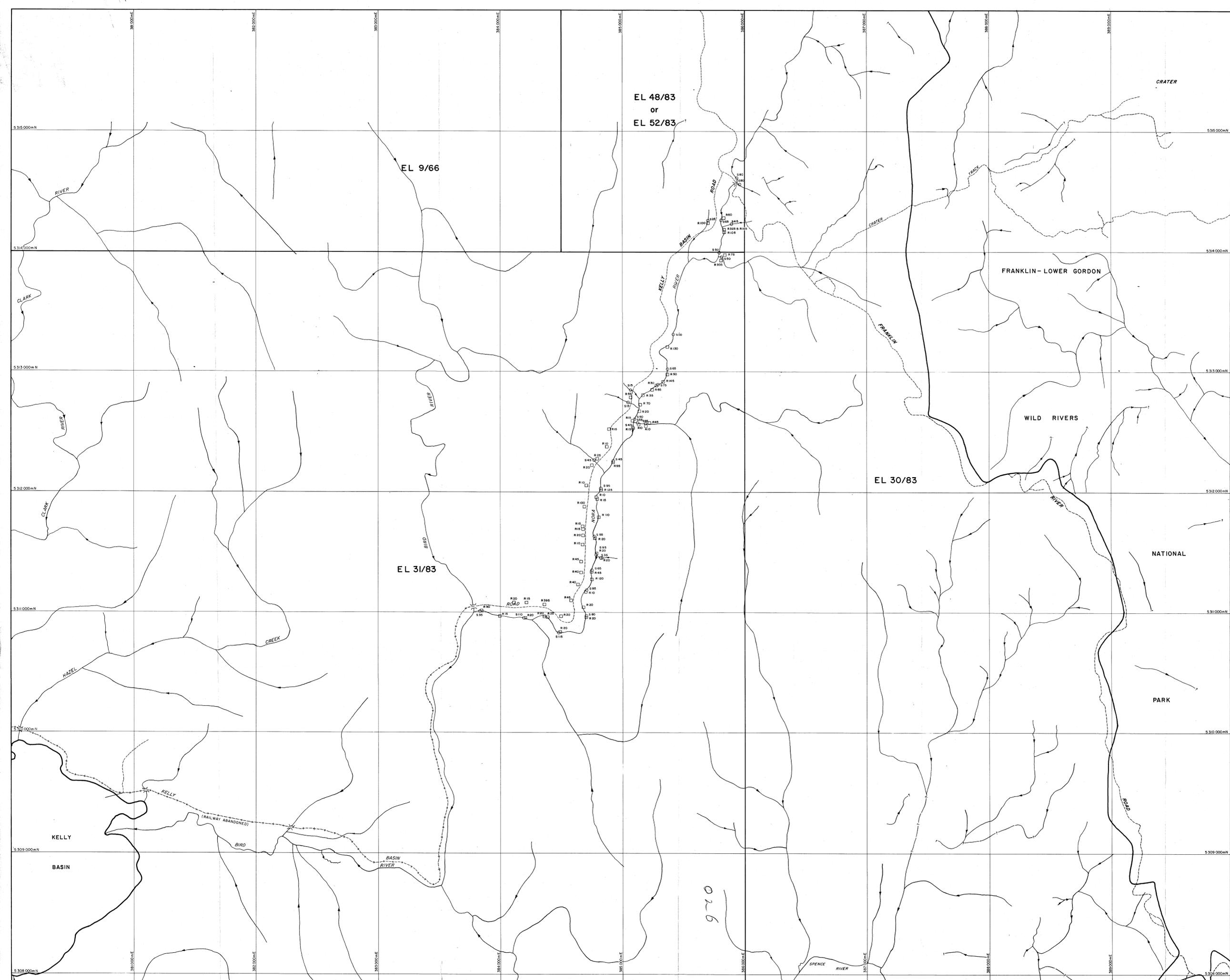
025

378025



PROJECT: GORDON LIMESTONE J.V.		
LOCATIONS		
Compiled S.T.	Date:	PLAN NO
Drawn R.J.R.	Scale	Fig.

AMC REFERENCE POINTS ADDED



○ STREAM SEDIMENT SAMPLE.
S 55
□ ROCK CHIP SAMPLE.
R 100
X = below 5 ppm
Note: All results are ppm

378026
5 cm

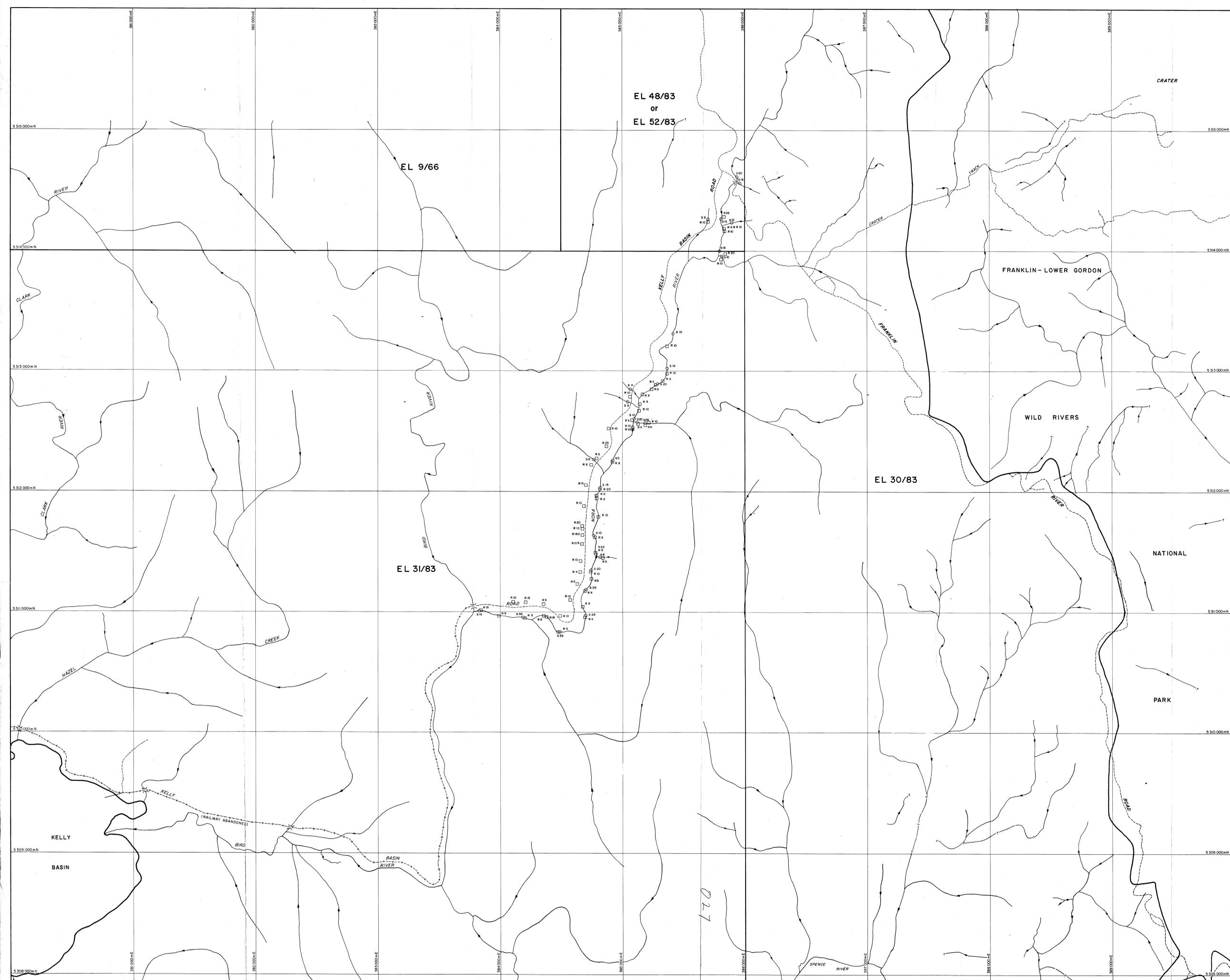
Fig. NR 1
ELECTROLYTIC ZINC CO. OF ASIA LTD.
PROJECT: NORA RIVER EL 31/83, TAS.

GEOCHEMISTRY 026

Zn 84-2180

Scale: 1:10,000	Survey: 1. MAT.	Revised:
Reference: H.E.C.	Date: 22-3-'84	Ref. No.
Drawn: R.J.R.	Checked: L.W.	A0-530-1001

026



○ STREAM SEDIMENT SAMPLE
S 55

□ ROCK CHIP SAMPLE
R 10

X = below 5 ppm

Note: All results are ppm

378027

5 cm

Fig NR 2

ELECTROLYTIC ZINC CO. OF ASIA LTD.

PROJECT: NORA RIVER EL 31/83 ,TAS.

GEOCHEMISTRY 027

Pb

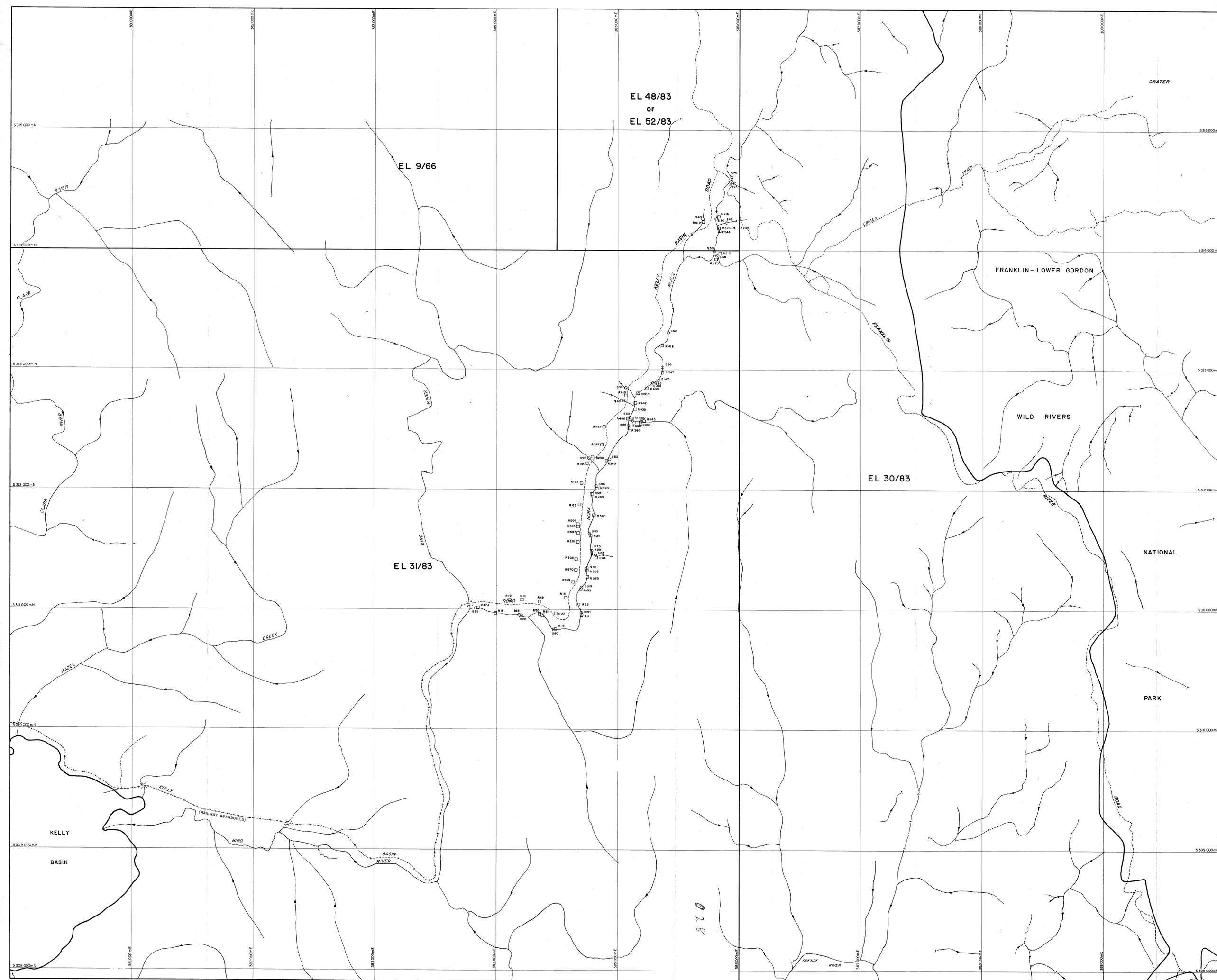
Scale: 1:10000 Survey: I.MAT. Revised:

Reference: H.E.C. Date: 22-3-'84 Ref. No.

Drawn: R.J.R. Checked: L.W. AO-530-1002

027

84-2180



EL 48/83
or
EL 52/83

EL 9/66

EL 31/83

EL 30/83

CRATER

FRANKLIN - LOWER GORDON

WILD RIVERS

NATIONAL

PARK

KELLY

BASIN

SPENCE RIVER

- STREAM SEDIMENT SAMPLE.
S 55
- ROCK CHIP SAMPLE.
R 565
- X = below 10ppm
- Note: All results are ppm

378028

Fig. NR 3

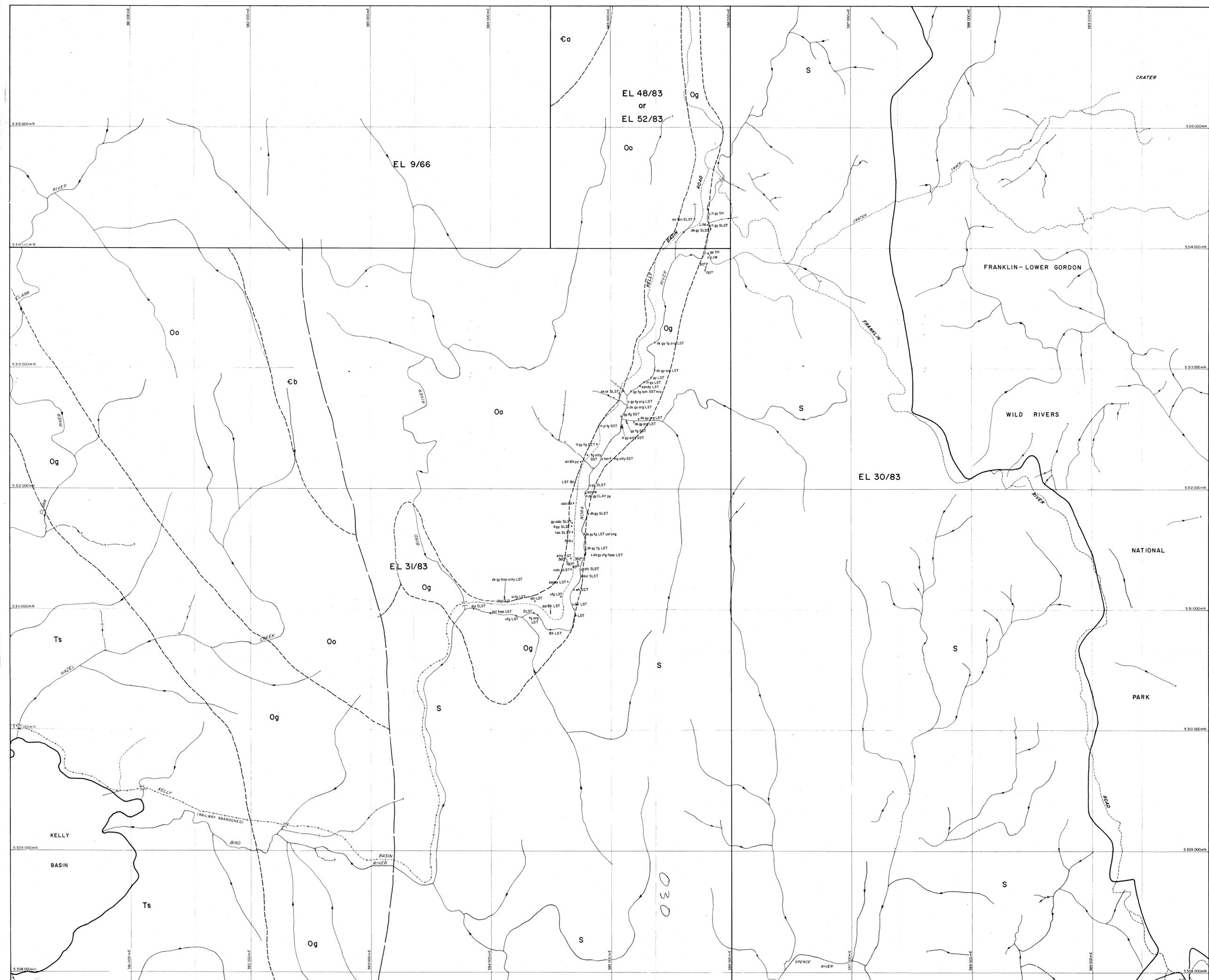
ELECTROLYTIC ZINC CO. OF ASIA LTD.
PROJECT: NORA RIVER EL 31/83 ,TAS.

GEOCHEMISTRY 028

Ba

Scale: 1:10000	Survey: 1.MAT	Revised:
Reference: H.E.C.	Date: 22-3-84	Ref. No.
Drawn: R.J.R.	Checked: L.W.	AO-530-1003

028



LEGEND

CLOUR	pk - pink	wh - white
br - brown	bl - black	bk - black
bl - blue	gr - green	gr - green
gy - grey	yl - yellow	yl - yellow
rd - red	or - orange	or - orange
cr - cream	pl - pale	pl - pale
lt - light	dk - dark	dk - dark

TEXTURE

fg - fine grained	fos - fossiliferous
mg - medium grained	sil - siliceous
cg - coarse grained	mic - micaceous
brd - brecciated	fer - ferruginous
clv - cleaved	int - intense
shrd - sheared	wk - weak
calc - calcareous	v - very
carb - carbonaceous	pb - pebble
lgn - laminated	cb - cobble
xbd - cross bedded	tr - trace
fb - thin bedded	in bd - inter bedded
tk bd - thick bedded	tbl - tubular
vn - veins, veining	frct - fractured

ROCK TYPE

SST - sandstone	SLT - siltstone
LST - limestone	DLST - dolomite
BX - breccia	CGL - conglomerate
SH - shale	BSH - black shale
QZT - quartzite	LIM - ironstone
GRIT - grit	CLY - clay
PUG - pug	GRA - gravel

MINERALOGY or ALTERATION

qt - quartz	py - pyrite
gn - gneiss	sp - sphalerite
lim - limonite	cp - chalcopyrite
cid - carbonated	sl - silicified
c - calcite	

ORDER

Colour, Texture, Rock Type, Mineralogy or Alteration, Fossils

e.g.

dk gy mg foss SST or gy calc SH py or pl gy LST sil

TOPOGRAPHICAL

cut grid lines	90° joint
roads	90° joint - vertical
tracks	overturned
tramways	bedding
power lines	bedding - vertical
et	quarries
swampy area	

INTERPRETED GEOLOGY
 Geology adapted from Queensland 1:250,000 geological map (Corbett & Brown 1975)

TERTIARY	Ts	Tertiary sediments.
SILURIAN	S	Undifferentiated siltstone, shale and minor sandstone.
ORDOVICIAN	Og	Gordon limestone, limestone with some siltstone.
	Oo	Siliceous conglomerate and quartz sandstone.
CAMBRIAN	Cb	Basic to intermediate volcanics and volcanoclastic sediments.
	Ca	Acid volcanics and volcanoclastic sediments.

378030

Fig. NR 5

5 cm

ELECTROLYTIC ZINC CO. OF ASIA LTD.
 PROJECT: NORA RIVER EL 31/83, TAS.

GEOLOGY	030	
(INTERP)	SL-2150	
Scale: 1:10000	Survey: 1. MAT.	Revised:
Reference: H.E.C.	Date: 28-6-84	Ref. No.
Drawn: R.J.R.	Checked:	AO-530-1005