

**Zelos Resources NL**

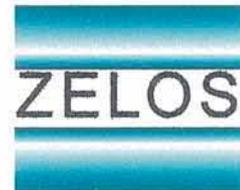
**EL 41 / 2004 Nelson Bay River**

**Year 1 Annual Report**

For the period 1 July 2005 to 1 March 2006

**W M Harder**

**14 November 2006**



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## ABSTRACT

EL 41/2004 was last explored in 2000 when Pacific Nevada carried out a two diamond drill hole exploration programme to test a large airborne magnetic anomaly in the centre of the licence. The target was gold and base metals. The holes intersected a west dipping dyke structure that contained only pyrite and magnetite mineralization. No further work was carried out.

Zelos Resources NL was interested to investigate this magnetic anomaly further and re look at it from a magnetite resource viewpoint and also investigate the other areas of targeted mineralization as outlined by our Independent Consultant Geologist as per the prospectus.

A programme of work proposal was submitted to the MRT and the Environmental Field Officer made a field visit with the company's consulting geologist.

A recommended programme of flora hygiene and quarantine was been submitted and approved and was put in place prior to the commencement of drilling in May 2006.

A line cutting contractor was engaged to extend the base line and prepare drill pad sites.

The EL 41/2004 looks promising for a magnetite resource suitable for use in coal washing and preparation plants.

The resources will undergo continuing exploration.

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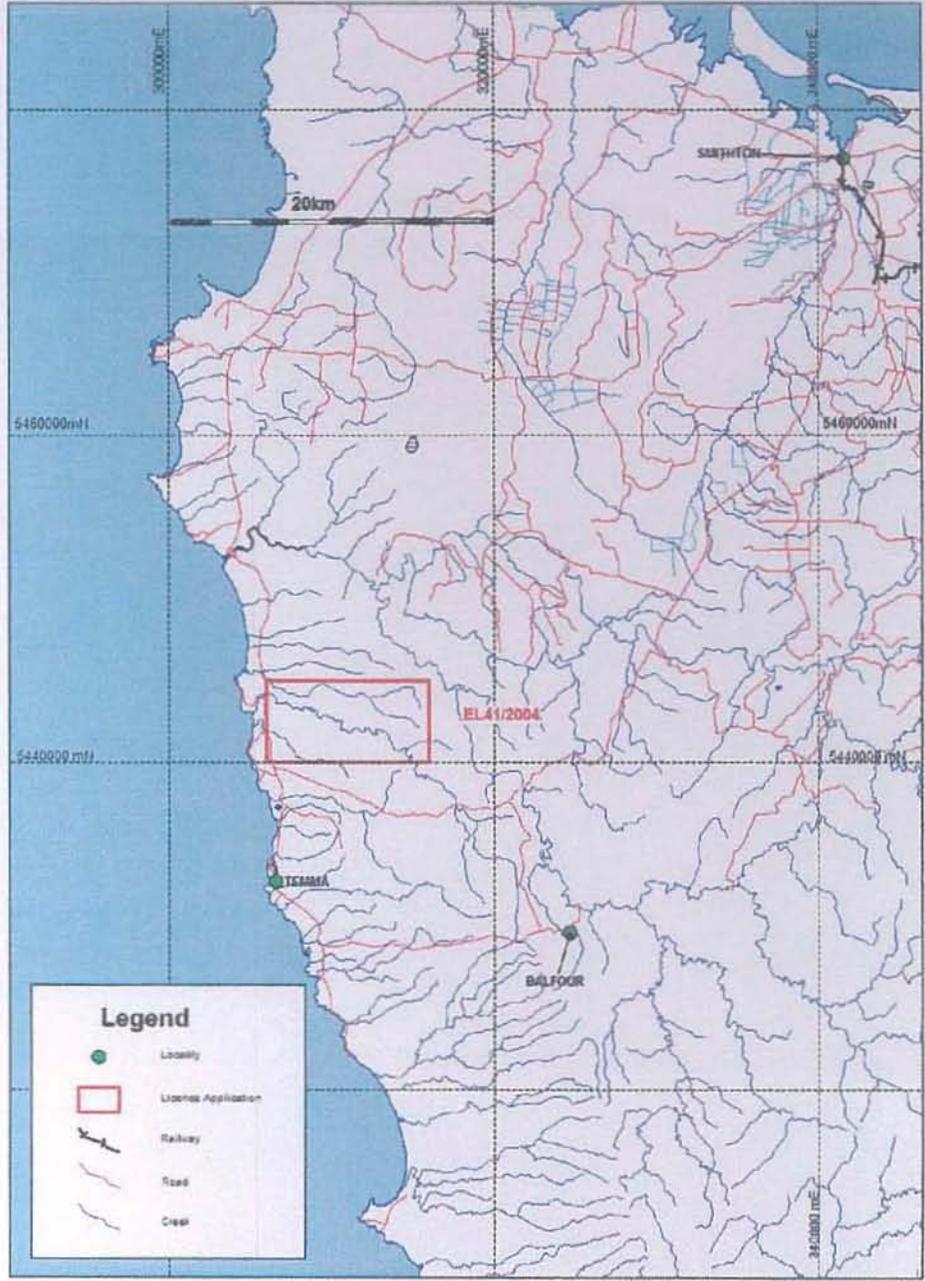
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# LOCATION MAP



# **1 Introduction**

## **1.1 Exploration Rational**

EL 41/2004 was last explored in 2000 when Pacific Nevada carried out a two diamond drill hole exploration programme to test a large airborne magnetic anomaly in the centre of the licence. The target was gold and base metals. The holes intersected a west dipping dyke structure that contained only pyrite and magnetite mineralization. No further work was carried out.

Zelos Resources NL was interested to investigate this magnetic anomaly further and re look at it from a magnetite resource viewpoint and also investigate the other areas of targeted mineralization as outlined by our Independent Consultant Geologist as per the prospectus.

## **1.2 Tenement Information**

The exploration licence EL 41/2004 measures 50 square kilometres and is located in the far North-West of the State near the small township of Temma about 70km southwest of Smithton.

The licence was granted for 5 years from 1 March 2004 until 1 March 2009.

The licence was granted to Zinico Resources NL which was listed on the Australian Stock Exchange on the 25<sup>th</sup> August 2005. At the AGM on 22<sup>nd</sup> November 2005 the company changed its name to Zelos Resources NL. The company holds a 100% interest.

This report therefore covers the nine month period from 1 July 2005 until 1 March 2006 which is the annual renewal date.

# NELSON BAY

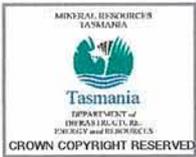
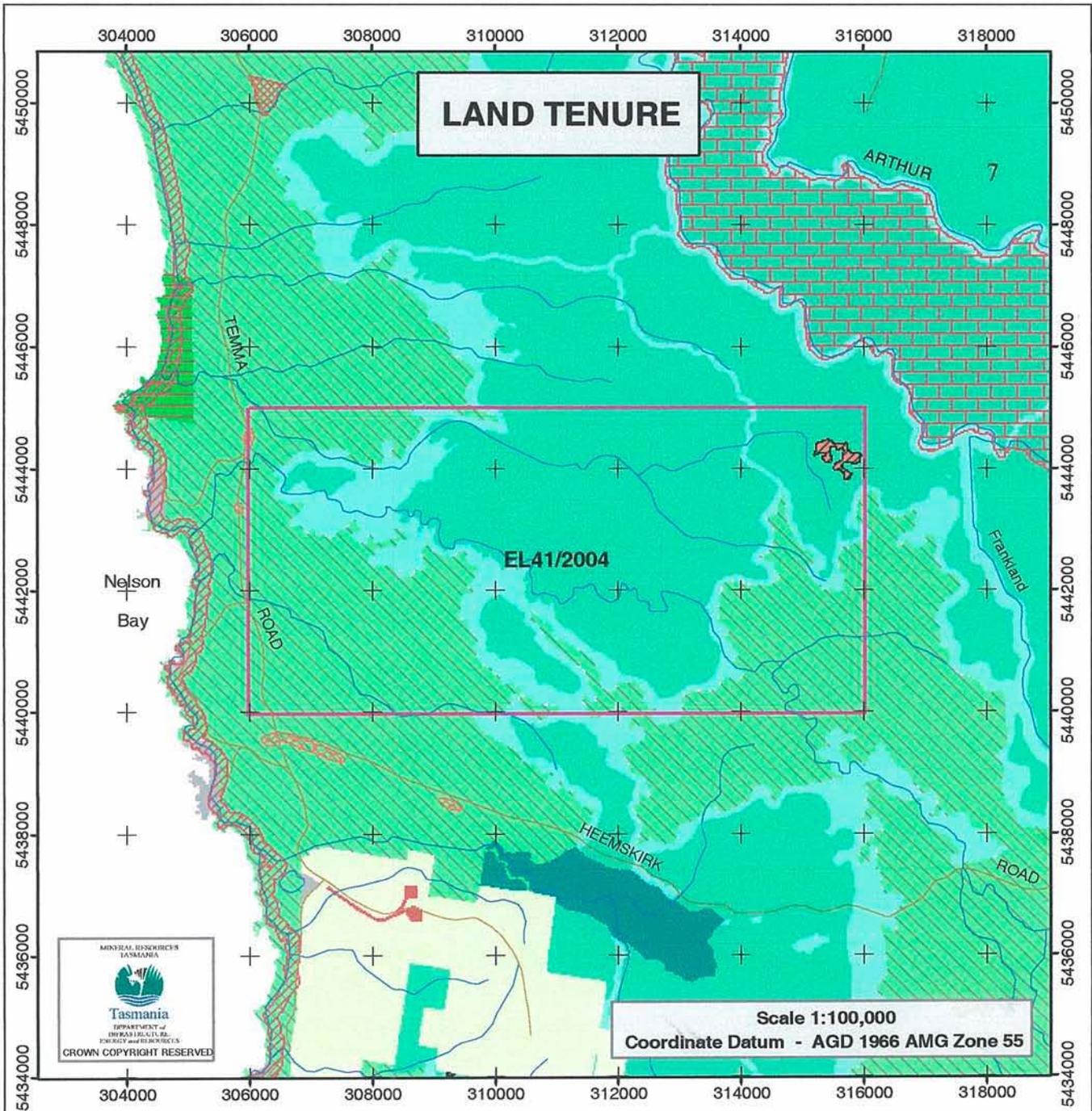
MARRAWAH 10 km

30 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20

**NELSON BAY SHEET**  
**TOPOGRAPHIC MAP**  
Scale 1: 100 000  
1cm = 1km



**EL 41/2004 Nelson Bay River**



Scale 1:100,000  
Coordinate Datum - AGD 1966 AMG Zone 55

**Land Tenure / Special Management Areas (Guide Only)**

	Exploration Licence		Aboriginal Administered Land		Private Nature Reserve
	Mining Lease		Private Land		Nature Reserve
	Fossicking Area		Proposed Private Land Reserve (RFA)		Private Sanctuary
	Gas Pipeline Corridor		Private Land Reserve (RFA)		Proposed Reserve
	RAMSAR Site		Crown Land		Wellington Park
	Phytoph Cin Management Zone		Public (Crown) Reserve		Hydro/Transend/Aurora Land
	Suspected Phytoph Cin region		Conservation Area		Commonwealth Land
	Forest Communities Managed by Prescription		Regional Reserve		
	MDC Informal Reserve		Nature Recreation Area		
	State Forest / Hydro		National Park		
	State Forest		State Reserve		
	Forest Reserve		Game Reserve		
	Administratively Excluded Areas		Historic Site		

**Relevant tenement land tenure / land management area indicated \***

Note: Land Tenure is derived from the LIST and other sources and may be incomplete. Not all Land Tenure depicted in legend may appear on the map.

## 2 Review of Previous Work

CRAE Pty Ltd carried out mapping and in 1983 and 1997 of the general area. Full details of this work are described in the consultants report attached.

Pacific Nevada held the licence in 2000 and carried out a diamond drilling programme. Their target was gold and base metal mineralization and when this was not found in the drill core the licence was relinquished.

In summary the two diamond drill holes were sited to drill to 55 degrees (magnetic) at -45 degrees dip and ended around 250m of inclined depth. They intersected a magnetite mineralized dyke. Full details of the results of this work are described in the consultants report which is appended.

This dyke became the focus for work carried out by Zelos Resources NL.



**Heathland grass and scrub on the southern edge of the EL**





## **2.1 Regional Geology**

The geology of the Nelson Bay River licence area consists of a mixed siltstones, sandstones and carbonaceous mudstones of the Cowrie Siltstone, part of the Rocky Cape Stratotectonic Element.

CRAE Pty Ltd mapped the area in 1997 and noted a sequence of northwest striking quartzites, black siltstones with cherts, chloritic siltstones (possibly volcanic tuffs) and black shales. Their detailed work also suggested a volcanic sinter in conjunction with the tuff units. Locally there is pyrite within the sediments and pyritic quartz veins are developed in fault zones. A black carbonaceous chert was found in Sundown Creek with anomalous levels of lead and arsenic. This unit is along strike from the magnetic anomaly

This regionally big magnetic anomaly is an iron lode and reported in the literature as a 40m wide dyke-like structure containing a quartz-carbonate-magnetite-pyrite-garnet-amphibole assemblage that cross cuts stratigraphy at right angles. This mineral style has been linked in the past to iron formations that occur at Tennant Creek, NT.

The airborne magnetic data indicates a slightly more varied picture than the geology map. There is a strong 4km long, stratabound magnetic feature coincident with the NBR copper/iron occurrence. This occurrence exists close to the boundary between two subtly distinct geological sub-terrane with the join terminating at a north-south striking set of presumed dolerite dykes. This structural setting in combination with the magnetic anomaly and mineral occurrence is considered very prospective. There are additional magnetic features that could indicate mineralization around the licence (see map p13).

There is also a mineral occurrence in the southwest corner of the licence, reported as a silver/copper anomaly with minor gold and arsenic.

## **2.2 Previous Exploration and Mining**

The area (in modern time) was looked at and drilled by Pickands-Mather (the developers of the Savage River Magnetite Mine in 1966). CRAE Pty Ltd in 1983 and 1997. Geopeko carried out field gridding and mapping in the mid 1980's. Pacific-Nevada drilled two diamond holes in 2000. (for details see consultants report appended).

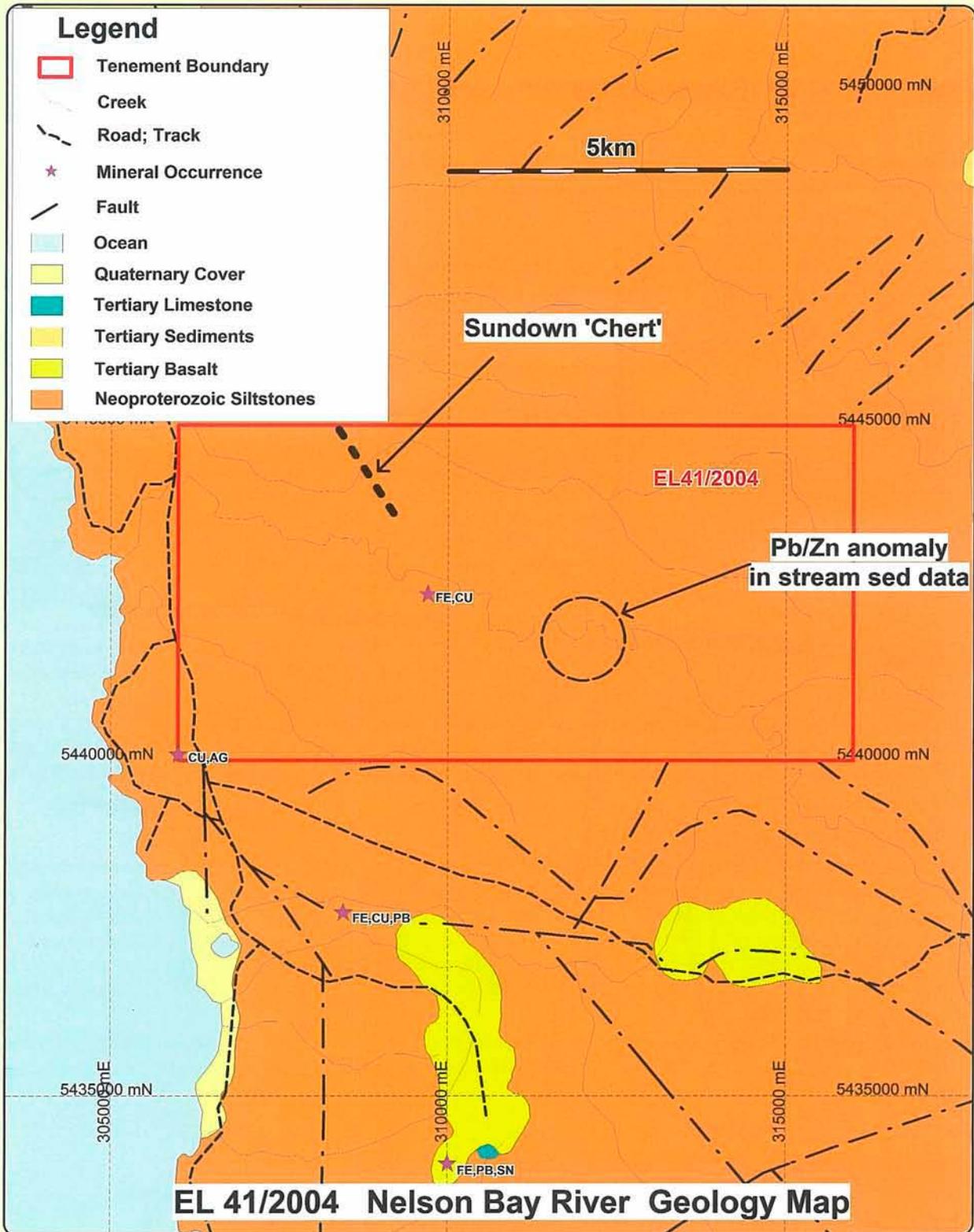


Figure 6: Geology Map of Nelson Bay River

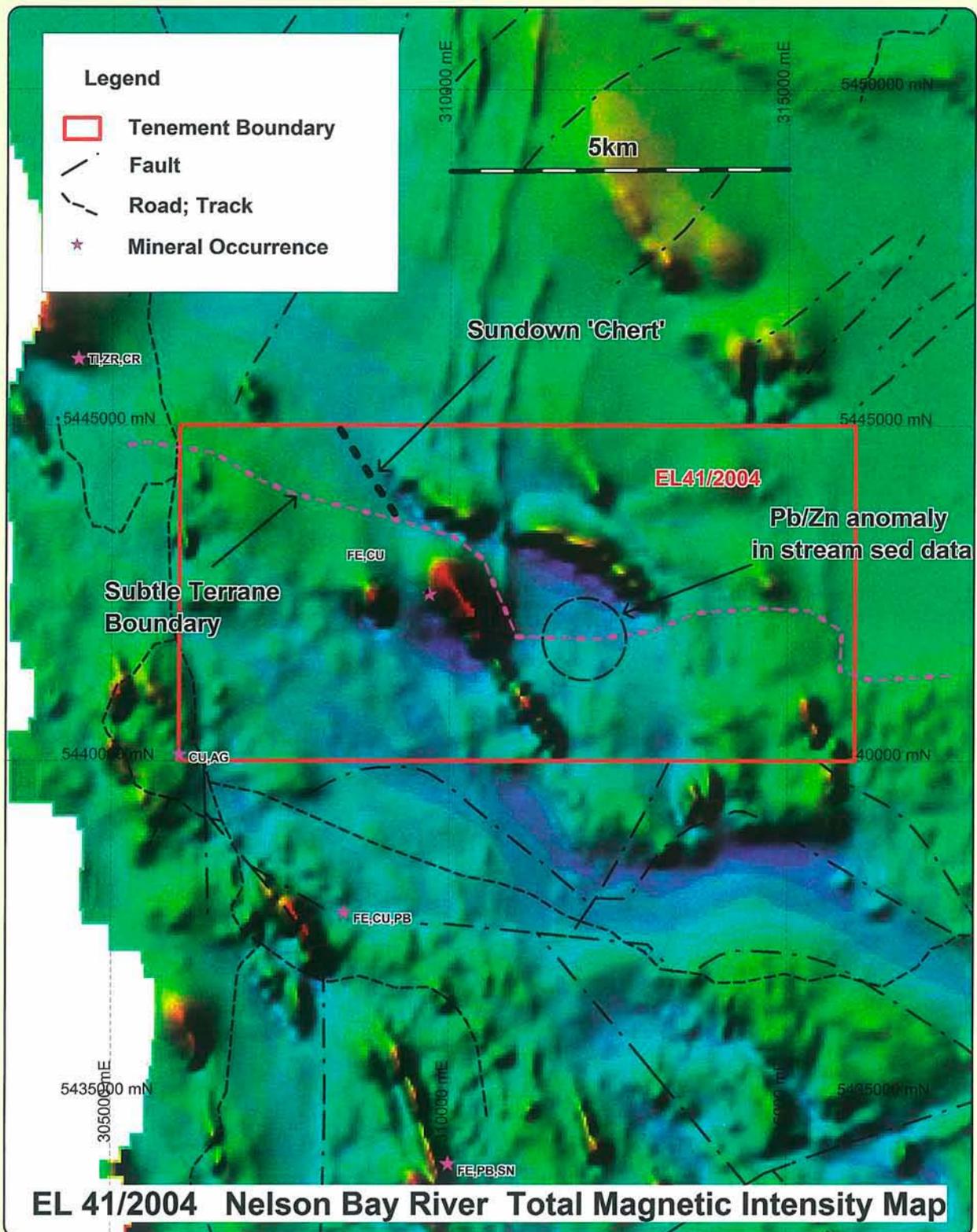


Figure 7: Magnetic map of Nelson Bay River

### **3 Current Exploration**

A programme of work proposal was submitted to the MRT and the Environmental Field Officer made a field visit with the company's consulting geologist.

A recommended programme of flora hygiene and quarantine has been submitted and approved and will be put in place prior to the commencement of drilling in May 2006.

A line cutting contractor was engaged to extend the base line and prepare drill pad sites.

The company contracted TasGold Diamond drillers to drill a minimum three further exploration angled holes into the main magnetite anomaly.

This work will be carried out in the next reporting period.

#### **3.1 Literature Review**

Zelos has commissioned a very comprehensive data compilation and study with a recommended exploration programme.

This report by Simon Tear of SMG Consultants is appended.



**Nelson Bay River at the Wuthering Heights Spur 10 road bridge**

### 3.2 Regional Exploration Activities

Zelos Resources NL has conducted 2 reconnaissance field trips to the area. The area was first visited on a regional reconnaissance basis in July 2005. Local logistics were recorded for future reference and use.



**Forestry Tasmania Road into Eucalypt Tree Plantation at NBR**

### 3.3 Prospect-based Exploration Activities.

A second field visit was made to the area in November 2005. This field trip of several days comprised a party of three geologists and one metallurgist. A visit was made to the drill sites of the 2000 work and the collar of the 1966 drill site (by Pickhands-Mather) was also found. The field mapping of Geopecko of the 1980s was confirmed. And a detailed study of all past work and literature with future work recommendations was commissioned.

Amdel Laboratories of Adelaide was commissioned to conduct petrographic studies and Davis Tube Recovery of four core samples from the drilling that was done in 2000. The full report is appended.

Coast and Mountain Exploration Consultants firm was contracted to supervise the line cutting extension of the existing base line and preparation of the drilling sites and the actual diamond drilling scheduled to commence in May 2006, after the current reporting period.

## 4 Discussion of Results

The Consulting Geologists report was read, and extensively discussed in detail at a conference held with all the company's consulting contractors. Geophysical input was provided by the company's Consulting Geophysicist at this same meeting. This cross reference meeting was very successful and set strategies and guidelines for carrying out the proposed drilling and other field work.

The company's consultant went over the core logs from the drilling in 2000 and was able (using Min-Pac Software) to estimate an inferred iron-ore resource of 4 million tonnes at 40% iron. (Release to the ASX 24<sup>th</sup> November 2005)

The AMDEL petrographic study of the four samples said that the rock types are: Banded Iron Formation and composed as follows:

NBR 1	Pet 1	54	Magnetite 35%	Tremolite 45%	Mica 15%	222.3m
	Pet 2	36	Magnetite 25%	Tremolite 20%	Carbonate 20%	Mica 25% 223.1m
	Pet 3	50	Magnetite 65%	Tremolite 1%	Carbonate 25%	Mica 5% 224.25m
	Pet 4	48	Magnetite 30%	Tremolite 45%	Carbonate 8%	Mica 10% 225.4m

The samples above came from the NBR 001 drill hole of June 2000 from the inclined depth of 222.3 to 228m a 6 metre interval.

The results confirmed the presence of Magnetite with the first column being the % magnetic fraction, the second the mineral composition and lastly the inclined depth of the sample. The description and results are consistent with a magnetite rich dyke.

The full AMDEL report is appended.

## 5 Conclusions

The initial regional reconnaissance of the area was very useful for the follow up work that was carried out. Local contractors were sourced and used as was accommodation etc.

The extended base line and drill sites prepared in the current reporting period were used and the recommended flora hygiene programme was also successfully implemented.

All this local and desk top work and study led to a successful diamond drilling programme which commenced after this reporting period to 1 March 2006.

The EL 41/2004 looks promising for a magnetite resource suitable for use in coal washing and preparation plants.

The resources will undergo continuing exploration.

## 6 Environment

There are no environmental issues within the lease apart from the main magnetic anomaly area.

In this reporting period, the area was visited by the MRT Environmental Field Officer who noticed some *Phytophera* infestation of the area that underwent drilling in 2000.

The infestation was surveyed and duly noted in the MRT memo to the company about the need for proper quarantine and flora hygiene. A proposal to manage this was implemented with wash stations, using appropriate disinfectants and restricted use and access by the introduced machinery such as crawlers, backhoe and the drill rig. These machines had to be disinfected and sterilized prior to entry and upon leaving the area. In addition all field personals' boots in particular had to be washed and dipped in disinfectant before entry and after leaving the field work sites.

The existing base line was extended for about 600m beyond the previous most northerly drilling site and minor clearance made at the appropriate distance for the proposed new diamond drill holes.

The existing track was used for foot access in the current reporting period and was refurbished for crawler use in the next reporting period.

Because the existing and new cut tracks are to be used in the next reporting period, there has been no rehabilitation work carried out in the current reporting period.

## 7 Expenditure

A total of \$ 22 920 (excludes GST) has been spent on the licence to the end of the March 2006 quarter.

Of this the main break down was Geological	\$ 20 199
Geochemical	\$ 1 520
Geophysics	\$ 320

## **8 References**

### **MRT Open File Reports**

00\_4494

NEWNHAM LA

EL 15/97 Arthur River : Report on Nelson Bay River Drilling Program June-July 2000  
For Pacific-Nevada Mining Pty Ltd August 2000

### **ZELOS RESOURCES NL In House Commissioned Reports**

TEAR S

Zinico Resources NL: Independent Experts Report in Prospectus August 2005

TEAR S

Nelson Bay River Licence EL41/2004 : Literature Study Report for  
Zelos Resources NL November 2005



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**REPORT N1759PE06**

**PETROLOGY AND DTR OF FOUR SAMPLES**



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15 February 2006

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Attention: Luke Vanzino/Wes Harder

## REPORT N1759PE06

### PETROLOGY AND DTR OF FOUR SAMPLES

YOUR REFERENCE:	Samples received 20 Jan 2006 (QBL60612)
SAMPLE IDENTIFICATION:	NBR001 PET1 to PET4
MATERIAL:	4 quarter core samples
DATE RECEIVED:	20 January 2006
PROJECT MANAGER:	Frank Radke

  
for **Frank Radke**  
Senior Mineralogist

FR: ek

## 1. INTRODUCTION

Four samples of quarter diamond drill core were submitted by Zelos Resources NL for petrographic and mineragraphic description and determination of magnetite content by Davis Tube Recovery (DTR). Amdel quotation of 5 January 2006 applies to this work.

## 2. PROCEDURE

Each of the four samples represent an interval of diamond drill core. A small section of a few inches was selected for petrographic and mineragraphic examination. Polished thin sections were made of the samples and examined by transmitted and reflected light microscopy. The hand specimens were tested with dilute hydrochloric acid for the presence of calcite but no calcite was detected.

The remaining sample was used for Davis Tube Recovery (DTR) to determine its magnetite content using the following procedure:

- Crush the entire sample to -3.35 mm
- Split out about 150 g to pulverise in a ring pulveriser
- Pulverise the sample for 150 seconds
- Wet screen the sample at 75µm
- Pulverise the oversize for 4 seconds per 5 g of oversize
- Repeat screening and pulverising until less than 5 g of oversize remain
- Split out approximately 20 g for DTR testwork
- Discard the tailing (non-magnetic fraction)
- Collect, filter, dry and weigh the concentrate (magnetic fraction)

The conditions for the DTR testwork are as follows:

- Stroke frequency                    60/minute
- Stroke length                        38 mm
- Magnetic field strength            3000 gauss
- Tube angle                            45 degrees
- Tube diameter                        25 mm
- Water flow rate                      540 ml/minute
- Washing time                        15 minutes or until tailings are clear, whichever is longer

## 3. DTR RESULTS

The DTR results and percentage of magnetic product in these samples as determined by DTR are given in Table 1. The magnetic product would consist mainly of magnetite but assays would be required to determine its precise composition.

## 4. PETROGRAPHIC AND MINERAGRAPHIC DESCRIPTIONS

All four of these samples are banded iron formation comprised largely of magnetite intergrown with varying amounts of tremolite, a degraded mica, carbonate and quartz. Samples PET1 and PET4 are similar containing abundant tremolite while Samples PET 2 and PET3 have lower tremolite contents and higher proportions of carbonate and quartz. Although some of the carbonate in these samples could represent original carbonate, most is thought to be an alteration product replacing silicate minerals including tremolite and micaceous minerals. This replacement is most pronounced for sample PET3 in which the tremolite and fibrous micaceous minerals have been almost completely replaced by carbonate, which in some areas exhibits ghosts or pseudomorphs after the pre-existing mineral. Quartz is also thought to be an alteration product associated with the carbonate alteration. Both the carbonate and quartz tend to be concentrated in magnetite rich bands as linings along fractures in magnetite crystals and as interstitial intergrowths between magnetite crystals.

A brown phyllosilicate called degraded mica in samples PET1, PET2 and PET4 or degraded biotite in sample PET3 is present in these rocks. It is thought to be mica such as biotite, which has been largely replaced by chlorite but it could represent another phyllosilicate or possibly a brittle mica.<sup>22</sup>

These samples contain trace levels of sulphides comprised mainly of chalcopyrite and iron sulphides comprised of pyrite, marcasite and pyrrhotite. The pyrrhotite occurs only as inclusions in magnetite and is thought to be a metamorphic mineral. The chalcopyrite occurs both as inclusions in magnetite and as intergrowths with minerals interstitial to magnetite and is thought to be both a metamorphic mineral and an alteration product. The pyrite and marcasite generally form porous appearing aggregates, which are considered to be an alteration product and possibly represent altered pyrrhotite. Some areas of the pyrite have a well polished character which is considered to be due to recrystallisation of porous pyrite. Arsenopyrite was seen in sample PET2 as large crystals approximately a millimetre in size.

All four of these samples are thought to represent banded iron formation originally comprised mainly of magnetite and tremolite with minor amounts of a mafic phyllosilicate, which show varying degrees of alteration to carbonate and minor quartz with very small amounts of sulphide. This alteration is most pronounced in sample PET3 and least pronounced in samples PET1 and PET4.

**SAMPLE:** NBR001 PET1

**ROCK NAME:** Banded iron formation

23

**HAND SPECIMEN:** This is a weakly banded rock containing dark grey to black magnetite rich bands separated by pale grey to greenish grey bands. The banding is generally on a scale of about 1 cm.

**POLISHED THIN SECTION:**

An optical estimate of the constituents gives the following:

Mineral	%	Origin
Tremolite	45	Metamorphic
Magnetite	35	Metamorphic
Degraded (?) mica	15	Alteration
Carbonate	5	Alteration/(?) metamorphic
Chlorite	Trace -1	Metamorphic
Quartz	Trace -1	Alteration
Chalcopyrite	Trace	(?) alteration
Pyrite	Trace	(?) alteration
Marcasite	Trace	Alteration
Hematite	Trace	Alteration

This sample consists of magnetite crystals distributed through a matrix comprised of tremolite intergrown with an interstitial brown phyllosilicate termed degraded mica in the above list of minerals. Magnetite forms anhedral to subhedral crystals which are between 0.05 and 0.6 mm in size with most of the magnetite having a grain size of about 0.1 mm. The banding noted in hand specimen is due to concentrations of magnetite within the darker bands. The tremolite forms deformed crystals up to approximately 1 mm in length showing evidence of granulation producing aggregates with a much finer grain size. The degraded mica forms flaky aggregates generally below 0.2 mm located interstitially between tremolite crystals. This mineral has a highly variable birefringence ranging from moderate birefringence to very low birefringence and is thought to be a mica (possibly phlogopite or biotite) showing partial replacement by a colourless, weakly birefringent chlorite. The rock also contains pleochroic green chlorite flakes up to 0.3 mm in length, which generally occur as inclusions or marginal intergrowths to magnetite. This mineral has been termed chlorite in the above list of minerals.

Carbonate forms disseminated grains and aggregates ranging up to 0.3 mm in size. The carbonate is concentrated in some magnetite rich bands as interstitial intergrowths between magnetite and as fracture linings within magnetite crystals. The carbonate has not been positively identified but is thought to be magnesite or dolomite. Minor quartz was noted as narrow fracture fillings within magnetite bands.

Traces of chalcopyrite, pyrite and marcasite form disseminated anhedral grains below 0.1 mm in size which are concentrated in magnetite rich bands as fine intergrowths with interstitial and vein type carbonate and quartz. The pyrite and marcasite form crystals with a porous appearing texture and in some aggregates are intergrown with each other. Hematite was noted as a rare marginal intergrowth to magnetite and is a replacement product of magnetite.

This is a banded iron formation comprised mainly of magnetite and tremolite with moderate amounts of degraded mica. The rock shows evidence of deformation along with the development of carbonate and quartz veining with trace levels of sulphides comprised of chalcopyrite and iron sulphides (pyrite and marcasite).

**SAMPLE:** NBR001 PET2

**ROCK NAME:** Banded iron formation

24

**HAND SPECIMEN:** This is a mottled rock containing black magnetite rich aggregates generally below 5 mm in size distributed through a pale grey matrix. The polished thin section was cut from an area containing a somewhat higher proportion of magnetite than most of the core interval.

**POLISHED THIN SECTION:**

An optical estimate of the constituents gives the following:

Mineral	%	Origin
Magnetite	25	Metamorphic
Degraded (?) mica	25	Alteration
Tremolite	20	Metamorphic
Carbonate	20	Alteration/(?) metamorphic
Quartz	5	Alteration
Goethite	3	Alteration
Hematite	1	Alteration
Arsenopyrite	Trace -1	Alteration
Chalcopyrite	Trace	Metamorphic/alteration
Pyrrhotite	Trace	Metamorphic
Marcasite	Trace	Alteration
Pyrite	Trace	Alteration

The polished thin section was cut from a region containing more magnetite than the bulk of the sample. The magnetite crystals are between 0.05 and 1.5 mm in size with most of the magnetite crystals between 0.1 and 0.8 mm in size. The magnetite crystals generally have angular, broken appearing shapes with some exhibiting weakly subhedral shapes. Many of the subhedral crystals are fractured and veined.

The magnetite crystals are distributed through a highly variable matrix with a banded character containing some bands with concentrations of tremolite and other bands with concentrations of degraded mica or carbonate. Quartz also tends to be concentrated in a band several millimetres wide. The tremolite forms crystals up to 0.6 mm long, which exhibit a weakly developed preferred orientation parallel to the mineralogical banding. The degraded mica forms flakes up to 0.2 mm in length, which are concentrated in aggregates up to 0.5 mm in size. This degraded mica consists mainly of a colourless, weakly pleochroic chlorite but it does contain some birefringent areas, which could represent remnant biotite. The carbonate is concentrated in bands up to several millimetres wide as granular mosaics with a typical grain size below 0.15 mm. The carbonate has not been positively identified but is probably dolomite or magnesite.

The quartz forms granular aggregates with a grain size below 0.15 mm. Quartz tends to be concentrated as irregular veins and fracture linings in magnetite. Quartz also occurs as rims or partial rims around magnetite. Much of the quartz veining or rimming magnetite forms intergrowths with a lamellar texture perpendicular to the magnetite crystals. Finely granular carbonate also occurs as interstitial intergrowths between magnetite crystals and as fracture linings in magnetite.

Goethite forms narrow linings along vague foliation lamellae within degraded mica bands and lenses. Hematite forms marginal intergrowths to magnetite and is a replacement product of magnetite. The hematite intergrowths are generally between 0.05 and 0.2 mm in size.

Arsenopyrite crystals between 0.2 and 1 mm in size are concentrated in a band with a fractured and deformed character. Traces of chalcopyrite, marcasite and pyrite form anhedral disseminated grains below 0.1 mm in size. All of the pyrite and marcasite and most of the chalcopyrite form intergrowths with minerals located along fractures in magnetite crystals or in material interstitial to magnetite crystals. A small proportion of the chalcopyrite and all of the pyrrhotite form inclusions in magnetite

crystals. The marcasite and pyrite typically form poorly polished aggregates and could represent altered pyrrhotite.

25

This is a banded iron formation comprised mainly of magnetite, tremolite, carbonate and a degraded phyllosilicate which now consists mainly of chlorite. The sample shows evidence of deformation with fracturing of magnetite crystals and deformation effects in tremolite. The carbonate, quartz and most of the sulphides are thought to be an alteration product possibly associated with the deformation. Pyrrhotite and some of the chalcopyrite occur as inclusions in magnetite and are thought to be an original metamorphic mineral. Arsenopyrite is locally present as large crystals associated with deformed areas. The marcasite and pyrite could represent original pyrrhotite, which has been replaced by iron sulphides.

**SAMPLE:** NBR001 PET3

**ROCK NAME:** Banded iron formation

**HAND SPECIMEN:** This sample consists mainly of magnetite with some paler coloured bands up to about 1 cm in size, which range in colour from a milky grey to a brownish grey.

**POLISHED THIN SECTION:**

An optical estimate of the constituents gives the following:

Mineral	%	Origin
Magnetite	65	Metamorphic
Carbonate	25	Alteration/(?) metamorphic
Degraded biotite	5	Alteration
Quartz	3	Alteration
Tremolite	1	Metamorphic
Chalcopyrite	Trace -1	Metamorphic/alteration
Pyrite	Trace -1	Alteration
Marcasite	Trace	Alteration
Pyrrhotite	Trace	Metamorphic

This sample consists mainly of magnetite, which generally forms crystals between 0.05 and 0.8 mm in size and is concentrated in polycrystalline areas up to several millimetres wide. The magnetite rich areas consist mainly of magnetite with only small amounts of other minerals along grain boundaries between the magnetite crystals.

The polished thin section includes some bands containing concentrations of carbonate intergrown with degraded biotite, quartz and minor tremolite. The carbonate forms a finely granular mosaic with a maximum grain size of about 0.2 mm with some fibrous textured areas which appear to represent a replaced phyllosilicate. Tremolite is partially replaced by granular carbonate leaving remnants of tremolite and ghosts after tremolite crystals. Quartz is intergrown with the carbonate as finely granular aggregates. Some quartz has a columnar texture where it is located marginal to magnetite crystals as fracture linings or vein fillings.

Some bands contain concentrations of an intensely pleochroic brown phyllosilicate which is probably biotite. In some areas this phyllosilicate has a translucent, reddish brown colour believed to be due to alteration. The colour appears to be due to finely intergrown goethite although no goethite could be detected in reflected light.

Sulphides comprised of chalcopyrite, pyrite, marcasite and pyrrhotite are disseminated through the rock. The chalcopyrite forms anhedral grains up to 0.2 mm, which are generally intergrown with the carbonate although a small proportion of chalcopyrite forms small (below 0.05 mm) inclusions in magnetite. Pyrite and marcasite form anhedral grains and aggregates up to 0.2 mm in size and tend to be concentrated in a band as intergrowths with carbonate. A small proportion of pyrite forms recrystallised appearing crystals and aggregates with anhedral to weakly subhedral shapes. Pyrrhotite was noted only as inclusions in magnetite, which are below 0.05 mm in size.

This rock is banded iron formation showing evidence of alteration with the development of carbonate and quartz along with minor sulphides comprised of chalcopyrite and iron sulphides (pyrite and marcasite). Some of the carbonate could be an original metamorphic mineral at most is thought to be a replacement product of pre-existing silicates (tremolite and a probable phyllosilicate). The pyrrhotite and some of the chalcopyrite are thought to be primary metamorphic minerals but the pyrite and marcasite as well as most of the chalcopyrite are associated with the carbonate and are thought to be associated with the carbonate alteration.

**SAMPLE:** NBR001 PET4

**ROCK NAME:** Banded iron formation

27

**HAND SPECIMEN:** This rock contains dark grey to black, magnetite rich bands separated by pale greenish grey bands. The banding is generally between 1 and several millimetres in width.

**POLISHED THIN SECTION:**

An optical estimate of the constituents gives the following:

Mineral	%	Origin
Tremolite	45	Metamorphic
Magnetite	30	Metamorphic
Degraded (?) mica	10	Alteration
Carbonate	8	Alteration/(?) metamorphic
Quartz	5	Alteration
Chalcopyrite	1	Alteration/metamorphic
Pyrite	Trace -1	Alteration
Chlorite	Trace	Metamorphic
Marcasite	Trace	Alteration
Hematite	Trace	Alteration
Pyrrhotite	Trace	Metamorphic

This sample consists of a magnetite and tremolite intergrowth containing bands rich in magnetite or tremolite. The magnetite crystals are generally between 0.1 and 2.5 mm in size and are concentrated in bands up to several millimetres wide. In some bands the large magnetite crystals have fractured characters.

The tremolite forms crystals up to 1.5 mm in length with evidence of deformation including bent and broken shapes and granulation to form fibrous aggregates. The tremolite crystals have a random orientation.

Carbonate forms granular aggregates concentrated in the magnetite rich bands. Much of the carbonate occurs as interstitial linings or vein fillings in magnetite.

Sulphides comprised of chalcopyrite, pyrite and marcasite are disseminated through the rock as anhedral grains and aggregates up to about 0.3 mm in size. Most of the chalcopyrite is intergrown with the tremolite and carbonate and a small proportion occurs as inclusions in magnetite. The pyrite and marcasite form irregular patches with a poorly polished, porous texture that could represent altered pyrrhotite. A small proportion of the pyrite forms well polished areas believed to be due to recrystallisation of porous pyrite. Pyrrhotite was noted only as small (below 0.05 mm) inclusions in magnetite.

A pleochroic green chlorite forms flakes between 0.05 and 0.1 mm in size, which are included within magnetite. The magnetite shows minor marginal replacement by hematite.

This is a banded iron formation much like Sample NBR001 PET1 although this sample has a slightly higher sulphide content than Sample NBR001 PET1.

Table 1. Davis Tube Recovery Results

Sample No.	Weight (g)		Wt % Magnetic Fraction
	Initial	Magnetic Fraction	
NBR001 PET1	20.42	10.92	53.5
NBR001 PET2	19.97	7.16	35.9
NBR001 PET3	24.65	14.83	60.2
NBR001 PET4	18.00	9.04	50.2
NBR001 PET4 (Dup)	23.43	11.35	48.4