

**Annual Report for EL 6/2001
(Professor Creek)**

for the Period

22nd June 2001 to 22nd June 2002

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**For Tenure Holder:
Noranda Pacific Pty Ltd**

Copies
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Annual Report for EL 6/2001 (Professor Creek) for the Period 22nd June 2001 to 22nd June 2002

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Summary

Noranda Pacific Pty Ltd is the 100% tenure holder of EL 6/2001 (Professor Creek) near Zeehan, in West Tasmania. Within this tenement lies a 1km² excised area which constitutes a Retention Licence held by Allegiance Mining NL. This report details exploration work carried out on the exploration lease over the period 22nd June 2001 to 22nd June 2002.

The target type being explored for is an Irish-style carbonate hosted lead/zinc deposit within the Ordovician-aged Gordon Limestone. The regional setting, the basin tectonics and the relatively impure nature of the carbonates are all similar to Ireland. Previous competitor exploration has outlined small resources, some with ore grade zinc mineralisation of an Irish-style.

The geology of the EL comprises a 700m thick, mixed sequence of shallow water limestones sandwiched between medium to coarse grained siliciclastics. This sequence unconformably overlies rocks belonging to the Cambrian aged Dundas Trough, which interdigitates with the Mt Read Volcanics. The Mt Read Volcanics are known to host several large scale deposits including the Mt Lyell Copper and Rosebery and Hellyer zinc deposits. Structurally the area lies within an open folded sequence with some later reverse faulting believed to be the result of the Late Devonian Tabberabberan Orogeny, which included the intrusion of mineral-bearing granites into the region.

Previous exploration consisted of a substantial number of diamond drillholes, aircore drilling and geochemical bedrock sampling and a detailed helimag and localised gravity surveys. Thus an extensive database exists for the Gordon Limestone that is primed for informed reinterpretation in conjunction with already known drill targets within the area.

Work completed by Noranda includes digital data capture and compilation, reprocessing of the geophysical data, a new geological map, all of which led to the drilling of 3 diamond drillholes for 879m. Targeting for the drilling utilised data from a number of geoscientific disciplines including favourable structure and sedimentology, magnetic anomalies, geochemical anomalies and basin analysis.

The drilling failed to intersect significant lead/zinc mineralisation. Unusual 10m thick dolomitic vein systems were found in drillcore from Professor Range with an estimated combined sphalerite/galena/pyrite content of 3-4%. An unusual 100m sequence of hydrothermal breccias and limestones was intersected in drillcore from the King Billy prospect. No obvious explanation exists for the surficial geochemical anomaly at King Billy.

There are remaining drill targets at Myrtle, Baura and Firewood Siding. A second drilling campaign of 4 holes for 1200m is recommended for the EL.

Total expenditure for the reporting period is \$160,045.

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Annual Report for EL 6/2001 (Professor Creek) for the Period 22nd June 2001 to 22nd June 2002

1] Introduction

West Tasmania is one of the world's premier mineral belts with a variety of deposits and deposit styles covering a range of commodities including a global zinc inventory of 7.5Mt of contained metal. Mining is one of the most important sources of revenue for the Tasmanian state and currently there are substantial infrastructure upgrades under development in the area that are designed to improve the mining economics of the region.

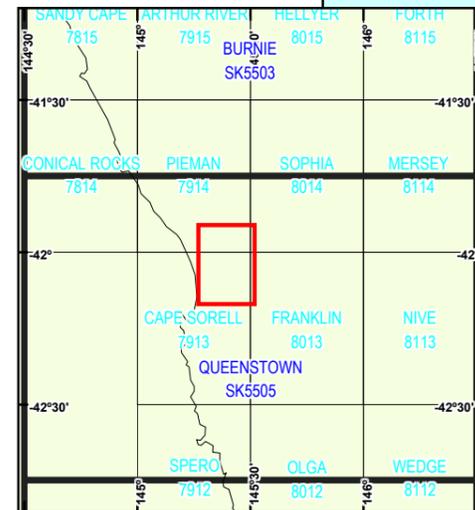
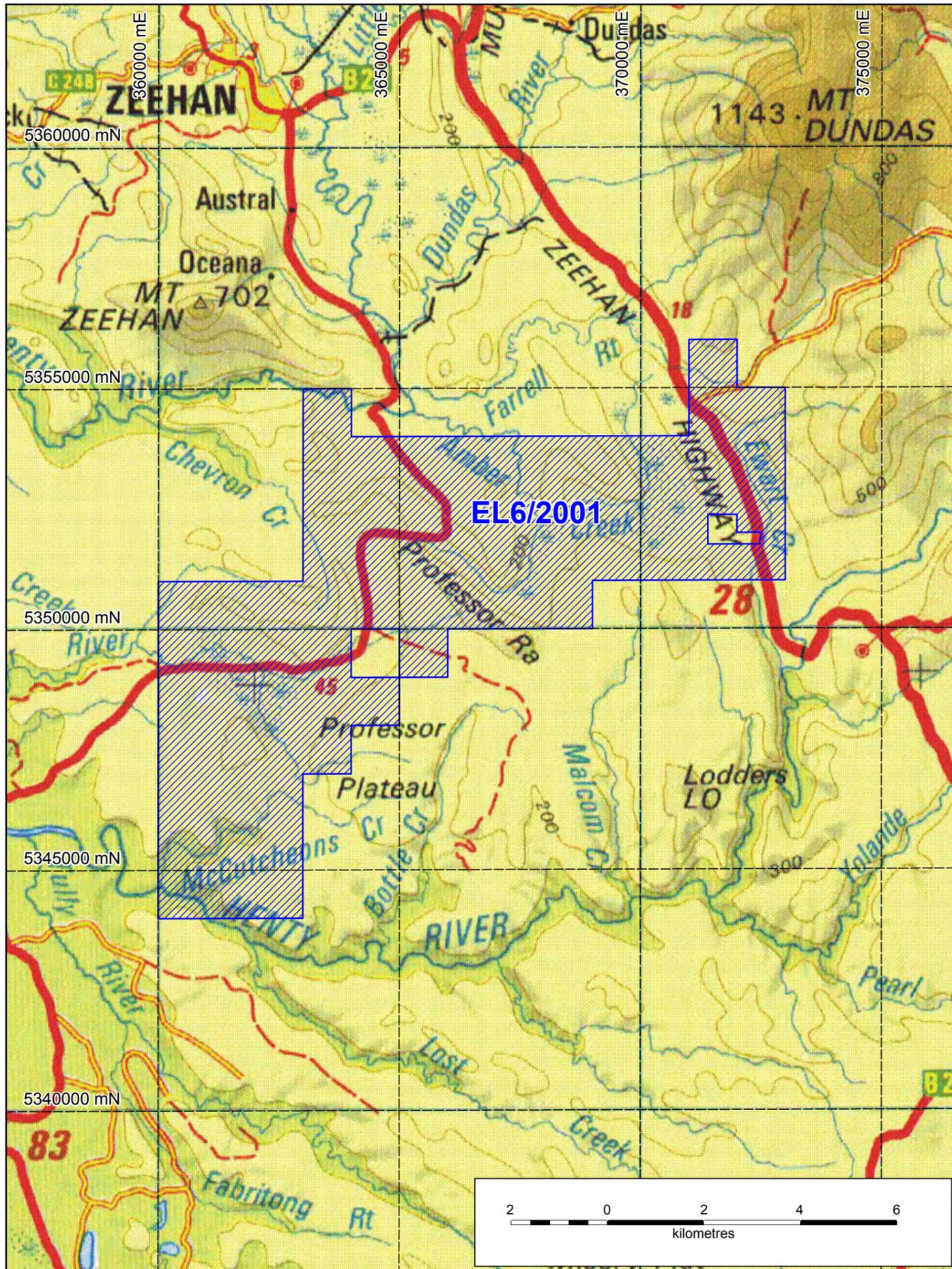
Noranda Pacific Pty Limited has a 100% interest in EL 6/2001 (Professor Creek) located near Zeehan in West Tasmania (figure 1). The target is a structurally controlled stratabound Irish-type zinc orebody (>20Mt at 10% Zn) hosted by carbonates of the Ordovician-aged Gordon Limestone. Irish examples include the Navan Mine circa 90Mt at 8% Zn and the Lisheen Mine 14.4Mt at 11.7%Zn. The regional geological setting, previously discovered mineral styles and proposed host lithologies for the Zeehan area are similar to those for the Irish deposits (see table 1).

Table 1 : Irish Type Carbonate Hosted Characteristics

- A regional setting comprising a tectonic suture zone with the collided plates consisting of volcano-sedimentary rocks with VHMS deposits, all of an island-arc affinity.
- Structurally-controlled stratabound zinc/lead orebody hosted by Carboniferous carbonates
- The Navan Mine, Ireland (90Mt @ 8% Zn) and the Lisheen Mine (14.4Mt @ 11.7%Zn) are hosted by different lithostratigraphies but with the host ore sediments contemporaneously deposited
- Replacement of porous, clean calcilutites/calcarenites (Navan) or pre-dolomitised calcilutite breccias (Lisheen, Galmoy, Tynagh, Silvermines)
- Early phase ferroan dolomite association eg black matrix breccias
- Proximal to major basement features/structures/perturbations
- Related to normal faulting with fault timing early syndiagenetic (poss early epigenetic?)
- Capping units to ore can comprise dolomitised units and/or strongly arenaceous rocks
- Locally high levels of argillaceous content within the limestone package

Exploration work for the reporting period has consisted of a brief data compilation exercise, reprocessing of detailed helimag and gravity data and a reinterpretation of the surface geochemical data. A subsequent drilling programme consisted of 3 angled diamond drillholes totaling 879m. This report details the work completed in the first year of the renewal period and its conclusions.

A list of acknowledgements of personnel who worked on the property is included in appendix 1. A statement of expenditures is included in appendix 2.



Map Projection:
AMG Zone 55, AGD 66

 **Noranda Pacific Pty Limited**
noranda

Zeehan Carbonate Project
EL 6/2001 (Professor Creek)
Location Map

Author: CB	Date: 31/05/02	Sheet Ref: SK55
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Figures\01		

1.1] Location and Access

EL 6/2001 is located approximately 20 kilometres by road SE of the town of Zeehan in West Tasmania on the Queenstown 1:250000 (SK55-5) map sheet, and the Oceana and Professor 1:25000 map sheets (figure 1). Vehicular access to the tenement block is via bitumen roads, the Strahan Road and the Queenstown Road (Lyell Highway), both of which pass through the tenement. Access to individual prospects is either by pre-existing 4WD access tracks or by foot, usually along old exploration tracks.

1.2] Tenure

EL 6/2001 was granted to Noranda Pacific Pty Limited on the 22nd of June 2001 for a period of 5 years with a minimum expenditure commitment of \$49,500 during the first two years of the licence. The total area of the licence is 66km².

The southern part of the licence comes under the Regional Forestry Agreement and requires a programme assessment by a committee before approval is given. The northern half is state forest subject to the normal provisions for crown land.

Allegiance Mining NL has a 1km² Retention Licence around the Grieves Prospect which is completely surrounded by Noranda's EL.

1.3] Surficial Geology and Topography

The licence is underlain by rolling hills of relatively fresh outcrop of Palaeozoic clastic sequences and valley floors of rotted carbonates. The hilly areas represent a relief variance of up to 200m. The Gordon Limestone is generally recognised as forming the flat valley floors often with a thin covering of Quaternary gravels overlying black residual clays. Exposure of the limestone is rare and often of poor quality in contrast to the surrounding clastic packages.

Vegetation consists of button grass plains over the limestone with grassland to dense bush to temperate rainforest covering the over and underlying sequences.

2] Exploration History

2.1] Previous Work

The area incorporating EL 6/2001 was subject to extensive exploration activity from the mid to late 1980's until 1996. Much of this activity was directed towards Irish style carbonate hosted lead/zinc mineralisation. The main explorers were initially EZ (and Amoco) followed by CRAE and details of the relevant open file reports are included in appendix 3.

A review of the geology of the nearby Oceana Mine (Taylor and Mathison 1991), which operated in the late 1950's, concluded that there were many aspects similar to an Irish style carbonate hosted lead/zinc orebody. This prompted the detailed exploration by the EZ/Amoco JV who drilled around the mine confirming its ore style, its prospectivity and delineated a resource of 2.45Mt @ 9%Pb and 4% Zn. This led to an expanding of the search area to cover all of the Zeehan carbonate sub-basin

CRAE acquired access to most of the Gordon Limestone around Zeehan in 1991 by both entering into a JV with Major Mining who subsequently sold their interest to Allegiance Mining NL and completed in 1992 by 100% tenement application. CRAE actively explored the area from 1993 to 1996. Both EZ/Amoco and CRAE completed an extensive amount of exploration on the current Noranda tenement comprising the following :-

Table 2 : Previous Work Details

Worktype	Amount	Meterage
Drilling		
Diamond	63 holes	9380.20m
Winkie	28 holes	643.75m
Aircore	884 holes	13537.50m
		Total 23561.45m
Geochemistry		
Bedrock/Wacker	2559 samples	18892.65m
Streams	Considered ineffective	
Costeans	At Myrtle, Baura, Grieves and Rose Valley	Approximately 400m Ineffective due to overburden depth >6m
Geophysics		
Helimag	Whole area 60m ht	60m line spacing
Gravity	Myrtle-Grieves Baura	
Resistivity	Considered ineffective	
EIP/MIP	Considered ineffective	
UTEM	Considered ineffective	
EM37	Considered ineffective	
Turair EM	Considered ineffective	
Dighem II	Considered ineffective	
Downhole EM	Considered ineffective	
SP/AP/EP	Considered ineffective	

The best results from this work for EL 6/2001 were from the CRAE undertakings which discovered :-

1. A small mixed secondary/primary sulphide resource at Grieves circa 0.7Mt @ 8% Zn (source Allegiance Annual Report)
2. A collection of small secondary zinc sulphide resources at Myrtle totalling circa 0.5Mt @ 2-3% Zn approx

The CRAE programme was terminated abruptly in May 1996 with several targets remaining undrilled.

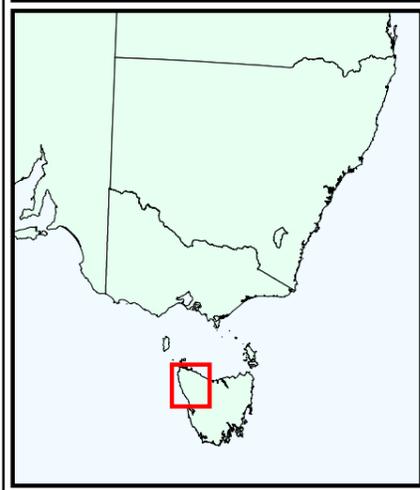
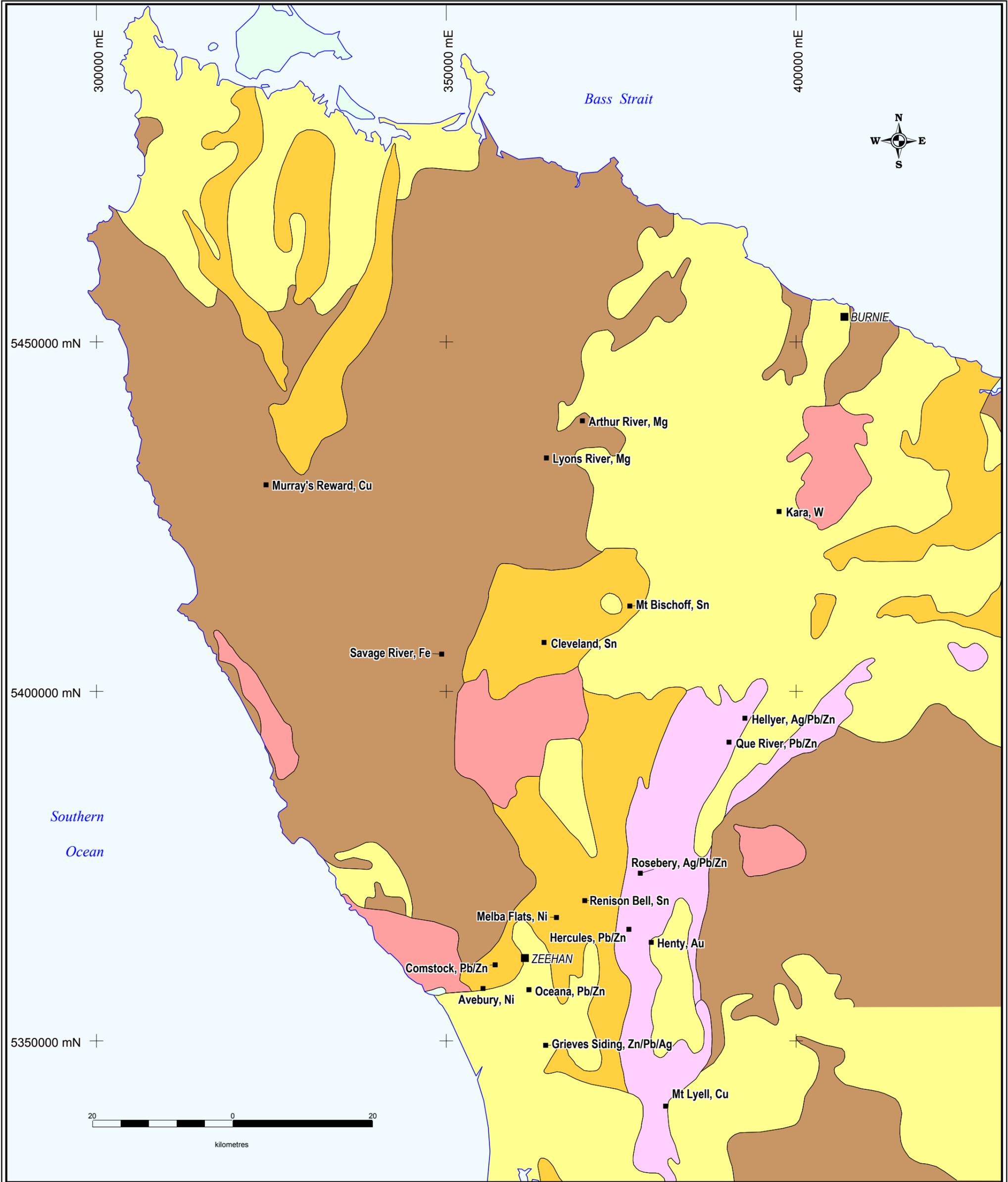
3] Geology

3.1] Regional Geology

The regional geology of West Tasmania is underpinned by initial rifting followed by arc-continent collision followed by tectonic emplacement of thrust slices (figure 2). Passive continental rifting occurred during the Late Pre-Cambrian to Early Cambrian times. This was followed by Early to Mid Cambrian arc-continent collision, subduction and ultramafics allochthon emplacement. Downwarping of the foreland produced the Dundas Trough, which comprised a sequence of siliciclastic sediments with some volcano-sedimentary derived sources. Coincident with the Dundas Trough sediments were the extrusive rocks belonging to the Mt Read Volcanics (MRV), the host sequence to Rosebery, Hellyer etc, which occur on the Trough's eastern margin and interfinger with the sequence. With the cessation of volcanism subsequent tectonism including tectonic emplacement, uplift, erosion and subsidence resulted the current Cambrian structural configuration and the deposition of platformal sediments of the Wurawina Supergroup, including carbonates, within fault controlled (half?) grabens in an overall deepening basin from Ordovician to Devonian times.

Mid Ordovician-aged carbonates of the Gordon Group are part of a state-wide sedimentary basin that had variable rates of subsidence, which produced localised lithological variations. These variations are attributable to the past manoeuvrings of the underlying Proterozoic and Cambrian basement along major, pre-existing fault lines. A small tectonic event the Benambran Orogeny is believed to have taken place immediately post-deposition of the Gordon Limestone and is marked by a disconformity.

The Mid to Late Devonian Tabberabberan Orogeny resulted in substantial deformation and metamorphism concomitant with the intrusion of mineral-rich granites. This deformation consisted of steep reverse faults and open NNW oriented folds. Some later cross cutting faulting has broken the sedimentary sequence into north-tilted blocks eg the E-W Little Henty Fault.



Geology Legend

	Post Cambrian Cover
	Devonian Granite
	Proterozoic
	Sediments
	Mt Read Volcanics

CAMBRIAN

 **Noranda Pacific Pty Limited**

Zeehan Carbonate Project

Regional Geology and Mineral Deposits
Western Tasmania

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Subsequent geology comprises minor Permo-Carboniferous sedimentation including glaciation, Jurassic dolerite sills and Tertiary basalt flows.

Associated with the Devonian deformation is the intrusion of the Heemskirk Granite, 8km west of Zeehan, with a suite of associated mineral deposits of mainly zinc-lead and tin lode types along with some skarn mineralisation.

3.2] Regional Metallogeny

The dominant style of mineralisation in West Tasmania is zinc-rich volcanogenic hosted massive sulphide (VHMS) although the area is characterised by a variety of mines and deposits. Current large scale operations include :-

Table 3 : Operating Mines in West Tasmania

Mine	Mineral Style	Commodity	Tonnages (pre-mining resources)
Mt Lyell	Volcanic hosted disseminated	Cu, Au	311Mt @ 0.97%Cu and 0.31g/t Au
Rosebery	Volcanic hosted massive sulphide (16 lenses)	Zn, Pb, Ag, Cu, Au	31.7Mt @ 0.58%Cu, 14.3%Zn, 4.4%Pb, 146g/t Ag & 2.3g/t Au
Renison Bell	Skarn	Sn	24.5Mt @ 1.41% Sn
Henty	Structurally controlled/vein	Au	1.82Mt @ 13.4g/t Au
Savage River	Massive magnetite	Fe	371Mt @ 31.9%Fe (plus more)

Table 4 : Other Zinc Resources in West Tasmania

Mine or Deposit	Mineral Style	Commodity	Tonnages (pre-mining resources)
Hellyer (closed 2000)	Volcanic hosted massive sulphide	Zn, Pb, Ag, Cu, Au	16.5Mt @ 0.4%Cu, 13.9%Zn, 7.2%Pb, 195g/t Ag & 3.3g/t Au
Que River (closed 1987)	Volcanic hosted massive sulphide	Zn, Pb, Ag, Cu, Au	3.3Mt @ 0.7% Cu, 7.4%Pb, 13.3%Zn, 172g/t Ag and 2.8g/t Au
Hercules (closed 2000)	Volcanic hosted massive sulphide	Zn, Pb, Ag, Cu, Au	3.33Mt @ 0.4%Cu, 17.3%Zn, 5.5%Pb, 171g/t Ag & 2.8g/t Au
Oceana (shut 1960)	Carbonate hosted	Zn, Pb, Ag	2.4Mt @ 9.3%Pb, 4%Zn and 58g/t Ag
Grieves	Carbonate hosted	Zn, Pb, Ag	~0.7Mt @ 8% Zn (inferred resource)
Sylvester	Skarn	Zn, Pb, Ag	6.1Mt @ 5.5% Zn
Comstock Field	S.Comstock and Allison's Lodes (replacement veins)	Zn, Pb, Ag	~1Mt @ 8% Zn (inferred resource)

The VHMS deposits are associated with the Mount Read Volcanics which underlie the Gordon Limestone acting as a pseudo-basement. The second most important age of mineral introduction is the Mid Devonian, which is

associated with the intrusion of granites linked to the Tabberabberan Orogeny. This latter phase tends to be tin dominant in the Zeehan area although there are strong suggestions that a major series of lead/zinc lodes/veins also formed at this time, hosted by a range of formations. These lodes provided for the 'Metal Rush' at Zeehan in the 1880's that led to the town having its own stock exchange. The primary metal being sought at that time was silver associated with the Pb/Zn veins.

The Zeehan carbonate sub-basin is host to a number of zinc mineral occurrences, a few small scale trial operations (Grieves and Mariposa) and one former mine at Oceana.

Age dates from lead isotopes on galena from Oceana and Grieves give a Cambrian age to the mineral suggesting that the base metal fluids were sourced from the underlying Dundas Trough (pseudo-basement).

The Oceana Lead Mine is hosted within sedimentary breccias, stratigraphically located in the middle/lower section of the Gordon Limestone. Some workers have equated Oceana's mineral style and geological setting with that for the Irish carbonate hosted base metal orebodies and based on the author's observation this is a very plausible model. Sulphide mineralisation at Oceana comprises galena and sphalerite in both crosscutting and bedding parallel zones, similar to Silvermines in Ireland.

Smaller scale stratabound zinc mineralisation occurs at Grieves (2 stratigraphic positions) and Mariposa, not necessarily at the same stratigraphic position.

3.3] EL 6/2001 Geology

Within the general Zeehan area the Dundas Trough units and the Eo-Cambrian rocks of the Oonah Formation (figure 3) surround the Ordovician-Devonian sedimentary basin. Ultramafic bodies with nickel mineral accumulations are included within the Cambrian rocks.

The geology of the Professor Creek EL consists of a faulted block of an open folded sedimentary sequence of siliciclastics and limestones that were continuously deposited in a sub-basin from Ordovician to Devonian times (figure 3). In the Zeehan area the Gordon Limestone was deposited in an unstable shelf environment, locally with increased amounts of argillaceous and arenaceous material and sub-aerial exposure. This carbonate sub-basin measures 17 by 12km and exhibits facies variations and facies thickness variations indicative of the former presence of syndepositional faults. This sub-basin is also distinguishable from other Gordon Limestone sub-basins in the state by the high level of Pb/Zn geochemical noise associated with it.

The overlying clastic sequences to the limestone comprise 1760m of siliciclastics that terminate in a thick sequence of deep water shales, the Bell Shale.

Three main stratigraphic positions host base metal mineralisation in the Gordon Limestone around Zeehan (figures 4, 5, & 6) :-

1. The Basal Contact (prospects include : Grieves and ?Mariposa)
2. Micritic and coarsely bioclastic, dolomitic limestone/synsedimentary breccias beneath the argillaceous Siltstone Unit in the middle of the Limestone (Grieves, Myrtle, Oceana, ?Mariposa)
3. Dolomitised limestone at the Upper Contact (Mariposa). Possibly the base of this unit could be a target cf Lisheen, Galmoey etc in Ireland.

Table 5 : Zinc Resource Figures for the Gordon Limestone, Zeehan

Prospect	Tonnage Mt	Zn Grade %	Comments
Oceana			
Pasminco	3.05	2.9	>1 zone
ARIMCO	2.45	4.0	>1 zone
Grieves			
Primary Zone	0.65 to 0.75	7 to 9	Potentially difficult mineralogy
Secondary Zone	0.15 to 0.2	4 to 5	
Myrtle	0.53	2.14	3 zones of surface mineral (sulphide)
With High Grade	0.29	3.42	

Highly anomalous and relatively coherent bedrock geochemistry (aircore EOH and wacker), often in excess of 0.5% Zn, is recorded in several areas.

Siderite occurs within the limestone as a sub-regional feature of varying intensity at the lower sandstone/limestone contact eg Grieves and Sunny Corner. It is also locally associated with high levels of zinc mineralisation at the base of the limestone, in the middle of the limestone sequence (South Grieves) and localised in the Upper Dolomite Unit (Firewood Siding). The residual magnetic data from CRAE's helimag survey also shows some large coherent areas of enhanced response within the limestone eg Grieves and King Billy and this is attributed to a major but subtle siderite/ferroan dolomite alteration related to a hydrothermal mineralising system(s).

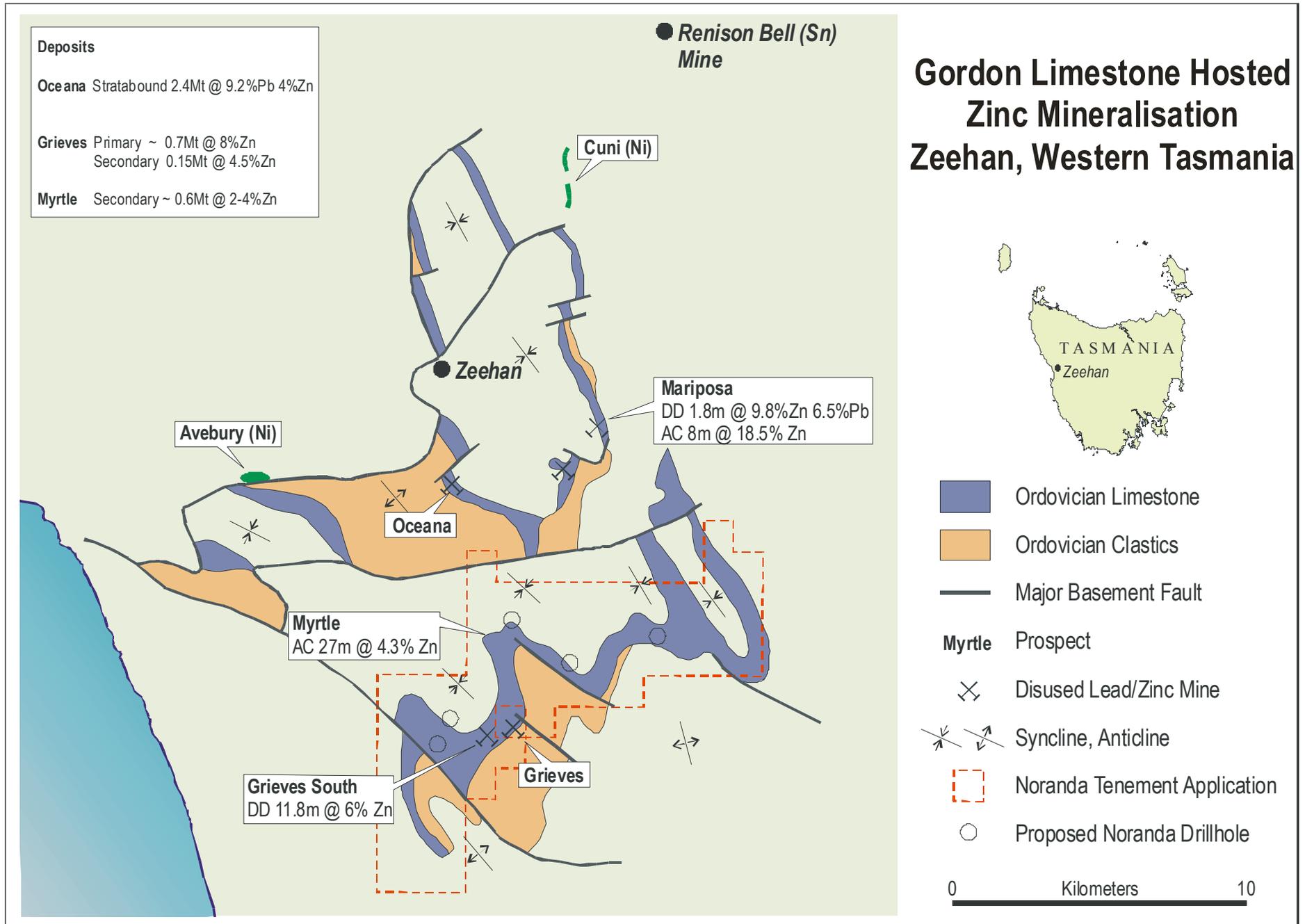
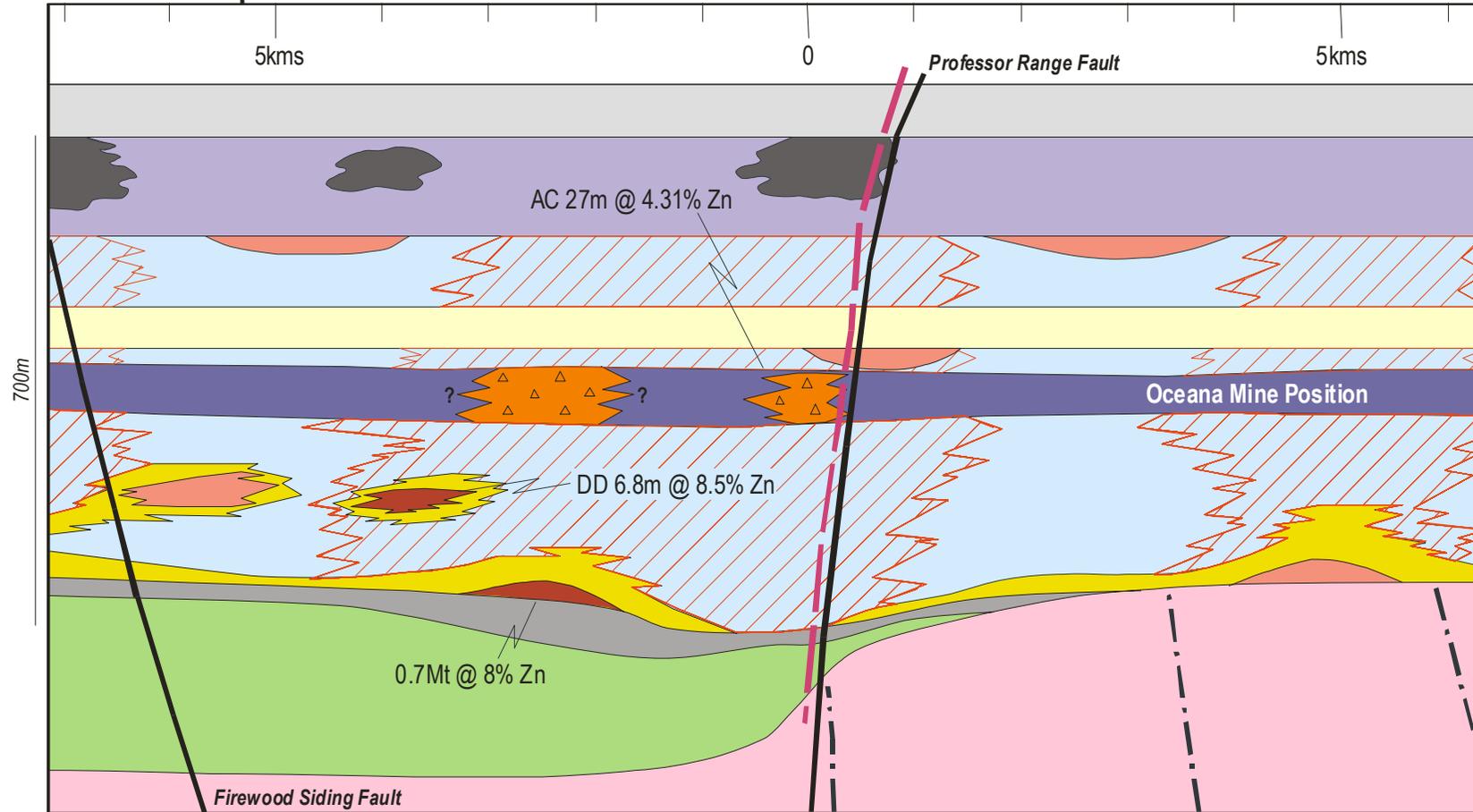


Figure 4

Schematic Representation of Mineralisation in the Southern Section of the Gordon Limestone at Zeehan



Firewood Siding Baura S. Grievess Grievess Myrtle Professor Range King Billy

- | | | | |
|--|----------------------------------|------------|-------------------------|
| Devonian remobilised carbonate-sulphide vein | Siderite alteration | Silurian | Crotty Quartzite |
| Irregular low-grade Zn in dolomite | Hydrothermal dolomite alteration | | Upper Dolomite Unit |
| Basement Structure | Sulphide mineralisation | Ordovician | Limestone |
| Fault | Possible Sulphide mineralisation | | Siltstone |
| Syndimentary Breccia | | | Middle Dolomite Unit |
| | | | Moina Sandstone |
| | | | Conglomerate |
| | | Cambrian | Sediments and volcanics |



Figure 5

Schematic Representation of Mineralisation in the Northern Section of the Gordon Limestone at Zeehan

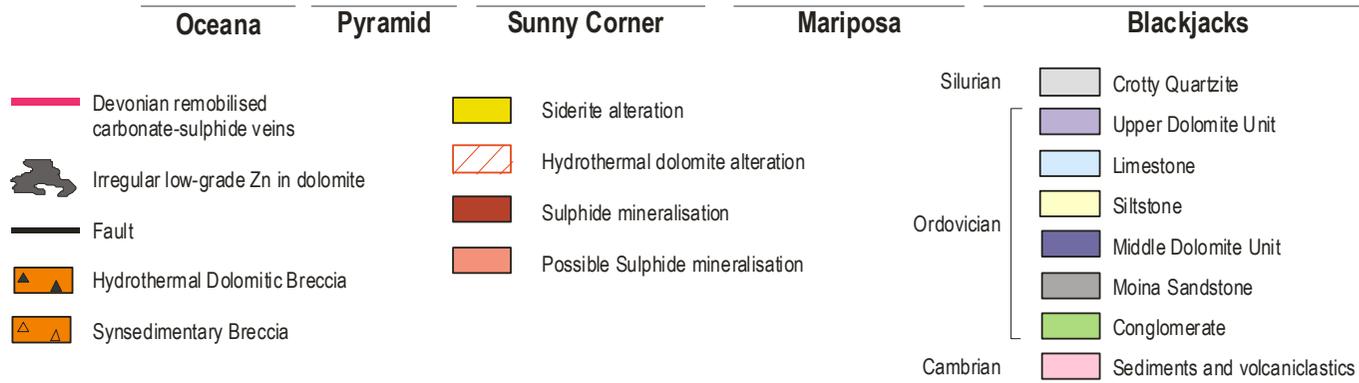
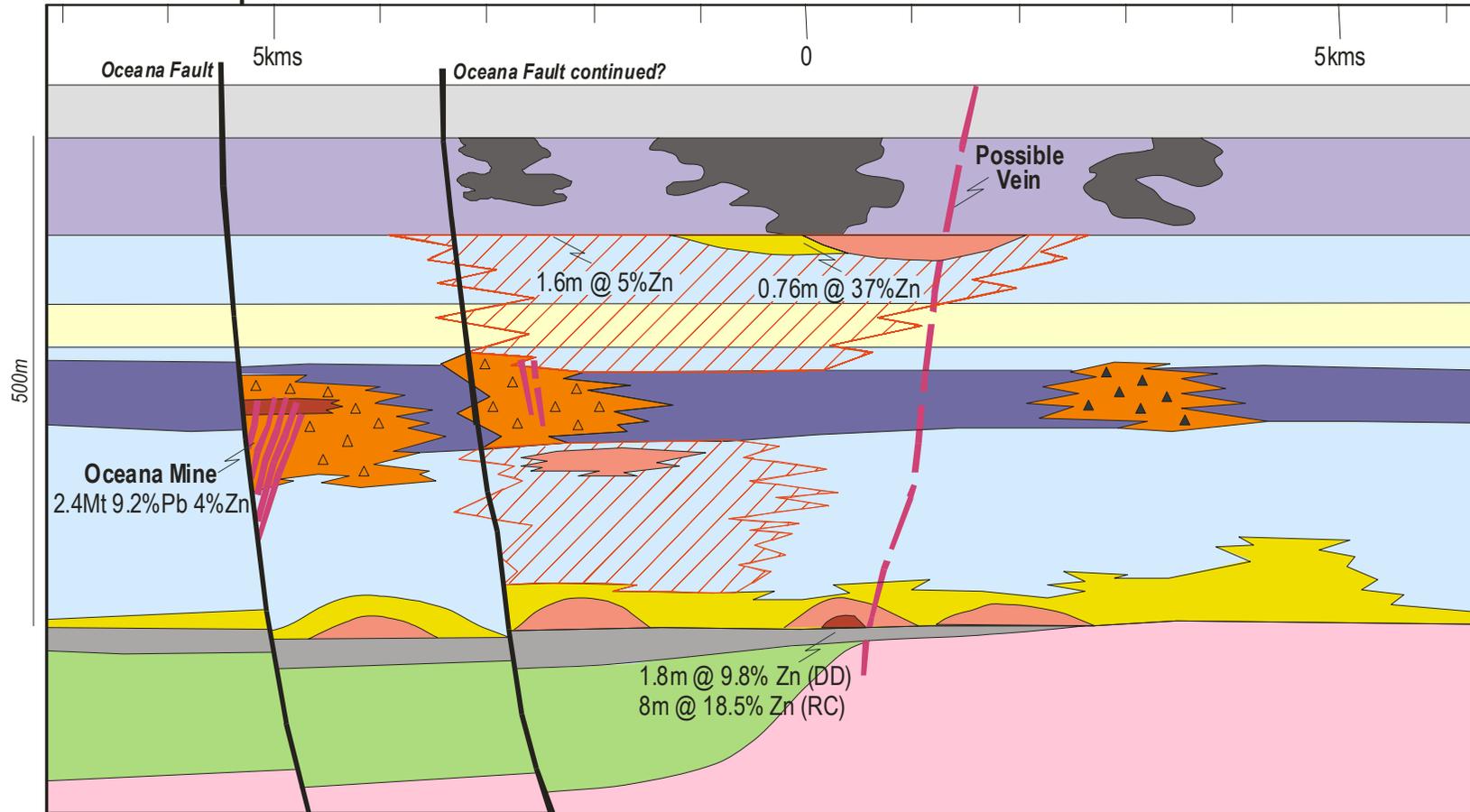


Figure 6

3.3.1] Stratigraphy

The licence area comprises a conformable Ordovician to Devonian sedimentary sequence unconformably overlying Cambrian basement.

3.3.1.1] Cambrian

Interbedded sandstones and siltstones make up this sequence although the magnetic data shows that there are discrete magnetic features likely to be dolerite dykes and perhaps mafic volcanics. These clastic units generally form topographic highs.

3.3.1.2] Ordovician Owen Conglomerate

This unit comprises a variably thick (0-1000m) coarse conglomerate to fine sandstone generally strongly silicified and often pink in colour. It forms distinct peaks in the general area and within the actual licence at Professor Range.

3.3.1.3] Ordovician Moina Sandstone

The sandstone is a relatively thin unit (<100m) with variable thickness and presence. It is a white fine to medium grained well bedded sandstone, prone to friable weathering, with distinctive scolithes trace fossils. It is believed to be a littoral sequence at the base of the Gordon Limestone with some interdigitation with the limestone, particularly to the north of the Zeehan sub-basin.

3.3.1.4] Ordovician Gordon Limestone

The average thickness of the limestone is believed to be about 700m but thickness variations are known to occur eg the third order basins at Myrtle and King Billy. Generally the limestone is a mixture of clean calcsiltite/calcilutite with argillaceous calcsiltite/calcarenite, all deposited in a shallow water environment possibly in a sabkha setting. Past workers (Burrett and Ellis) have identified distinct lithotypes for logging/basin interpreting purposes. This involved recognising depositional environments and depth of water during deposition. A range of environments are noted from supratidal to subtidal; from tidal flats to lagoons to open platform. Distinctive laminated units periodically occur and these represent shallowing intratidal sequences. As defined by Burrett 1995, these cryptoalgal laminites are part of a punctuated aggradational cycle or PAC. A collection of 15 to 18 of these PAC's represent a marker unit that has been given the informal name of the Myrtle Formation. This is a very useful marker unit when logging the limestones as it provides an estimate of depth to the basal target zone. A second marker unit is the Siltstone Unit (see below).

Other distinctive facies include local abundances of synsedimentary breccias coarse bioclastic debris units and equigranular calcarenite bands with the last lithotype not to be used as markers except very locally. It is interesting that

from examination of some cores from the Oceana deposit that the Myrtle Formation appears to be absent although in its stratigraphic place there is a substantial thickness (circa 300m) of syn-sedimentary breccia cycles that happen to number fifteen.

3.3.1.4.1] Basal Sequence

This is a complicated sequence of lithotypes that occurs within the last 50-70m of the base of the limestone. Essentially it comprises a thick (10-25m) equigranular calcarenite (previously known as the Oolite Unit) underlain by a series of argillaceous bioclastic calcarenites and calcsiltites. Pervasive hydrothermal dolomitisation and sideritisation, signifying a halo to ore, strongly impinges locally on this sequence. Subsequent Mesozoic to Quaternary weathering phases have often produced in drillcore a series of black clays, ferruginous clays and white clays. It is possible that where the clays have developed substantial amounts of calcitic material may have been dissolved out leaving behind the residual clays.

This Basal Sequence hosts the mineralisation at Grieves.

3.3.1.4.2] Siltstone Unit (Lords Siltstone)

This is generally a non-calcic fine grained argillaceous siliciclastic that marks a major break in the sedimentological regime not only in the Zeehan sub-basin but also throughout the whole Gordon Limestone basin. It can be very variable in its clastic nature which can include conglomerates. It is often underlain by a coarse bioclastic calcarenite to calcirudite unit which can locally be hydrothermally dolomitised.

This unit appears to host the main sulphide accumulation at Myrtle

3.3.1.4.3] Upper Dolomite Unit

Throughout the Zeehan sub-basin a top portion of the Gordon Limestone is universally dolomitic. This dolomitisation is an overprint on pre-existing limestones and is characteristic by being vuggy. The top of the dolomite unit is usually represented by a black clay zone which can range in thickness from 5 to 30m. This clay is thought to be weathered dolomitised limestone caused by water flow through the overlying porous Crotty Quartzite. Progressing down sequence this vuggy dolomite gives way to a similar pervasive dolomite but without the vugs. This suggests that there may have been two phases of dolomitisation, either a diagenetic reflux dolomite followed by hydrothermal fluid introduction or two phases of hydrothermal fluid introduction corresponding to the Ordovician Benambran Orogeny and the Devonian Tabberabberan Orogeny.

At Firewood Siding this Upper Dolomite Unit has undergone localised intense siderite alteration which may be either the result of hydrothermal fluid flow or possibly the oxidation of pyrite due to surface processes. In any case zincian siderite/clays (0.38% Zn over 10m from diamond drillcore, 22m @1.46% Zn &

0.5% Pb from aircore drilling) in this stratigraphic position are a rarity in the Zeehan sub-basin and makes the Firewood Siding feature worthy of note. These intercepts also lie within the weathered zone and may have been leached of zinc.

3.3.1.5] Silurian Crotty Quartzite

The quartzite consists of a series (490m) of massive to thinly bedded, white, medium to coarse grained friable sandstones interspersed with finer grained white to light grey siltstones. It is thought to be disconformable with the underlying limestones and may be an effect of the Benambran Orogeny. No conclusive evidence of a disconformity was observed by the author.

From the helimag data and air photo interpretation there are areas within the quartzite of major facies changes. This can be used to infer the past presence of syndepositional faulting post limestone deposition that may have been related to syndiagenetic mineralising fluids.

3.3.1.6] Siluro-Devonian Clastic Sequence

The overlying sequence to the Crotty Quartzite comprises the Amber Slate (240m), Keel Quartzite (120m), Austral Creek Siltstone, Florence Quartzite (490m) and the Bell Shale (420m). This is a series of fining up siliciclastics (due to basin deepening) that ultimately terminated with the deep basinal mudstones of the Bell Shale.

No intrusives/dykes or tuff bands have been observed in the area within the Gordon Limestone

3.3.2] Structure

The Zeehan sub-basin has been broken into two sub-blocks, a northern and southern one, with the latter held under licence by Noranda. The Little Henty Fault borders this block in the North with the downthrow on the south side. It is uncertain if the steep-angled fault has normal or reverse movement. Open folding with a gently plunging fold axis to the NW characterises the folding within the licence. Whilst faulting is dominated by NW structures some of which appear to have a basement relationship. These structures eg the Firewood Siding Fault and the Professor Range Fault, seem to divide the block in sub-blocks and appear to be spaced at 5km intervals.

Structural complexities occur where fold hinges are proximal to major structure propagation. This is apparent at Myrtle and Grieves.

3.3.3] Mineral Occurrences

The Grieves deposit is the subject of a 1km² Retention Licence and hence details of recent work (1995-6) are not on open file. Mineralisation comprises sphalerite and minor galena that has been partially oxidised to zinc oxides and silicates to a depth of 100 to 200m. This mineralisation has seemingly replaced a mixed argillaceous and equigranular calcarenite unit, with siderite and dolomite alteration phases in association with the mineralisation.

Other mineral occurrences within the EL are included below :-

1] South Grieves : Middle Target Zone intercepts (generally <20m vertical depth)

ZWG1 11.8m @ 6% Zn including 6.8m @ 8.5% Zn (1.59% Pb)
ZWG22 0.8m @ 17.5% Zn (1.49% Pb)
ZWG26 1.9m @ 7.3% Zn (0.95% Pb)
ZWG26 1.0m @ 6.9% Zn (0.84% Pb)

And at 300m vertical depth

ZG1007 17.8m @ 2.95% Zn inc a high grade zone of 6m @ 5.4% Zn mineralisation consists of sphalerite, zincian siderite and willemite

The above two zones are thought to be equivalent and possibly the same as the Oceana Mine position.

2] Myrtle : Middle Zone

The Middle Zone mineralisation at Myrtle is at a slightly higher stratigraphic position than Grieves, being associated with a dolomitised unit underneath the non-calcareous argillaceous Siltstone Unit. The CRAE aircore drilling defined three zones of zinc accumulation with the main zone being the eastern one as exemplified by the first three diamond drillhole intercepts listed below with the fourth intercept from the western zone

ZM1008 3.0m @ 6.7% Zn (<0.1% Pb) from 24m
ZM1008 6.0m @ 4.3% Zn (2.9% Pb) from 56.4m
ZWM18 7.1m @ 2.4% Zn (<0.1% Pb) from 6.85m
DD94ZM185 0.6m @ 14.9% Zn (<0.1% Pb) from 74.8m

Best aircore results for Myrtle from seemingly the same stratigraphic position as ZM1008 (the eastern zone) remain not fully explained.

ZM18 36m @ 4.31% Zn as sphalerite only
ZM87 9m @ 7.86% Zn

3] Baura : Upper Contact

Best intercept DD95ZG402 2.5m @ 3% Zn and 4%Pb

4] Firewood Siding : Upper Contact with 2 zones stratigraphically 50m apart

Best diamond drilling :-

DD95ZF37 10m @ 0.38%Zn and 0.11%Pb from 36m

Best aircore drilling :-

AC94ZF30 22m @1.46% Zn & 0.5% Pb from 12m

AC94ZF29 9m @ 1.94%Zn & 0.27%Pb from 14m

5] Professor Range : Upper Contact

A collection of old workings (source MRT mapping)

6] King Billy : Basal Contact

A collection of old workings (source MRT mapping) at the western end of King Billy.

Paragenetic studies by Paul Ashley of UNE (old CRAE report) concluded the following order of alteration and mineralisation (oldest first) :-

1. Pervasive dolomite alteration precedes fracturing : is this reflux dolomitisation or hydrothermal, the latter is preferred as there is some mention of the dolomite being iron-rich.
2. Intense alteration with iron carbonate replacement; zincian siderite as a product.
3. A sulphide stage replacing ferroan carbonate, mainly sphalerite and galena, but occasionally with marcasite and trace chalcopyrite and tetrahedrite.
4. Sparry carbonate as void space infill.

Parts of this paragenesis story bears a strong resemblance to the Irish style carbonate hosted base metal deposits in particular the pre-sulphide intense iron carbonate phase ie the black matrix breccias at Lisheen, Silvermines and Galmoy.

The presence of hydrocarbons were noted in P. Ashley's report. There is a strong belief by some oil explorationists that the Gordon Limestone could be

the source of oil for many of the oil seeps observed in mainland Tasmania. In some sediment hosted base metal orebodies there is evidence for the involvement of hydrocarbons in the precipitation process of the sphalerite.

One of the important observations for the Gordon Limestone hosted mineral occurrences in the Zeehan area is the presence of an abundance of zincian siderite in conjunction with sphalerite. This zincian siderite may be the result of oxidation in cold alkaline conditions of pre-existing pyrite and sphalerite accumulations or alternatively it could imply a lack of sulphur in the system. Burrett made one or two observations of calcite pseudomorphing gypsum within the intertidal to supratidal sequences but otherwise there appears to be no obvious sulphur source apart from seawater sulphate. Pyrite is a rare occurrence within the limestones. Locating a good sulphur source ie pyritic sediments or sabkha related gypsum-rich lithologies within the sequence may assist the ore search eg Myrtle and Baura.

4] Work Completed During Current Reporting Period

Despite the abundance of past exploration, opportunities still exist in the Gordon Limestone around Zeehan. Exploration in carbonate terrains is very difficult and after drilling the obvious geochemical anomalies requires a lot of geological driven thought in the search for ore. In Ireland nearly 20 years passed between the discovery of Navan and Lisheen.

Exploration problems for the Gordon Limestone in the Zeehan area are :-

- Minimal limestone outcrop
- Abundant and difficult to explain geochemical noise
- Complicated localised geological structure and stratigraphy not fully appreciated by previous workers
- The target is a sphalerite-dominant body and not easily receptive to geophysical detection.
- Complicated weathering overprint that has produced zinc oxides, silicates and carbonates, possibly to considerable depths.
- Lack of coherent maps, at suitable scales, providing a comprehensive sub-basin picture

The exploration leverage for Noranda comes from :-

- Advanced level of knowledge for the area
- Previous workers abandoned ship early without fully interpreting all the data. A lot of information was collected but was not assimilated into the targeting process e.g. basin analysis, helimag survey, geochemical processing etc.
- A new detailed geological map is available
- A coordinated multidisciplinary interpretation and target assessment has generated drill targets

As part of this process Noranda completed the following work for EL 6/2001 :-

- Reinterpretation of the EZ gravity data
- Reinterpretation of CRAE's 1995 helimag survey
- Digital data capture of surface geochemistry
- Construction of a new digital geology map for the licence
- Diamond drilling : 3 holes for 879m

4.1] Geophysical Data Reprocessing

4.1.1] Gravity data

A detailed gravity survey completed by EZ in the 1980's covered only the western half of the Gordon Limestone within tenement EL 6/2001. The reprocessing work was completed by GeoDiscovery (a consultancy group based in Brisbane) on data supplied by Mineral Resource of Tasmania and included a new image (figure 7) as well as modeling of the two main anomalies (see appendix 4). This reprocessing subtly enhanced the work completed by CRAE (Tear 1995) with the new salient points being :-

- 2 small but significant stratabound anomalies at the Myrtle and Baura prospects. Strike length for the Myrtle anomaly is 800m whilst for the Baura feature the strike length is 1km. Modelling of the data showed dips of 45° in dip directions compatible with the anomalies being stratabound. Both features are earmarked for future drilling.
- A small circular feature, 350m in diameter, at Firewood Siding. The explanation for the feature is unknown but may be related to its proximity to the major basin controlling Firewood Siding Fault, a possible anticlinal hinge in the limestone and the occurrence of hydrothermal silicic breccias in the immediate vicinity.
- A distinct lithological break occurs between the lower third of the Gordon Limestone and the overlying two thirds, stretching from Myrtle south to Firewood Siding. This is attributed to the occurrence of more widespread hydrothermal dolomitisation in the upper two thirds of the limestone giving a higher average density. Positive distortions within either of the two divisions would represent a denser body, possibly sulphide accumulation. Examples of this would be the small highs at Baura and Myrtle as discussed above and the small high at Grieves.
- A large lithology related feature that was the subject of CRAE drillhole ZM189 (702m deep) at Myrtle south. This possibly represents a thicker than normal limestone sequence in combination with a flatter dip. Thus

allowing for the inference of a synsedimentary structure in close proximity to this local sequence either at the south end at Grieves or at the northern end at Myrtle – the Professor Range Fault.

An increase in the gravity tenor occurs at the south west extremity of the Gordon Limestone at Rose Valley. This area has always been neglected by past exploration and suffers from a lack of data to confirm the presence of the limestone and any significant geochemical anomalies. The gravity feature remains unexplained but it is significant that it lies proximal to a possible revised fault trace for the major Firewood Siding Fault.

4.1.2] Airborne Magnetic Data

GeoDiscovery (a consultancy group based in Brisbane) completed this work on data supplied by Mineral Resources of Tasmania and includes reprocessed images (figures 8-11) as well as modeling of several anomalies (see appendix 4). A series of images were generated including TMI, 1VD, residual magnetics and automatic gain control.

The processing methods used are detailed in appendix 4

The salient points for each processed map are listed below :-

TMI Image (figure 8)

- A general trend occurs from a high in the SW of the area (Rose Valley) decreasing to the NE.
- A major break in the gradient occurs as at Myrtle and is attributable to a NNW structure between Professor Range and Myrtle
- A second possible major break is a NW feature occurring at King Billy.
- At Amber Creek/King Billy the 1.5km long N-S strong anomaly, mentioned in past reports, is clearly hosted by Cambrian rocks.
- An arcuate anomalous feature at King Billy corresponds to the basal section of the Gordon Limestone implying a stratabound feature possibly a strong siderite alteration zone. It is an order of magnitude lower than the N-S feature mentioned above. Close inspection suggests that there is a measure of complexity associated with the anomaly.
- Bedding traces for various formations and sub-formations can be seen.
- A stratabound lower amplitude zone occurs at Firewood Siding/Baura in supposedly Lower Ordovician clastics. This is out of character for the rest of the image but perhaps is due to a more coherent and thicker Moina Sandstone unit unless it signifies an alteration effect.

1VD Image (figure 9)

- This image greatly enhances the mapping capability as the limestone beds represent weak magnetic highs and the more argillaceous beds are relative lows; the Siltstone Unit and the limestone-surrounding clastic packages are very distinctive lows. This phenomena of 'magnetic limestones' may be due to the weak magnetism associated with siderite alteration and possibly (ferroan?) dolomitisation, both related to mineral fluid introduction.
- The siderite alteration associated with the basal limestone contact is mappable.
- A moderate amplitude, discrete 1.5km long magnetic anomaly occurs at the base of the limestone sequence at the western end of the King Billy prospect (figure 10). This is believed to be related to weakly magnetic siderite alteration, which is known to help characterise the zinc mineralisation at Grieves and Oceana. Modelling of the feature showed a dip of 45° to the NNE, which is compatible with the anomaly being stratabound.
- A deep magnetic low is located within the main part of King Billy and is probably due to deeper than normal weathering. On subsequent drilling it is believed that the low is due to excessive weathering of the hydrothermal limestone breccias (see drilling section)
- Some major N-S anomalies of limited strike length occur west of King Billy at the Amber Creek prospect both within the limestone and within the Cambrian sediments. CRAE briefly tested the major anomaly with some surface geochemistry concluding that the anomaly was a mafic feature possibly a dolerite dyke. It would be interesting to note if these Cambrian rocks are of similar age to those that host the Melba Flats nickel deposits or to those rocks that contain the Avebury Nickel deposit.
- A distinctively anomalous wedge-shaped sediment sub-unit is delineated in the Crotty Quartzite at Baura. This is inferred to represent the presence of a syndepositional fault acting after the limestone deposition. This fault appears traceable in the data and cuts through the gravity anomaly at Baura coincident with weakly anomalous bedrock geochemistry (1000-2000ppm Zn+Pb and unconfirmed memories of massive pyrite in the wacker sampling).
- The Upper Dolomite Unit shows up as a relatively strong magnetic high which is attributed to iron-rich carbonate alteration probably of hydrothermal origin.

- The magnetic patterns are diffuse in the Rose Valley area south of 5346500N with no geological/geochemical validation of the magnetic features available.

Residual Magnetism Image (figure 11)

- A distinct zone of residual magnetic anomalism is associated with the limestone in the Myrtle-Grievess-Baura area. This is attributed to the flow of hydrothermal fluids which produced the dolomitisation referred to in the gravity data deductions. There appears to be some zoning in alteration strength with the greatest intensity proximal to the base metal occurrences and basement structure located at the Myrtle prospect.
- A similar zone of residual magnetic anomalism occurs at the western end of the King Billy prospect, on a slightly smaller areal scale, but it does transect all the stratigraphy including the overlying clastics. It is assumed that the cause of this anomalism is the result of the passage of hydrothermal fluids, resulting in increased amounts of dolomitisation and sideritisation. This feature is spatially linked to the discrete anomaly identified in the detailed 1VD image (see above).
- At Firewood Siding the inferred alteration is of a lower magnetic order either side of the Firewood Siding Fault. It may be that the destructive phase 3 of P Ashley's paragenetic story has reduced the effect of the iron carbonate alteration implying stronger development potential for zinc mineralisation.

Automatic Gain Control Image (figure 12)

This image helps with the mapping by reducing the overshadowing effect of more strongly anomalous units.

- Major structural breaks are noted in the following areas :-
 - A NW structural break at Myrtle
 - A NNW structural break also at Myrtle
 - A NNW fundamental structural break between Amber Creek and Professor Range. This feature has not been observed before. There is a major difference in the limestone pattern either side of the inferred trace with the supposition that the substantial dolomite effect observed west of the line is dramatically reduced east of it. The limestone and overlying sequences appear unfaulted going across the inferred structural line.
- Major basement breaks are a major component to the Irish model with base metal mineralisation/anomalism related to inferred major basin-controlling faults. The main breaks from the AGC image occur at the boundary between the Amber Creek and the Professor Range

prospects and at the boundary between the Professor Range and Myrtle prospects. This interpretation has been used to raise the potential profile of the Professor Range area.

- Zones of discontinuity in the limestone occur at Baura, Firewood Siding and Myrtle. There seems to be some form of thrust repetition of the limestone sequence at Baura.

4.2] Data Compilation

4.2.1] Geochemical Compilation

Data capture was completed for all surface bedrock geochemical sampling either as wacker samples or aircore end-of-hole samples. No surface stream sediment data or rock sampling was incorporated. In addition downhole aircore data was collated for King Billy, Professor Range, Myrtle, Firewood Siding and Grieves.

The bedrock data was reinterpreted using a technique of additive indices (A.I.). This involves normalizing data for Pb and Zn and then adding the values together viz.

$$\text{A.I. for a sample} = \frac{(\log X_{\text{zn}} - \log \text{mean} X_{\text{zn}})}{\log s.d. X_{\text{zn}}} + \frac{(\log X_{\text{pb}} - \log \text{mean} X_{\text{pb}})}{\log s.d. X_{\text{pb}}}$$

The results of this work highlight significantly anomalous Pb/Zn zones at :-

- Firewood Siding – top contact of the limestone
- Grieves – Basal contact, sporadic over 3km of strike length.
- King Billy – lower one third of the limestone including the basal contact

The latter zone recorded relatively higher lead values.

Smaller anomalous zones are noted at :

- Myrtle – broad area 1km long with incoherent anomalism
- South Grieves – small discrete zone but drilling failed to explain/confirm at depth
- South Grieves/Baura – widely spaced values associated with the top one third of the limestone
- Professor Range - patchy values associated with the top one third of the limestone

Fe, Mg and Ca assays were used for delineating siderite and dolomite distribution.

The main, broad zones of anomalism at Firewood Siding, Myrtle, Professor Range and King Billy appear related to major NW striking basement faults.

4.2.2] Geological Interpretation

Following the geophysical and geochemical reprocessing a new geological map was constructed (figure 13). This map aimed to accentuate the subtle lithological variations within the limestone, provide a better definition of the fault patterns and assist with the basin analysis. New geological interpretations are as follows :-

- There appears to be a major subdivision within the limestone at approximately half way up its stratigraphy. The upper section contains a substantial amount of dolomitisation as well as some marked changes in the sedimentological regime ie indications of a major break in sedimentation. The implication being that major syndepositional faulting occurred at this point in time, possibly allowing deeply generated mineral fluids access to sites for potential ore precipitation within the lower half of the limestone eg Grieves and South Grieves (and Oceana?). Variations in the uniformity of the thickness of this unit may help to infer possible ore sites.

From the magnetic and multi element geochemical data it is possible to identify four stratigraphic positions for dolomitisation. For an explanation of the relevance of dolomitisation the reader is referred to a paper by Shearley et al (1996) on the Lisheen deposit in Ireland where there are six delineated phases of dolomite of which only 3 are related to ore formation.

Upper Dolomite Unit

This comprises a vuggy dolomite possibly overprinting a pre-existing pervasive dolomitisation. It is universal in the Noranda tenement although its thickness appears to be greater in the Baura area although this may be due to flatter bed dips. One or both of the dolomite phases is believed to be hydrothermal in origin as there is abundant Pb/Zn geochemical noise associated with it. In an Irish setting a potential target for Pb/Zn ore would be towards the base of the dolomite at its contact with the underlying limestone, similar to Lisheen.

This unit occurs beneath the Siltstone Unit generally throughout the whole licence and is believed to be a weakly dolomitised unit as most drillcore intersected in this position shows some reaction with cold, dilute hydrochloric acid. The exception is at Grieves where there is a strongly dolomitised, coarse, bioclastic calcirudite beneath the Siltstone Unit. This pervasive dolomitisation could be related to an introduction of

hydrothermal fluids associated with the sedimentological break implied by the presence of the Siltstone Unit or one of the two later orogenies. The Siltstone Unit may have acted as a capping unit to the hydrothermal mineral fluid flow, with the porous coarse bioclastic unit as a favourable host.

Dolomite no. 3

This unit has limited areal extent confined to King Billy West and Grieves-Baura-Firewood Siding. The stratigraphic position would appear to be similar to that for Oceana towards the base of the limestone. This dolomite may be an indicator of an orebody halo as defined by the exploration model.

Basal Dolomite

Towards the base of the limestone sequence is the occurrence of a substantially thick equigranular calcarenite (previous authors referred to it as the Oolite Unit). At Grieves this unit is hydrothermally dolomitised forming a halo to ore grade mineral. This dolomite is ferroan and has a magnetic signature in close proximity to ore.

From the above it is possible to conclude that dolomitisation in the lower half of the limestone sequence may have a more direct relation to ore, forming part of an orebody halo. The sub-regional to regional dolomitisation of the upper half may be a combination of hydrothermal and reflux dolomite or 2 phases of hydrothermal alteration, one associated with spent mineral fluids. Locating distortions in the uniformity of the dolomitised units may assist the ore search.

- From the magnetic data it is possible to distinguish more argillaceous units within the lower half of the limestone and thus possible trap sites for ore fluids in close proximity to clean, porous host rocks.
- At Firewood Siding close to the main Firewood Siding Fault, the small circular gravity feature coincides with a series of silicic breccia mounds. These breccias appear to be hydrothermal although in some instances they take on the appearance of the Moina Sandstone. It is possible that they are the result of re-cementation of talus material from the surrounding hills although none of the clasts are pink ie Owen Conglomerate derived which would be expected. Alternatively they may be Crotty Quartzite derived re-cemented material although it would have to be atypical sandstone lithologies if from the Crotty. Some of these breccia mounds have an elongate strike partially parallel to the main fault and sometimes parallel to the lithological strike. It is inferred that they are hydrothermal related and are linked to the faulting, with some of the breccias reaching out into favourably replaced stratigraphy. These breccias might be likened to the precursor black matrix breccias in the Irish Waulsortian Reef hosted deposits. Extensive weathering of the area is likely to have leached lead,

zinc, calcium and magnesium from these breccias and thus no surface geochemical signature would be seen.

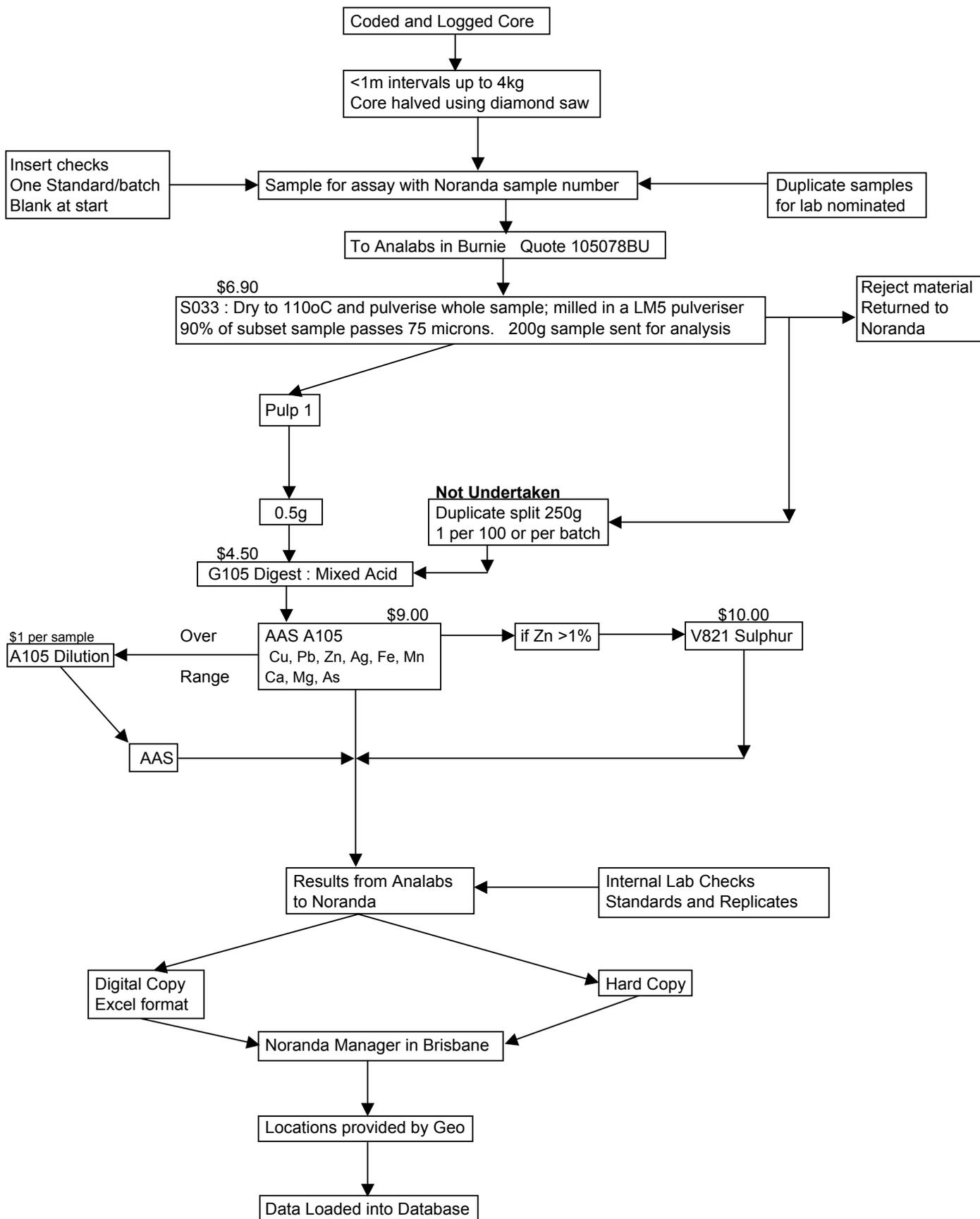
- Several zones of structural dislocation are delineated by the magnetic data in particular at Baura and Myrtle. Both areas are closely linked to major NW structures and associated with second order hinge zones.
- A distinctive unit in the Crotty Quartzite (see elsewhere)
- The Owen Conglomerate occurs on the west side of the major Amber Creek/Professor Range structural break (helimag AGC data) but is completely absent from the eastern side. This adds to the evidence for a major pre-Gordon Limestone basin controlling syndepositional fault. This structure and a parallel one passing through Myrtle may be regarded as part of single fault system that shows reactivation along a possible transfer fault – the Professor Range Fault.

4.3] Diamond Drilling

Diamond Drilling of Tasmania Pty Ltd completed the drilling using a UDR 650 track mounted rig, with HQ/NQ triple tube rods. A skid mounted rod sloop towed by a tracked mounted excavator accompanied the drillrig. A small tracked vehicle, a bombardier, was used for support.

Drill logs and assay results are included in appendix 5. Figure 14 shows the sample flowsheet with the analysis conducted by Analabs in Burnie, Tasmania.

Noranda Pacific Drillhole Sampling Flowsheet Zeehan Carbonate 2001



G105 : Multi-acid Total digest : HF, HClO₄, HCl, HNO₃

S.J.Tear September 2001

Figure 14

4.3.1] King Billy Prospect

The King Billy prospect lies in the east of EL 6/2001 and is accessed by the Queenstown road (Lyell Highway). Listed below are the target criteria for the prospect.

Table 6 :Target details for the King Billy Prospect (Figure 15)

<ul style="list-style-type: none"> • Potential basement-related structural breaks occur in the western part of the prospect. • Anomalous bedrock zinc geochemistry (to 0.7%) is recorded in the same area within the Lower Gordon Limestone. Relatively higher levels of anomalous lead (including galena in aircore down-the-hole samples) are associated with this zinc geochemistry. Interpretation of downhole aircore results indicates a substantial lead/zinc anomalous zone (to 1.5%Zn and 1.5%Pb) that appears parallel to the dip of the rocks in the area. • Larger than normal alteration zones of siderite and dolomite are identified from aircore end-of-hole drilling near the lower contact in the same area. • A major residual magnetic anomaly occurs in this same western area and is inferred to represent a subtle alteration zone related to a hydrothermal fluids from a mineralising system, a similar anomalous pattern to that seen in the Grieves area. • A discrete, stratabound magnetic feature (thought to be siderite) coincides with the potential ore hosting Basal Zone

Collar details of drillholes for the prospect are included below :-

Table 7 : King Billy Drillhole Collar Details

Hole	AMGE	AMGN	Azim	Dip	Depth	Comment
ZC01-001	370417	5352005	222	45	350.5	Intersected a 100m zone of hydrothermal breccias
ZC01-002	369701	5352021	241	45	155.0	Intersected barren siderite alteration in the weathered zone
				Total	505.5m	

ZC01-001 (Figure 16)

This hole aimed to test down dip a substantial and coherent downhole aircore anomaly in residual black clays. The aircore drilling was completed by CRAE and defined an 80m thick gently dipping zone of lead and zinc geochemical values up to 1.5%Zn and 1.5%Pb with associated enriched iron (siderite) values. The target's stratigraphic position was believed similar to that for the main stratabound mineralisation at the Oceana deposit.

After the obligatory black clays the drillhole intersected heavily weathered red matrix limestone (dolomitic?) breccias with corresponding poor core recovery intermixed/interbedded with limestones. More competent core appeared after 90m down the hole. These breccias have not been seen before in the area or elsewhere within the Zeehan sub-basin and their origin is enigmatic. However it is believed that they are stratabound hydrothermal breccias, with the red hematitic matrix fading out at depth to be replaced by a smectite-looking matrix. The breccias do not seem to be palaeosol/cavity collapse resulting from post-Devonian weathering. Some of the clasts have reaction rims seemingly with replacement by iron carbonate alteration (the penetrating effect of weathering in the area may also discolour the clasts). The breccias cease to exist after 151.6m.

Zeehan Carbonate Project Target Map

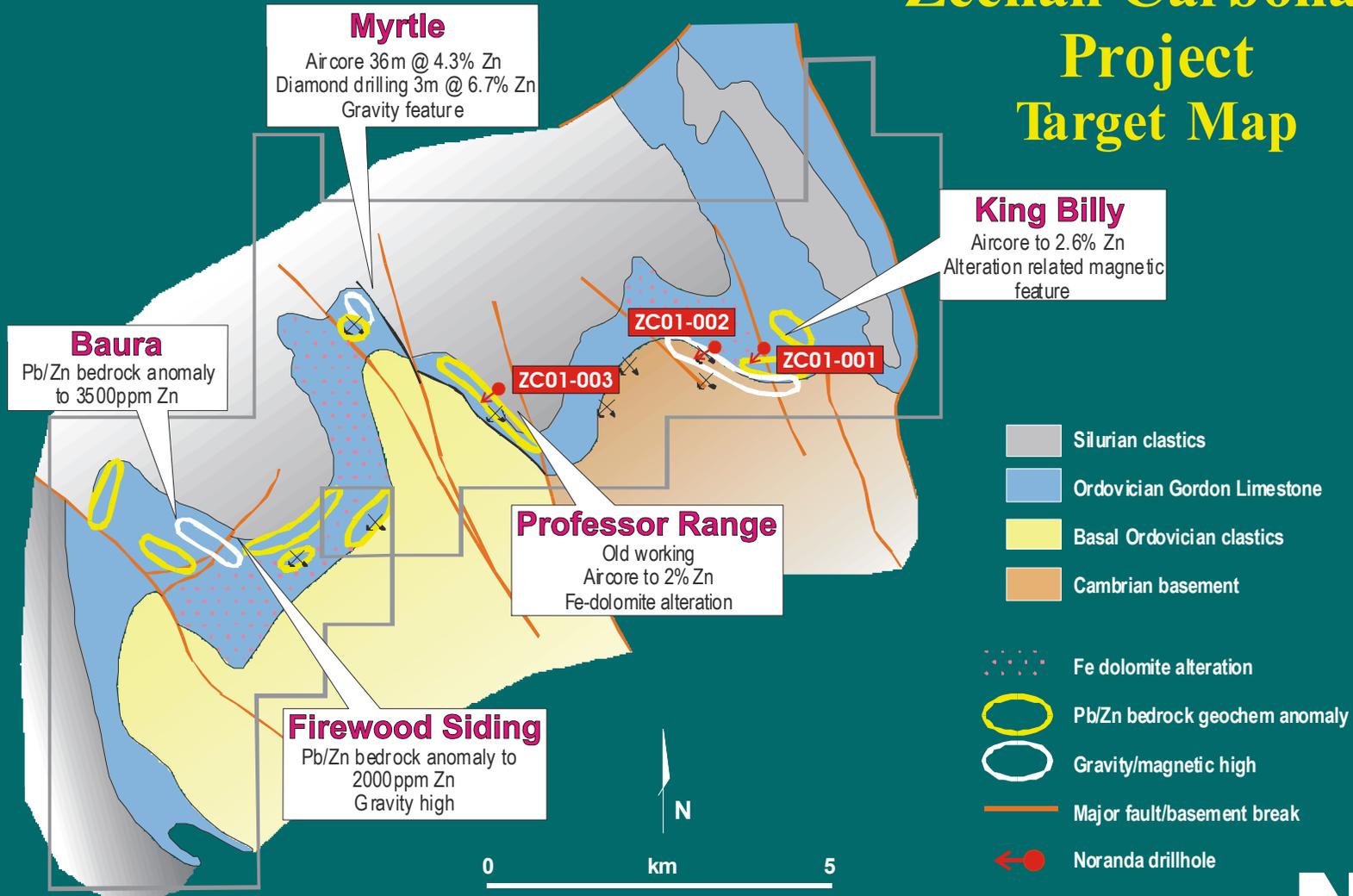


Figure 15

Another red matrix breccia zone occurs between 232m and 245m, but these breccias are associated with shallower-deposited limestone sequences including some red beds, they have more exotic clasts and thus the breccias are thought to be sedimentary terrestrial breccias perhaps storm related. However some of the textures do appear to have a hydrothermal affinity. No sulphide mineralisation was observed in any of the breccias. The use of thin sections to deduce the nature of all breccias is strongly recommended.

The only occurrence of sulphides were at 69m with disseminated sphalerite and galena (2-3%) in pyrite over 20cm and at 320m with disseminated blebs of sphalerite over 20cm(2-3%).

The Myrtle Formation was defined from 208.3m to 267m but possibly to 302m if the breccias and red beds are discounted from the calculation.

Minor clay gouge zones occur within the core probably representing minor late stage brittle faults. No major displacement related to faulting was observed.

Assay results for the hole confirm its barren nature. A peak value of 600ppm Zn was recorded for the black clay and 740ppm Zn for the weathered limestone breccia (@37-40m downhole). Minor zones of dolomitisation are associated with some of the breccia zones

The conclusion for the drillhole is that a substantial thickness of interbedded and stratabound hydrothermal breccias was intersected. These breccias were subjected to preferential deep weathering that occurred within a relatively flat-lying sequence of the Gordon Limestone. An immediate explanation for the anomalous near surface geochemistry is not known suffice to say that the zinc enhancement may have resulted from the decay of the weakly anomalous (~500ppm) breccias within the residual clay development zone.

ZC01-002 (Figure 17)

This drillhole aimed to test a stratabound, weakly magnetic feature at the base of the Gordon Limestone (the Grieves position). Ideally it would have been the aim to test this contact with ZC01-001 but uncertainty surrounding the identification of the base of the Myrtle Formation suggested that it would be wise to begin a separate hole testing nearer to the target.

Alluvial gravel overburden was intersected for the first 8m followed by black clays until 20m but with major core loss in the latter. Fresh rock was encountered at 20m, much earlier than ZC01-001 (at 90m). A major weathered zone was encountered from 57 to 75m and this preferential weathering is due to the unit being dolomitised possibly the Oolite Unit as identified in previous CRAE reports.

Sideritic limestone was observed at 115m that passed into more exclusively sideritic material including sideritic clays to 123m, but all within a weathered zone. Underneath this alteration was a series of generally white clays interbedded with some light brown clays with the former possibly representing the start of the Moina Sandstone or representing an extreme alteration overprint by strong weathering of the basal limestone. The drillhole passed into basal Moina Sandstone at 131.35m and continued in the coarse sandstone unit to the Cambrian unconformity at 139.4m. The contact with the underlying Cambrian was difficult to determine but looked to be unconformable rather than faulted. Beneath this contact pink, maroon, grey and green sandstones and siltstones belonging to the Cambrian were recorded. Therefore there is no basal Owen Conglomerate in the area as suggested at by the geological mapping and this indicates a major facies thickness variation within the basal Ordovician attributable to a major basin controlling structure between King Billy (west) and the Professor Range.

Disappointing assay results for the drillhole show virtually no anomalism for the siderite zone which is unusual. The top-of-hole black clays show some increased levels of lead and zinc with a peak zinc value of 0.6% over 1.5m and maximum lead value of 1.26% over 1.5m.

The conclusion from the hole is that the magnetic feature was intersected in the drillhole at the expected position although its overall width of <5m questions its ability to have caused the magnetic feature observed in the helimag data. Unfortunately this siderite unit contained no detectable zinc mineralisation although it must be noted that the units were within the weathered zone. The anomalous levels of base metals in the top of hole clays once again demonstrate the complex surficial environment. There is a small body of evidence from the previous CRAE drilling for a near surface phenomena that involves lead being dissolved and reprecipitated near surface as coarse grained galena within the clay material.

4.3.2] Professor Range Prospect

The Professor Range Prospect lies 3km west of King Billy and is accessed by the Strahan Road

Table 8 : Target details for the Professor Range Prospect (Figure 15)

- | |
|--|
| <ul style="list-style-type: none"> • Bordered by the major WNW-striking Professor Range reverse fault, which is thought to be part of a pre-existing syn-sedimentary fault system. This fault intersects a major NNW basement break at the eastern and western ends of the prospect (inferred from the helimag data). • Near the eastern end of the prospect anomalous Zn/Pb is associated with an old working; up to 1%Zn and 2.6%Pb was found in aircore end-of-hole samples. This anomaly is part of a significant stratabound surface geochemical anomaly, which has an overall strike length of >1.3km and a width of at least 100m. • This anomalism is associated with the base of the Upper Dolomite Unit. |
|--|

Table 9 : Professor Range Drillhole Collar Details

Hole	AMGE	AMGN	Azim	Dip	Depth	Comment
ZC01-003	366538	5351401	232	47	373.5	Small stockwork sulphide vein systems; possible leakage from stratabound mineralisation
				Total	373.5m	

ZC01-003 (Figure 18)

This hole aimed to test down dip of a broad zone of surface geochemical anomalism in a favoured stratigraphic position proximal to a major, possibly basin controlling, fault system. The favoured stratigraphic position lies within the upper third of the Gordon Limestone, down to and just beyond the Siltstone Unit. The surface anomalism is a combination of downhole aircore values to 2% Zn over 4m and end-of-hole aircore values up to 2.7%Pb and 2.6% Zn. Difficult access meant that the hole had to step back well away from the Gordon Limestone/Crotty Quartzite contact resulting in 145.6m of sandstone being cored. Open holing through this sandstone was attempted but failed to penetrate beyond 16m. The drilling also encountered a slightly steeper than expected bed dip of 70° to the NE.

Following the sandstone approximately 25m of black clay was intersected which represents the top of the Upper Dolomite Unit. This clay is perceived to be the result of preferential weathering of the upper contact perhaps accentuated by bed parallel shearing associated with the competency contrast of the limestone and the sandstone. Vuggy dolomitised limestone was intersected down to 242.5m and subsequently non-vuggy dolomitised limestone to 296.5m. Both upper and lower contacts of the non-vuggy dolomitised limestone are represented by total core loss for 1-2m. A mixed sequence of limestones persisted to 330.15m where there is the first appearance of strongly argillaceous calcsiltites representing the Siltstone Unit. This unit continues to 363.2m when it is followed by a coarse bioclastic unit for 5.8m. The hole terminated in grey and black argillaceous calcsiltites,

presumed not to be the Siltstone Unit. The stratigraphic sequence was as predicted albeit with a steeper bed dip.

Mineralisation within the hole comprised stockworks of dolomitic veins with galena, sphalerite and pyrite within coarser dolomitised limestone units eg 194m to 204.3m and 256.5 to 278.5m. These zones of mineralisation appear to connect up with the near surface aircore base metal anomalism. If that is the case then the zones are bed parallel inferring stratabound mineralisation similar to Ireland, perhaps distal to a major sulphide accumulation down dip or along strike. Galena-sphalerite stockworks have rarely been noted elsewhere within the drillcore of the Zeehan carbonates.

A sample of galena from 240m was sent to the CSIRO for a lead isotope analysis. Their report concluded a Cambrian age for the mineralisation and the report is included in appendix 6. This does allow for the possibility of lead and zinc mineralisation being leached from the underlying volcano-sedimentary sequence (the Mt Read Volcanics) which is a similar scenario to the Irish deposits.

Assays results for the top contact clays showed no anomalism. The vein stockworks were not sampled.

The conclusions for the hole is that the surface anomalism is the result of small stockwork sulphide vein systems roughly of the order 3-4% combined galena and sphalerite. These veins systems may be the result of later, perhaps Devonian-aged, tectonics fracturing the more brittle dolomitised limestones but sourcing the fluids from Cambrian or older rocks, or distal representatives of syndiagenetic to early epigenetic stratabound mineralisation. These vein systems have not been noted before from any of the previous drilling of the limestones around Zeehan except possibly for Oceana.

A review of the QA/QC results for the drilling is included below as table 10. There are no analytical issues.

Table 10		QA/QC Report 2001								
Standards					All values in % unless stated					
Noranda Blank	GBM997-1	Published Values			6.09	0.0014	N/A	N/A	0.001	0.001
Drillhole	Sample No	DPO	Lab Batch	Date	Ag ppm	Cu	Fe	Mn	Pb	Zn
ZC01-001	1404	160551	BUO18696	23-Oct-01	<5	<0.001	3.15	0.01	<0.001	0.01
ZC01-002	1441	160552	BUO18697	23-Oct-01	<5	<0.001	2.74	0.01	<0.001	0.01
ZC01-003	1491	160553	BUO18725	06-Nov-01	5	<0.001	2.79	<0.01	<0.001	<0.001
STD1	GBM396-7	Published Values			124.6	2.35	N/A	N/A	3.95	11.02
Drillhole	Sample No	DPO	Lab Batch	Date	Ag ppm	Cu	Fe	Mn	Pb	Zn
ZC01-001	1427	160551	BUO18696	23-Oct-01	126	2.53	9.18	0.12	3.94	11.2
ZC01-003	1517	160553	BUO18725	06-Nov-01	120	2.22	9.07	0.12	3.96	11.3
STD2	GBM995-8	Published Values			Ag ppm	0.026	N/A	N/A	2.59	12.43
Drillhole	Sample No	DPO	Lab Batch	Date	Ag	Cu	Fe	Mn	Pb	Zn
ZC01-002	1467	160552	BUO18697	23-Oct-01	47	0.03	6.01	0.48	2.69	12.2

5] Conclusions

- Reprocessing of the helimag and gravity data for Noranda's Professor Creek tenement (EL 6/2001) has better delineated the geology of the Gordon Limestone and environs and in combination with new concepts has provided a fresh impetus to drillhole targetting.
- A review and reprocessing of the near surface geochemical data collected by past explorers has also added a stimulus to the drill targetting process.
- The above two aspects have enabled the construction of a more detailed geological map beneficial to the ore search.
- As a result three diamond drillholes totalling 879m were completed on targets at the King Billy and Professor Range prospects.
- The drilling failed to intersect ore grade zinc mineralisation. However the King Billy drillholes intersected :-
 1. a substantially thick zone of unique stratabound hydrothermal breccias (<120m thick) in the Oceana Mine stratigraphic position and
 2. a weathered siderite alteration zone at the base of the limestone in the Grieves stratigraphic position but which proved to be barren.
- The drilling failed to adequately explain the downhole aircore anomalism at King Billy but in the absence of other ideas it is assumed that some form of surficial weathering process has accumulated residual products from weakly zinc elevated hydrothermal breccias.
- Drilling at Professor Range intersected two 10m zones of intense dolomite/sulphide veining ranging up to 3-4% galena & sphalerite which explains the anomalous surface geochemistry.
- An additional four drillhole targets are identified in the Myrtle, Baura and Firewood Siding areas and await future drilling.

6] Recommendations

1. Establish the true nature of the King Billy breccias and evaluate the potential significance.
2. Consider deepening ZC01-001 to intersect an unweathered basal target zone at depth.
3. Step back and diamond drilltest at depth the King Billy breccias.

4. Complete drilltesting the targets at Myrtle, Baura and Firewood Siding
5. Consider the down dip potential of the Grieves mineralisation at 300-400m depth.

7] Proposed Programme

Following the recent drilling it is recommended that additional targets be drilled within the licence at Myrtle, Baura and Firewood Siding. This amounts to 4 diamond drillholes for a total of 1200m. Target criteria for the drilling is included below

Table 11: Target parameters for Myrtle, Baura and Firewood Siding (figure 15)

Myrtle
<ul style="list-style-type: none"> • Highly anomalous Zn geochem (downhole and EOH aircore) related to the Siltstone Unit/Middle Target position 36m @ 4.3% aircore and up to 8%Zn in bedrock • Outcropping <u>barite</u>, pyrite and sphalerite mineralisation can be seen in dark grey clay (presumed to be weathered Siltstone Unit). Small surface resources are estimated at 0.5Mt approx containing sphalerite-rich clays at 2-3% Zn • The major Professor Range Fault transects the area, near to the mineralisation. The fault lies in proximity to a major basement feature identified in the magnetic data • The target area occurs on the flank of a major formational bouguer gravity anomaly. The anomaly is thought to represent a third order basin with the basin margin as being a likely focus for mineralisation. • A dense body parallel to bedding is identified, from reprocessing of the gravity data, on the immediate northern side of the Professor Range Fault proximal to the main (enigmatic), highly anomalous aircore drilling (see above).
Planned Work : 1 by 300m drillhole into the Middle target zone
Baura
<ul style="list-style-type: none"> • A Zn/Pb geochemical target (values to 0.5% Zn) 1.4km along strike from a Middle target zone magnetic (siderite?) anomaly remains untested by drilling. Previous drilling of a similar stratigraphic position at South Grieves, 2.3km to the east recorded significant results (see above). • The target is proximal to a major basinal fault i.e. the Firewood Siding Fault in a complex geological area. • A second target occurs as a significant stratabound gravity feature with anomalous surface geochemistry (up to 0.3% Zn) within the Upper Dolomite Unit. This is 1km along strike from previous drill results of 2.55m @ 2.47% Zn & 4% Pb from 18m down the hole (also 2.5m @ 1.8% Zn from 35m) • A possible syndimentary fault bisects the gravity anomaly
Planned Work : 2 by 300m drillholes into the Upper and Middle target zones
Firewood Siding
<ul style="list-style-type: none"> • Conceptual target based on the premise that the area is on an anticlinal hinge in the Gordon Limestone on the downthrow side of the proximal Firewood Siding Fault. • The target is flat lying and hence has no surface geochemical anomaly. • The nearest outcropping Basal Target zone up dip from the proposed drillhole is strongly sideritic and anomalous in zinc and lead geochemistry • Unique to the target area is a collection of exposures of hydrothermal silicic breccias forming a weakly concentric zone. • This concentric zone is weakly magnetic and has a weak concentric gravity anomaly associated with it.
Planned Work : 1 by 300m drillhole into the Basal target zone

8] Environmental Rehabilitation

Environmental impact was kept to a minimum by utilising the track mounted UDR650 drillrig.

Access to the King Billy drillsites involved using an old prospecting track and part of the old Mariposa Tramway. This required some minor amounts of rehabilitation using a track mounted excavator.

Final access to the actual ZC01-001 drillsite re-used the old CRAE aircore track. Minor disturbance was caused to the button grass plain with replacing and stamping on the upturned sods of earth effecting most repairs.

Final access to the ZC01-002 drillsite required approximately 300m of new track across the button grass plain. Localised bog holes were encountered with the rod sloop occasional cutting into the peat. Approximately 40m by 5m of tea tree bush was demolished to locate the site.

Attempts to rehabilitate the King Billy drill sites, particularly ZC01-002, are likely to involve further damage to the vegetation and thus was not attempted.

Access to the Professor Range drillsite ZC01-003 utilised an old prospector's track. Very minor ground damage was caused mainly from the rod sloop cutting into the peat in localised areas. Replacing and stamping on the upturned sods of earth effected most repairs.

An access track has been cleared for the proposed Myrtle drillhole. Clearing of previous exploration tracks for 1km was followed by 200m of new track through dense tea tree bush.

In moving between prospects all vehicles were washed in Zeehan to remove plant diseases and gorse seeds.

Respectfully submitted,

Simon Tear

Principal Geologist, Benmore Exploration Pty Limited

9] References

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Tear, S.J; Russell S.A. (1996). Annual Report P.E. November 1996 - EL 34/88 - Zeehan No. 2. TCR 97-3957

Tear, S.J; Russell S.A. (1997). Annual Report - EL 45/92 - Mt Dundas. TCR 97-4009

Tear, S.J.; Tesselaar, J. (1996). Helicopter-Borne Magnetic Survey - Zeehan EL's 28/88, 34/88, 45/92, 43/92, 38/89. TCR 96-3902

Virgoe, K.J. (1989). EL 4/78 - Zeehan, Report on Diamond Drilling at Grieves Siding January - June, 1989. TCR 89-2981

CERTIFICATE OF QUALIFIED PERSON

I, Simon Tear, of the City of Brisbane, State of Queensland, do hereby certify that:

1. I am a Professional Geologist residing at 30 Alton Terrace, The Gap QLD 4061
2. I am a graduate of the Royal School of Mines, Imperial College, University of London with an Upper Second Class Honours Degree in Mining Geology.
3. I am an employee of Benmore Exploration Pty Limited from 1999 to the present. From 1983 to 1998 I was an employee of Rio Tinto PLC.
4. I am a member of the Association of Australian Institute of Mining and Metallurgy since 1997.
5. I have been practising my profession for 19 years.
6. My direct involvement in the project has been to provide geological expertise. I am responsible for all section(s) of this report.
7. I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of any affiliate.
8. The statements made in this report are based on a study of published geological literature and unpublished private reports and databases. I have been working on this project for 3 years and have visited the property on numerous occasions
9. Neither the whole or part of this report can be included in or with or attached to any public document or used for any other purpose without the expressed written consent of Noranda Pacific Pty. Limited.

Dated at Brisbane

This ____ day of July, 2002

(ARSM, PGEO, MAusIMM, MIMM)

Appendix I

Acknowledgements

The following is a list of personnel who worked on EL 6/2001

Name	Position	Company
Craig MacDougall	Exploration Manager	Noranda Pacific Pty Ltd, Brisbane
Simon Tear	Senior Geologist	Benmore Exploration Pty. Ltd, Brisbane
Bob Henry	Senior Geologist	TerraSearch, Townsville
Christine Brown	Information Geologist	Noranda Pacific Pty Ltd, Brisbane

The following is a list of contractors who provided services on EL 6/2001

Contractor	Work/service	Company Address
Diamond Drilling of Tasmania Pty Limited	Drilling	Zeehan, Tasmania
Analabs Limited	Laboratory Analysis	Burnie Tasmania
Williams Contracting Services	Drill site pad preparation and access track construction	Queenstown, Tasmania
Poltock Exploration Services	Site Access	Devonport, Tasmania
Gillies Garage	Fuel and garage supplies	Zeehan, Tasmania
Rogers Exploration Services	Site Access	Zeehan, Tasmania
West Coast Transport	Core Transport	Burnie, Tasmania
Mike Phelan	Contract Core Cutting	Zeehan, Tasmania

Appendix 2
Statement of Expenditures

Statement of Expenditures

Geophysics (Mag Interpretation)	\$ 845
Geological / Drill Engineering (Labour)	\$ 33,294
Field and Drill Supplies	\$ 2,709
Field Accommodation / Meals	\$ 3,907
Air Fares, Vehicle Rental, Freight	\$ 9,204
Analytical Services	\$ 2,670
Diamond Drill Services	\$ 92,346
Site Reclamation	\$ 520
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<u>Sub-Total</u>	<u>\$145,495</u>
10% Administration	\$ 14,550
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<u>TOTAL</u>	<u>\$160,045</u>

Appendix 3

List of Open File Reports for the Zeehan Carbonate Area

Zeehan Open File Listing

Report Number	Title	Report Year	Tenement	Company	Author(s)
TCR 79-1385	Progress Report, June 1978 to June 1979 Zeehan Project, Exploration Licence 4/78, Tasmania.	1979	EL4/1978	Amoco Minerals Australia Company*	Jones, P.A.
TCR 80-1495	Progress Report, June 1979 to June 1980, Zeehan Project Exploration Licence 4/78, Tasmania.	1980	EL4/1978	Amoco Minerals Australia Company*	Jones, P.A.; Roxburgh, B.
TCR 81-1593	Progress Report, June 1980 to June 1981, Zeehan Project, E.L. 4/78, Tasmania	1981	EL4/1978	Amoco Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited*	Jones, P.A.
TCR 81-1593A	Review of the Oceana Mine Area, Zeehan, Tasmania	1981	EL4/1978	Amoco Minerals Australia Company*; R Curtis and Associates	Curtis, R.
TCR 81-1593B	DIGHEM II Survey of Zeehan Area, Tasmania.	1980	EL4/1978	Amoco Minerals Australia Company*; Dighem Limited	Dvorak, Z.; Fraser, D.C.
TCR 82-1708	Progress Report, July 1981 to January 1982, Zeehan, Exploration Licence 4/78, Tasmania	1982	EL4/1978	Amoco Minerals Australia Company	Jones, P.A.
TCR 82-1708A	Geological Reconnaissance Visit to the Oceana-Austral Carbonate-Hosted Pb-Zn-Ag Mineralisations, Zeehan District, Tasmania	1981	EL4/1978	Amoco Minerals Australia Company	Wolf, K.H.
TCR 82-1800	Progress Report, January to July, 1982, Zeehan Project E.L. 4/78, Tasmania	1982	EL4/1978	Amoco Minerals Australia Company	Jones, P.A.
TCR 83-1943	Progress Report July to December 1982, Zeehan Project, E.L. 4/78, Tasmania	1983	EL4/1978	Amoco Minerals Australia Company*	Jones, P.A.
TCR 83-2004A	An Evaluation of the Geophysical Surveys Carried Out Within E.L. 4/78 and Part of E.L. 15/76 Prior to 1978	1983	EL15/1976; EL4/1978	Amoco Minerals Australia Company*; CSR Limited*; Mitre Geophysics Proprietary Limited	Bishop, J.R.
TCR 83-2024	Progress Report, January to July 1983, Zeehan Project E.L. 4/78, Tasmania	1983	EL4/1978	Amoco Minerals Australia Company*	Jones, P.A.
TCR 83-2071	Amoco-E.Z. Exploration of the Gordon Limestone	1983	EL30/1983; EL31/1983; EL32/1983; EL4/1978; EL49/1983; EL50/1983; EL51/1983; EL52/1983	Amoco Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited	Taylor, S.
TCR 84-2104	Exploration Licence No. 4/78 - Zeehan. Progress Report on Exploration Activity 14th June, 1983 to 14 January, 1984.	1984	EL4/1978	Amoco Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited	Kary, G.L.; Mathison, I.J.
TCR 84-2174	Part Relinquishment Report, Zeehan EL 4/78	1984	EL4/1978	Amoco Minerals Australia Company;	Jones, P.A.

Zeehan Open File Listing

Report Number	Title	Report Year	Tenement	Company	Author(s)
TCR 84-2208	Exploration Licence No. 4/78 - Zeehan, Progress Report on Exploration Activity 14th January, to 14th June, 1984.	1984	EL4/1978	Amoco Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited	Mathison, I.J.
TCR 85-2440	Exploration Licence No. 4/78 - Zeehan Progress Report on Exploration Activity 15th June, 1984 to 30th April, 1985.	1985	EL4/1978	Amoco Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited	Mathison, I.J.
TCR 85-2440A	Interpretation of UTEM Surveys Over the Grieves and Myrtle Grids (E.L. 4/78, Zeehan)	1985	EL4/1978	Amoco Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited; Mitre Geophysics Proprietary Limited	Bishop, J.R.
TCR 85-2440B	An Interpretation of the Grieves Grid Gravity Anomaly (E.L. 4/78, Zeehan)	1985	EL4/1978	Amoco Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited; Mitre Geophysics Proprietary Limited	Bishop, J.R.
TCR 85-2440C	Interpretation of UTEM Surveys Over the Baura and Grieves Grids (E.L. 4/78, Zeehan)	1985	EL4/1978	Amoco Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited; Mitre Geophysics Proprietary Limited	Bishop, J.R.
TCR 86-2547	Exploration Licence No. 4/76 - Zeehan. Progress Report on Exploration Activity 30th April, 1985 to 30th April, 1986	1986	EL4/1978	Electrolytic Zinc Company of Australasia Limited*	Mathison, I.J.
TCR 86-2558	E.M. 37 Surveys, Mackintosh East and Henty River Prospects, Tasmania, May-June 1985	1985	EL2/1970; EL4/1978	Amoco Minerals Australia Company*; Cleveland Tin Limited*; P and V Geophysical Services	Anon
TCR 87-2625	Notes on the Correction and Unification of Gravity Surveys by Amoco in the Zeehan Area.	1987	EL4/1978	Cyprus Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited; Leaman Geophysics	Leaman, D.E.
TCR 87-2699	Exploration Licence No 4/78 - Zeehan. Progress Report on Exploration Activity 30th April, 1986 to 30th April, 1987.	1987	EL4/1978	Cyprus Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited	Mathison, I.J.; Taylor, S.
TCR 88-2819	Oceana Project, Tasmania, Retention Licence Application : Geological Report	1988	EL4/1978; RL9/1988	Cyprus Gold Australia Corporation*	Jones, P.A.
TCR 88-2819	Oceana Project, Tasmania, Retention Licence Application : Geological Report	1988	EL4/1978; RL9/1988	Cyprus Gold Australia Corporation*	Jones, P.A.
TCR 88-2820	Oceana Project, Tasmania, Retention Licence Application : Feasibility Study	1988	EL4/1978; RL9/1988	Cyprus Gold Australia Corporation*	Ingram, P.
TCR 88-2820	Oceana Project, Tasmania, Retention Licence Application : Feasibility Study	1988	EL4/1978; RL9/1988	Cyprus Gold Australia Corporation*	Ingram, P.
TCR 88-2828	Exploration Licence No. 4/78 - Zeehan. Relinquishment Report Including Report on Exploration Activity 30th April, 1987 to 31st May, 1988	1988	EL4/1978	Cyprus Gold Australia Corporation*; Electrolytic Zinc Company of Australasia Limited	Mathison, I.J.
TCR 88-2828A	Au Potential of the Queensberry Mine Area.	1988	EL4/1978	Cyprus Gold Australia Corporation*; Electrolytic Zinc Company of Australasia Limited	Ferguson, N.
TCR 89-2980	EL 4/78 - Zeehan, Report on Diamond Drilling at Grieve Siding May - July, 1988	1988	EL4/1978	Cyprus Gold Australia Corporation*; Electrolytic Zinc Company of Australasia Limited	Virgoe, K.J.

Zeehan Open File Listing

Report Number	Title	Report Year	Tenement	Company	Author(s)
TCR 89-2981	EL 4/78 - Zeehan, Report on Diamond Drilling at Grieves Siding January - June, 1989	1989	EL4/1978	Cyprus Gold Australia Corporation*; Electrolytic Zinc Company of Australasia Limited	Virgoe, K.J.
TCR 89-2981A	Interpretation of Downhole Electromagnetic Surveys, Zeehan (EL 4/78)	1989	EL4/1978	Mitre Geophysics Proprietary Limited	Bishop, J.R.
TCR 89-3045	Exploration Licence 34/88 - Zeehan Annual Report for Period 19th May 1989 to 31st October 1989	1989	EL34/1988; EL4/1989	His Grace The Duke of Avram*; Major Mining Limited	Howland-Rose, A.W.
TCR 89-3046	Exploration Licence 28/88 - Zeehan, Annual Report for Period 19th May 1989 to 31st October 1989	1989	EL28/1988	His Grace The Duke of Avram*; Major Mining Limited	Howland-Rose, A.W.
TCR 89-3046A	A Report on Geophysical Test Surveys Over the Comstock Lead Zinc Silver Lode and Areas to the East Thereof Within E.L. 28/88, Zeehan Area, Tasmania.	1989	EL28/1988	His Grace The Duke of Avram*; Major Mining Limited; Scintrex Proprietary Limited	Howland-Rose, A.W.
TCR 90-3198	Exploration Licence 34/88 - Zeehan Second Annual Report for Period 1st November, 1989 to 31st October 1990	1990	EL34/1988	His Grace The Duke of Avram*; Major Mining Limited	Anon
TCR 90-3198A	A Report on Geophysical Surveys Over the East Queensberry and Badger River Area Within EL 34/88 near Zeehan, Tasmania.	1990	EL34/1988	His Grace The Duke of Avram*; Major Mining Limited	Howland-Rose, A.W.
TCR 90-3204	Exploration Licence 28/88 - Zeehan. Second Annual Report for Period 1st November, 1989 to 31st October, 1990.	1990	EL28/1988	His Grace The Duke of Avram*; Major Mining Limited	Anon
TCR 90-3204A	A Report on Geophysical Test Surveys Over the Comstock Lead Zinc Silver Lode and Areas to the East Thereof Within E.L. 28/88, Zeehan Area, Tasmania.	1989	EL28/1988	His Grace The Duke of Avram*; Major Mining Limited	Howland-Rose, A.W.
TCR 90-3204B	A Report on Further Geophysical Test Surveys South East of the Comstock Lode (EL 28/88) near Zeehan, Tasmania.	1990	EL28/1988	His Grace The Duke of Avram*; Major Mining Limited	Howland-Rose, A.W.
TCR 91-3302	RL 8809 Oceana Annual Report for Period October 1990 to September 1991	1991	RL9/1988	Arimco Mining Proprietary Limited*; Pasmenco Australia Limited (Exploration)	Fitzgerald, F.G.
TCR 91-3312	Exploration Licence 34/88 Henty, Tasmania Statutory Progress Report for the Period Ending 9th November, 1991.	1991	EL28/1988; EL33/1989; EL34/1988	CRA Exploration Proprietary Limited; Major Mining Limited*	Kratochvil, M.
TCR 91-3313	EL 28/88 Zeehan, Tasmania Progress Report for the Period Ending 9th November, 1991 Base Metal Mineralisation Potential in the Precambrian Age Rocks around Zeehan.	1991	EL28/1988	CRA Exploration Proprietary Limited; Major Mining Limited*	Summons, T.G.
TCR 92-3393	Annual Report 1991-1992	1992	RL9/1988	Arimco Mining Proprietary Limited*; Pasmenco Australia Limited (Exploration)	Quayle, P.M.
TCR 92-3393A	Review of Gravity and Magnetic Data Oceana Mine Area, Zeehan for Pasmenco Exploration;	1992	RL9/1988	Arimco Mining Proprietary Limited*; Leaman Geophysics; Pasmenco Australia Limited (Exploration)	Leaman, D.E.
TCR 92-3398	Report on Fourth Year 1991-92	1992	EL28/1988	CRA Exploration Proprietary Limited	Parkinson, R.G.

Zeehan Open File Listing

Report Number	Title	Report Year	Tenement	Company	Author(s)
TCR 92-3399	Report on Fourth Year 1991-92	1992	EL34/1988	CRA Exploration Proprietary Limited*	Parkinson, R.G.
TCR 93-3417	Zeehan No.4 EL 38/89 Tasmania. Report on Exploration for the Third Year of Tenure 1/3/92 to 28/2/93	1993	EL38/1989	CRA Exploration Proprietary Limited; Major Mining Limited*	Parkinson, R.G.
TCR 93-3449	Logistics for Aeromagnetic and Radiometric Surveys	1993	EL1/1993; EL22/1990; EL24/1991; EL25/1991; EL37/1989; EL9/1992; RL9/1988	Geoterrex Proprietary Limited; Pasmenco Limited*	Anon
TCR 93-3501	Annual Report RL 8809 Oceana 1992-93	1993	RL9/1988	Pasmenco Australia Limited (Exploration)*	Quayle, P.M.
TCR 93-3501A	Further Evaluation Gravity and Magnetic Data RL 8809 Oceana	1993	RL9/1988	Leaman Geophysics; Pasmenco Australia Limited (Exploration)*	Leaman, D.E.
TCR 93-3519	Zeehan No.1 EL 28/88 Report on Exploration for Fifth Year 9.11.92 to 9.11.93	1993	EL28/1988	CRA Exploration Proprietary Limited; Major Mining Limited*	Parkinson, R.G.
TCR 93-3520	Zeehan No.2 EL 34/88 Report on Exploration for Fifth Year of Tenure, 9/11/92 to 9/11/93	1993	EL34/1988	CRA Exploration Proprietary Limited; Major Mining Limited*	Parkinson, R.G.
TCR 93-3521	Zeehan No 1 EL 28/88 Report on Exploration in Relinquished Areas for the Period 9.12.88 to 9.11.93.	1993	EL28/1988	CRA Exploration Proprietary Limited; Major Mining Limited*	Parkinson, R.G.
TCR 93-3522	Zeehan No 2 EL 34/88 Report on Exploration in Relinquished Areas for the Period 9.12.88 to 9.12.93	1993	EL34/1988	CRA Exploration Proprietary Limited; Major Mining Limited*	Parkinson, R.G.
TCR 94-3550	Zeehan No.4 EL 38/89 Tasmania, Report on Exploration for the Fourth Year of Tenure, 1/3/93 to 28/2/94.	1994	EL38/1989	Allegiance Mining NL; CRA Exploration Proprietary Limited; Major Mining Limited*	Parkinson, R.G.
TCR 94-3551	Mount Dundas EL 45/92, Tasmania, Report on Exploration for the First Year of Tenure, 16/4/93 to 15/3/94.	1994	EL45/1992	CRA Exploration Proprietary Limited*	Parkinson, R.G.
TCR 94-3618	A List of Transparencies of Plans from EL 4/78	1994	EL4/1978	Amoco Minerals Australia Company*; Electrolytic Zinc Company of Australasia Limited; Geopeko Limited; Mineral Resources Tasmania	Anon
TCR 94-3655	Zeehan No.1 EL 28/88. Report on Exploration for Year 6, 9.11.93 to 9.11.94	1994	EL28/1988	Allegiance Mining NL*; CRA Exploration Proprietary Limited*	Parkinson, R.G.
TCR 94-3656	Zeehan No 2 EL 34/88 Tasmania Report on Exploration for Year 6 9/11/93 to 9/11/94.	1994	EL34/1988	Allegiance Mining NL; CRA Exploration Proprietary Limited*	Parkinson, R.G.
TCR 95-3714	Zeehan No.4 EL 38/89, Tasmania Report on Exploration for the Fifth Year of Tenure 1/3/94 to 28/2/95.	1995	EL38/1989	CRA Exploration Proprietary Limited*	Parkinson, R.G.
TCR 95-3714A	Zinc Mineralisation in the Gordon Limestone, Tasmania	1994	EL38/1989	CRA Exploration Proprietary Limited*	Morris, D.G.; Taylor, D.

Zeehan Open File Listing

Report Number	Title	Report Year	Tenement	Company	Author(s)
TCR 95-3722	Mt Dundas EL 45/92 Tasmania Report on Exploration for Year 2 16.4.94 to 15.3.95	1995	EL45/1992	CRA Exploration Proprietary Limited*	Parkinson, R.G.
TCR 96-3882	7th Annual Report for P.E. 9/11/95. EL 28/88 - Zeehan No.1	1995	EL28/1988	Allegiance Mining NL; CRA Exploration Proprietary Limited*	Tear, S.J.
TCR 96-3885	Annual Report P.E. 15/3/96, EL 45/92 - Mt Dundas	1996	EL45/1992	CRA Exploration Proprietary Limited*	Tear, S.J.
TCR 96-3886	7th Annual Report for P.E. 9/11/95, EL 34/88, Zeehan No.2	1995	EL34/1988	CRA Exploration Proprietary Limited*	Tear, S.J.
TCR 96-3902	Helicopter-Borne Magnetic Survey - Zeehan EL's 28/88, 34/88, 45/92, 43/92, 38/89	1996	EL28/1988; EL34/1988; EL38/1989; EL43/1992; EL45/1992	CRA Exploration Proprietary Limited*	Tear, S.J.; Tesselaar, J.
TCR 96-3902	Helicopter-Borne Magnetic Survey - Zeehan EL's 28/88, 34/88, 45/92, 43/92, 38/89	1996	EL28/1988; EL34/1988; EL38/1989; EL43/1992; EL45/1992	CRA Exploration Proprietary Limited*	Tear, S.J.; Tesselaar, J.
TCR 97-3957	Annual Report P.E. November 1996 - EL 34/88 - Zeehan No. 2	1996	EL34/1988	CRA Exploration Proprietary Limited*	Russell, S.A.J.; Tear, S.J.
TCR 97-3957A	Basin Analysis Report - Ordovician Gordon Group Carbonates	1995	EL34/1988	CRA Exploration Proprietary Limited*	Burrett, C.F.
TCR 97-3965	Zeehan Slag Dump Retreatment Project Pre-Feasibility Dump	1991	RL3/1996	Pyrosmelt NL*	Anon
TCR 97-4009	Annual Report - EL 45/92 - Mt Dundas	1997	EL45/1992	CRA Exploration Proprietary Limited*	Russell, S.A.J.; Tear, S.J.
TCR 97-4009A	Zonation Within Mineralisation Phases around the Heemskirk Granite, Zeehan, Tas, EL 45/92	1996	EL45/1992	CRA Exploration Proprietary Limited*; Pasmenco Australia Limited (Exploration); University of Melbourne	Ely, K.
TCR 97-4094	Annual Report - Zeehan 2 - EL 34/88	1997	EL34/1988	Rio Tinto Exploration Proprietary Limited*	Russell, S.A.J.
TCR 98-4120	EL 45/92 Mt Dundas - Final Report to 15 March 1998 - Queenstown, SK 55-05	1998	EL45/1992	Rio Tinto Exploration Proprietary Limited*	Russell, S.A.J.
TCR 98-4135	Final Report - EL 34/88 Zeehan 2 - Queenstown SK 55-05	1998	EL34/1988	Rio Tinto Exploration Proprietary Limited*	Russell, S.A.J.
TCR 98-4138	EL 28/88, Zeehan 1 - Partial Relinquishment Report	1998	EL28/1988	Rio Tinto Exploration Proprietary Limited*	Russell, S.A.J.
TCR 98-4192	Partial Relinquishment Report - EL 38/89 - Zeehan	1998	EL38/1989	Allegiance Mining NL*; Newnham Exploration and Mining Services; Rio Tinto Exploration Proprietary Limited	Newnham, L.A.

Appendix 4

GeoDiscovery Geophysical Assessment Report for the Zeehan Carbonates



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Minerals exploration, discovery and management

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Memo

To: Simon Tear
From: Graeme Mackee
CC:
Date: 17th March 2002
Re: Zeehan Geophysical Image Notes

Introduction

This note describes the geophysical magnetic and gravity images prepared for the Zeehan project for Noranda Pacific Pty Ltd during 2001, and details the filtering/processing performed.

Magnetic Data

Available aeromagnetic data comprised a series of six small areas of detailed helimag data completed by CRA Exploration (Rio Tinto) during the early 1990s. These surveys were unusual in that Areas 1, 4, 5 & 6 included flight lines that were not of constant direction, but rather varied to maintain orthogonal traverses across the folded target lithological bedding. Areas 2 & 3 were more conventional rectangular areas with parallel flight lines and orthogonal tie-lines. Processing and levelling of the magnetic data were completed by CRA Exploration, and these finally levelled datasets were those received from CRAE.

Subsequent filtering and imaged products by Geo Discovery Group using Geosoft *montaj* software included the following –

- Total Magnetic Intensity (TMI)
- First Vertical Derivatives (1VD)
- Residual Mag
- Automatic Gain Control (AGC)

All images were created as located geotifs within Geosoft and exported as MapInfo tab files for use with MapInfo Ver 5.5.

TMI Images: A standard drape image of coloured TMI over TMI shaded relief was produced, usually at a declination/inclination of 045deg/45deg. The local magnetic field inclinations are approx -72.5 deg, and reduction-to-the-pole (RTP) imaging was not completed since little change would be expected and the filter would likely introduce unwanted artefacts.

The TMI image is an accurate measure of the actual magnetic response of the various lithologies present in the survey area, reflecting the magnetic susceptibilities and geometry of these magnetic units. It is generally the main parameter used for quantitative modelling.

1VD Images: A 1VD grid was produced for each area from the TMI data using Geosoft's MagMap's Fourier Domain routine. Coloured drape images of 1VD on 1VD shaded relief were produced.

The 1VD data are useful for separating (resolving) adjacent magnetic units, although it can introduce some confusion by its resultant multi-peak/trough response from a dipolar magnetic signature.

Residual Images: The residual magnetic images were produced using Geosoft to calculate a third-order regional trend-surface for each area and subtracting this from the observed TMI data. The resultant residual was presented as a coloured drape image as above.

The residual magnetic image allows the impact of large and/or deep (ie long wavelength) responses to be eliminated from the dataset while approximately preserving the shape and amplitude of more local (ie short wavelength) responses. It generally reduces the overall amplitude range of the data set and allows more detail to be seen in the resultant image.

AGC Images: The AGC grids were produced using Geosoft's AGC filter, described by Geosoft as follows: *"The local gain is estimated using a moving window. (The window Size is actually the closest odd number less than or equal to the input value so that it may be centered over each position). In this window the average RMS signal amplitude is calculated, and is taken to be an estimate of the local signal gain. During the initial pass over the data, the maximum "gain" value is recorded. In the second pass, all points are multiplied by the ratio of the maximum gain to the local gain. A maximum gain correction is specified to prevent the operation from "blowing up" in regions with little or no signal."*

The Automatic Gain Control produces a grid that attempts to equalise the amplitudes of the various magnetic units such that a dominant unit does not swamp the response from weaker units. This is useful for mapping the extents of the various magnetic units.

In addition to the grids/images produced for the individual survey areas, subsets of the above series of images were produced for Areas 2, 4, 5 & 6 to include only the Gordon Limestone outcrop/subcrop. The intent here was to further reduce the overall data amplitude ranges to locally enhance the resultant geophysical images.

Gravity Data

The gravity data used were from the Tasmanian gravity database, which included relatively detailed data within parts of the Zeehan areas of interest. These data were windowed out from the State-wide database and gridded at a resolution of 50 metres (Gordon and Oceana grids) while the State-wide data were gridded at a cell size of 200m to reflect the general paucity of data over most areas. A residual Bouguer Gravity grid of the Gorgon sub-set was produced by removing a third-order trend surface as for the magnetic data, and imaged.

Geophysical Models

The following targets were modelled using Encom's ModelVision magnetic/gravity modelling software, as requested by S. Tear –

- Baura prospect – Western Gravity Anomaly
- King Billy prospect – magnetic horizons
- Myrtle Prospect – gravity
- Professor Range prospect – magnetic linear
- Professor Range Central prospect – magnetic anomalies
- Pyramid Central prospect – magnetic anomalies
- South Greeves prospect – magnetic units

Figures and pdf files are included.

Graeme Mackee

Appendix 5

Drill Logs and Assay Results



NORANDA INC.

Drill Hole Log

Drillhole Collar

Hole-ID: ZC01-001

Length: 350.5

Units: Metres

Started: 2/10/2001

Proj. #: 156

Project: Zeehan Carbonate

Finished: 12/10/2001

Claim #: EL6/2001

Logged By: S.Tear

Drill Type: UDR650

Case Pld:

Contractor: DD(Tas)

Core Size: HQ/NQ

Case Dep:

Core Location: DD(Tas) shed, Zeehan

Co-ordinates - GEMCOM

Easting: 370417

Northing: 5352005

Elevation: 190

Plot_Sys: AGD 84

NTS:

Co-ordinates - Grid

Easting: 70400.00

Northing: 2000.00

Elevation: 190.00

Grid Declin:

Mag Declin: -12

Co-ordinates - UTM

Easting: 370417

Northing: 5352005

Elevation: 190

UTM Declin:

UTM Zone: 55

Co-ordinates - Lat/Long

Latitude:

Longitude:

Collar Survey: No

Target: Basal Gordon Limestone test (Grieves Position); wide downhole aircore anomaly with siderite alteration proximal to residual magnetic anomaly

Geophysics:

Remarks: Proposed Hole B. Hole intersected approximately 100m of cavity collapse breccias but no obvious sign of mineralisation. Core orientations possibly indicate flat dipping beds
Faults at 116.7-117.4m, 146.6-147.8m, 162.4- 163.8m, 170.5-172m, 183-184.3m, 194.8-199.65m, 252.5-254.3m, 271.2-272.25m, 305.8-306.4m, 316.4-316.7m
No significant mineralisation

Downhole Survey

Distance	Dip	Mag Azm	True N Azm	Type	Comments
0.00	-45.00	210.00	198.00	COLLAR	Hole Spotted
50.00	-47.00	207.00	195.00		
115.00	-47.50	206.00	194.00		
158.00	-45.00	208.50	196.50		
206.00	-44.00	208.50	196.50		
262.00	-44.00	206.00	194.00		
304.00	-43.00	208.00	196.00		
350.00	-42.00	208.00	196.00		

Geology

ZC01-001

Lithology			Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i>	<i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>							
0.00	OB	(Alluvial) Overburden												
3.00		No recovery												
3.00	9DC	Dark Clay	3.00											
4.80		Light grey clay (leached dark clay)	24.40		Weathered clay									
4.80	9DC	Dark Clay												
14.40		Black sulphidic clay; no features					4.80	6.80	1405	0.01		0.04	-5.00	
							6.80	8.35	1406	0.01		0.05	-5.00	
							8.35	10.00	1407	0.01		0.03	-5.00	
							10.00	11.70	1408	0.00		0.06	-5.00	
							11.70	13.00	1409	0.00		0.04	-5.00	
							13.00	14.40	1410	0.01		0.02	-5.00	
14.40	9DC	Dark Clay												
24.40		Black to dark clay with zones of weathered limestone fragments					14.40	15.90	1411	0.01		0.03	-5.00	
							15.90	16.80	1412	0.01		0.02	-5.00	
							16.80	17.60	1413	0.00		0.02	-5.00	
							17.60	19.00	1414	0.00		0.02	-5.00	
							19.00	20.50	1415	0.00		0.01	-5.00	
							20.50	22.00	1416	0.00		0.01	-5.00	
							22.00	23.10	1417	0.00		0.02	10.00	
							23.10	24.40	1418	0.01		0.03	-5.00	
24.40	9DC	Dark Clay	24.40											
28.30		weathered limestone fragments and clay material; breccias with red hematitic matrix	120.00		Red earthy hematite matrix to breccias; sometimes calcareous; localised calcite veining		24.40	25.60	1419	0.01		0.02	-5.00	
							25.60	27.10	1420	0.01		0.03	-5.00	
							27.10	29.00	1421	0.01		0.04	-5.00	
28.30	9DC	Dark Clay												
36.00		Weathered limestone fragments and clay material; poor recovery					31.00	32.30	1422	0.00		0.03	-5.00	
							32.30	34.00	1423	0.01		0.06	32.00	
							34.00	35.50	1424	0.00		0.03	-5.00	
							35.50	37.00	1425	0.00		0.03	-5.00	
36.00	9DC	Dark Clay												
47.30		Weathered limestone fragments and clay material with red matrix breccias; rotted calcarenites; poor recovery					37.00	40.00	1426	0.01		0.07	-5.00	
47.30	4CCS	Calcsiltite												
52.70		Weathered and partially rotted argillaceous calcsiltite with clays; localised red matrix breccias					47.40	47.90	1428	0.01		0.05	-5.00	
							47.90	48.25	1429	0.00		0.04	-5.00	
52.70	4CCS	Calcsiltite												
55.00		Partially weathered mottled argillaceous calcsiltites												
55.00	4CCS	Calcsiltite												
57.30		Limestone breccias with numerous clasts some looking exotic; possible palaeosols seen elsewhere in the Gordon Limestone around Zeehan but not with this frequency					56.50	57.30	1430	0.00		0.03	-5.00	

ZC01-001

Lithology			Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i>	<i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>								
57.30	4CCL	Calcilutite												
57.80		Thinly bedded to interlaminated calcilutites and calcsiltites with fenestral texture												
57.80	4CCS	Calcsiltite												
64.40		Argillaceous calcsiltites with substantial zones of brecciation, including brecciation of a breccia; exotic fragments; red matrix breccias												
64.40	4CCS	Calcsiltite												
66.10		Argillaceous calcsiltites with large bioclast and some mottled texture												
66.10	4CCS	Calcsiltite												
66.80		Part of a major zone of rotted limestones with clay material and red matrix breccias												
66.80	4CCL	Calcilutite												
67.30		Interlaminated calcilutites discernable through weathering												
67.30	4CCS	Calcsiltite												
71.00		Part of a major zone of rotted limestones with clay material and red matrix breccias					67.95	69.00	1431	0.00		0.00	-5.00	
							69.00	70.00	1432	0.00		0.00	-5.00	
							70.00	71.00	1433	0.00		0.02	-5.00	
71.00	4CCL	Calcilutite												
72.00		Interlaminated calcilutites and argillaceous calcsiltites; with fenestral texture and stylolites												
72.00	4CCS	Calcsiltite												
75.20		Non argillaceous calcsiltites with localised zones of red matrix brecciation												
75.20	4CCL	Calcilutite												
75.70		Interlaminated calcilutites and argillaceous calcsiltites; with fenestral texture												
75.70	4CCS	Calcsiltite												
76.20		Argillaceous calcsiltites												
76.20	4CCS	Calcsiltite												
89.20		A major zone of rotted limestones with clay material and red matrix breccias; some bad core loss												
89.20	4CCS	Calcsiltite												
96.00		Competant core but still partially weathered calcsiltite with red matrix breccia zones; occasional equigranular calcarenite beds and coarse bioclastic bands					91.40	92.40	1434	0.00		0.00	-5.00	
96.00	BX	Breccia												
96.90		Limestone breccia with red earthy hematite matrix; angular to sub-rounded clasts assumed to be hydrothermal and not a palaeosol												

ZC01-001

Lithology		Alteration		Mineralization		Assay							
From Code	Rock Name	From Code		From Code		From	To	#	Cu%	Mo%	Zn%	Ag(g)	Au(g)
To	Description	To	Description	To	Description								
96.90	4CCS Calcsiltite												
104.20	Locally argillaceous calcsiltites with some equigranular calcarenite bands and localised red matrix breccias in abundance; minor calcilutite at 102.4m												
104.20	4CCS Calcsiltite												
112.10	A major zone of rotted limestones with clay material and red matrix breccias; some bad core loss												
112.10	4CCS Calcsiltite												
115.00	Extensive limestone brecciation												
115.00	4CCL Calcilutite												
116.00	Grey calcilutite with argillaceous calcsiltite bands; locally fenestrate and stylolitic												
116.00	4CCS Calcsiltite												
116.70	Calcsiltite												
116.70	FZ Fault Zone												
117.40	Possible fault zone strong cleavage development in surrounding rocks												
117.40	4CCL Calcilutite												
118.00	Interbedded and interlaminated calcilutite and argillaceous calcsiltite bands; fenestrate with localised breccia zones												
118.00	4CCS Calcsiltite	120.00											
134.90	Calcsiltites with limestone breccia zones, some earthy hematite matrix and some with smectite matrix; 2 phases of brecciation one or both hydrothermal?	151.60	Red earthy hematite and/or smectite matrix to breccias; sometimes calcareous; localised calcite veining			119.40	120.45	1435	0.00		0.00	-5.00	
						124.30	124.80	1436	0.00		0.00	-5.00	
134.90	4CCA Calcarenite												
135.90	Equigranular calcarenite with minor argillaceous calcsiltite beds												
135.90	4CCS Calcsiltite												
145.10	Calcsiltites with limestone breccia zones, some earthy hematite matrix and some with smectite matrix; 2 phases of brecciation one or both hydrothermal?												
145.10	VN Vein												
145.90	Calcite vein												
145.90	4CCS Calcsiltite												
146.60	Calcsiltites with limestone breccia zones, some earthy hematite matrix and some with smectite matrix												
146.60	FZ Fault Zone												
147.80	Calcsiltite with strong cleavage development and clay zones; low angle to core axis												

ZC01-001

Lithology			Alteration		Mineralization		Assay							
From Code	Rock Name		From Code		From Code		From	To	#	Cu%	Mo%	Zn%	Ag(g)	Au(g)
To	Description		To	Description	To	Description								
147.80	4CCS Calcsiltite													
151.60	Calcsiltites with limestone breccia zones, some earthy hematite matrix and some with smectite matrix						150.40	151.20	1437	0.00		0.00	-5.00	
151.60	4CCA Calcarenite		151.60											
153.90	Mixed sequence of calcarenites; some massively bedded, some as interlaminated with argillaceous calcsiltites		207.05	Minor calcite veining and stringers										
153.90	4CCR Calcirudite													
154.80	Synsedimentary breccias with tetradium fossils													
154.80	4CCS Calcsiltite													
158.00	Calcsiltites with mottled appearance (synsedimentary breccias) with some interlaminated calcsiltites and argillaceous calcsiltites													
158.00	4CCR Calcirudite													
159.00	Synsedimentary breccias with tetradium fossils; red matrix breccia at top contact, possible fault zone													
159.00	4CCS Calcsiltite													
162.40	Mottled calcsiltites coarsening up; bed dislocation due to movement on cleavage planes													
162.40	FZ Fault Zone													
163.80	Zone of brecciation and rotted limestone including clays and calcite brecciation													
163.80	4CCS Calcsiltite													
168.50	Intermixed calcsiltites and argillaceous calcsiltites with good cleavage and locally coarsely bioclastic													
168.50	4CCR Calcirudite													
170.50	Synsedimentary breccias with tetradium fossils; unusual red bed within zone													
170.50	FZ Fault Zone													
172.00	Zone of brecciation and rotted limestone including clays and calcite brecciation													
172.00	4CCS Calcsiltite													
183.00	Intermixed calcsiltites and argillaceous calcsiltites with good cleavage and locally coarsely bioclastic; mottled texture and possible synsedimentary breccias													
183.00	FZ Fault Zone					183.00								
184.30	Zone of brecciation and rotted limestone					184.40								

ZC01-001

Lithology		Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i> <i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>								
184.30	4CCS Calcisiltite												
192.30	Intermixed calcisiltites and argillaceous calcisiltites with good cleavage and locally coarsely bioclastic; mottled texture and possible syndimentary breccias												
192.30	4CCL Calcilutite												
194.80	Intermixed calcilutites and calcisiltites but heavily broken up due to cleavage or syndimentary brecciation												
194.80	FZ Fault Zone												
199.65	Zone of brecciation and rotted limestone including clays and calcite brecciation; calcite veining postdated by cleavage												
199.65	4CCS Calcisiltite												
202.80	Intermixed calcisiltites and argillaceous calcisiltites with good cleavage and locally coarsely bioclastic; mottled texture and possible syndimentary breccias												
202.80	4CCL Calcilutite												
204.80	Calcilutite dominant sequence with well developed cleavage; localised stylonitic development; occ coarse bioclastic zones												
204.80	4CCS Calcisiltite												
206.00	Intermixed calcisiltites and calcilutites with some syndimentary brecciation												
206.00	4CCS Calcisiltite	207.05											
208.40	Intermixed calcisiltites and argillaceous calcisiltites; mottled appearance	209.00	Increase calcite veing associated with footwall of fault										
208.40	4CCL Calcilutite												
209.00	Calcilutite dominant section with stylonitic development, coarse bioclastic beds, syndimentary brecciation												
209.00	4CCS Calcisiltite	209.00											
211.50	Intermixed calcisiltites and calcilutites with some syndimentary brecciation	230.70	Minor calcite veining and stringers										
211.50	4CCL Calcilutite												
214.00	Partially rotted calcilutite with some calcarenites including syndimentary breccias; some argillaceous calcisiltites												
214.00	4CCA Calcarenite												
214.40	Equigranular calcarenite with argillaceous calcisiltite beds												
214.40	4CCS Calcisiltite												
216.70	Intermixed calcisiltites and calcilutites; partially rotted; locally coarsely bioclastic												

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Lithology			Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i>	<i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>								
216.70	4CCL	Calcilutite												
217.85		Rotted interlaminated calcilutites with clays												
217.85	4ST	Siltstone												
219.65		Red-brown non calcareous mudstone/siltstone with a sandy base; no obvious bedding												
219.65	4CCL	Calcilutite												
220.60		Fenestrate calcilutite												
220.60	4CCS	Calcsiltite												
222.25		Intermixed calcsiltites with large nodular texture; argillaceous bands up to 5cm												
222.25	4SS	Sandstone												
223.00		Calcareous sandstone; red-pink colour												
223.00	4CCS	Calcsiltite												
223.70		Intermixed calcsiltites with large nodular texture; argillaceous bands up to 5cm												
223.70	4CCL	Calcilutite												
225.70		Interbedded to interlaminated calcilutite with laminae of argillaceous material												
225.70	4CCS	Calcsiltite												
226.50		Intermixed calcsiltite and fine grained calcarenite												
226.50	4CCL	Calcilutite												
230.70		Massive calcilutite with well developed cleavage; localised zones of coarse bioclasts; fenestrate texture; partially rotted												
230.70	4CCS	Calcsiltite	230.70											
233.90		Zone of intermixed calcsiltites and red mudstones; limestone fragments in red matrix breccias (earthy hematite)	258.60		Localised zones of more intense calcite veining, particularly near faults; Red earthy hematite breccia matrix									
233.90	4CCS	Calcsiltite												
244.10		Zone of intermixed calcsiltites and red mudstones; less massive red beds and more breccias than overlying unit					234.50	235.10	1438	0.00		0.00	-5.00	
							235.50	236.00	1439	0.00		0.01	-5.00	
							241.90	242.90	1440	0.01		0.02	-5.00	
244.10	4SS	Sandstone												
245.10		Calcareous sandstone												
245.10	4SS	Sandstone												
247.90		Intermixed red mudstones, red calcareous sandstones, white calcareous sandstones, synsedimentary breccias												
247.90	4CCR	Calcirudite												
249.90		Mixed sequence of synsedimentary breccias with tetradium fragments, calcarenites underlain by a basal section of calcilutite and argillaceous calcsiltites												

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Lithology		Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i> <i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>								
249.90	FZ Fault Zone												
250.40	Clay gouge and rock fragments												
250.40	4CCS Calcsiltite												
252.50	30cm of collapsed breccia followed by 30cm of calcilutite and then a mixture of calcsiltites, synsedimentary breccias, red bed breccias and argillaceous calcsiltites												
252.50	FZ Fault Zone												
254.30	Clay gouge and rock fragments												
254.30	4CCS Calcsiltite	258.60											
258.65	Intermixed calcsiltites and argillaceous calcsiltites; nodular texture; stylocumulates	276.00	Minor calcite veining and stringers										
258.65	4CCL Calcilutite												
261.10	Calcilutite with interlaminated zones with argillaceous calcsiltites												
261.10	4CCA Calcarenite												
264.90	Fine grained calcarenite becoming intermixed with calcsiltite; some synsedimentary breccias; some rotted parts; some calcilutites												
264.90	4CCL Calcilutite												
267.60	Calcilutites with fenestrate texture; locally rotted with core loss												
267.60	4CCS Calcsiltite												
271.20	Intermixed calcsiltites and argillaceous calcsiltites												
271.20	FZ Fault Zone												
272.25	Broken core and gouge												
272.25	4CCA Calcarenite	276.00											
280.00	Fine grained equigranular calcarenite; massive bedding, limited of argillaceous calcsiltite material	280.00	Increase in calcite vein frequency										
280.00	4CCS Calcsiltite	280.00											
281.90	mixed zone of synsedimentary breccias, calcsiltites, calcarenites; coarse bioclastic bands; argillaceous base to unit	297.20	Minor calcite veining and stringers										
281.90	4CCL Calcilutite												
283.10	Interbedded calcilutites with interlaminated argillaceous calcsiltites												
283.10	4CCS Calcsiltite												
288.10	Intermixed calcilutites and argillaceous calcsiltites; some mottled texture; localised zones of rotted core												
288.10	4CCL Calcilutite												
290.00	Intermixed calcilutite with subordinate calcarenite zone												

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Lithology			Alteration		Mineralization		Assay							
From	Code	Rock Name	From	Code	From	Code	From	To	#	Cu%	Mo%	Zn%	Ag(g)	Au(g)
To	Description		To	Description		To	Description							
290.00	4CCS	Calcsiltite												
292.90		Intermixed calcsiltites and argillaceous calcsiltites; localised coarse bioclast bands; some mottled texture												
292.90	4CCL	Calculutite												
295.20		Intermixed calcilutite with subordinate calarenite zone passing up into interlaminated calculutite and argillaceous calcsiltite												
295.20	4CCS	Calcsiltite												
297.20		Intermixed calcsiltites and calculutites; small nodular texture locally; distinct upper contact												
297.20	VN	Vein	297.20											
298.60		Calcite vein with a section of limestone breccia in a calcite matrix	320.40		Major zone of calcite veining and some brecciation; variable intensity and frequency									
298.60	4CCS	Calcsiltite												
301.65		Zone of mixed units with abundant calcite veining												
301.65	4CCL	Calculutite												
303.70		Locally interlaminated calculutite with fenestrate texture												
303.70	4CCS	Calcsiltite												
305.80		Intermixed calcsiltites and argillaceous calcsiltites with a 40cm equigranular calcarenite unit at base												
305.80	FZ	Fault Zone												
306.40		Possible fault zone with calcite veining; ?dolomitisation												
306.40	4CCS	Calcsiltite												
316.40		Veined and brecciated intermixed calcsiltites and argillaceous calcsiltites; localised synsedimentary breccias; nodular texture; odd smectite/mudstone zone at 311.3m; localised limestone rotting												
316.40	FZ	Fault Zone												
316.70		Fault zone with red calcareous sandstone clasts												
316.70	4CCS	Calcsiltite												
320.40		Intermixed calcsiltites and argillaceous calcsiltites. Some unusual breccias in an argillaceous matrix (also seen before fault)												
320.40	4CCS	Calcsiltite	320.40											
322.60		Dark grey/black argillaceous calcsiltite ?dolomitised	345.50		Minor calcite veining and stringers									
322.60	4CCA	Calcarenite												
323.30		Coarse bioclastic calcarenites and argillaceous calcsiltite												

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Lithology		Alteration		Mineralization		Assay							
<i>From Code</i>	<i>Rock Name</i>	<i>From Code</i>	<i>Description</i>	<i>From Code</i>	<i>Description</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
323.30	4CCL Calcilutite												
328.30	Calcilutite with localised sections of interlamination with argillaceous calcsiltite; localised clay zones with core loss - rotted limestones												
328.30	4CCS Calcsiltite												
331.00	Fining upward clean calcsiltite sequence with a calcarenite base												
331.00	4CCL Calcilutite												
331.50	Interlaminated calcilutite												
331.50	4CCS Calcsiltite												
335.00	Relatively clean massive calcsiltite with very localised argillaceous beds/stylolites? Stylocumulates?												
335.00	4CCA Calcarenite												
339.00	Clean fine grained equigranular calcarenite with minor argillaceous stylolites; partially rotted with core loss; transitional upper contact												
339.00	4CCS Calcsiltite	345.50		341.60	PY								
350.50	Intermixed calcsiltites and argillaceous calcsiltites; minor calcarenite bands; localised	350.50	Increased intensity of calcite veining and stringers	350.50	Rare pyrite blebs associated with calcite								



NORANDA INC.

Drill Hole Log

Drillhole Collar

Hole-ID: ZC01-002 **Length:** 155 **Units:** Metres
Started: 14/10/2001 **Proj. #:** 156 **Project:** Zeehan Carbonate
Finished: 16/10/2001 **Claim #:** EL6/2001 **Logged By:** S.Tear
Drill Type: UDR650 **Case Pld:** **Contractor:** DD (Tas)
Core Size: HQ/NQ **Case Dep:** **Core Location:** DD(Tas) shed, Zeehan

Co-ordinates - GEMCOM

Easting: 369701
Northing: 5352021
Elevation: 184
Plot_Sys: AGD 84
NTS:

Co-ordinates - Grid

Easting: 69686.00
Northing: 2016.00
Elevation: 184.00
Grid Declin:
Mag Declin: -12

Co-ordinates - UTM

Easting: 369701
Northing: 5352021
Elevation: 184
UTM Declin:
UTM Zone: 55

Co-ordinates - Lat/Long

Latitude:
Longitude:

Collar Survey: No

Target: Basal Gordon Limestone test (Grieves Position); 45 degree dipping magnetic feature inferred to be related to siderite alteration.

Geophysics:

Remarks: Proposed Hole B2. No significant sulphide mineralisation.

Downhole Survey

Distance	Dip	Mag Azm	True N Azm	Type	Comments
0.00	-45.00	229.00	217.00	COLLAR	Hole Spotted
52.00	-46.00	226.00	214.00		
106.00	-47.00	227.00	215.00		

Geology

Lithology

Alteration

Mineralization

Assay

From Code **Rock Name**
To Description

From Code
To Description

From Code
To Description

From To # Cu% Mo% Zn% Ag(g) Au(g)

0.00 **OB** (Alluvial) Overburden

8.50 Sandstone pebbles and gravel; very poor recovery

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Lithology			Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i>	<i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>								
8.50	9DC	Dark Clay												
20.30	Black clays with major cavities; poor recoveries						8.50	10.00	1442	0.00		0.12	-5.00	
							10.00	11.50	1443	0.00		0.60	-5.00	
							11.50	13.00	1444	0.00		0.10	-5.00	
							13.00	14.50	1445	0.01		0.12	-5.00	
							17.50	19.00	1446	0.01		0.03	-5.00	
							19.00	20.30	1447	0.01		0.05	-5.00	
20.30	4CCS	Calcsiltite	20.30											
25.90	Argillaceous calcsiltite intermixed with calcsiltite; partially weathered/rotted; major 4m cavity; poor recoveries		58.00	Minor calcite veining										
25.90	4CCS	Calcsiltite												
28.70	Intermixed argillaceous calcsiltite and calcilutite; partially rotted; some coarse bioclast bands; mottled appearance													
28.70	4CCS	Calcsiltite												
31.50	Clean calcsiltite with minor argillaceous calcsiltite bands; more rotted basal section													
31.50	4CCS	Calcsiltite												
33.00	Argillaceous calcsiltite with a coarse bioclastic base													
33.00	4CCS	Calcsiltite												
33.70	Coarsely bioclastic clean calcsiltite; abrupt and irregular base													
33.70	4CCA	Calcarenite												
38.60	Fining upward sequence of clean calcarenites (into calcsiltite and calcilutite); stylonitic; localised coarse bioclastic band													
38.60	4CCS	Calcsiltite												
41.00	Clean calcsiltite with argillaceous wisps and thin bands; coarse bioclastic zones; some larger scale nodular texture													
41.00	4CCS	Calcsiltite												
42.80	Clean calcsiltite with increased amounts of argillaceous calcsiltite bands; small scale synsedimentary breccias													
42.80	4CCA	Calcarenite												
47.70	Equigranular calcarenite with localised coarse bioclastic zones becoming more rotted downhole; cavities													
47.70	4CCS	Calcsiltite												
50.80	Clean calcsiltite with argillaceous calcsiltite; mottled zones; locally coarse bioclast bands (?syringapora); becoming more argillaceous downhole													

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Lithology			Alteration		Mineralization		Assay							
From	Code	Rock Name	From	Code	From	Code	From	To	#	Cu%	Mo%	Zn%	Ag(g)	Au(g)
To	Description		To	Description		To	Description							
50.80	4CCS	Calcsiltite												
57.00		More argillaceous than above unit; possibly becoming more rotted downhole; major 3m cavity at base												
57.00	4CCS	Calcsiltite												
58.00		Rotted mixture of argillaceous calcsiltite bands and bioclastic calcilutite					57.00	58.00	1448	0.01		0.00	-5.00	
58.00	9DC	Dark Clay												
60.00		Dark grey/black clay; rotted limestone					58.00	59.50	1449	0.01		0.01	-5.00	
							59.50	61.00	1450	0.01		0.06	-5.00	
60.00	9DC	Dark Clay												
69.00		Very major core loss; cavities and dark clays					61.00	64.00	1458	0.00		0.01	-5.00	
							64.00	65.50	1459	0.00		0.01	-5.00	
							65.50	67.00	1460	0.00		0.01	-5.00	
							67.00	68.50	1461	0.00		0.02	-5.00	
							68.50	70.00	1462	0.00		0.02	-5.00	
69.00	9DC	Dark Clay												
75.80		Black/dark grey clay with rotted limestone fragments					70.00	71.50	1463	0.00		0.03	-5.00	
							71.50	73.00	1464	0.00		0.02	-5.00	
							73.00	74.50	1465	0.00		0.01	-5.00	
							74.50	75.00	1466	0.00		0.08	-5.00	
75.80	4CCS	Calcsiltite												
78.50		Intermixed calcsiltite and argillaceous calcsiltite; rotted limestones; possible shearing												
78.50	4CCA	Calcarenite	78.50											
84.90		Equigranular bioclastic calcarenite with minor argillaceous bands; partially rotted	100.30		Minor calcite veining									
84.90	4CCS	Calcsiltite												
90.00		Intermixed calcsiltite and argillaceous calcsiltite; locally bioclastic bands; minor synsedimentary brecciation												
90.00	4CCA	Calcarenite												
91.20		Equigranular bioclastic calcarenite												
91.20	4CCS	Calcsiltite												
92.90		Intermixed calcsiltite and argillaceous calcsiltite; locally bioclastic bands; minor synsedimentary brecciation; stylonitic												
92.90	4CCS	Calcsiltite												
95.00		Calcsiltite with light brown clay zones (weathered siderite?)												
95.00	4CCR	Calcirudite												
95.80		Coarse bioclastic debris (?stromatolites); calcite cavity infill - Irish-type?												
95.80	4CCS	Calcsiltite												
96.40		Intermixed calcsiltite and argillaceous calcsiltite												

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Lithology			Alteration		Mineralization		Assay							
From	Code	Rock Name	From	Code	From	Code	From	To	#	Cu%	Mo%	Zn%	Ag(g)	Au(g)
To	Description		To	Description		To	Description							
96.40	4CCR	Calcirudite												
96.60		Coarse bioclastic debris (?stromatolites)												
96.60	4CCS	Calcsiltite												
97.70		Intermixed calcsiltite and argillaceous calcsiltite												
97.70	4CCR	Calcirudite												
98.50		Coarse bioclastic debris (?stromatolites)												
98.50	4CCS	Calcsiltite												
99.70		Clean calcsiltite with coarse bioclastic zones; brown clay base - Possible fault?												
99.70	4CCA	Calcarenite												
100.30		Equigranular bioclastic calcarenite												
100.30	4CCS	Calcsiltite	100.30											
103.60		Intermixed calcsiltite and minor argillaceous calcsiltite; locally bioclastic bands; basal equigranular calcarenite	104.20		Very minor patches of siderite									
103.60	9DC	Dark Clay												
104.20		30cm clay zone (?siderite) juxtaposed with 30cm calcite vein					103.60	103.90	1468	0.01		0.08	-5.00	
104.20	4CCA	Calcarenite	104.20											
107.40		Equigranular calcarenite	107.40		Some calcite veining; fe-calcite									
107.40	4CCS	Calcsiltite	110.00											
110.10		Argillaceous calcsiltite with strong shearing fabric	115.30		Brown clay (?weathering or siderite?)									
110.10	9DC	Dark Clay												
110.50		Light brown clay (not a fault)												
110.50	4CCS	Calcsiltite												
111.50		Sheared and fractured argillaceous calcsiltite												
111.50	4CCS	Calcsiltite												
113.60		Rounded limestone fragments redrill. Gravel? Difficult to tell if in situ												
113.60	4CCS	Calcsiltite												
115.30		Heavily sheared friable limestones; badly broken core					115.00	116.00	1469	0.00		0.01	-5.00	
115.30	4CCS	Calcsiltite	115.30											
117.30		Pervasively siderite altered basal limestone sequence	124.50		Locally pervasive siderite alteration		116.00	117.00	1470	0.00		0.00	-5.00	
117.30	4CCS	Calcsiltite					117.00	117.80	1471	0.00		0.00	-5.00	
119.10		Lt grey/brown latered limestone with strong siderite alteration					117.80	118.60	1472	0.00		0.01	-5.00	
119.10	9DC	Dark Clay					118.60	119.10	1473	0.01		0.01	-5.00	
120.10		Brown clay					119.10	120.15	1474	0.00		0.04	-5.00	
120.10	9DC	Dark Clay												
120.50		Black clay					120.15	120.65	1475	0.00		0.01	-5.00	

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Lithology			Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i>	<i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>								
120.50	9DC	Dark Clay												
123.00		Intermixed sequence of brown clays, grey clays and sideritised limestones					120.65	121.40	1476	0.00		0.03	-5.00	
							121.40	121.90	1477	0.00		0.04	-5.00	
							121.90	122.50	1478	0.00		0.02	-5.00	
							122.50	123.00	1479	0.00		0.04	-5.00	
123.00	9DC	Dark Clay												
124.50		Light brown clays					123.00	123.80	1480	0.00		0.03	-5.00	
							123.80	124.50	1481	0.00		0.01	-5.00	
124.50	9DC	Dark Clay												
130.00		Light grey/white clays with zones of core loss					124.50	125.00	1482	0.01		0.02	-5.00	
							125.00	126.00	1483	0.00		0.02	-5.00	
							126.00	127.00	1484	0.00		0.08	-5.00	
							127.00	127.60	1485	0.00		0.01	-5.00	
							127.60	129.20	1486	0.00		0.00	-5.00	
							129.20	130.00	1487	0.01		0.01	-5.00	
130.00	4SS	Sandstone												
131.40		Intermixed grey fine grained sandstone and light grey/white clay zones with core loss					130.00	131.35	1488	0.01		0.01	-5.00	
							131.35	132.00	1489	0.00		0.00	-5.00	
131.40	4SS	Sandstone	131.40											
132.70		Medium grained sandstone with brown (?siderite alteration)	132.70		Brown alteration, possibly siderite		132.00	132.70	1490	0.00		0.00	-5.00	
132.70	4SS	Sandstone												
135.90		Fine grained grey sandstone with core loss												
135.90	4SS	Sandstone												
139.40		Grey, coarse grained friable sandstone with major core loss; basal contact very narrow and clayey, possibly faulted												
139.40	4ST	Siltstone												
143.00		Interbedded siltstones and sandstones; grey, green and maroon in colour												
143.00	4SS	Sandstone												
155.00		massive quartzite with minor siltstone beds; Cambrian sediments												



NORANDA INC.

Drill Hole Log

Drillhole Collar		Hole-ID: ZC01-003	Length: 373.5	Units: Metres
Started	20/10/2001	Proj. #:	156	Project: Zeehan Carbonate
Finished:	31/10/2001	Claim #:	EL6/2001	Logged By: R.Henry
Drill Type:	UDR650	Case Pld:		Contractor: DD (Tas)
Core Size:	HQ/NQ	Case Dep:		Core Location: DD(Tas) shed, Zeehan
<u>Co-ordinates - GEMCOM</u>		<u>Co-ordinates - Grid</u>		<u>Co-ordinates - UTM</u>
Easting:	366538	Easting:	65420.00	Easting: 366538
Northing:	5351401	Northing:	50650.00	Northing: 5351401
Elevation:	252	Elevation:	252.00	Elevation: 252
Plot_Sys:	AGD 84	Grid Declin:		UTM Declin:
NTS:		Mag Declin:	-12	UTM Zone: 55
Collar Survey: No				
Target: Upper contact limestone test of anomalous aircore geochemistry proximal to a major basement break.				
Geophysics:				
Remarks: Local grid coordinate error of 20m. Aircore anomalism appears to be explained by sphalerite and galena in vein system. Replacement pyrite at 263.4 clearly cut by younger vein system.				

Downhole Survey

Distance	Dip	Mag Azm	True N Azm	Type	Comments
0.00	-47.00	220.00	208.00	COLLAR	Hole Spotted
33.00	-51.00	220.00	208.00		
80.00	-52.00	220.00	208.00		
130.00	-52.00	221.00	209.00		
180.00	-53.50	219.50	207.50		
230.00	-53.50	220.00	208.00		
280.00	-53.50	221.00	209.00		
330.00	-53.50	193.00	181.00		

Geology

Lithology

Alteration

Mineralization

Assay

ZC01-003

From Code	Rock Name	From Code	From Code	From	To	#	Cu%	Mo%	Zn%	Ag(g)	Au(g)
To Description	To Description	To Description									
0.00	4SS Sandstone										
16.30	Triconed no recovery										
16.30	4SS Sandstone										
22.50	White oxidised sandstone										
22.50	4SS Sandstone										
37.90	Partially weathered sandstone with siltstone laminae with core loss										
37.90	4ST Siltstone										
43.30	Laminated siltstone and fine grained sandstone										
43.30	4SS Sandstone										
49.40	Light grey sandstone with some laminated siltstone										
49.40	4SS Sandstone										
58.50	Massive light grey sandstone fining upwards										
58.50	4ST Siltstone										
80.30	Grey to dark grey siltstone, thin beds with fine laminae of sandstone, locally oxidised; burrowed										
80.30	4SS Sandstone										
81.10	Siliceous quartzite										
81.10	4ST Siltstone										
87.30	Laminated to thinly bedded siltstones and fine sandstones										
87.30	4SS Sandstone										
90.30	Grey/white thickly bedded sandstone										
90.30	4ST Siltstone										
101.50	Laminated to thinly bedded siltstones and fine sandstones; burrows										
101.50	10BX Breccia										
102.80	Siltstone and sandstone fragments in clay - probable fault										
102.80	4SS Sandstone										
109.10	Intermixed sandstone and siltstone										
109.10	4ST Siltstone										
114.10	Clayey sandstone and siltstone - possibly part of fault zone										
114.10	4SS Sandstone										
129.30	Hard light grey massive sandstone; siliceous with quartz vein networks										
129.30	10BX Breccia										
131.00	Brecciated sandstone and siltstone										
131.00	4SS Sandstone	131.00	SIL								
146.50	Brown-grey quartz sandstone, hard and siliceous locally oxidised zones	146.50	Pervasive silicification								
146.50	9DC Dark Clay	146.50									
149.00	Clay with sandstone and siltstone fragments; ?part of shallowing sequence	170.90	Clay alteration ?weathering	147.00	148.00	1492	0.00		0.00	-5.00	
				148.00	149.00	1493	0.00		0.01	-5.00	

ZC01-003

Lithology			Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i>	<i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>								
149.00	9DC	Dark Clay			149.00	PY								
170.90	Dark grey/black clay with relict breccia textures and oxidised sandy zones				170.90	Trace pyrite	149.00	150.00	1494	0.00		0.01	-5.00	
							150.00	151.00	1495	0.01		0.01	-5.00	
							151.00	152.00	1496	0.00		0.01	-5.00	
							152.00	153.00	1497	0.01		0.01	-5.00	
							153.00	154.00	1498	0.00		0.00	-5.00	
							154.00	155.00	1499	0.01		0.00	-5.00	
							155.00	156.00	1500	0.01		0.00	-5.00	
							156.00	157.00	1501	0.00		0.00	-5.00	
							157.00	158.00	1502	0.00		0.00	-5.00	
							158.00	159.00	1503	0.00		0.02	-5.00	
							159.00	160.00	1504	0.00		0.01	-5.00	
							160.00	160.70	1505	0.00		0.03	-5.00	
							160.70	161.30	1506	0.00		0.02	-5.00	
							161.30	162.00	1507	0.00		0.01	-5.00	
							162.00	163.00	1508	0.00		0.00	-5.00	
							163.00	164.00	1509	0.00		0.00	-5.00	
							164.00	165.00	1510	0.00		0.00	-5.00	
							165.00	166.00	1511	0.00		0.00	-5.00	
							166.00	167.00	1512	0.00		0.01	-5.00	
							167.00	168.00	1513	0.00		0.02	-5.00	
							168.00	169.00	1514	0.00		0.00	-5.00	
							169.00	170.00	1515	0.00		0.00	-5.00	
170.90	4CCS	Calcsiltite	170.90	DOL										
193.90	Dolomitised calcsiltite with vuggy zones - the Upper Dolomite Unit - with clayey zones algal laminite at 191m		242.50	Pervasive dolomite with localise quartz carbonate veinlets and stockworks; Vuggy										
193.90	4CCA	Calcarenite												
204.80	Dolomitised calcarenite with subordinate calcsiltite;vuggy and veined													
204.80	4CCS	Calcsiltite												
211.60	Dolomitised calcsiltites with minor calcilutites with a fine stockwork vein system; stylolites at 206m													
211.60	4CCA	Calcarenite												
216.00	Dolomitised calcarenite													
216.00	4CCS	Calcsiltite												
222.30	Dolomitised calcsiltite vuggy with minor calcarenite													
222.30	4CCA	Calcarenite												
232.30	Intermixed dolomitised calcsiltite and calcarenite; stylolitic at 229.2m													
232.30	4CCS	Calcsiltite												
242.50	Dolomitised vuggy calcsiltite with minor caclarenite; major core loss for basal 2m possible fault End of Upper Dolomite Unit?													

ZC01-003

Lithology			Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i>	<i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>							
242.50	4CCS	Calcsiltite	242.50	DOL										
254.70		Dolomitised grey to dark grey calcsiltite with minor calcarenite	294.20		Pervasive non vuggy dolomite with localise quartz carbonate veinlets and stockworks									
254.70	4CCS	Calcsiltite												
256.50		Dolomitised dark grey black calcsiltite				256.50	PY							
256.50	4CCS	Calcsiltite				263.40	Pyriye with sphalerite in veins							
263.40		Dolomitised grey to dark grey calcsiltite with												
263.40	4CCS	Calcsiltite												
264.70		Dolomitised black calcsiltite												
264.70	4CCA	Calcarenite												
278.50		Dolomitised calcarenite; localised synsedimentary breccias												
278.50	4CCS	Calcsiltite												
296.50		Dolomitised intermixed calcsiltite and calcarenite; basal 2.3m as core loss ?cavity												
296.50	4CCL	Calcilutite												
313.40		Light grey to grey calcilutite and dark grey argillaceous calcsiltite; wavy laminae zones; burrowed												
313.40	4CCR	Calcirudite												
315.80		Calcirudite interbedded with calcilutite and calcsiltite												
315.80	4CCL	Calcilutite												
319.50		as before												
319.50	10VN	Vein												
320.00		Breccia vein												
320.00	4CCA	Calcarenite												
324.40		Grey calcarenite with minor calcilutite												
324.40	4CCS	Calcsiltite												
330.15		Grey calcsiltite with burrows; thinly bedded in places												
330.15	4ST	Siltstone												
338.50		Dark grey to black calcareous siltstone with some light grey calcsiltite - Lords Siltstone Member												
338.50	4CCS	Calcsiltite												
346.50		Intermixed dark grey, light grey calcilutites, calcsiltites and calcareous siltstones; thin to laminar bedding												
346.50	4ST	Siltstone												
358.60		Dominantly dark grey calcareous siltstone intermixed with calcsiltite and calcilutite; bioclastic												

ZC01-003

Lithology			Alteration		Mineralization		Assay							
<i>From</i>	<i>Code</i>	<i>Rock Name</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>Code</i>	<i>From</i>	<i>To</i>	<i>#</i>	<i>Cu%</i>	<i>Mo%</i>	<i>Zn%</i>	<i>Ag(g)</i>	<i>Au(g)</i>
<i>To</i>	<i>Description</i>		<i>To</i>	<i>Description</i>	<i>To</i>	<i>Description</i>								
358.60	4ST	Siltstone												
363.20		Mixed sequence of calcirudites, black calcareous siltstones, calcsiltites and calcilutites; lamainar in places; coarsely bioclastic - End of the Lords Siltstone Member												
363.20	4CCR	Calcirudite												
369.00		Coarsely bioclastic calcirudite and calarenite;												
369.00	4CCL	Calcilutite												
371.90		Grey calcilutite and black siltstone												
371.90	4CCS	Calcsiltite												
373.50		Grey calcsiltite with minor black siltstone with calcirudite beds												

TABULATED DATA LISTING**Exploration Licence 6/2001****Annual Report To June 2002**

File Name	Tenement Holder	Tenement ID	Data Type	Location (100K Map Sheet)	Date Last Modified	Consultant Name
EL062001_200206_12_Drill.txt	Noranda Pacific P/L	EL06/2001	Drilling – Collar	SK55	June 2002	Benmore Exploration Pty Ltd
EL062001_200206_13_Drill.txt	Noranda Pacific P/L	EL06/2001	Drilling – Downhole Survey	SK55	June 2002	Benmore Exploration Pty Ltd
EL062001_200206_14_Drill.txt	Noranda Pacific P/L	EL06/2001	Drilling – Lithology	SK55	June 2002	Benmore Exploration Pty Ltd
EL062001_200206_15_Drill.txt	Noranda Pacific P/L	EL06/2001	Drilling – Assay	SK55	June 2002	Benmore Exploration Pty Ltd
EL062001_200206_16_Drill.txt	Noranda Pacific P/L	EL06/2001	Drilling – Recovery	SK55	June 2002	Benmore Exploration Pty Ltd
EL062001_200206_17_Drill.txt	Noranda Pacific P/L	EL06/2001	Drilling – Mineralisation	SK55	June 2002	Benmore Exploration Pty Ltd
EL062001_200206_18_Drill.txt	Noranda Pacific P/L	EL06/2001	Drilling – Alteration	SK55	June 2002	Benmore Exploration Pty Ltd

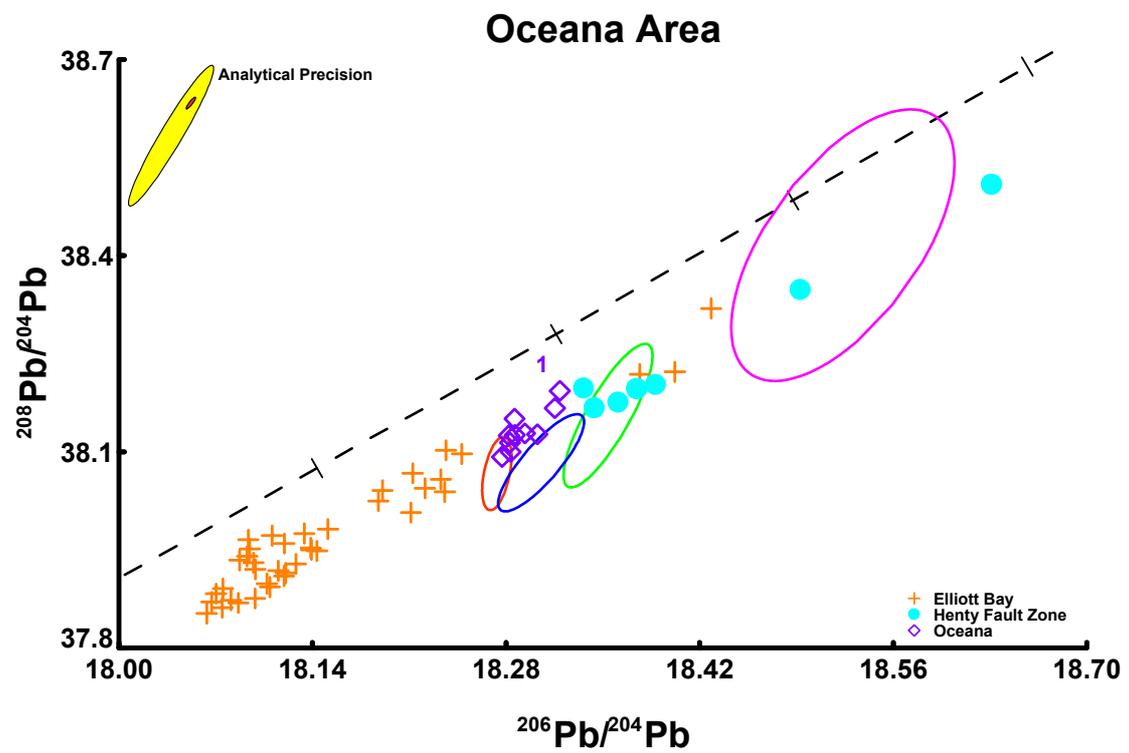
Appendix 6

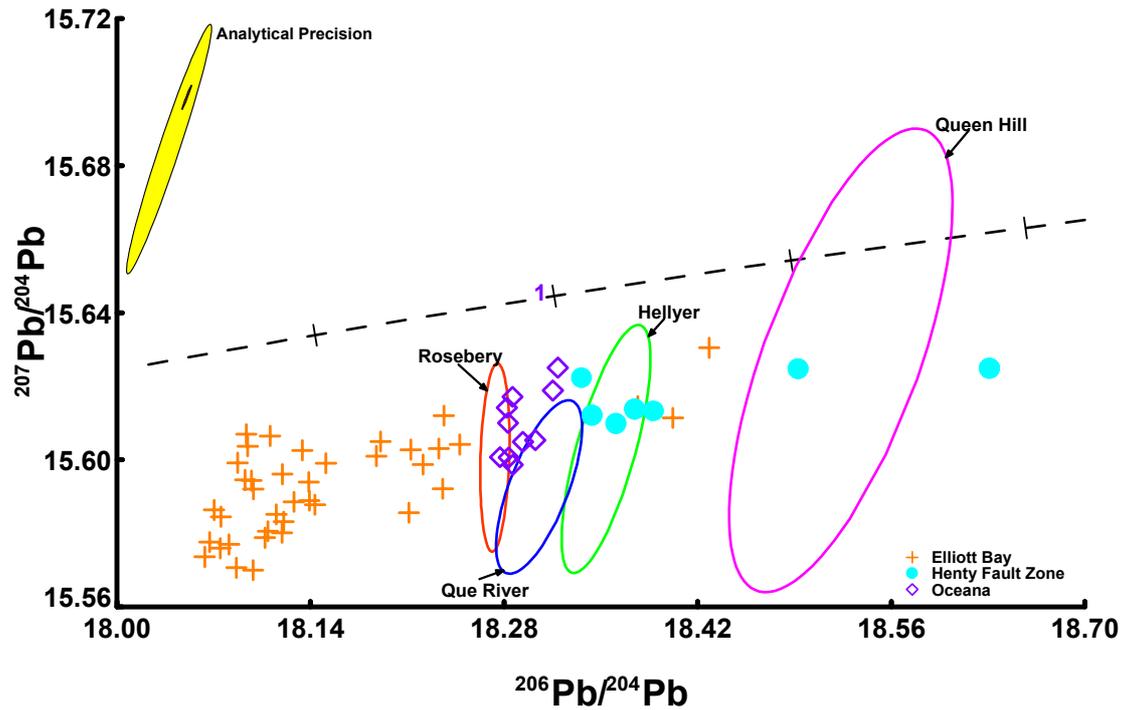
CSIRO Lead Isotope Analysis Report

Dear Simon

Here is the result from the Pb isotope analysis of your exploration sample from near the Oceana prospect in northwest Tasmania.

Plot No.	Sample No.	$^{206}\text{Pb}/^{204}\text{Pb}$	$^{207}\text{Pb}/^{204}\text{Pb}$	$^{208}\text{Pb}/^{204}\text{Pb}$	Quality High=0 Low=9
1	ZC01-003	18.306	15.645	38.234	1

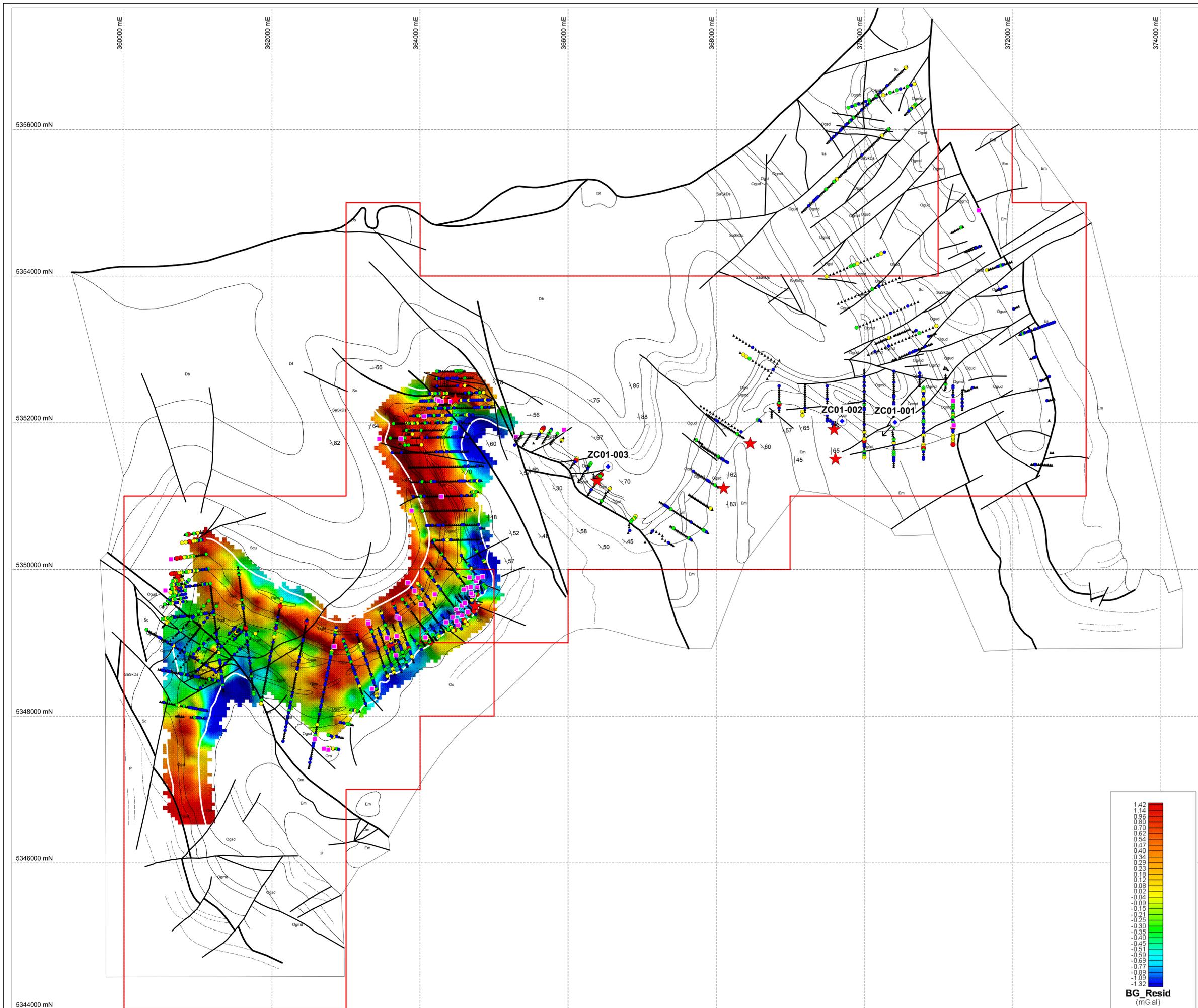




The data has been plotted against varying styles of mineralisation in Tasmania. The Elliott Bay data represents base metal mineralisation possibly related to Cambrian granitoids. Rosebery, Que River and Hellyer represent the Cambrian VHMS mineralisation of the Dundas Trough. The Henty Fault Zone mineralisation represents a Devonian volcanogenic event. Queen Hill represents a Devonian granite related signature. The Oceana deposit has been described as a Sedex deposit, but more recently is thought to represent Irish style mineralisation hosted within Ordovician Gordon Limestone.

The data plots within the Cambrian mineral field. Given the analytical precision of our data it is possible that ZC01-003 has the same Pb isotopic composition as the Oceana deposit. As ZC01-003 is hosted in Ordovician Gordon Limestone and is proximal to the Oceana deposit it is likely that it is related to the same metallogenic event.

Figures

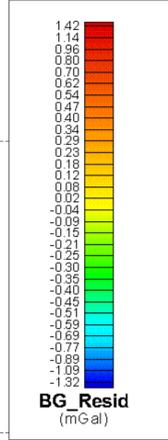


Geological_Unit	Description
Db	Bell Shale
Df	Florence Quartzite
Em	Mafic Units
Es	Sediments
Ogar	Argillaceous Unit
Ogdl	Dolomitic Unit
Ogmd	Middle Dolomite Unit
Ogsd	Siderite Unit
Ogsi	Siltstone Unit
Ogud	Upper Dolomite
Ogul	Limestone
Om	Moina Sandstone
Oo	Owen Conglomerate
P	Undifferentiated Sediments
SaSkDs	Austral Creek Siltstone
Sc	Crotty Quartzite
Scu	Unidentified Unit

- Legend**
- EL6/2001 Boundary
 - Gordon Limestone Contact
 - Lithological Contact
 - Major Fault
 - Fault
 - ★ Old Working
 - / Bedding
 - Previous Diamond Drilling
 - Noranda Drillhole Locations

Professor_Creek_Surface_Gchem by SUM_ZNPB

●	0.4 to 1.26 (70)
●	0 to 0.4 (177)
●	-0.25 to 0 (298)
●	-0.5 to -0.25 (641)
▲	-1.33 to -0.5 (2040)



AMG North
Magnetic North (112°)

Noranda Pacific Pty Limited

Zeehan Carbonate Project
Professor Creek EL 6/2001
Bouguer Gravity and Bedrock
Zinc Geochemistry

Author: S.Tear Date: 13/06/02 Sheet Ref: SK55
 Drawn: C.Brown Date: Source: Scale: 1:25000
 Revised: Date: File name/path: Professor Creek Annual/Figures/07 Figure No.: 7

Map Projection:
AMG Zone 55, AGD 66