

SOUTH EASTERN RESOURCES PTY LTD

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HENTY ROAD

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by

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EXECUTIVE SUMMARY

The Grieve Siding area, situated approximately 10 km south of Zeehan on the Henty Road to Strahan, contains an unusual zinc deposit ('Grieves') hosted in Ordovician limestone. The weathered or secondary part of the deposit contains dominantly sphalerite with a little galena in a largely organic matrix while the deeper parts contain a mixture of carbonates, aluminosilicates and a little sphalerite. The normal mineral zonation is thus inverted in this deposit. The reason is not altogether clear but is possibly related to the overlying peat bog.

There has been considerable previous work by several explorers including geology which is limited by available outcrop, geochemistry, aeromagnetism, gravity, electromagnetics, over 400 drill holes of various sorts and some metallurgical work. Non JORC compliant estimates of the resource were made for the Primary Zone of 650,000-750,000t @ 7-9% Zn and secondary Zone of 150,000-200,000t @ 4-6% Zn Newnham (1999b). Previous workers have generally abandoned the area as a result of corporate restructuring or change of corporate direction rather than lack of exploration results. Nevertheless this style of mineralization presents a difficult exploration target. Previous work has been extensive, expensive and produced little.

In the past the known mineralization has generally been considered too small, too difficult to treat and not worth the process development required in view of the small tonnage available. South Eastern Resources (SER) acquired the tenement with the aim of growing the resource to the point where extraction and process development might be economically viable.

The style of mineralization has been variously described as Mississippi Valley Type or Irish Style according to the geologists working on the area.

Feasibility studies have been made in the past (Newnham 1999b) which indicated that development might be feasible if the metallurgical extraction problems could be resolved.

During the year the geology and geophysics have been reviewed leading to a forward exploration program, resource computations for the secondary sphalerite have been brought up to the JORC Inferred status at 409,000t at 3.9% Zn, the feasibility studies revisited and a start made on attacking the metallurgical problems which have been confirmed post reporting period: previous problems had been thought to be possibly due to oxidized samples.

The results of the year's work indicate that extraction prospects are now much brighter than in the past due to the current price of Zinc. Forward forecasts suggest this state will last for some time due to upcoming mine closures without replacements. The principal current obstacle at Grieves is metallurgy and investigations are proceeding. It has been established that conventional flotation methods are not applicable to the secondary zone and are not suitable for the primary zone. Other processes have also been examined including the Intec process being investigated by Intec Ltd for treating the Hellyer Mine tailings. This has many advantages but it appears there will be no capacity to treat material (e.g. From Grieves) in the foreseeable future at Hellyer.

The immediate forward exploration program will trial 3D Induced Polarization at Grieves followed by drilling of targets. If the IP is successful it will be extended to cover more prospective zones in the tenement.

KEYWORDS

3D IP

aeromagnetics

Badger River

Baura

Blackjacks

bulk sampling

carbonate hosted zinc

dolomitization

Drillhole Data Base

EL47/2004

electromagnetics

exploration program

feasibility studies

Firewood Siding

flotation

gorse

gravity

Grieve Siding

hydrothermal alteration

Intec Process

Irish style

JORC inferred resource

JORC resource

Mariposa

metallurgy

mineralization

mineralogy

Myrtle

net present value

Oceana

organic matrix

oxide ores

Professor Range

resource estimate

Rose Valley

secondary sphalerite

siderite

sphalerite

sphalerite clays

Table of Contents

EXECUTIVE SUMMARY.....	2
EL472004_060606_01_Report.pdf.....	2
KEYWORDS.....	3
TENURE.....	6
Figure 1. Map of EL47/2004.....	6
ACCESS	6
INTRODUCTION.....	7
PHYSIOGRAPHY.....	8
PREVIOUS WORK.....	9
Table 1. Prior Work in the area.....	10
GEOLOGY.....	11
Regional Setting.....	11
Local Stratigraphy.....	11
Cambrian.....	11
Ordovician Conglomerates.....	11
Ordovician Sandstone.....	11
Ordovician Limestone.....	11
Silurian Quartzite.....	12
MINERALIZATION.....	13
Figure 6. Possible mineralization in sandstones.....	15
GEOPHYSICS.....	16
Magnetics.....	16
Gravity.....	16
Electromagnetics – UTEM & DIGHEM.....	17
Geophysics Based Future Exploration.....	17
FEASIBILITY STUDIES.....	18
Table 2. NPV estimate 1.	19
Table 3. NPV estimate 2.....	20
Table 4. NPV estimate 3.....	21
ENVIRONMENTAL.....	22
CONCLUSIONS.....	23
FUTURE PROGRAM & BUDGET.....	24
REFERENCES.....	25
FIGURES.....	27
Figure 2. Deposit & Prospect Locations	27
Figure 3. Satellite image of Grieves.....	28
Figure 4. Grieves Cross section.....	29
Figure 5. Stratigraphic levels of mineralization.....	30
Figure 6. TMI image.....	31
Figure 7. 1VD image.....	32
Figure 8. Residual TMI image.....	33
Figure 9. TMI image with AGC.....	34
Figure 10. Gravity image.....	35
FIGURES IN SEPARATE FILES (digital version).....	36
Figure 2. Deposit & Prospect Locations EL472004_060606_02_Figure02.pdf.....	36
Figure 3. Satellite image of Grieves. EL472004_060606_03_Figure03.pdf.....	36
Figure 4. Grieves Cross section. EL472004_060606_04_Figure04.pdf.....	36

Figure 5. Stratigraphic levels of mineralization EL472004_060606_05_Figure05.pdf.....	36
Figure 6. TMI image. EL472004_060606_06_Figure06.pdf.....	36
Figure 7. 1VD image EL472004_060606_07_Figure07.pdf.....	36
Figure 8. Residual TMI image EL472004_060606_08_Figure08.pdf.....	36
Figure 9. TMI image with AGC EL472004_060606_09_Figure09.pdf.....	36
Figure 10. Gravity image EL472004_060606_010_Figure10.pdf.....	36
MINERALOGY - APPENDIX 1	37
EL472004_060606_11_Mineralogy.pdf.....	37
RESOURCE ESTIMATION – APPENDIX 2.....	38
EL472004_060606_12_Resource.pdf.....	38

TENURE

In mid 2004 an area previously held by Allegiance from 1998 as a 1km² Rentention Licence was opened for tender under the Mineral Resources Tasmania ERA program. Applied Geophysical Research Pty Ltd applied for the ERA 626 area and a further 22km² of the surrounding limestones. This area was granted as EL47/2004 on 10/2/2005 for a maximum period of 5 years. A map of the area from TIGER appears below as Figure 1. The EL is outlined in red. As reviews of previous work progressed it became apparent that there were adjacent related targets and the areas immediately north and east of the original application were applied for.

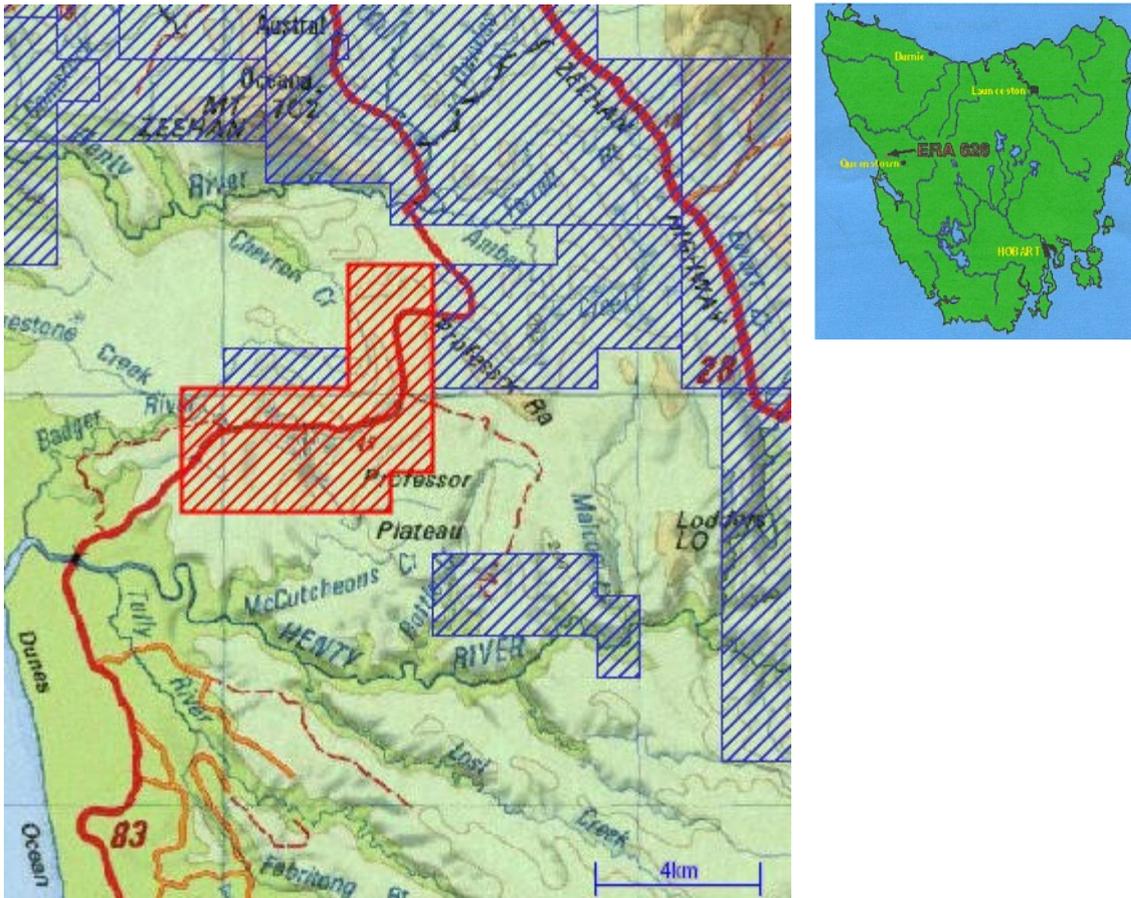


Figure 1. Map of EL47/2004.

The Queensbury Track branches from the Zeehan-Strahan Road in the licence and the Grieves deposit lies on either side of the track to the north of the Professor Plateau escarpment.

ACCESS

For Grieves there is good access from the main Henty Road passing through the centre of the EL, the Queensbury Track which crosses the eastern part of the Grieves deposit, an overgrown track currently disconnected from the main road leading to gravel pits further west on the deposit. Other tracks afford access to the Myrtle Prospect etc. However, off these tracks there is generally button grass peat bog and some scrub which will make equipment access difficult and require environmental sensitivity. The rehabilitation after previous work is described in the ENVIRONMENTAL section.

INTRODUCTION

The Grieves Siding zinc deposit is located in western Tasmania some 10km south of Zeehan on the south side of the Zeehan – Strahan (Henty) Road. Unlike most of the deposits in the Zeehan Field which are vein style mineralization related to Devonian granite emplacement this deposit appears to have formed syngenetically with the Ordovician limestone host rocks. It has been suggested on the basis of lead isotope signatures that the metal was derived from a still cooling pile of Cambrian Mount Reid Volcanics. It might also be noted that igneous activity was occurring at this time in areas on the mainland.

Various authors have attributed the deposit to the Irish or Mississippi Valley style, apparently according as to their background. The Oceana Mine just south of Zeehan seems to be in a similar style. As in the case of the Irish deposits which appear to form in clusters Grieves does not occur in isolation. The areas studied so far by various explorers are shown in Figure 2. There is more zinc to the north at Myrtle, to the northwest at Firewood Siding and to the west at Baura and Rose Valley. At King Billy to the east drilling has revealed siderite altered hydrothermal breccias comparable to those associated with some Irish deposits. Other probably genetically related deposits occur in the limestones south of Zeehan and north of the EL. These include Oceana, Blackjacks and Mariposa indicating that the whole belt of the Ordovician limestones in the area potentially host this type of mineralization. Mineralization appears to occur at three distinct levels in the limestone: at the base (Grieves), in the middle of the section (Oceana) and there are suggestions of mineralization at the top of the limestones as well.

Amoco? The deposit was explored by RTZ and Allegiance until 1998. From then until 2004 it was held as a Retention Licence by Allegiance with essentially no further work. In mid 2004 the Retention Licence area was opened for tender under the Mineral Resources Tasmania ERA program. Applied Geophysical Research Pty Ltd was granted Exploration Licence EL 47/2004 known as Henty Road in early 2005. The EL covers an area of some 21 km² enclosing the 1km² Allegiance Retention Licence. It covers the adjacent Ordovician limestones which have the potential to host further mineralization.

With the long exploration history there is a voluminous literature and significant data from drilling. This year the geology and geophysics has been reviewed, a database constructed from the drilling, a JORC compliant resource estimate obtained for the 'sphalerite clays' or weathering zone mineralization, arrangements made to start resolving some of the metallurgical problems associated with the secondary mineralization and future exploration program strategy determined.

PHYSIOGRAPHY

The rocks of interest are the Ordovician carbonates forming the floor to the valleys e.g. That of the Badger River. These rocks are mostly covered by peat bogs so outcrop in many areas is minimal. The Ordovician sandstones underlying the limestones crop out on the southernmost border of the valleys forming a steep scarp rising to the Professor Plateau. The northern boundary marks the transition into Silurian quartzites again with a pronounced rise in elevation.

Along the margin of the Professor Plateau to the south of Grieves the scarp is cut by deep gullies. One marks the position of the Grieves Fault, the others certainly also mark fault positions. There is no such expression on the other side (top) of the limestone suggesting that these faults were growth faults active during limestone deposition.

A satellite image (Figure 3) shows that the limestone is folded on a large scale and this folding is reflected in the physiography.

PREVIOUS WORK

Previous work is described under a number of locality names within TIGER requiring individual reference in some cases to locate reports i.e. The cross referencing is inadequate. This initially made discovery difficult. Different localities involved are sometimes virtually synonymous e.g. Grieve Siding and Badger River (the main river in the valley containing Grieves). The Badger River locality referred to is just across the Henty Road from Grieves. Yet more relevant reports are to be found under Oceana, Mariposa etc. The related deposits e.g. Oceana to the north are described in another group of reports. The collected literature is large. Drill hole localities are described in a similarly diverse way. The situation is further complicated by the apparent lack of information flowing between holders of the Retention Licence over Grieves and those exploring nearby.

Much of the grid at Grieves remains intact from previous work as do many drill collars. In the course of fieldwork it became apparent that at least along the Queensbury track there were small but significant errors in the relationship between the grid and the maps of previous explorers and this difference was also revealed consistently by GPS measurements. The distances involved are small and seem to involve only the eastings e.g. Drillhole collars mapped as just off one side of the Queensbury Track are in fact on the opposite edge of the track. So far this has not been critical and it is not known how general the error is on the grid but it is noted here for future consideration.

The general area of Ordovician carbonates was subject to considerable exploration effort from the mid 1980's through the mid 1990's with sporadic efforts since. Initially the main explorers were Amoco and EZ followed by CRAE. In 1987 Mathison & Taylor reviewed the geology of the Oceana Mine, a carbonate hosted deposit mined in the late 1950's and concluded it had many similarities to the Irish style carbonate hosted deposits which at various times have accounted for up to 7% of the world zinc production. This led to detailed exploration around the mine by an EZ/Amoco joint venture which confirmed the style and estimated a resource of 2.45Mt @ 9% Pb and 4% Zn. Note that Oceana is a lead dominant system in contrast to Grieves which is zinc dominated. This led to a search for Irish style deposits throughout the carbonates around Zeehan. CRAE acquired a dominant position in 1991 with a JV with Major Mining whose interest was later acquired by Allegiance Mining NL. CRAE discovered the Grieves resource estimated at 0.7Mt @ 8% Zn and a secondary resource at Myrtle of about 0.5Mt @ 2-3% Zn. CRAE restructured and terminated their program abruptly in May 1996. Allegiance held Grieves under a retention licence for some time before turning their full attention to the Avebury nickel deposit. Noranda acquired much of the carbonates south of Zeehan in 2001 including the area of EL47/2004. Having discovered interesting targets and drilling some holes without great success they too abruptly abandoned the field due to corporate restructuring.

Thus the history of the field is of very limited discovery after much expense and drilling with efforts curtailed by corporate changes in direction or restructuring. Over 41km of drilling and sampling has produced only two small low grade deposits (Grieves, Myrtle) of any economic interest. The lesson is clearly that the approaches based on the methods used so far are not cost effective assuming always that there are discoveries to be made. What is required is a method providing much more effective and selective targeting for drilling.

There are also some obvious deficiencies in the previous work. It has always been assumed that the Grieves Fault was a pathway for mineralizing solutions. Yet examination of the drilling at Grieves shows that there has been no drilling at all in close proximity to or through the fault. This is a remarkable omission. Further, the same examination reveals that a considerable part of the Grieves mineralization 'boundary' remain open.

Type of Work	Quantity (Utility)	Metres
Drilling		
Diamond	66	10,259
Winkie	28	644
Aircore	884	13,538
Geochemistry		
Bedrock/Wacker	2559 samples (Ineffective)	18,892
Costeans	Myrtle, Baura, Grieves, Rose Valley (Ineffective)	400m. Ineffective – overburden too thick at >6m.
Geophysics		
Helimag	Whole area at 60m height	60m line spacing
Gravity	Myrtle, Grieves, Baura	
Geophysics	(This Group considered ineffective – though not all were tried.)	
Resistivity	No use discovered.	
EIP/MIP	Not Tried in Grieves area – but see Exploration Program	
UTEM	Produced responses – not mineralization. (Bishop, 1985)	
EM37	May have detected weak conductor at Mariposa (Staples, 1985)	
Turair EM	No use discovered.	
Dighem II	No conductors located at Oceana (Dvorak & Fraser, 1981)	
Downhole EM	No use discovered.	
SP/AP/EP	Might be effective for outcrop/subcrop targets.	

Table 1. Prior Work in the area.

Adapted from Tear (2002) with updates and commentary added.

Rather than repeat all the information in the voluminous prior reports a brief synthesis is presented here.

GEOLOGY

Tear (2002) as the last reporter gives a good summary of the general geology and the reader is referred there for more detail.

Regional Setting

The regional geology of western Tasmania was dominated by rifting during Late Precambrian to Early Cambrian times. This was followed in the Early to Mid Cambrian by arc-continent collision, subduction and ultramafic allochthon emplacement. The Dundas Trough developed containing siliciclastics and volcanic derived sediments. To the east and interfingering with the sediments the Mount Read Volcanics were being formed. The Ordovician sequence generally opens with localized conglomerates passing through sandstones to carbonates. The Mid Ordovician carbonates of the Gordon Group are part of a widespread sedimentary basin with variable rates of subsidence. These are the host rocks for Grieves and related deposits.

Mid to Late Devonian tectonic activity (Tabberabberan Orogeny) produced substantial deformation and the large scale folding that determines the gross structure of the carbonates around Zeehan (Figure 3).

Local Stratigraphy

The rocks in the EL are a conformable Ordovician to Devonian sedimentary sequence unconformably overlying Cambrian basement. The Ordovician through basal Silurian rocks are of particular interest here.

Cambrian

Interbedded siltstones and sandstones are the dominant rock types with some magnetic mafic igneous rocks. These rocks frequently form topographic highs.

Ordovician Conglomerates

The Owen Conglomerate and its correlates are very variable thickness (0-1000+m) coarse conglomerates usually silicified and often pink in colour. These rocks form topographic highs and form part of the Professor Range. These rocks probably formed as fan conglomerates along major active faults.

Ordovician Sandstone

The Moina Sandstone is a thin (not more than 100m) unit of variable thickness. It is a fine to medium grained well bedded sequence often with trace fossils. It may be a littoral sequence and passed upwards into limestones.

Ordovician Limestone

The Gordon Limestone is about 700m thick in the licence area but there may be sub basins at Myrtle that are deeper. The whole section is present in the Grieves area and is well sampled by drill hole ZG1007 which displays a wide range of carbonate lithologies. Tear (2002) describes some aspects of the sequence which form marker units. The deeper drilling at Grieves suggests a complex set of lithologies including syngedimentary breccias suggesting that the Grieves Fault and others of similar nature nearby may well have been growth faults. The mineralized limestone lithologies in

the deeper drill holes cannot be correlated with any certainty. Tear (2002) recognized a complicated basal unit in the bottom 70m of the limestone which is pervasively hydrothermally altered with dolomitization and sideritization. This basal sequence is the host for the Grieves mineralization.

The Lords Siltstone forms a marker throughout the Gordon Limestone. It marks a break in the sedimentary regime and is a fine grained argillaceous siliciclastic. At Myrtle it appears to be the main sulphide host.

An Upper Dolomite unit is recognized throughout the Zeehan area. The top of the limestone has a universal dolomitic overprint. At Firewood Siding this unit has local intense siderite alteration associated with zinc bearing siderite and clay (22m@1.46% Zn, 0.5% Pb from aircore drilling) which is rare at this stratigraphic position.

Silurian Quartzite

The Crotty Quartzite overlies the Ordovician carbonates and at Grieves forms the prominent north wall of the Badger River valley. There is divided opinion as to whether the transition is conformable or not. The sequence consists of some 490m of massive to thinly bedded variable grainsize sandstones and siltstones. It is the highest unit of interest here. The quartzite contains some magnetic features that may reflect the passage of hydrothermal fluids but these are little understood at present.

MINERALIZATION

Mineralization is widespread in the limestones (Figure 2) though only Oceana has seen significant mining. The other deposit of particular interest to us is Myrtle where a further low grade shallow poorly quantified resource exists. Resources are 0.5Mt @ 2-3% Zn at Myrtle and new estimates for Grieves are discussed in Appendix 2.

The mineralization at Grieves is very different from the vein style of the Zeehan Field. It has a Cambrian lead isotope signature suggesting the metals were derived from the Mount Read Volcanics presumably underlying the depositional site. The fluids may have been warmed by the still cooling Mount Read and related igneous activity. The mineralization appears to be syndepositional and it has been hypothesized that the Grieves Fault was a controlling feature in channeling fluids. As mentioned above there is more than one fault and examination of the rocks on the Professor scarp shows there is also significant fracturing parallel to bedding. The grade diagram resulting from resource calculations also suggests that the other faults are important as they divide the secondary ore into blocks of different grade. A cross section showing the general arrangement of mineralization around Grieves is given in Figure 4.

The characteristics of the Irish style deposits which are the conceptual model for Zeehan are set out below. Examples include the Navan Mine, about 90Mt @ 8% Zn and the Lisheen Mine with 14.4Mt @ 11.7%Zn. The general setting of these deposits (Shearley et al,1996, Anderson et al, 1995) are:

- 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 carbonates
- The Navan Mine Lisheen Mine are hosted by different lithostratigraphies but with contemporaneous host sediments..
- 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 early syndiagenetic normal faulting.
- Capping units to ore may be dolomitised units and/or strongly arenaceous rocks
- Locally high levels of argillaceous content within the limestone package

All of these characteristics fit the limestone hosted mineralization south of Zeehan.

The secondary mineralization lies under a shallow cover of peat bog overlying gravels and is most unusual for a weathering product consisting dominantly of sphalerite in an organic rich matrix rather than the usual oxide or carbonate minerals. The mineralogy is discussed in Appendix 1.

The primary mineralization is complex both structurally and mineralogically. Detailed examination of the secondary mineralization (Appendix 1) reveals quartz, muscovite, pyrite, sphalerite (+wurtzite?), galena, chlorite, dolomite, anhydrite and marcasite. A detailed examination of the oxide ore remains to be undertaken. In places primary sphalerite is found at shallow depths e.g. Hole ZWG1 at Badger River contains primary sphalerite dominant mineralization from 7.2-8.9m and 6.8m @ 8.5% Zn from 12.2-19.0m. More generally the deeper mineralization is thought to consist of some sphalerite, zinciferous siderite and zinc aluminosilicates. There is a need for better understanding of the mineralogy. Examination of the deeper drillholes reveals a complex pattern of

mineralization and carbonate lithologies and it is impossible to assess structure or continuity of mineralization from the available data. The mineralizing fluids were very low in sulphur (G. Green, MRT, pers comm) so much so that pyrite was not formed. The unusual mineralogy does not augur well for conventional processing methods.

Figure 4 shows an extrapolated section across the grieves area. Hole ZB1007/ZG1007 is of particular interest as it supports the idea that there are multiple horizons hosting sulphides at the bottom, middle and top of the limestone. The core from this hole was examined in the MRT Core Shed with particular attention to the mid level intersection. Unfortunately the core recovery in the intersection was very poor suggesting the mineralization is possibly fault related which raises questions, as yet unanswered, about the relative attitudes of the hole, fault and mineralization. Figure 5 shows the interpretation by Tear (2002) of the position of related deposits in the limestones.

It should be noted that if the Grieves model for mineralization is correct there is another possible mineralization site. This is in the sandstones beneath the limestones which may have had appreciable permeability at the time lending themselves as potential host rocks (Figure 6). Indeed, there are a series of small lead shows beneath the limestones that are worthy of study for this possibility. Certainly any geophysics done in future should extend some way into the sandstones on the Professor Plateau.

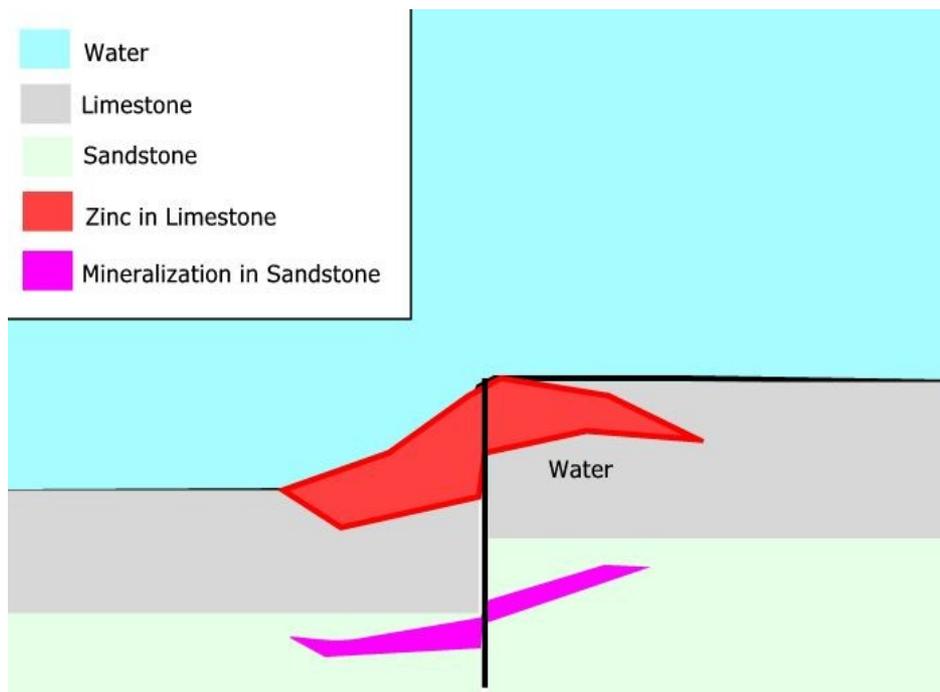


Figure 6. Possible mineralization in sandstones.

GEOPHYSICS

Magnetics

The whole area of the limestones in EL47/2004 and to the east has been covered by magnetics, part by Helimag at 60m elevation and 60m line spacing and magnetics provides by far the most comprehensive geophysical coverage. Geodiscovery processed the magnetic data into images for Noranda (Tear, 2002) for the usual Total Magnetic Intensity (TMI), First Vertical Derivative (1VD) presentations and also Residual Magnetics and a magnetic image with Automatic Gain Control. These are shown as Figures 6-9 The data is a mixture of Helimag and a complicated survey where the flight lines were perpendicular to the bedding of the regional folds. This has produced artefacts along the flight lines in the 1VD image. The survey extends well east of the licence.

The TMI image indicates the broad lithologies and there are a number of discrete anomalies labelled A-C in the mid to upper part of the limestone. These have not been remarked upon previously or investigated as magnetic anomalies.

The 1VD image clearly maps out different lithologies. Many limestone units appear as magnetic highs and others as lows. The magnetism in the limestones is probably due to siderite alteration and possibly ferroan dolomitization. The base of the limestone is one of the magnetic units. The magnetic lows are the more argillaceous beds. Given the paucity of outcrop the 1VD image is a powerful mapping tool.

The Residual Magnetic image is simply the TMI image with a third order trend surface removed. It adds little to the data available from the TMI image. If anything it enhances the magnetic effect of the limestones between Myrtle-Baura-Grieves which may reflect alteration. If this is so then either there is less alteration around Firewood Siding or the alteration is of a different type.

Gravity

Gravity coverage exists for the Myrtle, Grieves and Baura areas within the licence and at Mariposa without (Staples, 1985). Data is mostly from a detailed survey by EZ in the 1980s. The image from Tear (2002) is shown in Figure 10.

Tear discusses 5 features of interest in the gravity image:

- 2 small stratabound anomalies at Myrtle and Baura. The strike lengths are 800m and 1km respectively. They have been modelled but not drilled.
- A 350m diameter feature at Firewood Siding whose source is unknown. It is close to the major Firewood Siding Fault and there are hydrothermal silicic breccias nearby.
- A belt of highs associated with the upper part of the limestone. This is attributed to higher densities with dolomitization.
- A large lithology related feature at Myrtle south drilled to 702m by CRAE hole ZM189. This is thought to be a thicker area of limestone possibly related to synsedimentary movements.
- The gravity anomaly at Rose Valley (SW extremity of the limestone). The whole area is poorly explored.

In addition there are several unremarked features, the most obvious one being the gravity anomaly on the Grieves Fault in the Ordovician sandstones. It is a difficult area to do topographic correction in so this needs checking but if real it is in a very interesting position and would fit with the hypothesis for sandstone mineralization outlined elsewhere.

Electromagnetics – UTEM & DIGHEM

Bishop (1985) reports UTEM results for the Grieves and Myrtle grids. Several weak conductors were found but were attributable to contacts, fractures or faults.

Staples (1985) reported that a DIGHEMII survey over Oceana failed to locate any conductors. Being lead rich it seems probable that Oceana would be a better conductor than sphalerite rich deposits so they would be undetectable by this method.

Geophysics Based Future Exploration

The problem with the geophysics used to date is that there are no tightly defined targets so that exploration has really amounted to drilling through cover at zones rather than specific targets. Such an approach has, as might be predicted, a high cost and low success rate. Accordingly the geophysical results of other sediment hosted zinc deposits are of interest. While the deeper mineralization at Grieves may not be dominated by sphalerite there may well be enough for some geophysical techniques.

In some cases e.g. Navan, Ireland gravity has worked well because the deposit is large and at the surface. If such a body were present here it would likely have been found.

The best guidance probably comes from the sediment hosted Century deposit in North Queensland. In common with Grieves it has low iron sphalerite and contains organics. The geophysical characteristics of the Century deposit are summarized by Thomas *et al* (1992) and the geophysics is discussed by these authors and Mutton (2000). They describe mixed success with the application of geophysics. Density and susceptibility variations were not enough to cause useful gravity or magnetic anomalies that were associated with ore. Slight electrical contrasts gave little response from ground or airborne electromagnetic methods. Also, any conductive response of the sulphides was probably masked by the conductive shales and siltstones hosting the mineralization.

It was found that induced polarization surveys were successful at imaging the ore body, and DC resistivity data were able to outline overburden and structural information. Time domain and frequency domain IP surveys were used. Comparison showed that both detected the ore body and afforded good estimates of the extent and depth of mineralization. However, frequency domain results provided better definition because of the higher power and corresponding greater signal-to-noise ratio. It was suggested that complex resistivity methods might also discriminate the mineralization.

These results are in agreement with the wider ranging survey of zinc deposit characteristics by Bishop & Emerson (1999).

Applying this knowledge to Grieves indicates that IP with inversion may present a way forward. 3D IP should be used as the mineralization may be of complex shape requiring 3D models.

FEASIBILITY STUDIES

Newnham (1999b) produced approximate feasibility studies which suggested that it might be possible to economically extract zinc from the resource at Grieves. Such studies were revisited during the year as a cash flow from the mining the secondary material would expose the primary material and fund/facilitate additional metallurgy and exploration. One of the significant unknowns in the studies is the possibly difficult metallurgy. The studies available to Newnham showed that flotation produced poor recoveries (Newnham 1999c) but it was surmised that this may have been due to oxidized samples. Work completed past this reporting date shows that the problem is due to organics in the matrix which interfere with traditional flotation so the metallurgical problem remains at present. The feasibility studies assume that the metallurgical problems will be overcome.

Prices for zinc and costs have changed significantly since Newnham's estimates. Zinc prices are currently high but energy costs are high and volatile: both will probably remain so for some time. Other imponderables include exchange rates.

Two scenarios were examined, the first assuming that the material could be processed through Rosebery and the second with processing through the proposed Intec plant at Hellyer. A third possibility not studied yet is a local abbreviated Intec like process – much of the Hellyer circuit is required to extract material from pyrite which is not present here. (Incidentally it is interesting to note that chloride hydrometallurgy is not new. It was in successful use at Mt. Morgan, Queensland in the late 1800s.) Both scenarios have potential problems in terms of detailed suitability of the material in the deposit for the particular processes involved and also plant capacity to handle additional material. The conclusions were that the Intec process path could potentially provide superior returns.

Net Present Values were calculated for the deposit for various scenarios as set out in tables 2 to 4. The calculation requires numerous assumptions such as mining costs, recovery rates, transport costs etc which at this stage are necessarily approximate.

Estimates for mining costs and freight were obtained from local contractors. Freight costs are likely to vary significantly and possibly be significantly higher with rising fuel prices. Two figures, \$18/t & \$60/t are used reflecting possible transport costs to Rosebery and Hellyer. Some calculations use the higher figure throughout to examine the sensitivity to freight costs.

The price of zinc and exchange rates also enter the calculation. Exchange rates are unpredictable. After a period of low zinc prices the price had risen to around A\$2,000/t when modelling started. By the time this report was compiled the price was over A\$3,000/t. The price is clearly volatile although most forecasters believe that at least the short term outlook is for continued high prices due to upcoming mine closures, few replacements and buoyant demand.

Capital Expenditure (Capex in the calculations) varies between \$2.5M and \$12.5M for various cases.

Each set of calculations shows a Base Case based on knowledge of the deposit when the calculations were made and an Upside Case with more optimistic assumptions e.g. Tonnages, recovery rates etc. The purpose of the Upside models is to examine the effects of exploration success (tonnage) and processing (recovery).

Assumptions	Base Case			Upside Case	
	Sphalerite	Oxide	Total	Sphalerite	Oxide
Ore mined	350,000	800,000	1,150,000	800,000	1,500,000
Waste mined	100,000	1,600,000	1,700,000	200,000	2,000,000
Grade	3.9%	8.0%	6.8%	3.9%	8.0%
Price (A\$/t)	2000	2000	2000	3000	3000
Mining costs	\$7.00/t	\$7.00/t	7	\$7.00/t	\$7.00/t
Onsite processing (\$/t ore)	\$9.00/t	\$4.00/t	5.5	\$9.00/t	\$4.00/t
G&A	\$3.50/t	\$3.50/t	3.5	\$3.50/t	\$3.50/t
Recovery	85%	85%	85%	90%	90%
Concentrate grade	50%	50%	50%	50%	50%
Transport	\$60.00/t	\$18.00/t	30.78	\$60.00/t	\$18.00/t
Treatment penalty/cost	45%	\$100/t	n/a	45%	\$100/t
Economics (A\$'000s)					
Zinc in Concentrate	11,603	54,400	66,003	28,080	108,000
Tonnes concentrate	23,205	108,800	132,005	56,160	216,000
Gross revenue	23,205	108,800	132,005	84,240	324,000
Mining costs	-2,450	-16,800	-19,250	-5,600	-24,500
Onsite processing	-3,150	-3,200	-6,350	-7,200	-3,200
G&A	-1,575	-8,400	-9,975	-3,500	-12,250
Transport costs	-1,392	-1,958	-3,351	-3,370	-3,888
Treatment costs	-10,442	-10,880	-21,322	-37,908	-21,600
Net Operating Cash	\$4,195	\$67,562	\$71,757	\$26,662	\$258,562
Capex	-2,500	-10,000	-\$12,500	-2,500	-10,000
Pre-tax NPV	\$1,187	\$40,293	\$41,480	\$16,914	\$173,993
Total Pre-tax NPV					
	\$41M			\$190M	

Table 2. NPV estimate 1.

The Base Case uses approximate figures for currently estimated tonnages and grades. It suggests that the economics improve considerably when both the secondary sphalerite and the deeper oxide ores are mined. The Upside Case assumes a successful exploration effort has significantly increased tonnage at either Grieves or at one of the nearby prospects. The increase in value is dramatic.

Assumptions	Base Case			Upside Case	
	Sphalerite	Oxide	Total	Sphalerite	Oxide
Ore mined	350,000	800,000	1,150,000	800,000	1,500,000
Waste mined	100,000	1,600,000	1,700,000	200,000	2,000,000
Grade	3.9%	8.0%	6.8%	3.9%	8.0%
Price (A\$/t)	2000	2000	2000	3000	3000
Mining costs	\$7.00/t	\$7.00/t	7	\$7.00/t	\$7.00/t
Onsite processing (\$/t ore)	\$9.00/t	\$4.00/t	5.5	\$9.00/t	\$4.00/t
G&A	\$3.50/t	\$3.50/t	3.5	\$3.50/t	\$3.50/t
Recovery	85%	85%	85%	90%	90%
Concentrate grade	50%	50%	50%	50%	50%
Transport	\$60.00/t	\$60.00/t	60	\$60.00/t	\$60.00/t
Treatment penalty/cost	45%	\$100/t	n/a	45%	\$100/t
Economics (A\$'000s)					
Zinc in Concentrate	11,603	54,400	66,003	28,080	108,000
Tonnes concentrate	23,205	108,800	132,005	56,160	216,000
Gross revenue	23,205	108,800	132,005	84,240	324,000
Mining costs	-2,450	-16,800	-19,250	-5,600	-24,500
Onsite processing	-3,150	-3,200	-6,350	-7,200	-3,200
G&A	-1,575	-8,400	-9,975	-3,500	-12,250
Transport costs	-1,392	-6,528	-7,920	-3,370	-12,960
Treatment costs	-10,442	-10,880	-21,322	-37,908	-21,600
Net Operating Cash	\$4,195	\$62,992	\$67,187	\$26,662	\$249,490
Capex	-2,500	-10,000	-\$12,500	-2,500	-10,000
Pre-tax NPV	\$1,187	\$37,094	\$38,281	\$16,914	\$167,643
Total Pre-tax NPV	\$38M			\$184M	

Table 3. NPV estimate 2.

The effect of changing freight costs on some components of the previous model.

Assumptions	Base Case			Upside Case	
	Sphalerite	Oxide	Total	Sphalerite	Oxide
Ore mined	350,000	800,000	1,150,000	800,000	1,500,000
Waste mined	100,000	1,600,000	1,700,000	200,000	2,000,000
Grade	3.9%	8.0%	6.8%	3.9%	8.0%
Price (A\$/t)	2000	2000	2000	3000	3000
Mining costs	\$7.00/t	\$7.00/t	7	\$7.00/t	\$7.00/t
Onsite processing (\$/t ore)	\$9.00/t	\$4.00/t	5.5	\$9.00/t	\$4.00/t
G&A	\$3.50/t	\$3.50/t	3.5	\$3.50/t	\$3.50/t
Recovery	75%	75%	75%	75%	75%
Concentrate grade	50%	50%	50%	50%	50%
Transport	\$60.00/t	\$60.00/t	60	\$60.00/t	\$60.00/t
Treatment penalty/cost	45%	\$100/t	n/a	45%	\$100/t
Economics (A\$'000s)					
Zinc in Concentrate	10,238	48,000	58,238	23,400	90,000
Tonnes concentrate	20,475	96,000	116,475	46,800	180,000
Gross revenue	20,475	96,000	116,475	70,200	270,000
Mining costs	-2,450	-16,800	-19,250	-5,600	-24,500
Onsite processing	-3,150	-3,200	-6,350	-7,200	-3,200
G&A	-1,575	-8,400	-9,975	-3,500	-12,250
Transport costs	-1,229	-5,760	-6,989	-2,808	-10,800
Treatment costs	-9,214	-9,600	-18,814	-31,590	-18,000
Net Operating Cash	\$2,858	\$52,240	\$55,098	\$19,502	\$201,250
Capex	-2,500	-10,000	-12,500	-2,500	-10,000
Pre-tax NPV	\$250	\$29,568	\$29,818	\$11,901	\$133,875
Total Pre-tax NPV					
	\$29M			\$145M	

Table 4. NPV estimate 3.

The effect of lower recovery rates (75%) on the results of the previous model. It is apparent that it is critical to resolve the metallurgical issues to obtain best returns.

ENVIRONMENTAL

Preliminary field work examined the Grieves area with a view to assessing any environmental and access problems. There is an environmental problem which will need control and close monitoring in the form of gorse. Gorse has infested the sides of the Zeehan – Strahan road and the local authority is only controlling this on the road side of the table drains. The problem is not confined to the area about Grieves, rather it is a large scale environmental catastrophe along the Henty Road. Wherever there has been major ground disturbance (at Grieves along the Queensbury Track and in old gravel pits and their access track) gorse infestation has started. There appears so far to be no problem in slightly disturbed areas of peat cover. Clearly control measures to remove the present infestation and measures to prevent seed transport by vehicles or personnel will be required.

Old vehicle tracks over the peat from the last exploration at Grieves are faintly discernible but by and large natural re-vegetation has resulted in complete rehabilitation in the course of say a decade. This suggests that provided the peat cover is preserved or reinstated satisfactory rehabilitation will occur naturally.

CONCLUSIONS

Provided metallurgical problems can be overcome it is highly probable that under current economic conditions it would be economic to extract the zinc resource at Grieves. While it is not possible to calculate an oxide resource with certainty assuming previous estimates are approximately correct, the economics improve significantly if both the secondary sphalerite and oxide ores could be mined. Financial modeling shows that good recoveries are essential for a mining project to succeed. Growing the resource through exploration could dramatically enhance the economics.

Previous work has used most of the geological/geochemical information available. It has shown that if there is black pug/'sphalerite clay' near the surface then there is some zinc in the underlying limestone. However, this is unlikely to be true for a more deeply buried target. At least some of the zinc mineralization has associated arsenic geochemical anomalies. Previous exploration has accumulated magnetic, gravity and electromagnetic geophysical data whose interpretation may be refined e.g. By using electromagnetics to obtain weathering profiles for gravity corrections. The most important results from the geophysics are

- the detection of siderite alteration (or its weathering products) in the limestones by aeromagnetics. At Grieves there are two well defined horizons at Grieves itself and to the north in the vicinity of Badger River. At King Billy sideritic hydrothermal breccia is associated with a magnetic anomaly. Such breccias are associated with Irish deposits.
- The detection of possible sub basins at Myrtle via gravity. Such locations are favoured in Irish exploration.

The main problem with these results is that only generalized target areas result rather than specific drilling targets and lead to blanket drilling exploration approach. Comparison with other zinc deposits suggests that 3D IP might be able to provide specific targets and it should be noted that no IP has previously been used on these prospects. Accordingly these techniques will be tried shortly with drilling of targets produced.

FUTURE PROGRAM & BUDGET

Grievess is interesting because, as a geologist visiting the site remarked, 'you would never have come here if you were not model driven – there is virtually nothing to see at the surface'. Outcrop is minimal and short of blanket drilling the way forward must be guided by geophysics and whatever techniques are used they must produce definitive targets which can be tested economically.

The geophysical response of other zinc orebodies has been examined while reviewing the work on Grievess and the geophysical properties of other zinc mineralization has been collected in Bishop & Emerson (1999). The deposit found to be of greatest interest is the Century Mine in north Queensland. Of all the geophysics used at Century the only really successful technique was Induced Polarization. In my opinion the application of Induced Polarization with 3D techniques and inversion must be regarded as the geophysical technique most likely to be successful at Grievess. Accordingly these techniques will be applied, initially around Grievess and if positive results are obtained extended to cover as much of the limestone within the licence as practicable. Should this method be unsuccessful attempts will be made to refine the techniques already used and extract more information from the existing data.

Zinifex is committed to spend \$120,000 on metallurgy or exploration on the EL by 30 September 2006 under a Joint Venture arrangement. So far the expenditure has been on metallurgy aimed to investigate the possibility of treatment of the secondary ores through the Rosebery mill. However, part may also be spent on drilling dependant on the outcome.

Icon Resources has budgeted a further \$100,000 in the coming year to be spent largely on 3D IP starting with the Grievess/Badger River area. The timing will depend on contractor availability. A further \$400,000 has been budgeted for the subsequent year for drilling encouraging targets.

REFERENCES

- Anderson et al (Eds.) (1995) Irish Carbonate Hosted Zn-Pb Deposits – SEG Field Guide, Guidebook Series Vol 21
- Bishop, J.R. , 1985, Interpretation of UTEM Surveys Over the Grieves and Myrtle Grids (E.L. 4/78, Zeehan) MRT Report 85_2440A
- Bishop, J.R. & Emerson, D.W., 1999, Geophysical properties of zinc-bearing deposits, Australian Journal of Earth Sciences, **46**, pp. 311-328.
- Dvorak, Z., Fraser, D.C., 1981 DIGHEM II Survey of Zeehan Area, Tasmania. MRT Report 81_1593B
- Ellis A.P., 1984. Mineralisation and Palaeoenvironments in the Gordon Group Sediments, South of Zeehan, Western Tasmania. Unpublished Thesis.
- Mathison, I.J. & Taylor, S., 1987, Exploration Licence No 4/78 – Zeehan. Progress Report on Exploration Activity 30th April, 1986 to 30th April, 1987. MRT Report 87_2699
- Mutton, A.J., 2000, The application of geophysics during evaluation of the Century zinc deposit, Geophysics. **65**, Issue 6, pp. 1946-1960.
- Newnham, L.A., 1998, Report in Support of Retention Licence Application Grieves Siding Project (Zeehan) - EL 38/89 MRT Report 98_4193
- Newnham, L.A., 1999, Annual Report - Grieves Project, Zeehan Area, Y.E. Feb 1999, EL 38/89 MRT Report 99_4290
- Newnham, L.A., 1999b, Surficial Clay Zinc Deposits - Resource and Economic Potential, Grieves Siding Project MRT Report 99_4290A
- Newnham, L.A., 1999c, Zinc Flotation of Old Grieves Siding Drill Samples`, EL 38/89 MRT Report 99_4290B
- Parkinson, R.G., 1995, Zeehan No.4 EL 38/89, Tasmania Report on Exploration for the Fifth Year of Tenure 1/3/94 to 28/2/95. MRT Report 95_3714
- Shearley et al (1996). Geological controls on mineralisation and dolomitisation of the Lisheen Zn-Pb-Ag deposit, Co. Tipperary, Ireland. In Strogon et al (Eds) Recent Advances in Lower Carboniferous Geology, Geol Soc Spec pub no. 107 pp23-33
- Staples, P., 1985, Mariposa Prospect, Discussion of the EM-37 and Gravity Survey Results. MRT Report 85_2317A
- Tear, S., 2002, Annual Report for EL 6/2001 (Professor Creek) for the period 22nd June 2001 to 22nd June 2002 for Tenure Holder: Noranda Pacific Pty Ltd.
- Thomas, G., Stolz, E.M., Mutton, A.J., 1992, Geophysics of the Century zinc-lead-silver deposit, northwest Queensland, Exploration Geophysics, **23**, pp. 361-366.

DATABASE

As part of the resource calculations much of the drill hole data was compiled into an Access 2000 Data Base (accompanying this report as a separate file .MDB) used as input data for Datamine in resource calculations. (We are aware that previous tenement holders had such databases but they were never conveyed to MRT nor were we able to obtain them.) It also forms a starting point for incorporation into a more general GIS database. The database is ODBC compatible so it should be generally accessible and will be extended in the future. The structure of the database is self explanatory as regards drill collars etc. The assay data table contains the drill hole ID, assay interval and fields for Ag, Al, As, Ba, C, Ca, Cu, Fe, K, Mg, Mn, Pb, S, Zn etc. and Magnetic susceptibility. S is valuable for determining the sulphide/oxide nature of the mineralization. Not all the fields are populated and magnetic susceptibility is not available in all holes. Generally Ag, Cu, Fe, Mn, Pb & Zn values are present with e.g. S in certain cases. The tables etc are shown below:

