

# Resource Estimates for the Nelson Bay Iron Project, NW Tasmania

Prepared for Shree Minerals Limited

by

Simon Tear

BSc (Hons), ARSM, PGEO, MAusIMM, MIOM3, Eur Geol

Hellman & Schofield Pty Ltd

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April 2011



**Hellman & Schofield Pty Ltd**

*Technical specialists to the minerals industry*

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## Summary

Hellman & Schofield was requested by Shree Minerals Limited to complete updated resource estimates for the magnetite resource at Nelson Bay Iron Prospect. The deposit lies within exploration licence EL 41/2004, which is 100% owned by Shree and is located 120km south west of Burnie in north western Tasmania. In addition maiden resource estimates are reported for newly discovered oxide iron mineralisation at the same deposit.

The Nelson Bay iron mineralisation comprises a steeply SW dipping mafic dyke intruded into steeply NE dipping siliciclastic sediments of the Proterozoic Rocky Cape Group. The dyke has an unusual mineral assemblage of magnetite, siderite and grunerite and is reminiscent of skarn-type mineralogy. The deposit displays a very distinct and discrete airborne magnetic anomaly. There are additional magnetic anomalies 1km along strike to the SE and to the west adjacent to the main feature.

The iron mineralisation is divided into three components:

1. Fresh rock iron-rich mineralisation (referred to as Skarn Dyke) consisting of dominant magnetite, siderite and grunerite with subordinate, calcic green amphiboles, chlorite and stilpnomelane. Other gangue material includes some minor pyrite and quartz.
2. A distinctly defined, fresh rock magnetite body within the Skarn Dyke, characterised by coarse grained magnetite intergrown with siderite and grunerite.
3. Oxide mineralisation consisting of strongly oxidised Skarn Dyke material comprising goethite and hematite as iron-rich clays and gossan. This unit is sub-divided into a southern DSO zone and a northern lower grade Beneficial zone. The former is the oxidised product from weathering of a magnetite-poor section of the Skarn Dyke whilst the latter is the result of weathering of the magnetite body.

Exploration work completed by Shree in 2009-2010 includes surface mapping and geochemical sampling, modelling of airborne and ground magnetic data, and diamond drilling.

Shree has supplied the drill hole information for the deposit, which H&S has accepted in good faith as an accurate, reliable and complete representation of the available data. H&S performed only very limited validation of the data and did not detect any obvious problems likely to impact significantly on the resource estimates.

The quality control procedures for assay and sampling used by Shree were not investigated by H&S, so responsibility for quality control resides solely with Shree.

Resource modelling for the magnetite and oxide iron mineralised bodies included the generation of mineral wireframes based on geological logging, modelling of geophysical data and nominal iron or recoverable magnetic fraction cut off grades of 30% Fe and 20% DTR respectively. Ordinary Kriging was used to model 140 DTR magnetic fraction and 110 oxide iron 1m composites extracted from a drillhole database constrained by the interpreted wireframes. A single block model was created to encompass the different resource types.

Earlier metallurgical testwork completed by Shree/Zelos has indicated that a suitable product for sale as dense media coal washing material can be processed from the magnetite material. Shree plans to mine the deposits using a selective mining technique in an open pit scenario and the resources have been classified according to these assumptions.

**Skarn Dyke - Iron Resource Estimate**

(30% Fe cut off)

Category	M Tonnes	Iron %
Indicated	1.8	38.64
Inferred	10.9	35.63
<b>Total</b>	<b>12.7</b>	<b>36.06</b>

**Skarn Dyke - Magnetite Resource Estimate**

(20% DTR cut off)

Category	M Tonnes	Mag %	Mag Tonnes
Indicated	1.7	38.5	667,000
Inferred	6.1	38.2	2,324,000
<b>Total</b>	<b>7.8</b>	<b>38.3</b>	<b>2,991,000</b>

*(average density 3.71t/m<sup>3</sup>; the use of significant figures does not imply precision)*

The new magnetite resource estimates represent a 14% increase in the size of the resource from the 2007 estimate. This is due to an increase in the down dip interpretation partially offset by a small narrowing of the lode in the central section and at its extremities. The new resource also contains newly defined Indicated Resources.

Maiden Mineral Resource Estimates for the Oxide Iron mineralisation are also included:

**Oxide Iron - Inferred Resource Estimate**

(30% Fe cut off)

Resource	M Tonnes	Fe %	P %	SiO <sub>2</sub> %	S %	Al <sub>2</sub> O <sub>3</sub> %	LOI %	Fe (Cal)%
South	0.45	57.8	0.064	8.8	0.028	1.4	6.3	61.7
North	0.73	46.8	0.018	23.7	0.068	2.7	4.7	49.1
<b>Total</b>	<b>1.18</b>	<b>51.0</b>	<b>0.036</b>	<b>18.0</b>	<b>0.053</b>	<b>2.2</b>	<b>5.3</b>	<b>53.9</b>

*(average density 3t/m<sup>3</sup>; the use of significant figures does not imply precision)*

Exploration potential for magnetite consists of the untested western magnetic anomaly and at depth associated with the southern magnetic anomaly. Exploration potential for the oxide iron mineralisation includes the area between the current resource and the southern magnetic anomaly.

The Nelson Bay drill hole database might benefit from independent validation including a review of the sample and assay quality control procedures.

Recommendations for further work include infill drilling (>2500m) for both the magnetite and the oxide resources. It is also recommended that before any new drilling is undertaken that proper core handling and assay procedures are documented including planned details of QAQC sampling.

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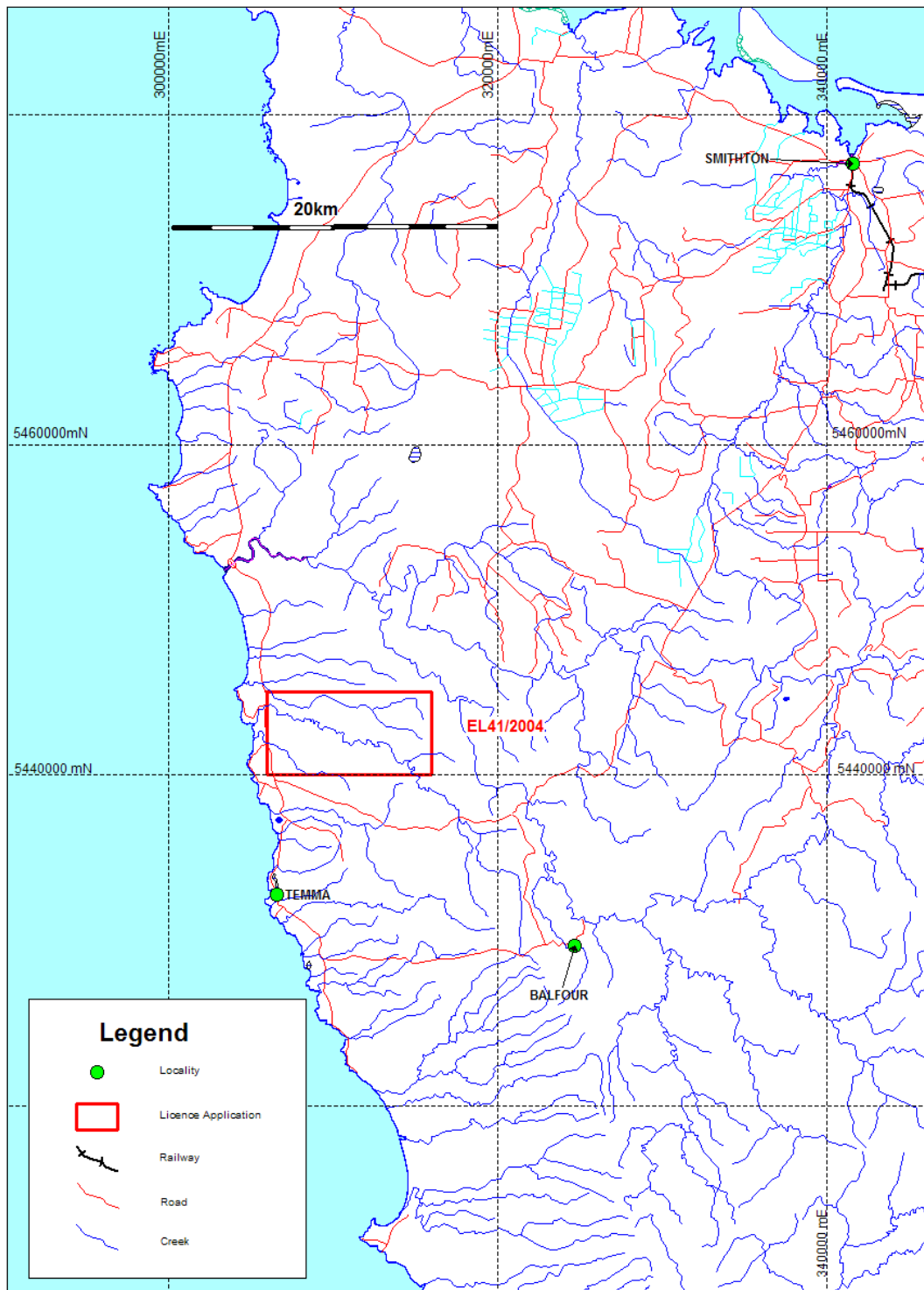
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# 1. Introduction

The Nelson Bay River exploration licence EL 41/2004 measures 50km<sup>2</sup> and is located about 7km north east of the small township of Temma, and about 60kms southwest of Smithton, in North West Tasmania (Figure 1). Shree holds a second contiguous licence to the south of EL41/2004 called Rebecca Creek (EL54/2008).

**Figure 1 Nelson Bay Iron Project Location Map**



Main road access to the property is via the Temma and Heemskirk roads, whilst parts of the licence can be accessed by the Wuthering Heights forestry roads. Off-road access is potentially very difficult due terrain and vegetation conditions (Figure 2). Previous explorers have created 4WD tracks, some of which require refurbishment for access to target areas. The Nelson River Iron Prospect is central to the licence area and is accessible from the Wuthering Heights forestry track. An access track to the deposit has been modified to allow for heavy machinery to access the area.

**Figure 2 Nelson Bay Iron Project Main Access Track for the Deposits**



The west of the property lies within a peneplained hinterland to the coast with fossil sand dunes locally. In the east the terrane becomes more undulating with incision by creeks. There are major rivers draining east to west, close to or through the property, including Sundown Creek, Sardine Creek and the Nelson Bay River.

Climate is temperate with substantial annual rainfall typical of Western Tasmania. Temperature ranges from just above freezing in winter to a likely maximum of 30°C in summer.

Vegetation cover is a mixture of low level heath in the west of the licence and plantation forestry in the east of the area.

## **2. Geology and Mineralisation of the Exploration Area**

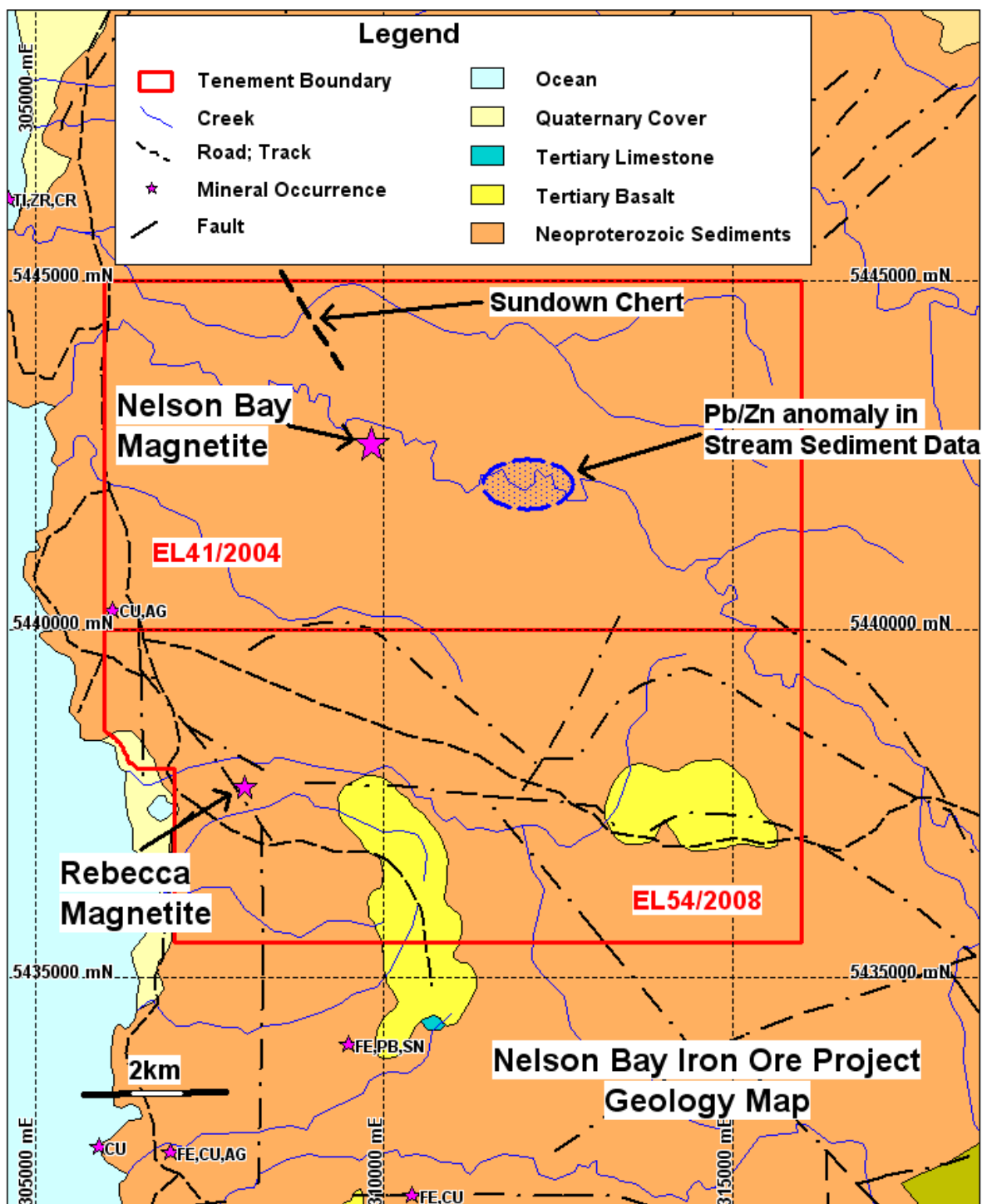
### **2.1 Regional Geology**

Tasmania has been geologically divided by Mineral Resources Tasmania (“MRT”) into seven Proterozoic-Palaeozoic regions or “Stratotectonic Elements”, each with a different geological history and economic mineral associations. As a result of orogenesis and multiple subduction episodes these elements or terranes were welded together during geological history, which has produced the current geological configuration for Tasmania.

The Nelson Bay area lies within the Rocky Cape element which resulted from the formation of basement as Early Neoproterozoic-aged shelf clastic sedimentation with an age range of 900-1000 million years ago (“ma”) followed by a major orogenic event at 760ma, which included granite intrusions. The Early Neoproterozoic autochthonous marine shelf clastic sequences are weakly metamorphosed to lower greenschist facies and are overlain (outside the licence area) unconformably by various suites of younger Neoproterozoic rocks (Figure 3). The main clastic unit, the Cowrie Siltstone, comprises mixed siltstones, sandstones and carbonaceous mudstones. A failed rift episode then followed with its associated clastic sedimentation and volcanic inputs ensued by a second, successful rift event that happened in the Late Neoproterozoic to Early Cambrian. This added an assortment of units including mafic lavas and dykes to the Rocky Cape Element. There are suggestions that the Proterozoic rocks were thrust over a later Cambrian sequence.

Cessation of sedimentation in the Mid Devonian was caused by uplift and erosion associated with the Tabberabberan Orogeny and with the subsequent intrusion of Late Devonian to Early Carboniferous granites. This included the Heemskirk, Meredith and the Northeast Tasmanian Granites, with the first two causing modifications to the Cambrian morphology via structural overprints and hydrothermal alteration effects. These granite intrusions resulted in the formation of many skarn and vein deposits for tin, nickel, lead/zinc etc.

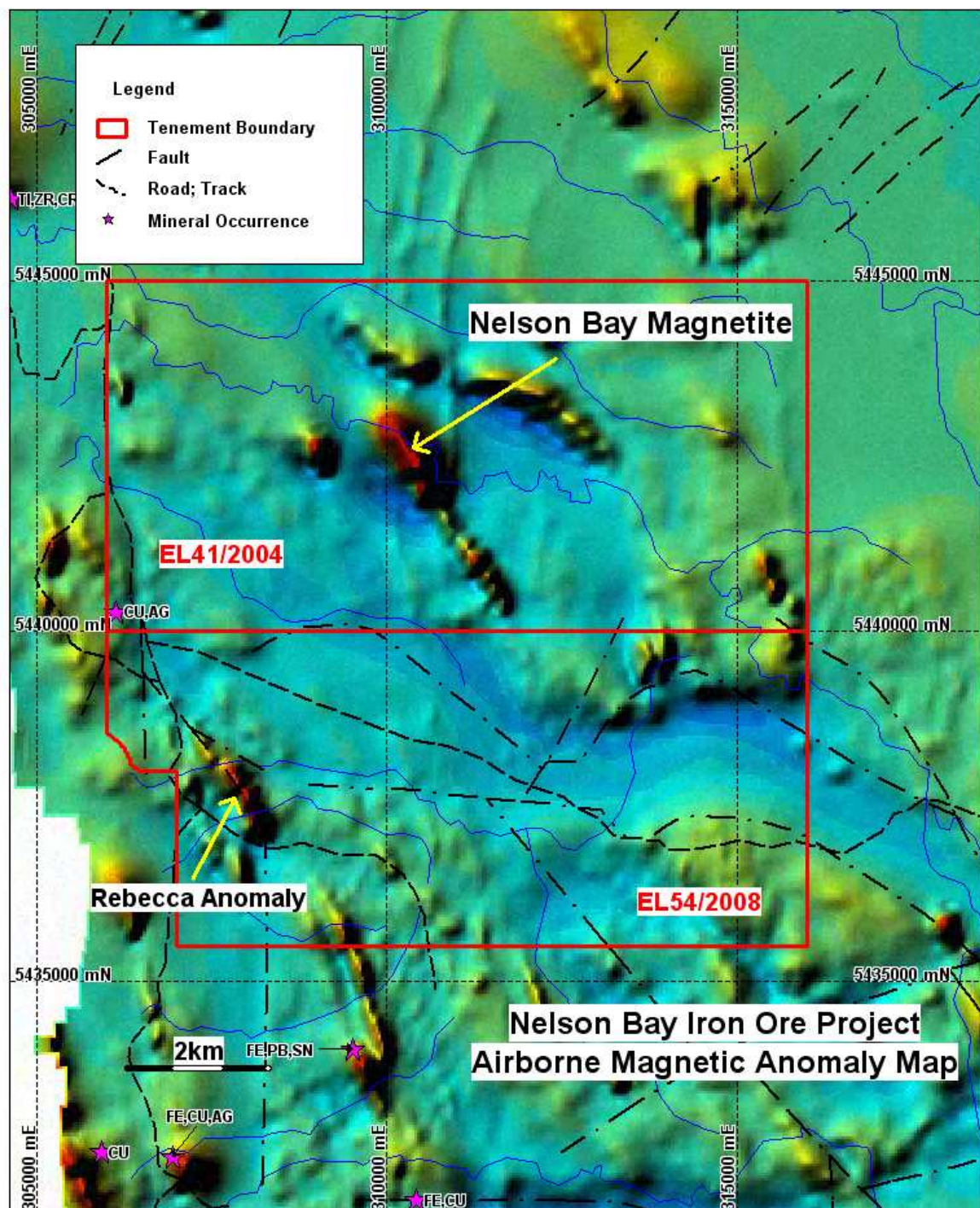
Subsequent Cainozoic rocks for the general area comprise relict Tertiary basalt flows and associated scree deposits. Quaternary sediments consist of a variety of sand, gravel and mud of alluvial, lacustrine and littoral origin. In addition there are also remnants of Pleistocene glacial deposits.

**Figure 3 Nelson Bay Iron Project Regional Geology Map**

(from Shree Prospectus 2009)

The MRT airborne magnetic data indicates a domain of weak to moderate magnetic relief for most of the two licences. This domain hosts a series of elongate, NW striking, strong amplitude magnetic features (Figure 4). One of these magnetic features, a 4km long structure lying within EL41/2004, is known in the MRT mineral occurrence database as the Nelson River Iron mineral occurrence. Exploration work on this anomaly is the focus of this report. A second significant magnetic feature, similar in style to the Nelson River occurrence, exists 5km further south on EL 54/2008 and is known as the Rebecca Magnetite occurrence.



**Figure 4 Nelson Bay Iron Project Airborne Magnetic Map**

(from Shree Prospectus 2009)

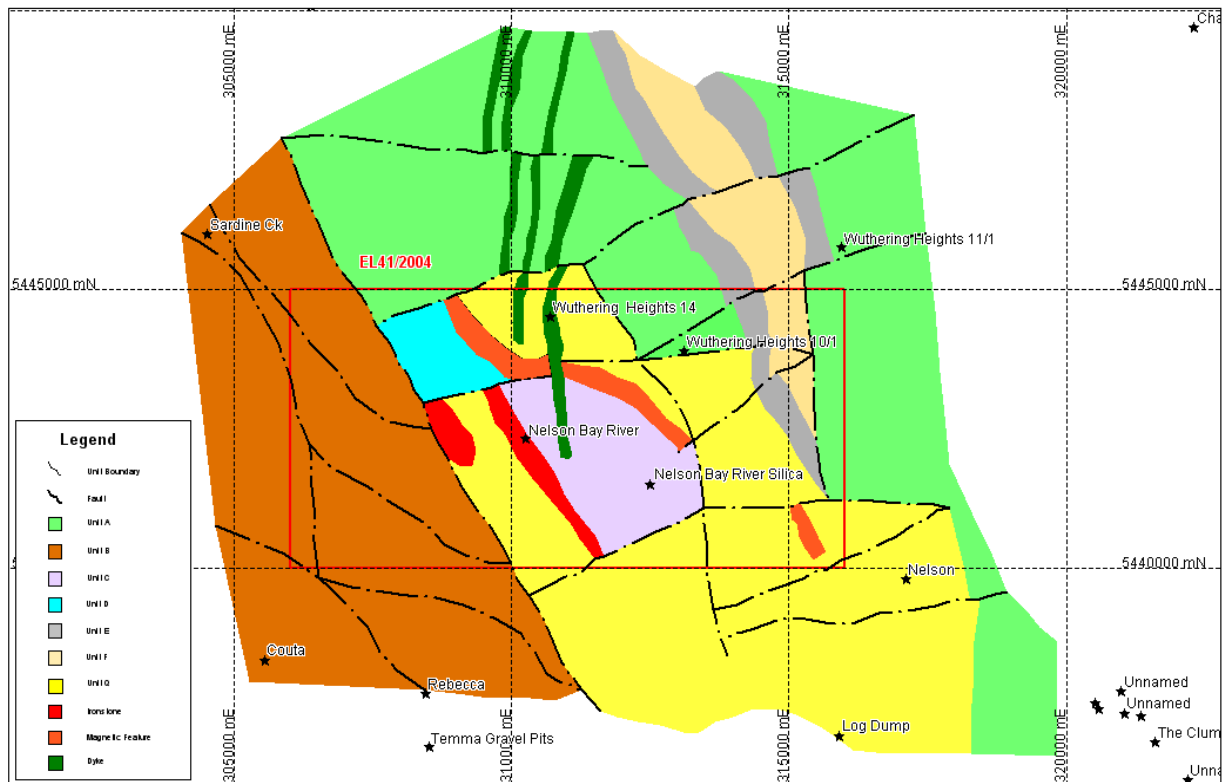
## 2.2 Local Geology

Rocks in the Nelson Bay area comprise finely laminated, psammo-pelitic, Proterozoic-aged siltstones with medium grained sandstones/quartzites. The quartzites are clean, well sorted, and massive to thinly bedded and up to 200m thick. Variable siltstones include finely laminated units to 'pyjama' siltstones, chloritic siltstones/schists and

carbonaceous siltstones. The rocks strike northwest and generally dip between 55° and 65° north east and face east. Metamorphic grade is low grade greenschist.

A local geology map has been interpreted from MRT's total magnetic intensity ("TMI") and first vertical derivative ("1VD") images and is included as Figure 5.

**Figure 5 Nelson Bay Iron Project Detailed Geology Map**



(from Shree Prospectus 2009)

The key features of the geology map for the general licence area are:

1. Unit A is an interlaminated siltstone/sandstone unit referred to by previous explorers as the Wavy Laminar Unit as seen at Balfour.
2. Unit B corresponds to interbedded siltstones and may be similar to Unit Q.
3. Unit Q is a large area of rocks with similar features in the 1VD image. It is believed to be a mixed quartzite and siltstone unit.
4. Unit C is similar to Unit Q.
5. Unit D appears to be a distinctive unit in the first vertical derivative airborne magnetic image, belonging to no other unit.
6. Unit E is part of a magnetically distinct unit in the TMI image linked to Unit F.
7. Unit F equates to the Scoured Channel Unit reported by previous explorers at Balfour. The unit corresponds to a discretely magnetic unit in the TMI image.
8. Magnetic Feature corresponds to a discrete magnetic feature that may be a folded part of the Ironstone, maybe a fault or some other unexplained unit.

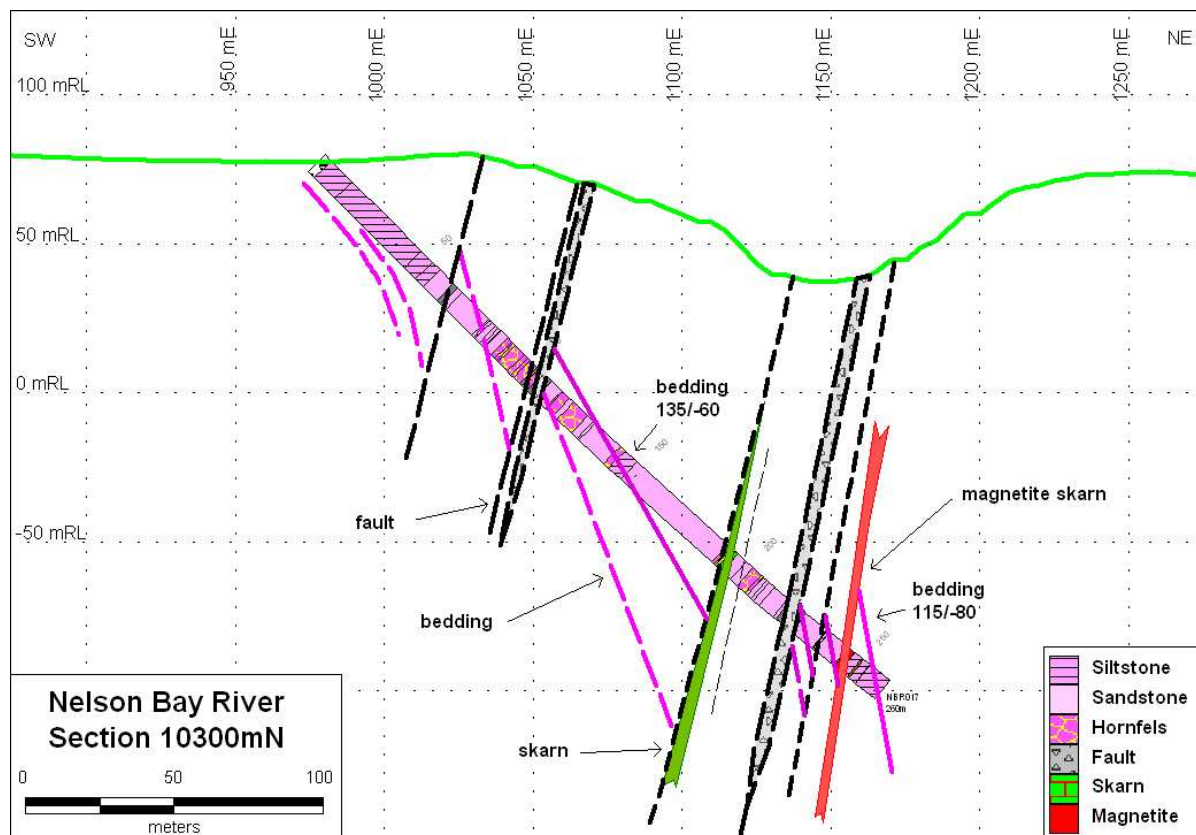
Other features include:

- N-S striking weakly mafic dykes just north of the area that appear to have a southern truncation by some unknown feature near the Nelson Bay prospect,

- A major NW to NNW striking fault is inferred to pass through the western third of the licence with a parallel fault interpreted 5km to the east. The former could be the Lagoon River Fault. In between the two faults lies the Nelson Bay Iron prospect with the same orientation. This orientation is also parallel to the Balfour Copper Trend. A second set of faults striking roughly ENE (to E-W) is also interpreted.

The Nelson Bay Iron mineralisation comprises a steeply SW dipping mafic dyke, the Skarn Dyke, intruded into the siliciclastic sediments (Figure 6). The dyke has an unusual iron-rich mineral assemblage of magnetite, siderite and grunerite and is reminiscent of skarn-type mineralogy.

**Figure 6 Nelson Bay Iron Project Geological Cross Section**

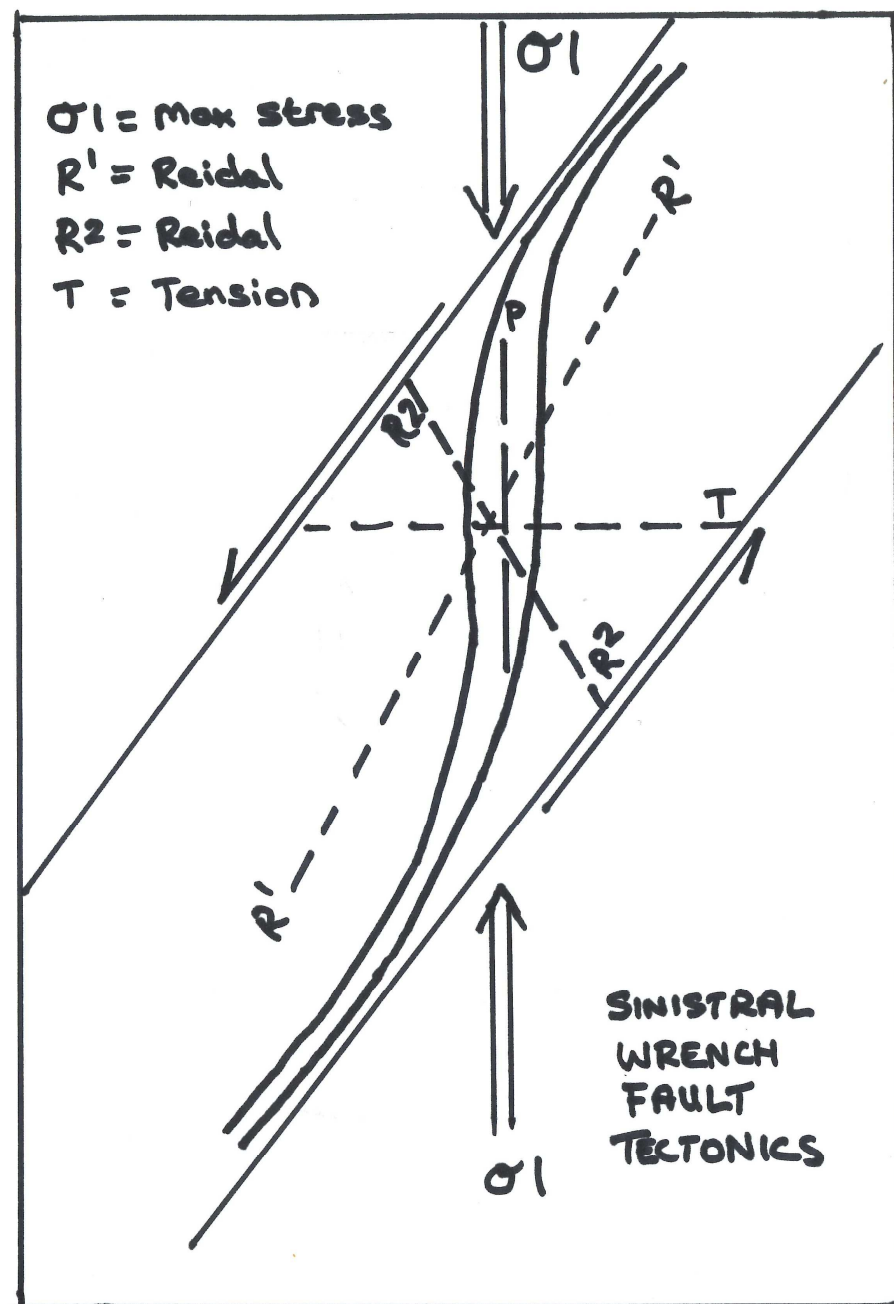


(supplied by Shree)

Ground truthing of the airborne magnetic data has comprised a series of survey lines completed over the main magnetic anomaly. This work has confirmed the existence and correct location of the magnetic anomaly and correlates well with the drilling. The southern portion of the airborne anomaly has also been tested with a ground-based magnetic survey, and drilling has indicated a modest magnetite/goethite intercept. This demonstrates, in conjunction with historical deep auger soil sampling, the continuity of the Skarn Dyke and by inference the iron mineralisation over the length of the >4km airborne anomaly.

The Skarn Dyke has a sigmoidal geometry around the magnetite-rich section, which may have been generated by a sinistral wrench fault active during the intrusive episode (Figure 7). This structural interpretation suggests a NW directed compression and is consistent with the currently understood tectonic history of the area. With this compression it is anticipated that dilation would have occurred with an associated tectonic rotation that would have produced a NW-striking thick lode with thinner tails striking NNE–SSW.



**Figure 7 Nelson Bay Magnetite Body Structural Explanation (Local Grid)**

Thermal metamorphism of the host rocks is associated with the intruded dyke. It comprises firstly of a medium to fine grained pink garnet overprint in the host sediments, generally 0.5-1m thick, immediately adjacent to the contact. A second component to the overprint occurs as a more peripheral halo up to 2m thick and consists of chlorite and hedingbergite alteration.

There are minor intrusive/skarn bands, generally <1.5m wide, which occur in both the footwall and the hanging wall of the main Skarn Dyke.

The mineralisation is divided into three components:



1. Fresh rock iron-rich material, the Skarn Dyke, generally consisting of dominant magnetite, siderite and grunerite with subordinate green amphiboles, chlorite and stilpnomelane (Figure 8). Other gangue material includes some pyrite and quartz.

**Figure 8 Nelson Bay Magnetite Body Skarn Dyke Contact**



2. Oxide mineralisation consisting of strongly oxidised Skarn Dyke material comprising goethite and hematite clays and gossan (Figures 9 and 10). This unit is sub-divided into a southern DSO zone and a northern lower grade Beneficial zone.

**Figure 9 Nelson Bay Oxide Mineralisation DSO Material (NBR022)**





**Figure 10 Nelson Bay Oxide Mineralisation Gossan Outcrop**



3. A distinct fresh rock magnetite mineralisation body within the Skarn Dyke, characterised by coarse grained magnetite intergrown with siderite and grunerite (Figure 11).

**Figure 11 Nelson Bay Magnetite Body High Grade Magnetite**



The Beneficial oxide mineralisation, rather than the DSO material, overlies the higher grade magnetite material and the thickest portion of the magnetite resource coincides with the highest magnetite grades. This suggests that the better oxidised iron grades are to be found overlying more non-magnetic areas of the Skarn Dyke.

## 2.3 Historical Mining & Exploration

A summary of previous exploration is included in Table 1.

**Table 1 Summary of Previous Competitor Activity for EL41/2004**

Company	Year	Licence No	Drilling	Other Work
Pickands & Mather	1966-1972 approx	EL16/68	1 hole for 137.6m	Mapping, ground mag and soil sampling Cu, Pb, Zn, As
Australian & NZ Exploration Co	1972-1973	EL8/72	None	Details the Nelson River Iron Prospect (& a tungsten search) as well as looking at the nearby clean quartzites for silica. Reconnaissance and local mapping completed
CRAE	1977-1984	EL1/77	None	Details the Sundown Prospect as a result of stream sediment sampling and prospecting. Thin section work identified tuffs (and a sinter?) with anomalous lead values
CRAE & Geopeko	1981-1982	EL1/77	None	Ground magnetics and vehicle mounted auger drilling delineate the Nelson River iron feature better.
Bach Holdings	1986-1990	EL33/86	Auger work	Tested various Quaternary sand deposits for heavy minerals.
Pacific Nevada	1997-2001	EL15/97	2 holes for 492m	Re-interpreted AGSO air magnetic data, re-logged and re-sampled Pickands 1967 drillhole. Drilled two hole on the northern anomaly

Pickands Mather undertook the first exploration work in the licence area in 1966 which began with identifying a distinct magnetic anomaly in airborne data known as the Nelson River anomaly (Davies 1969). Follow up ground work resulted in the drilling of one diamond drill hole, N401, which encountered magnetite (and poor recoveries) at about 70m below surface. Assaying for lead, zinc, silver, copper and arsenic yielded weakly anomalous zones associated with the 'lode'.

In 1973 the Australian & New Zealand Exploration Company provided details of the Pickands Mather exploration work at the Nelson River prospect (Brandt 1973). Their main area of interest was the nearby clean quartzites for the potential production of silica.

CRAE Pty Ltd. in 1978 undertook exploration beginning with a major regional stream sediment and rock chip sampling programme (Weir 1981). This work was reported to have delineated a cluster of five anomalous sites for the Nelson River Iron feature with peak rock chip values to 105ppm Pb, 475ppm Cu, 130ppm Zn and 170ppm As. However an



inspection of the maps with the creeks and the anomalies marked on seems to indicate that the anomalous creeks are not draining the main drill tested anomaly but appear to come from the southern magnetic anomaly area. No further work was undertaken by CRAE. Not all of the CRAE stream sediment sites are in the MRT stream sediment database.

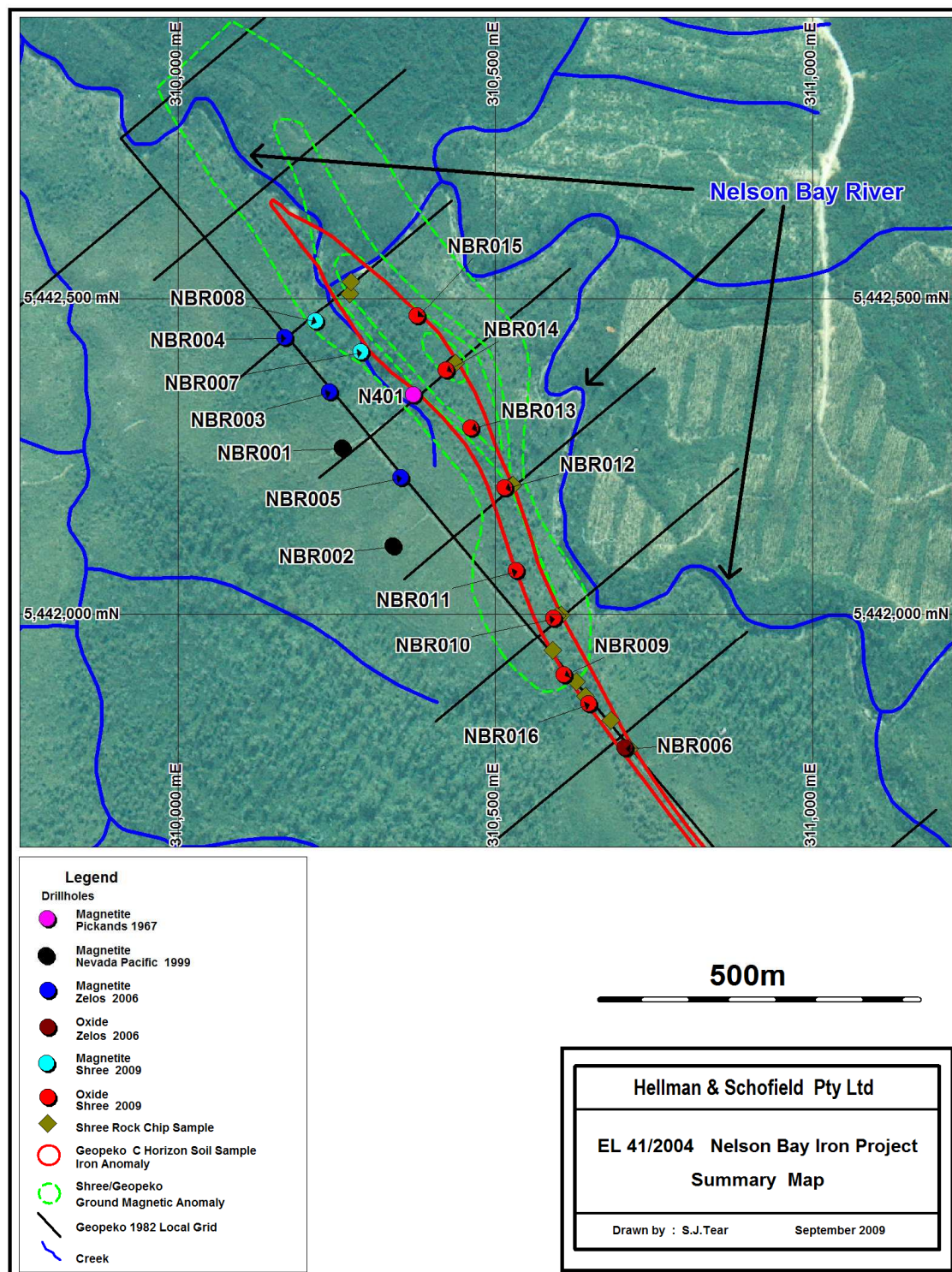
Geopeko in 1983 (Herrmann & Sumpton) repeated the Pickands Mather work at Nelson River, by re-establishing the baseline and the grid. They then completed a ground magnetic survey that separated the airborne anomaly into two distinct anomalies, a southern and a northern one. In addition a geochemical survey was completed by collecting C-horizon soil samples using a bombardier mounted power auger (a Jackro), and portable motor driven auger (a 'Mate'). This work produced a very distinct soil anomaly over the northern magnetic feature with Cu to 350ppm and Pb to 725ppm. There was no anomaly over the southern magnetic feature but this may be a function of overburden thickness and type. Geopeko also re-assayed the Pickands Mather drillhole N401 recording 0.42% Cu over 1.22m from 85.2m. Gold assays indicated only low levels were present.

CRAE Pty. Ltd. undertook further mapping in 1983 (Weir 1984) for an area around Sundown Creek in the north of the current licence and just beyond. They identified a mixed sequence of northwest striking quartzites, black siltstones with cherts, chloritic siltstones (possibly tuffs) and black shales. Thin section work suggested that a pyrite-chalcedonic rock was a volcanic sinter hosted within the chloritic tuff units. Locally there are varying quantities of pyrite within the sediments and pyritic quartz veins developed in fault zones were observed. A black carbonaceous chert was found in Sundown Creek with anomalous levels of lead and arsenic. This package of rocks is very similar to rock sequences mapped by CRAE at Balfour in 1996 (Tear & Russell 1998) although no volcanics have been confirmed at Balfour. Interestingly this unit appears to be along strike from the Nelson River iron mineral occurrence although the geology map indicates a possible truncation of the chert unit by an ENE fault.

In 1989/1990 David Leaman, at the behest of Aureole Resources, produced a set of regional structural interpretations from geophysical data for a large area of northwest Tasmania. He identified a northwest trending 'anticlinal' residual Bouguer gravity anomaly roughly centred on the Nelson River Iron feature. He deduced a possible conjugate set of structures striking east-northeast and northwest. He also proposed that the Proterozoic was thrust over the Cambrian with the contact depth between 0.5 and 1km. A shallowing of this feature was thought to exist in the Nelson River area.

In 1998-2000 Pacific Nevada used a Tennant Creek model for gold and base metal mineralisation on the Nelson River Iron occurrence. Their work involved completing a magnetic re-interpretation of the AGSO airborne magnetic data (pre-WTMRP) which confirmed that the strong anomaly at Nelson River was due to a large amount of magnetite (Turner, 1999). Re-logging and re-sampling of the Pickands Mather drillhole N401 was undertaken to be followed by diamond drilling, NBR001 and NBR002 (Newnham 2000). The drilling covered 200m of strike length of the main airborne magnetic anomaly and confirmed the geological nature of the anomaly i.e. a magnetite body dipping 60° west hosted by an "ultramafic dyke" within a fault zone.

A map showing the historical drilling prior to 2010 is included as Figure 12.

**Figure 12 Nelson Bay Iron Project Previous Drilling**

(from Shree 2009 Prospectus)

NBR001 recorded two main mineralised zones, 43m wide in total, consisting of an upper quartz-magnetite-pyrite unit with brecciated sediments and a lower magnetite-chlorite-amphibole unit. The best base metal result from drilling was 5.5m @ 0.4% Cu from 192.7m but this zone was characterised by poor recoveries. NBR002 was drilled 200m to the south of the first hole and encountered a break-up of the main ultramafic zone in to two 9m wide dykes with 22m of sediments in between. The second of these magnetite

dykes is a high grade zone that appears to be present in the footwall of the magnetite/ultramafic body in NBR001 and N401. No resource figures were reported for the iron grades and nickel values for the ultramafic dyke were low, often below detection of 10ppm.

In the period 2004-6 Zelos acquired the exploration licence and proceeded to complete additional diamond drilling on the main magnetic anomaly. In 2009 Shree completed a series of diamond drillholes to test the oxide mineralisation that had been intersected by Zelos in NBR006 (Figure 12).

Previous work by SMG Consultants in November 2005 identified at Nelson Bay an Inferred iron resource in fresh rock of 4Mt @ 40% iron for 600m of strike length and 225m of dip length with an estimated true width of 7.5m. The estimate was based on three diamond drillholes, historical ground geophysical data/modelling and mapped geology.

In 2006 Zelos completed additional exploration work on the deposit including:

- Three diamond drillholes totalling 564.4m with Davis Tube Recovery ("DTR") tests for magnetite on the relevant intervals
- DTR tests on magnetite zones within old holes NBR001 and NBR002
- Surveying of all drillholes using a registered surveyor
- Acquisition of digital topography for the area
- A bulk sample for metallurgical recovery tests with results proving to be positive for coal washing or iron pellet production.

From the drilling results a revised geological shape was interpreted in both 2D and 3D. The resource shape measured 600m long by an average of 220m down dip with a range of true thicknesses from 2.2m at the southern end to 27m in the middle to 18m at its northern end. Geological modelling also took into account surface weathering of the resource, the likely base of oxidation and topography.

This shape was used to reassess the previous resource estimation. Two methods were used, a sectional polygonal and an inverse distance squared block model ("ID<sup>2</sup>"), with the former being the preferred choice. An estimated bulk density of 3.85t/m<sup>3</sup>, based on the estimated grade and magnetite content in mafic rocks, was applied to the sectional polygonal data.

As a result, a new resource estimate was identified with a strike length of 400m at a 20% DTR magnetite cut off:

**6.9Mt at 38.2% magnetite** with the resources being in the **Inferred** category.

This equated to a contained magnetite content of **2.63Mt**.

This amounted to a 70% increase in the resource tonnage compared with the previous estimate due to the increased amount of drilling data and an interpreted increase in thickness of the mineralised body.

Bulk test sampling by Zelos indicated favourable results for the production of a marketable magnetite concentrate for the heavy media market.

There has been no historical mining of the iron deposits.



### 3. Data Validation

The current estimates are based on drillhole sampling data supplied by Shree which H&S accepted in good faith as an accurate, reliable and complete representation of the available data. The data consisted of a series of Excel files which H&S has compiled into an Access database ([nelson\\_bay.mdb](#)). Assay results were supplied as laboratory-issued digital files. H&S has sole access to this database. A series of error queries and software-based database auditing has removed numerous data entry errors, typos etc. H&S performed only very limited validation of the data, but did not detect any obvious problems likely to impact significantly on the resource estimates. The database might benefit from independent validation.

H&S completed site visits to the property in September 2006 and May 2010 and has been able to check both the geological situation and inspect the drillcore.

A summary of the drilling is included in Table 2. Primarily NQ core was used for the magnetite zone whilst HQ core was collected for the oxide zone. The magnetite deposit was tested by drillholes NBR001-5, NBR007-8, NBR017-18 and NBR021 for a total of 1909.6m. The oxide deposit was tested by drillholes NBR006, NBR010-016, NBR019-20 and NBR022 for a total of 465.8m. Historic hole N401 has been replaced by NBR018.

**Table 2 Drillhole Details**

Company	Year	No of Holes	Type	Hole Numbers.	Metres
Pickands Mather	1967	1	DD	N401	137.56
Pacific Nevada	2000	2	DD	NBR001-2	492.70
Zelos	2006	4	DD	NBR003-6	596.00
Shree	2009	10	DD	NBR007-16	502.10
Shree	2010	7	DD	NBR017-22	784.60
	Total	24		Total	2512.96

*(NBR005 was originally drilled to 150m in 2006 and extended in 2010)*

Drilling of the deposit comprised wireline diamond drilling using an initial HQ core size, reducing down to NQ. Zelos used an RB37 drill rig owned by Tasgold, Shree used a similar rig whilst Pacific Nevada used a skid-mounted LF70 belonging to Almac Drilling.

Plastic core trays were used by all three companies with plastic core blocks securely placed in the trays. The core was then transported to a core processing facility where the geological logging was undertaken.

#### 3.1 Collar Locations

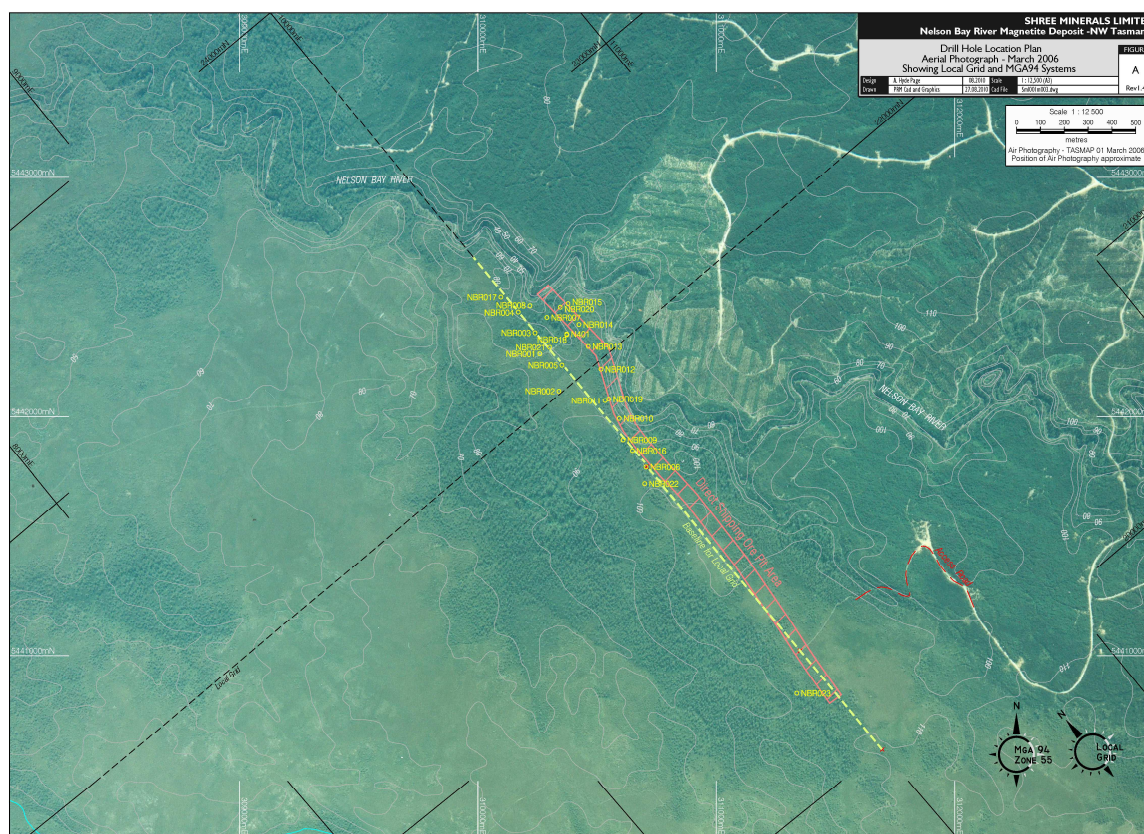
Collar locations for holes prior to 2010 were picked up in MGA94 and AGD66 Zone 55 grid projections by a qualified surveyor, Len Mackenzie of Wynyard, Tasmania, using a DGPS system. Collar locations for the 2010 holes were picked up by Shree using a hand held GPS in the MGA94 grid projection with an accuracy of +/-5m. H&S noted that there were elevation differences between hand held readings and the topographic surface of up to 5m. H&S completed its own field checks for the collar locations using a hand held GPS and encountered no significant discrepancies.

Digital topography was supplied by the Tasmanian Government as a 25m digital elevation model and as 10m contour lines, both of which were combined to produce a single file.

This data was modelled as a 3D surface using Surpac software. The 2010 collar elevations have been matched with the topographic surface.

The location of the drillholes and the local grid in the MGA94 grid are shown in Figure 13.

**Figure 13 Nelson Bay Iron Project Drill Location Map MGA94**



(supplied by Minserve)

The spatial orientation of the deposit has resulted in the development of a local grid with the conversion coordinates detailed in Table 3. The conversion involved rotating the national grid 40° clockwise. This local grid is different to the one used by Shree in hole planning. The Shree local grid was unfortunately incorrectly located on the ground by Zelos and is not an orthogonal grid.

**Table 3 Local Grid Transformation Details**

Coordinate	MGA94	Local Grid
X1	311355.545	10000
Y1	5441024.071	20000
X2	309741.822	10000
Y2	5442933.494	22500

The Oxide Iron mineral zone has been tested by single diamond drillholes, generally inclined 45° to grid east, on a 100m section spacing. The magnetite zone has generally been drilled on a 100m (along strike) by 75m spacing (down dip) and testing is limited to 200m depth.



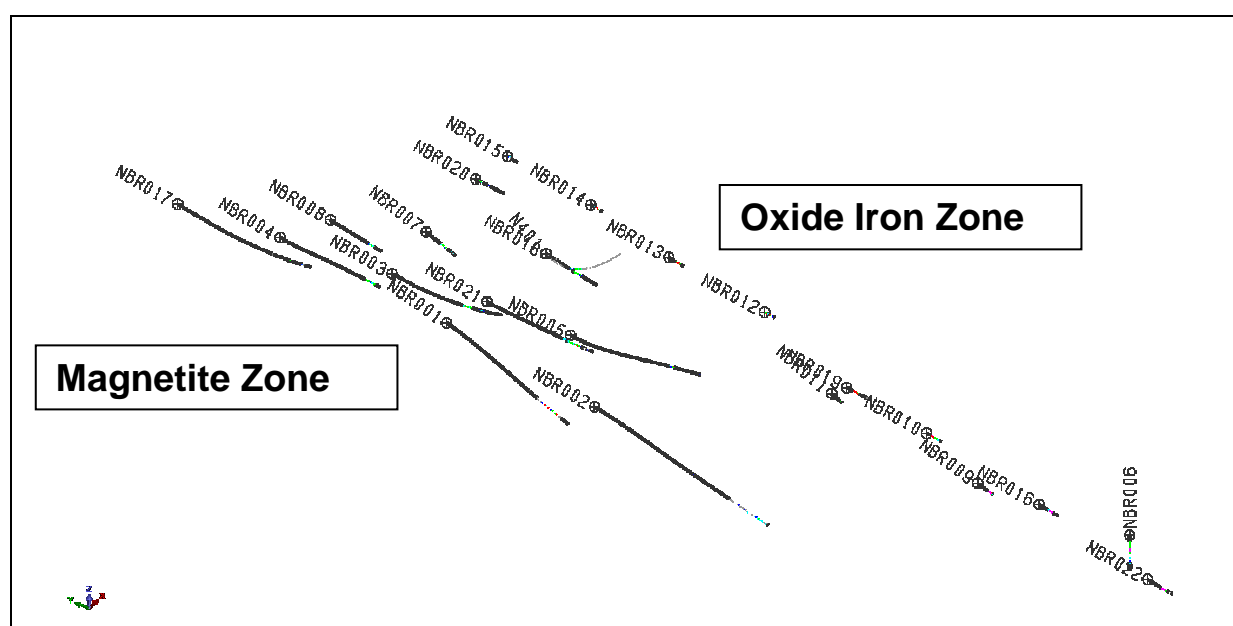
### 3.2 Down Hole Surveys

No downhole surveys were completed for any of the Oxide Iron drillholes, although the fact that they were HQ diamond drillholes and were generally less than 50m depth, suggests that the opportunity for any significant deviation is considered limited.

Downhole surveys were only measured in drillholes testing the deeper magnetite zone, using a single shot Eastman camera at 30 to 50m intervals. Spurious azimuth readings for surveys within or near the magnetite zone were discarded.

Hole traces are shown in Figure 14.

**Figure 14 Nelson Bay Iron Project Diamond Drillhole Traces**



(view looking down and to grid NNE)

### 3.3 Geological Logging

Logging of the diamond core has been variable, some of which is not to an adequate industry standard. The Pacific Nevada drilling has been logged to a good standard, but the early Zelos drilling was logged as paper copies with substantial text descriptions unsuitable for digital use. H&S has converted these logs to a minimal digital level for use in the resource estimation. It is understood relogging of the old core is currently being undertaken by Shree. The 2010 drilling was recorded as paper copies and then transferred to an Excel spreadsheet. A comprehensive set of codes relevant to various geological aspects of the deposits was used and this logging represents a substantial improvement.

### 3.4 Sampling

Sampling of core for the fresh rock material consisted of sawn half or quarter core depending on what was available. Cut or sawn half core was collected from the oxidised zone. Sampling was generally on 1m intervals under geological control.

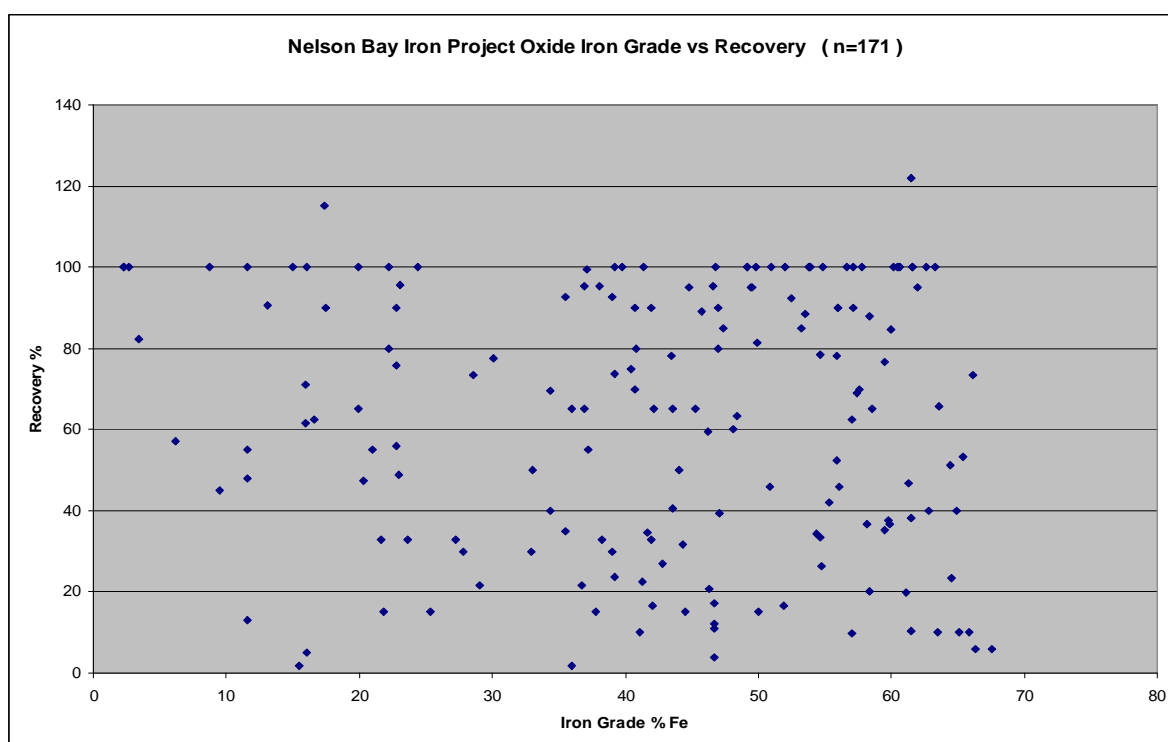
For drillholes NBR003, NBR004, sampling consisted of sawn half core cut again to give quarter core samples; one quarter was amalgamated with other samples to produce a bulk sample and the other quarter was sent for assay and DTR measurements. Sampling of NBR007 and NBR008 also consisted of quarter core taken in a similar fashion to NBR003 and NBR004. Sampling of core for DTR work from holes NBR001 and NBR002 consisted of existing half core (sawn) halved again to give quarter core and based on the same sampling intervals as used by Pacific Nevada. There was some difficulty in locating the intervals due to suspected movement of core blocks. Locally there was insufficient sample due to small scale core loss. Sampling of the later Zelos and Shree drillholes utilised sawn half core for DTR measurements and quarter core for assay samples.

No magnetic susceptibility data was supplied.

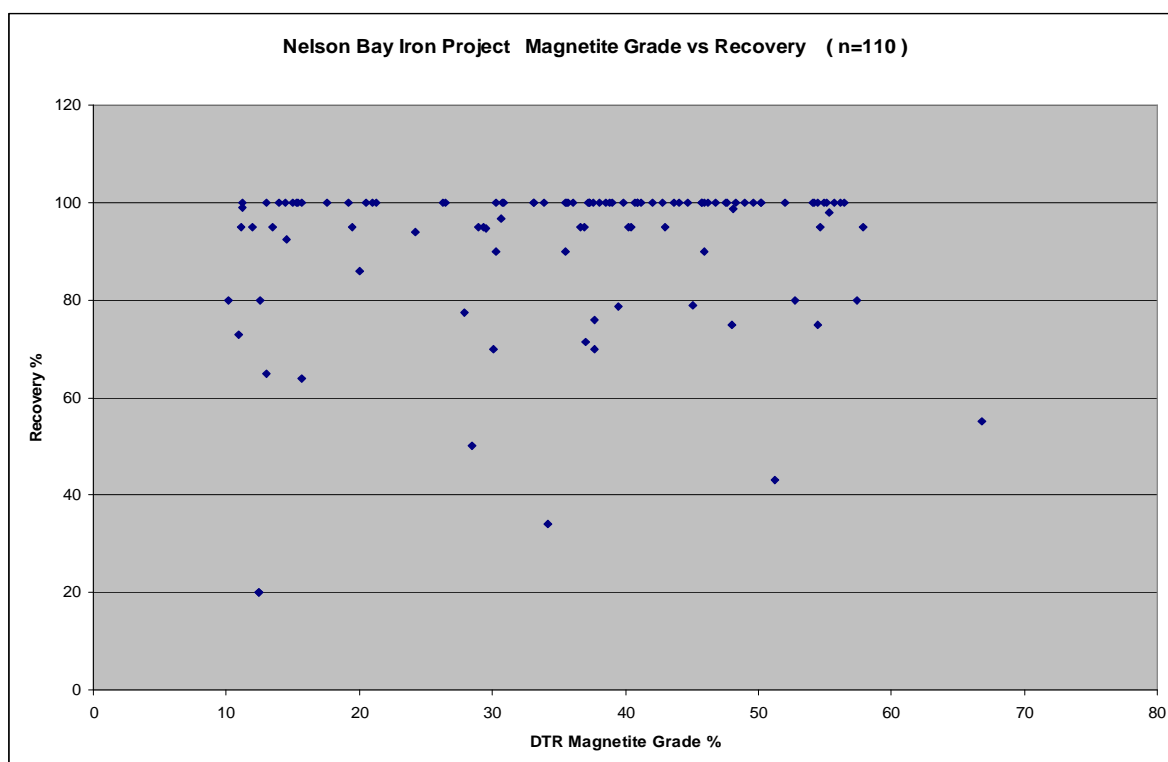
### 3.5 Sample Recovery

Core recoveries were variable for the Oxide Iron drilling ranging from 47 to 90% for the mineralised zone, but appeared to indicate no relationship with iron grade (Figure 15).

**Figure 15 Nelson Bay Iron Project Oxide Iron Grade vs Recovery**



Core recovery data for the magnetite zone indicated very good recoveries (Figure 16) generally >95%, although there were areas of localised poor recovery associated with faulting and some locally penetrative surface weathering. NBR001 recorded an average recovery of 78% interpreted to be due to more prevalent interstitial zones of vuggy gangue material compounded by a less than diligent drilling operator.

**Figure 16 Nelson Bay Iron Project DTR Magnetite Grade vs Recovery**

### 3.6 Assays

The analytical work was carried out by SGS Laboratories in Perth, WA. Sample preparation consisted of cone crushing to -4mm followed by riffle splitting for 150g. This material was then pulverised for 1.5 minutes to a give 20g sub-sample which had P80 at 86µm. (H&S notes that cone crushing size as supplied by Shree is relatively coarse and it is recommended that this figure is checked with the laboratory). Analysis for magnetite consisted of Davis Tube Recovery ("DTR") tests on the same 1m sample intervals used for the initial iron assays, no compositing was undertaken. The 20g sample had its magnetic component reported as a percentage of the sample, with XRF used to assay the magnetic concentrate for a range of elements including iron, silica, sulphur and phosphorous to determine its composition.

Head grade assaying consisted of XRF for a typical suite of elements for Iron Ore including Fe, P, S, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub> and LOI (loss on ignition). In some of the earlier drilling some multi-element data was received.

For the DTR data, there are no below detection values but there are zero values in the database where no magnetic fraction was recorded. Any below detection values for the other elements from assaying were substituted with half the detection value.

Analysis of the magnetic fraction indicated a range of iron contents for the concentrate material of between 51 and 71.3% Fe with the average being around the 66% Fe mark. Significantly, the 2010 results showed a distinct uniformity at a high level for the iron concentrate grade when compared to the previous work. This suggests some variation in the sample prep method i.e. inconsistent use of grind size or some analytical error. This is also suggested by the silica data which is significantly higher for the earlier work i.e. 1-10% SiO<sub>2</sub> (and higher) cf 1-3% for the 2010 work.

The assay and DTR results for the Zelos & the recent Shree work was supplied to H&S as laboratory-direct Excel files which were loaded into the database.

### **3.7 Quality Control**

H&S completed field checks on collar locations and noted no issues.

No gyroscope tests were completed on any of the holes to confirm any of the drillhole paths.

No data for check samples for any of the assaying or sampling work was supplied to H&S.

No standards or duplicate data for the oxide iron assaying or for the DTR recovered magnetic fraction concentrate analysis was supplied to H&S.

### **3.8 Dry Bulk Density**

A substantial amount of bulk density data has been collected for both oxide and magnetite drillcore and Shree are to be commended for this. Density measurements have been either by core measurement using a ruler and callipers and weighing the core or by the water immersion method (Archimedes Technique). Some of the results were for the full sample length; others were based on selected pieces of core from the relevant sampled interval. Whole, half and quarter core have been used depending on availability, and sampling has also included background host rock material (Tables 4 and 5). A total of 80 samples have been collected by the water immersion (Archimedes) method and 188 samples by the measuring method. There was also some minor check sampling of the calliper measuring method against the immersion in water technique; no issues were noted.

The density values for the Oxide Iron material would tend naturally to be biased towards competent solid core rather vuggy gossan and iron-rich clays. This would result in an overestimation of the true density value for the Oxide Iron mineralisation.

**Table 4 Summary of Density Data for Mineralisation**

<b>Archimedes</b>				
<b>Type</b>	<b>Hole_id</b>	<b>No of samples</b>	<b>Mean Density t/m<sup>3</sup></b>	<b>Wt Mean</b>
Mag Dyke	NBR001	12	3.77	3.77
Mag Dyke	NBR002	2	3.73	
Mag Dyke	NBR003	17	3.80	
Mag Dyke	NBR004	18	3.75	
<b>Mag Dyke</b>	<b>Total</b>	<b>49</b>	<b>3.76</b>	<b>Mean</b>
<b>Measured</b>				
<b>Type</b>	<b>Hole_id</b>	<b>No of samples</b>	<b>Mean Density t/m<sup>3</sup></b>	<b>Wt Mean</b>
Mag Dyke	NBR005	4	3.74	3.61
Mag Dyke	NBR007	13	3.35	
Mag Dyke	NBR008	9	3.54	
Mag Dyke	NBR017	4	3.42	
Mag Dyke	NBR018	16	3.73	
Mag Dyke	NBR021	24	3.70	
<b>Mag Dyke</b>	<b>Total</b>	<b>70</b>	<b>3.58</b>	<b>Mean</b>
<b>Measured</b>				
<b>Type</b>	<b>Hole_id</b>	<b>No of samples</b>	<b>Mean Density t/m<sup>3</sup></b>	<b>Wt Mean</b>
Oxide	NBR006	5	3.22	3.1
Oxide	NBR009	3	3.47	
Oxide	NBR010	9	3.11	
Oxide	NBR012	5	3.22	
Oxide	NBR013	8	3.17	
Oxide	NBR014	5	3.28	
Oxide	NBR016	4	3.20	
Oxide	NBR019	11	3.02	
Oxide	NBR020	7	2.58	
Oxide	NBR022	2	3.27	
<b>Oxide</b>	<b>Total</b>	<b>59</b>	<b>3.15</b>	<b>Mean</b>

(not all samples were used)

**Table 5 Summary of Density Data for Gangue & Host Rocks**

<b>Archimedes</b>		
<b>Type</b>	<b>No of samples</b>	<b>Mean Density t/m<sup>3</sup></b>
Skarn	15	3.37
Host Sediments	8	2.73
Hornfels	2	3.27
<b>Measured</b>		
<b>Type</b>	<b>No of samples</b>	<b>Mean Density t/m<sup>3</sup></b>
Skarn	6	3.36
Host Sediments	8	2.71
Hornfels	5	2.99
Oxide Host	15	2.57

## 4. Data Analysis

### 4.1 Geological Interpretation

The mineralised domains used for the current estimates were interpreted by H&S from the drillhole database and surface exploration work including rock chip sampling, historical soil sampling and ground magnetics. Outlines capturing zones of continuous mineralisation were digitised on cross sections aligned with the drillhole traces and linked to form closed three dimensional wireframes. As a result three wireframes were created namely for the Skarn Dyke, the magnetite body within the Skarn Dyke and the oxide iron mineralisation. A list of wireframe surfaces and solids used in the resource estimation is included as Table 6.

**Table 6 Summary of Wireframes used in Resource Estimation**

Filename	Feature
Local Grid	
fe_body_oxide_local_edit1010.dtm	Oxide Iron Mineralisation
fe_body_skarn_local_edit1010.dtm	Skarn Dyke
magnetitebody_local_edit_1010.dtm	Magnetite Body
mag_body_local_trim_1010.dtm	Magnetite Body cut for 2007 comparison purposes
nbr_sth_exp_potv2_810.dtm	Southern Anomaly Exploration Potential
nbr_detailed_topo_local710.dtm	Topography in local grid
MGA94 Zone 55 Grid	
fe_body_mga94_edit1010.dtm	Combined Skarn Dyke and Oxide Iron
magnetitebody_mga94_edit_1010.dtm	Magnetite Body
nbr_sth_exp_pot_mga94_810.dtm	Southern Anomaly Exploration Potential
nbr_detailed_topo_mga94_710.dtm	Topography

The oxide mineral wireframe was designed primarily using the drillhole logging for gossan material, additional input was from the iron grades above a nominal 30%, any surface rock chip sampling and the spatial position of the fresh Skarn Dyke. The contacts of the oxidised material are very distinct from the relatively unweathered country rock. At Shree's request the southern zone was modified to be a high grade zone with a nominal 45% iron cut off reflecting the higher grade material in this area. Shree were confident that selective mining would allow for mining the higher grade material separately. Shree also requested that the uncharacteristic intercept from NBR011 be omitted from the resource as they believed it had stopped short of the target zone. The base of oxidation has been difficult to define due to no single hole passing through the mineralised zone starting in oxide material in the hangingwall and passing through into fresh footwall mineralisation. An estimated down dip extent of 50m was selected by H&S. This figure is based on the minor oxidation associated with magnetite mineralisation in NBR018/N401 and the oxide mineralisation at 30m vertical depth in NBR006. Any allowance for a transition oxide zone was incorporated into the oxide wireframe.

The wireframe for the Skarn Dyke is based on geological logging (the skarn rock type) and iron assays at a nominal 25-30% Fe. Generally there is a distinct boundary in iron grades that corresponds to the logging of the skarn contact. The wireframe was extrapo-

lated down dip to just reach beyond the interpreted magnetite lode. Along strike extrapolation was guided by the oxide mineralisation from both the diamond drilling and the surface mapping. In the main magnetite zone the boundary of the skarn wireframe generally coincided with the magnetite wireframe. A good example of a substantial separation of the two mineral styles occurs in NBR002 where logging and iron grades indicate a 10m wide intercept of iron mineralisation (the Skarn Dyke) whilst the DTR results indicate only 2.5m of low grade magnetite material within the dyke.

A combination of geological logging and a 20% DTR cut off was used to define the magnetite mineral shape with the contacts being very distinct. The 20% figure corresponded to a distinct break coinciding with the logging of magnetite within the Skarn Dyke. Fine tuning of the shape involved matching the top of the lode with the base of oxidation. Along strike extrapolation was 50m from the last drillhole guided by the ground magnetic anomaly. This meant extending the lode to the grid NNE from hole NBR017 and to the grid SSW from hole NBR002. A minor amount of internal waste was included which usually existed as a single zone in any one intercept but occurred in different positions relative to the hangingwall and footwall positions. NBR001 contained three low grade zones although it should be noted that this is the deepest drillhole into the main magnetite mineralisation. 2D geophysical modelling by consulting geophysicist, D. Cowan of Perth WA, has indicated a lode width and dip angle and direction consistent with the current geological understanding. This modelling has indicated a down dip extent for the magnetic body of 300m which has been incorporated into the geological interpretation of the mineralisation.

The declining intensity of the magnetic anomaly along strike provides a limit to potential magnetite mineralisation at both ends of the resource shape. However this does not preclude the existence of the Skarn Dyke and by inference the along strike existence of any oxide iron material.

Mineral zone dimensions are detailed in Table 7 and shown in Figure 17. Note that the magnetite body is fully included within the figures for the Skarn Dyke.

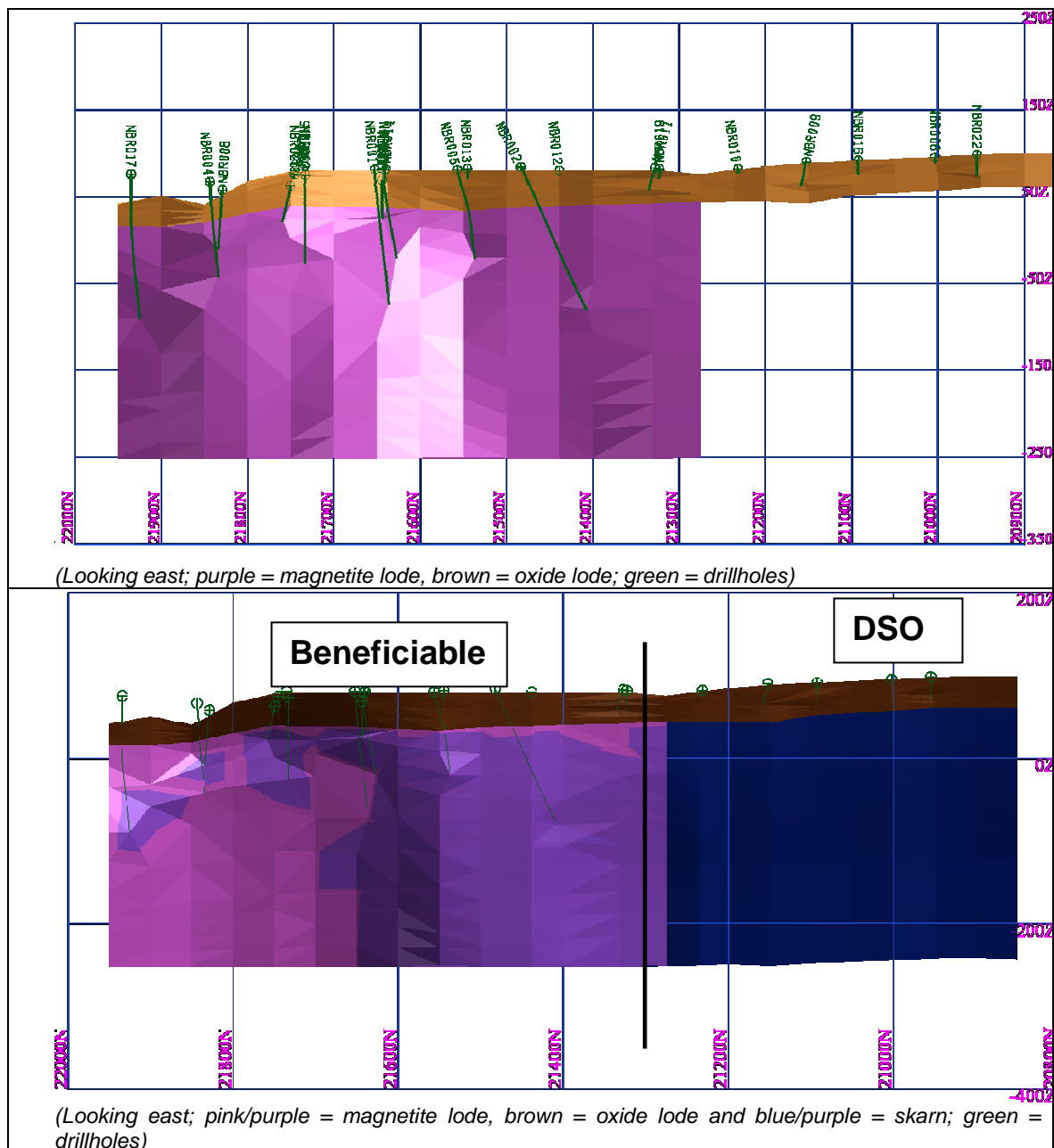
**Table 7 Dimensions of Mineral Resources**

<b>Zone</b>	<b>Strike (m)</b>	<b>Dip (m)</b>	<b>Width (m)</b>	<b>Ave Width (m)</b>	<b>Volume (m<sup>3</sup>)</b>
Iron Dyke	1125	305	6 - 31	10.5	3,615,134
Magnetite	690	300	2.5 - 28	10.0	2,104,546
Oxide	1125	40	7 - 13	9.0	404,563

*(Volume is from wireframe shape)*

The oxide resource is divided into high grade DSO material and lower grade Beneficial material with the separation at 21300mN.

A plan view of the sigmoidal shape of the lodes is included in Appendix 1.

**Figure 17 Nelson Bay Iron Project Drillholes & Mineral Wireframes**

## 4.2 Data Distribution

The oxide mineral zone has been tested by single diamond drillholes, on a 100m section spacing, inclined 45° to grid east. The magnetite zone has generally been drilled on a 100m by 75m spacing and testing is limited to 200m depth.



### 4.3 Sample Composites

As 1m was the average sample length, 1m composites were selected for all mineral types from the drillhole database, constrained to the relevant mineral wireframes. Details of the composite intervals for all resource types are included as Table 8.

**Table 8 Composite Intervals**

<b>Skarn Dyke</b>		
<b>Hole Id</b>	<b>Depth From</b>	<b>Depth To</b>
N401	59.3	74.1
NBR001	199.5	230.5
NBR002	222.7	233
NBR003	148	167.6
NBR004	159.7	177.7
NBR005	158.79	168.14
NBR007	55	77
NBR008	94	107
NBR017	242.1	245.47
NBR018	60.9	77.45
NBR021	144.4	167
<b>Magnetite</b>		
<b>Hole Id</b>	<b>Depth From</b>	<b>Depth To</b>
NBR001	199.5	228.3
NBR002	224	226.6
NBR003	149	167.6
NBR004	159.7	177.7
NBR005	163.25	168.14
NBR007	56	76
NBR008	95	106
NBR017	243	244.9
NBR018	60.95	75.87
NBR021	144.4	165.2
<b>Oxide Fe</b>		
<b>Hole Id</b>	<b>Depth From</b>	<b>Depth To</b>
NBR006	0	19
NBR009	36	47
NBR010	5	13
NBR011	35	38.5
NBR012	0	13
NBR013	15	26
NBR014	11	22
NBR016	21	31
NBR019	14.7	25.9
NBR020	5.3	14.6
NBR022	31.15	39.7

## 4.4 Univariate Analysis

Summary statistics for the oxide composites are included as Table 9 with a cumulative frequency plot of the data included as Figure 18.

**Table 9 Summary Statistics for Oxide Mineral Composites**

Variable	Iron	Phosphorous	Silica	Sulphur	Alumina	LOI
Units	(%)	(ppm)	(%)	(ppm)	(%)	(%)
No. Data:	110	110	110	110	110	110
mean:	51.905	465	16.94	505	2.102	5.776
variance:	98.213	206386	155.943	1059446	17.019	5.463
CV:	0.191	1	0.737	2	1.963	0.405
Minimum:	21.8	25	0.68	25	0.08	0.19
Q1:	44	150	4.98	120	0.28	4.45
Median:	53.7	330	15.3	293	0.55	5.52
Q3:	60	590	25.1	470	1.16	7.22
Maximum:	67.6	2270	51.7	8720	23.4	13.5
IQR:	16	440	20.12	350	0.88	2.77

The high LOI's are a reflection of the moisture content associated with goethite and other hydrated mineral phases.

**Figure 18 Cumulative Frequency Plot of Oxide Iron Composites**

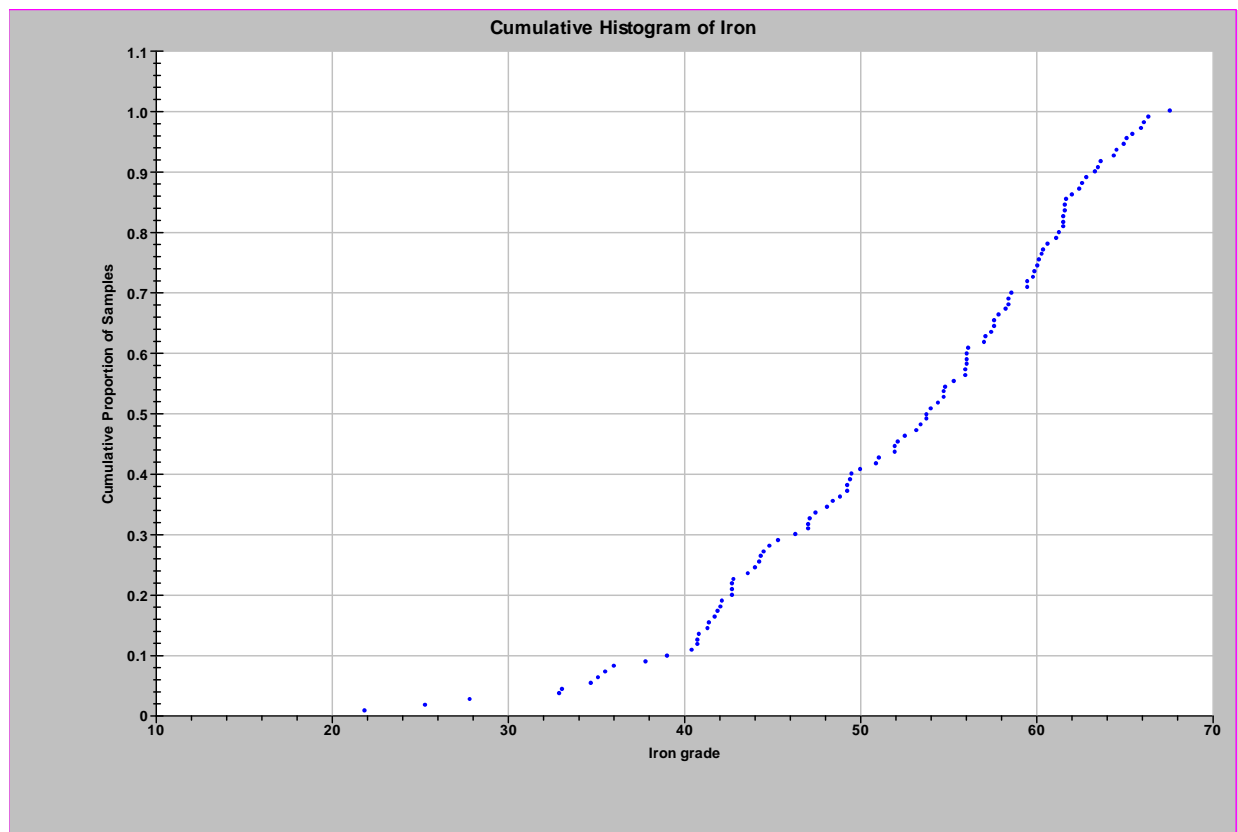


Table 10 details the summary statistics for iron composites for the fresh rock in the Skarn Dyke, which will include iron grades from the magnetite mineralisation. Shree requested

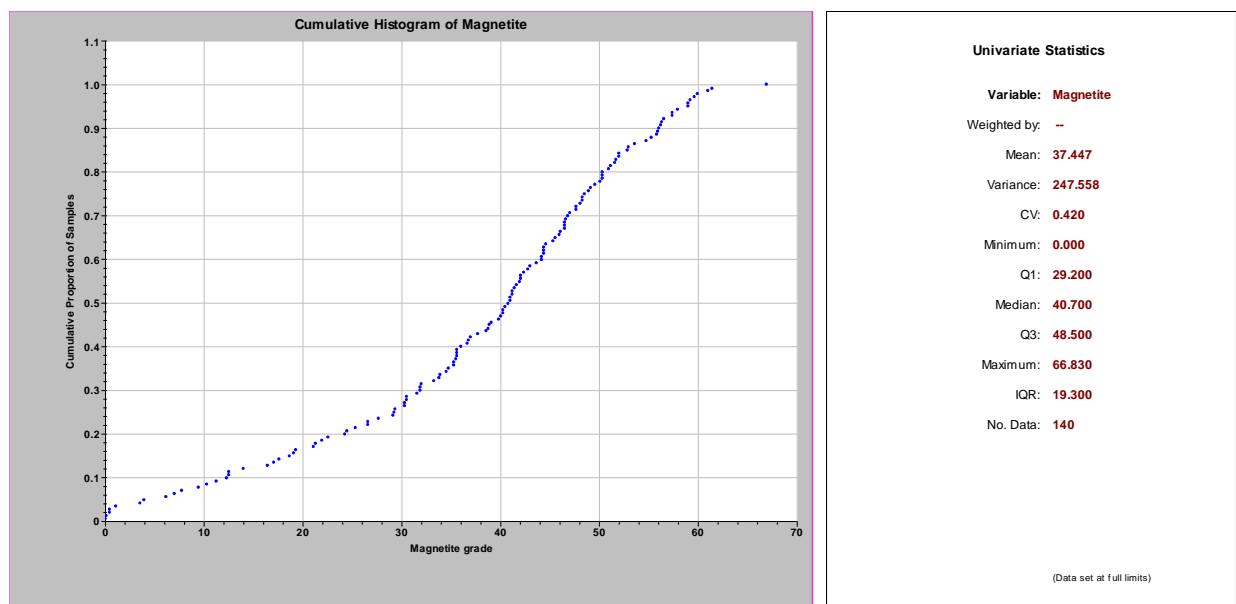
that the iron grade be modelled for the fresh rock Skarn Dyke material to give some measure of overall iron grade associated with the dyke as a whole.

**Table 10 Summary Statistics for the Skarn Dyke (Fresh Rock)**

Variable	Iron
Units	(%)
No. Data:	183
mean:	38.174
variance:	94.37
CV:	0.254
Minimum:	9.25
Q1:	31.36
Median:	40.9
Q3:	45.2
Maximum:	54.3
IQR:	13.84

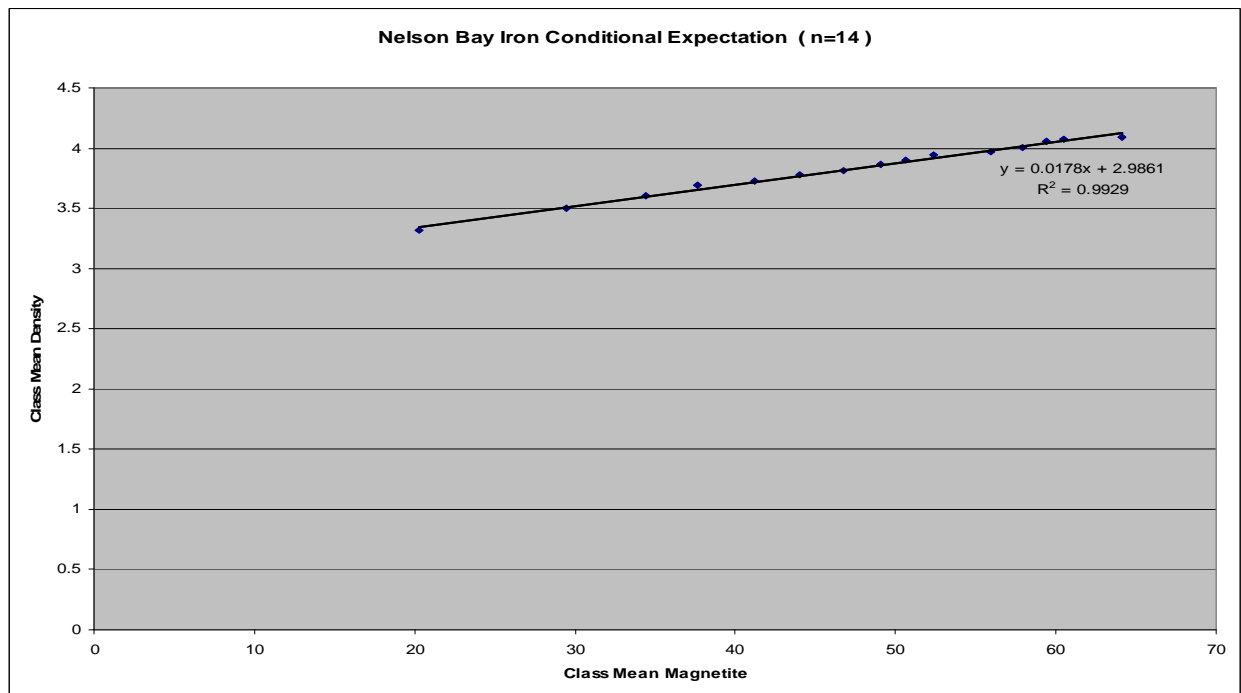
All the DTR concentrate data came with equal numbers of alumina, silica, phosphorous and sulphur grades. A cumulative frequency plot of the magnetite zone DTR composites used in the modelling is included as Figure 19 which also includes summary statistics for the DTR data.

**Figure 19 Cumulative Frequency Plot of DTR Magnetite Composites**



## 4.5 Bivariate Analysis

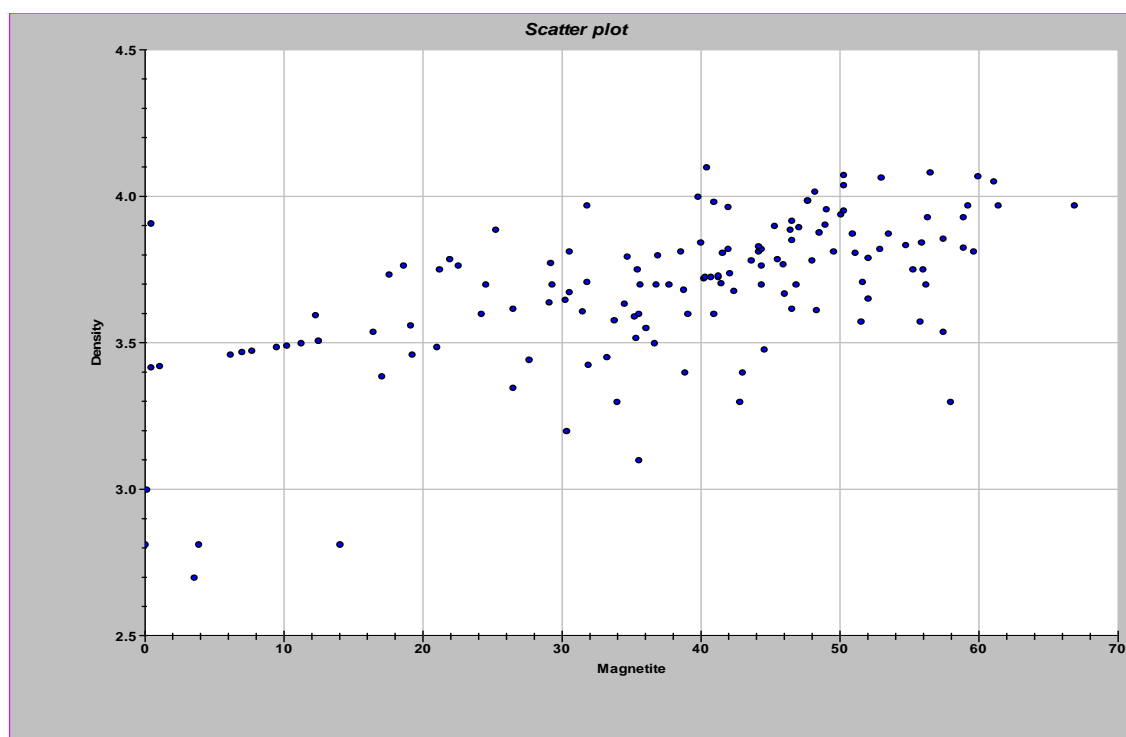
It was not possible to have the same number of data for DTR and density, with the latter being the lesser number. It was believed that the missing density values could be substituted with reasonable estimates based on DTR values using a statistical process known as Conditional Expectation. This splits up the data into grade bins or classes with equal number of samples in each class. Then the class means are plotted against each other to allow for the generation of an equation relating density value to recovery of the magnetic fraction (Figure 20).

**Figure 20 Conditional Statistics Plot for Density & DTR Magnetite**

The graph indicates a straight line relationship between the two elements and hence the missing density values can be calculated using the formula as follows:

$$\text{Density} = (0.0178 * \text{DTR Magnetite Grade}) + 2.9861$$

Figure 21 shows a scatter plot of the amended composite datafile for all the DTR values with their accompanying density values and Table 11 provides summary statistics for the two elements.

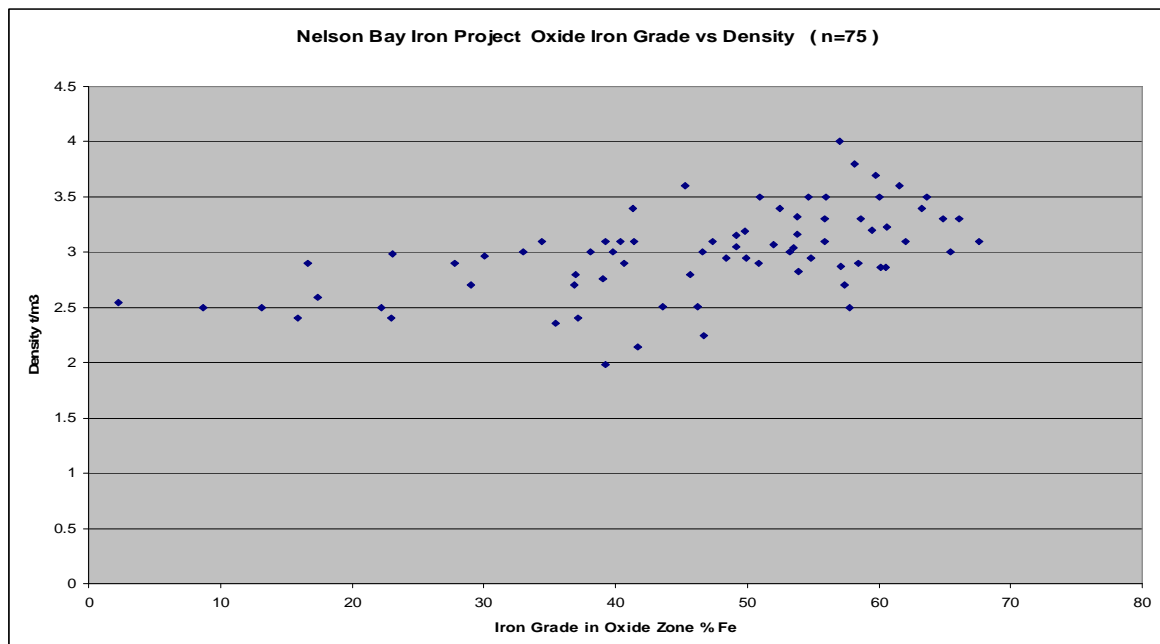
**Figure 21 Magnetite Mineralisation DTR Magnetite Grade vs Density****Table 11 Summary Statistics for DTR Magnetite and Density**

Data Statistics	
Variable: <b>Magnetite</b>	<b>Density</b>
Weight by: --	--
Mean: <b>37.447</b>	<b>3.683</b>
Variance: <b>247.558</b>	<b>0.066</b>
CV: <b>0.420</b>	<b>0.070</b>
Minimum: <b>0.000</b>	<b>2.700</b>
Q1: <b>29.200</b>	<b>3.551</b>
Median: <b>40.700</b>	<b>3.723</b>
Q3: <b>48.500</b>	<b>3.841</b>
Maximum: <b>66.830</b>	<b>4.100</b>
IQR: <b>19.300</b>	<b>0.289</b>
Covariance: <b>2.501</b>	
Pearson: <b>0.618</b>	
Spearman: <b>0.603</b>	
No. of Data: <b>140</b>	
(Data set at full limits)	

Figure 22 shows a plot of oxide iron grades versus density and indicates a moderate relationship between the two elements. In any case H&S decided that it was more

prudent to use a single density value of  $3.0\text{t/m}^3$  for the oxide resource estimation based on the density measuring work completed by Shree.

**Figure 22 Oxide Mineralisation Oxide Iron Grade vs Density**

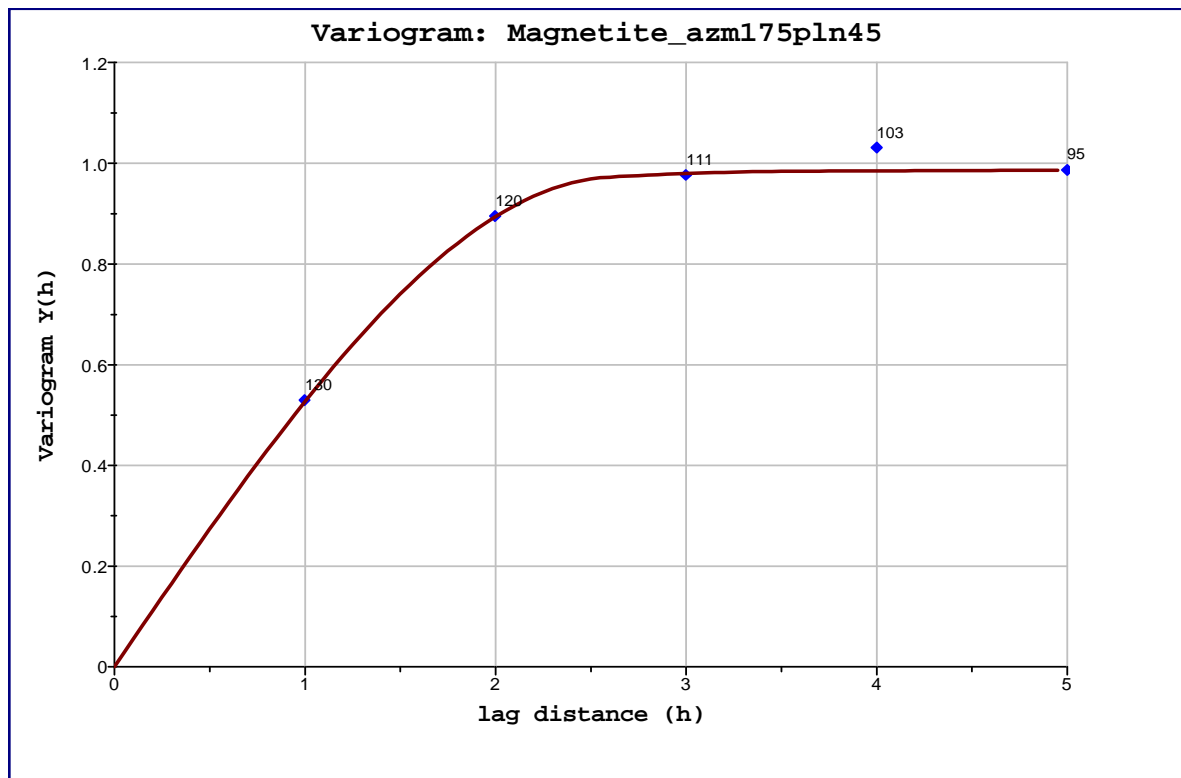


## 4.6 Zone and Domain Characterisation

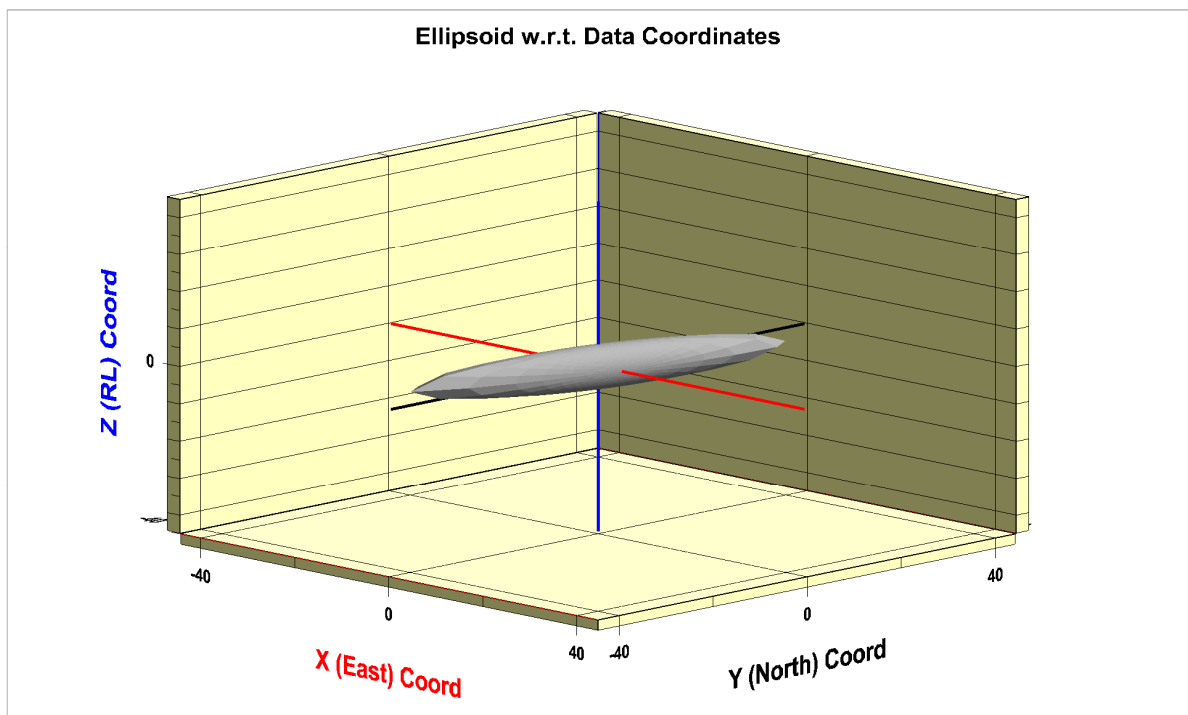
The Oxide Iron resource is defined by a wireframe that has a top limited by the topography and a base interpreted as the top of the magnetite mineralisation. This zone also has a distinct divide based on iron grade at 21300mN although this line was treated as a soft boundary for modelling purposes. The sigmoidal shape to both the Oxide Iron and Magnetite mineralisation has necessitated the use of two search directions, one for the dominant central section of mineralisation and one for the northern and southern peripheral areas of mineralisation.

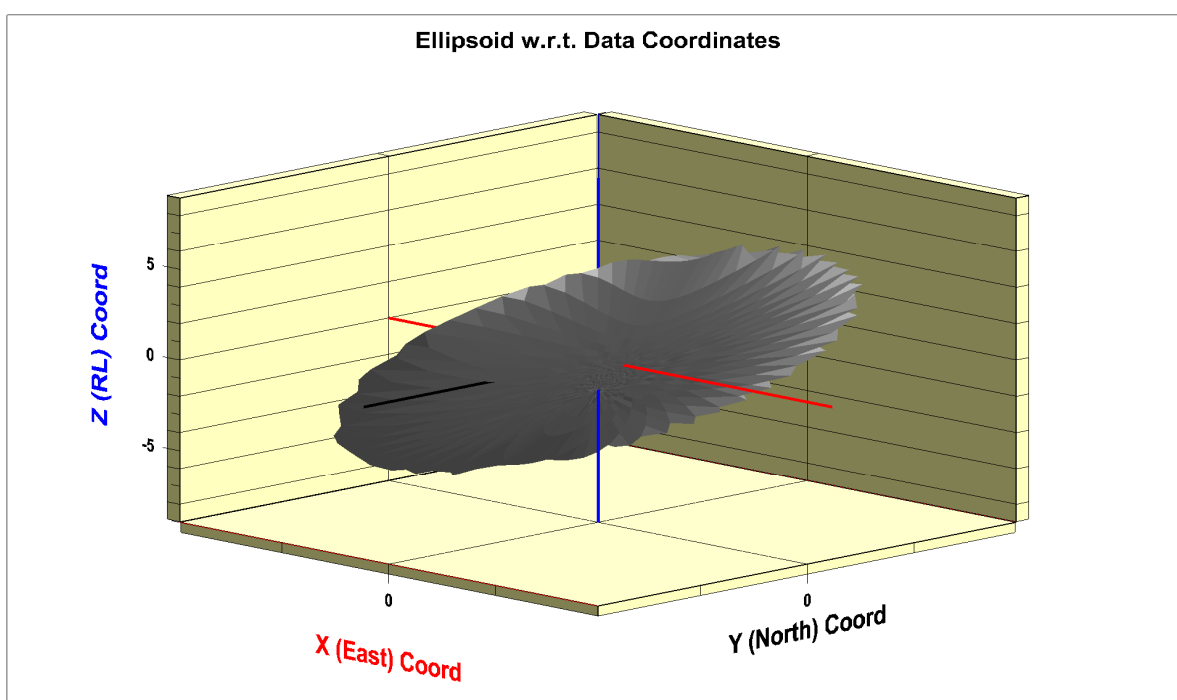
## 4.7 Spatial Analysis

Variography for the oxide iron and magnetite mineralised bodies was poor, mainly due to a lack of data i.e. the drillhole spacing is too wide and the continuity of mineralisation is too variable. An example of the downhole variography for the magnetic fraction of the deposit is included as Figure 23 and indicates a very short range across the strike of the deposit.

**Figure 23 Magnetite Model Downhole Variogram**

Figures 24 and 25 show 3D variogram models for the oxide and magnetite mineralisation. Details of the variogram models are included in Appendix 2.

**Figure 24 3D Variogram Model for Oxide Iron Mineralisation**

**Figure 25 3D Variogram Model for DTR Magnetite Mineralisation**

(note model dips quite steeply to grid west)



## 5. Estimation

A review of the summary statistics for the different mineralisation types, in particular the low coefficients of variation, indicated to H&S that Ordinary Kriging ("OK") would be the most appropriate modelling method for all resources.

### 5.1 Grade Estimation

Details of the search ellipse criteria for all resources are included in Table 12. Two searches were used to reflect the two different lode orientations associated with both the oxide and magnetite mineralisation. All parameters used for the magnetite mineralisation were also used for the Skarn Dyke iron grade modelling

**Table 12 Search Ellipse Parameters (Ordinary Kriging)**

<b>Magnetite &amp; Skarn Dyke</b>			
<b>Search 1 with 50% Expansion</b>	<b>Pass No 1</b>	<b>Pass No 2</b>	<b>Pass No 3</b>
X	25m	37.5m	37.5m
Y	100m	150m	150m
Z	50m	75m	75m
<b>Composite Data Requirements</b>			
Min Data	8	8	4
Max Data	32	32	16
Octants	4	4	2
<b>Search Ellipse Orientations</b>			
(trigonometrical orientation)	<b>X axis</b>	<b>Y Axis</b>	<b>Z Axis</b>
Domain 1	0	25	5
Domain 2	0	25	-15
<b>Oxide Lode</b>			
<b>Search 1 with 100% Expansion</b>	<b>Pass No 1</b>	<b>Pass No 2</b>	<b>Pass No 3</b>
X	15m	30m	30m
Y	60m	120m	120m
Z	40m	80m	80m
<b>Composite Data Requirements</b>			
Min Data	8	8	4
Max Data	32	32	16
Octants	4	4	2
<b>Search Ellipse Orientations</b>			
(trigonometrical orientation)	<b>X axis</b>	<b>Y Axis</b>	<b>Z Axis</b>
Domain 1	0	25	-15.5
Domain 2	0	25	7.7

Modelling used H&S's GS3M in-house software.

Table 13 shows the dimensions and block sizes of the block model created for the current study ([nbr\\_working\\_131010.mdl](#)). The block size dimensions were selected on the basis of sample spacing for the oxide portion of the resource. Ideally a different block size would have been created for the magnetite resource on account of its wider spaced

drilling but this would have meant two block models which would be very cumbersome for subsequent mine planning. Details of the block model attributes are included in Appendix 3.

**Table 13 Summary Details for the Block Model**

Type	Y	X	Z
Minimum Coordinates	20750	9807.5	-305
Maximum Coordinates	22250	10252.5	115
User Block Size	20	5	10
Min. Block Size	20	5	10
Rotation	0	0	0

## 5.2 Density Model

Based on detailed analysis of the density data supplied by Shree, H&S decided to use an average density for the iron oxide resource of 3.0t/m<sup>3</sup>. Density data supplied by Shree for the magnetite portion of the resource was modelled using OK. This produced an average density for the resource of 3.71t/m<sup>3</sup>. For the remaining Skarn Dyke resource i.e. the non-magnetic portion, the density data analysis indicated a likely average density of 3.5t/m<sup>3</sup>.

## 5.3 Resource Classification

Classification of the magnetite resources has been based mainly on the drillhole spacing, the variography, the geological understanding and the geophysical modelling. For the oxide mineralisation, the base of oxidation, core recoveries and density data are the main aspects that have meant an Inferred-only classification (Table 14).

**Table 14 Resource Classification Details**

Skarn Dyke and Magnetite	
H&S Pass No	Category
1	Indicated
2	Indicated
3	Inferred
Iron Oxide	
H&S Pass No	Category
1	Inferred
2	Inferred
3	Inferred

Positives for the resource classification include:

- The development of the geological understanding for the deposit and the lack of significant change to the resource delineation after each drilling campaign.
- The abundance of density data and its interpretation.
- Surveyed drillholes including downhole surveys for the magnetite holes.

- DTR data for the magnetite zone.
- Good recoveries for the magnetite mineralisation and the reasonable recoveries for the oxide material; no relationship is noted between recovery and iron grade.
- Ground geophysical data and 2D modelling.
- Surface rock chip sampling and historical soil sampling

Negatives for the resource classification include:

- The lack of drilling for both infill and down dip interpretation
- The uncertainty with the depth of oxidation for the oxide mineralisation
- Poor variography and hence a lack of grade continuity.
- Localised poor recoveries particularly in the oxide iron zone
- Lack of documentation of core handling and core sampling procedures

## 5.4 Estimation Results

Shree requested that the resources be reported as an overall iron resource for the Skarn Dyke, within which the magnetite zone would be a separate estimate, and the oxide iron resources. In addition the iron oxide resource was to be separated into a high grade DSO resource and lower grade Beneficiable resource with the separation between the two made on the local grid north line 21300mN.

The Skarn Dyke resource estimate is included in Table 15 with the mineral wireframe being the constraint at a nominal 30% iron. The Inferred Resources include blocks within the designed wireframe at the northern and southern ends that had no block grade estimated from the OK modelling. The average iron block grade of the immediately surrounding material was assigned to these blocks.

**Table 15 Skarn Dyke Iron Resource Estimate**

<b>Category</b>	<b>Volume</b>	<b>Tonnes</b>	<b>Iron %</b>
Indicated	516,134	1,806,472	38.64
Inferred	3,099,981	10,849,932	35.63
<b>Total</b>	<b>3,616,115</b>	<b>12,656,404</b>	<b>36.06</b>

*(the use of significant figures does not imply precision)*

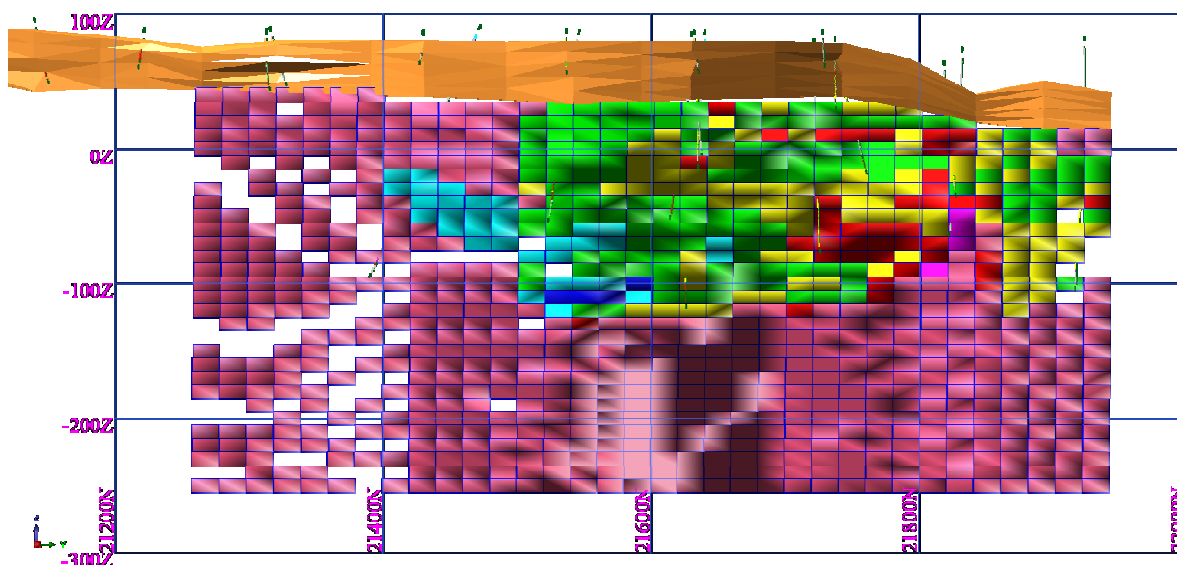
The Skarn Dyke iron resource includes the magnetite zone with estimates of the latter detailed in Table 16. The constraint on the reporting of the magnetite resource is the mineral wireframe i.e. a nominal 20% DTR but the model does include some blocks below 20% DTR accredited to small zones of low grade mineralisation. The Inferred Resource includes blocks within the designed wireframe that had no block grade estimated from the OK modelling; the overall average DTR was assigned to these blocks.

**Table 16 Skarn Dyke DTR Magnetite Resource Estimates**

Category	Volume	Tonnes	Mag %	Mag Tonnes
Indicated	466,980	1,734,100	38.5	667,096
Inferred	1,639,873	6,083,630	38.2	2,323,947
<b>Total</b>	<b>2,106,853</b>	<b>7,817,730</b>	<b>38.3</b>	<b>2,991,043</b>

(average density 3.71t/m<sup>3</sup>; the use of significant figures does not imply precision)

An example of the block grade distribution for magnetite is included as Figure 26.

**Figure 26 Magnetite Block Grade Distribution**

(view looking west; brown = oxide mineral zone) (blue = 0-20%; cyan = 20-30; green = 30-40; yellow = 40-45; red = 45-50; magenta = >50% magnetite; pink = inferred blocks within mineral wireframe)

As stated earlier, Shree's intention is to mine the magnetite in order to generate a dense media separation product. However for the sake of completeness the analysis of the magnetic fraction was also modelled using OK with the average concentrate grades given in Table 17.

**Table 17 Average Concentrate Grades of the Magnetic Fraction**

	Magnetite %	Fe Con %	SiO <sub>2</sub> Con %	S Con %	Al <sub>2</sub> O <sub>3</sub> Con %	P Con %
<b>Ave Grade</b>	38.3	65.5	5.2	0.3	0.2	BD

(BD = below detection)(magnetite difference to resource value due to less data for concentrate)

The previous 2007 resource estimate was a sectional polygonal model that produced an inferred estimated resource of 6.9Mt at 38.2% DTR magnetite for a total magnetite content of 2.63Mt. The 2010 modelling has generated a 14% increase in the size of the resource at a similar DTR magnetite grade.

The effects of the new data since the 2007 magnetite resource estimates are listed below:

- Additional drillholes have been drilled i.e. NBR005 (extension), 007, 008, 017, 018 and 021 and cover the extent of the deposit. Holes NBR017 and NBR005 have introduced a modest size reduction on the northern and southern ends of the resource respectively. Holes NBR007, NBR008, NBR018 and NBR021 are essential-

ly infill drillholes with slightly better DTR grades than the previous drilling. All of these holes have been used to generate the Indicated Resources.

- The along strike extrapolation of the wireframe has been reduced from 100m to 50m beyond the last hole but the down dip extent has been increased from 225m to 300m (based on recent geophysical work and the geological model). The overall effect of this will be to slightly increase the overall size of the resource.
- The down dip extent of the oxide resource has been increased from 30m down dip to 50m down dip; this will reduce the size of the magnetite resource.
- The NBR005 intersection is slightly thinner than expected producing a small narrowing of the deposit in the southern half.
- NBR0017 intersection is very thin and has substantially cut the width at the northern end of the deposit.
- The interpreted relationship between NBR021 and NBR001 and increased geological understanding have allowed for an increase in the amount of internal waste included with NBR001. This will result in an increased tonnage but of lower grade.
- A slightly lower average density of 3.71t/m<sup>3</sup> was used compared to the 2007 figure of 3.85t/m<sup>3</sup>. This will produce a slight drop in the resource tonnage.
- Historical hole N401 has been replaced by a much better hole, NBR018, with improved core recoveries and new DTR results. However there has been a reduction in the thickness of the deposit in this area.

The maiden Oxide Iron resource estimates are detailed in Table 18. As mentioned previously the oxide resource has been divided into northern and southern zones reflecting a difference in the average iron grade. Shree anticipate being able to mine the southern section as DSO material as part of the accessing of fresh rock magnetite zone. The northern zone has been nominated by Shree as Beneficial mineralisation.

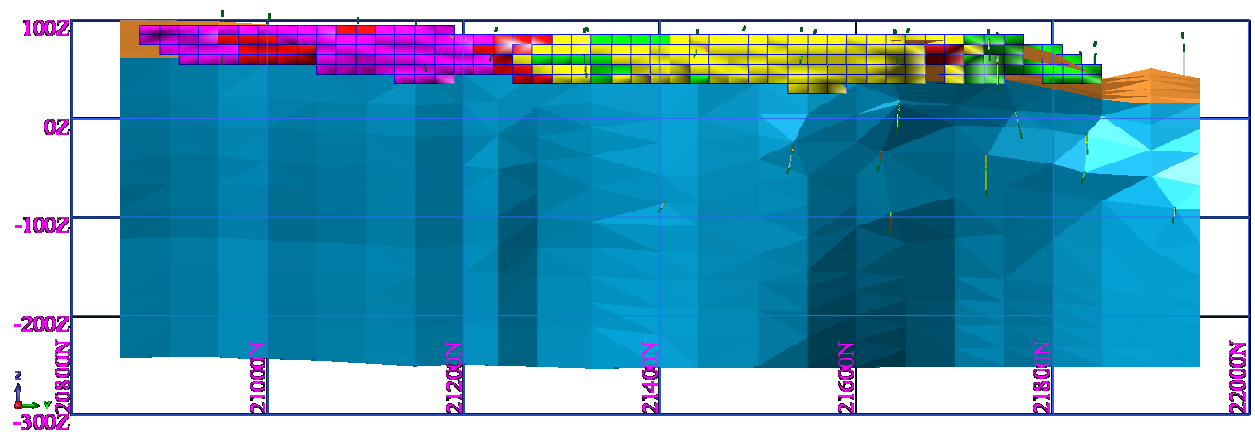
**Table 18 Oxide Iron Mineralisation Inferred Resource Estimates**

Resource	Volume	Tonnes	Fe %	P %	SiO <sub>2</sub> %	S %	Al <sub>2</sub> O <sub>3</sub> %	LOI %	Fe (Cal)%
South	149,654	448,963	57.8	0.064	8.8	0.028	1.4	6.3	61.7
North	244,822	734,466	46.8	0.018	23.7	0.068	2.7	4.7	49.1
<b>Total</b>	<b>394,476</b>	<b>1,183,429</b>	<b>51.0</b>	<b>0.036</b>	<b>18.0</b>	<b>0.053</b>	<b>2.2</b>	<b>5.3</b>	<b>53.9</b>

(average density 3t/m<sup>3</sup>; the use of significant figures does not imply precision)

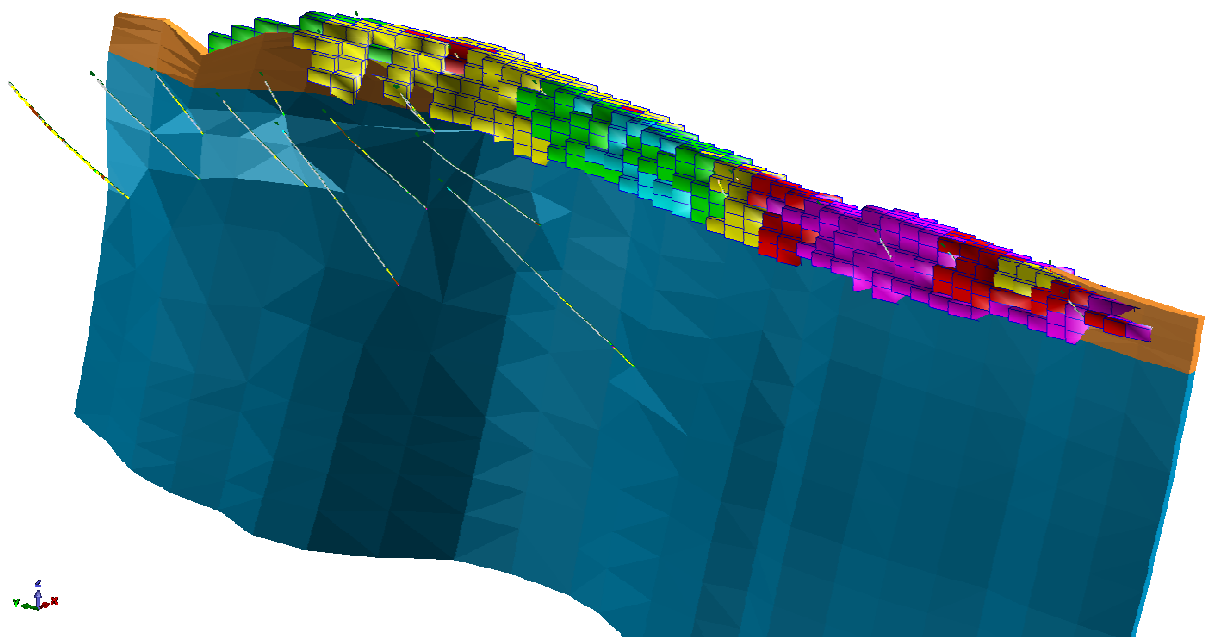
The Fe (Cal) grade is the calcined iron grade with the loss on ignition material removed from the block grade value [Fe\_Cal = Fe/(100-LOI)]. This reflects the head grade at the blast furnace minus any contained moisture.

Examples of the block grade distribution for iron in the oxide mineralisation are included as Figures 27 and 28. The brown areas represent zones within the block model where the modelling failed to assign a block grade. These areas were allocated an average block grade relevant to their location and added to the Inferred Resource category.

**Figure 27 Oxide Mineralisation Block Grade Distribution Long Section**

(view looking grid west; cyan = fresh iron mineral zone; brown = oxide mineral zone)  
 (blue = 0-30%; cyan = 30-37; green = 37-45; yellow = 45-52; red = 52-57; magenta = >57% Fe)

The higher grade DSO material is clearly indicated in both figures.

**Figure 28 Oxide Mineralisation Block Grade Distribution Oblique View**

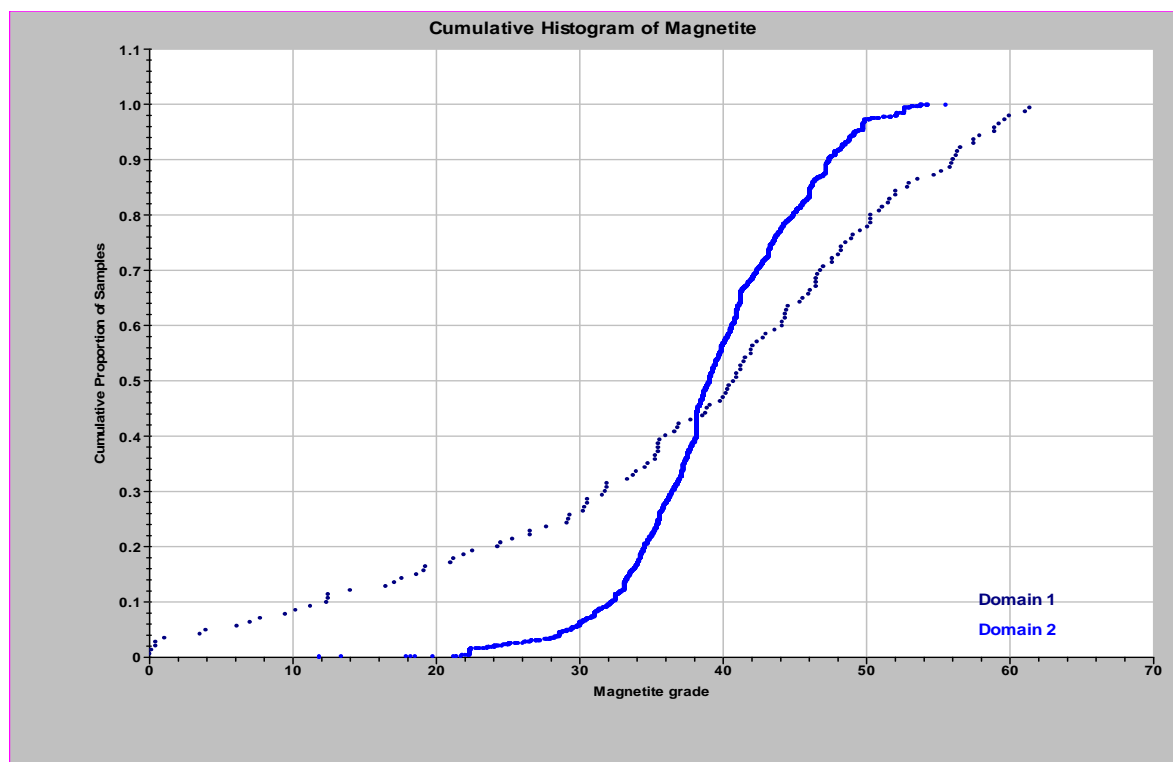
(view looking grid north east; cyan = fresh iron mineral zone; brown = oxide mineral zone)  
 (blue = 0-30%; cyan = 30-37; green = 37-45; yellow = 45-52; red = 52-57; magenta = >57% Fe)

## 6. Model Validation

The H&S modelling software generates a series of cross sectional views to allow for visual comparison of block grades with composite grades. No significant issues were noted with any of the models.

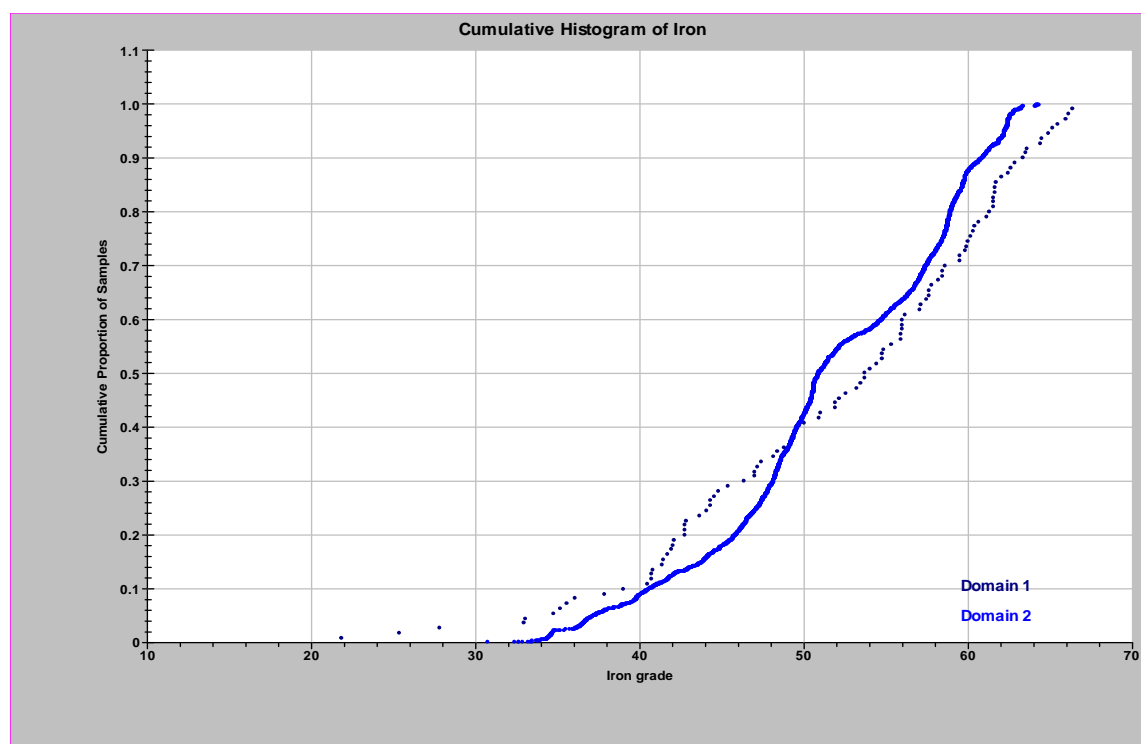
A further check involved the graphical representation of the two data sets. Figure 29 shows the comparison of the magnetic fraction composite grade data with the block model grades and indicates no obvious issue with the modelling. The irregularity in the curves is primarily due to the fundamental lack of data.

**Figure 29 Comparison of Block Model & Composite DTR Grades**



(Domain 1 = composites, Domain 2 = block grades)

Figure 30 shows the comparison of the oxide iron composite grade data with the block model grades and indicates no obvious issue with the modelling. Once again the lack of data becomes evident in the ragged nature to the curves.

**Figure 30 Comparison of Block Model & Composite Oxide Iron Grades**

(Domain 1 = composites, Domain 2 = block grades)

Minserv and H&S carried out a comparison of the new magnetite resource with the 2007 magnetite pit design (no river diversion). The pit shell was used as the basis for the comparison in order to check the two resource models and the quantity of resources contained within each model. This was done when it became apparent to Minserv that the 2007 design using the 2010 model appeared to have fewer equivalent tonnes than the 2007 figure for the same pit shell. An initial check of the conversion of the block values from the local grid used in modelling to the MGA 94 system showed that this was not the cause for the resource discrepancy.

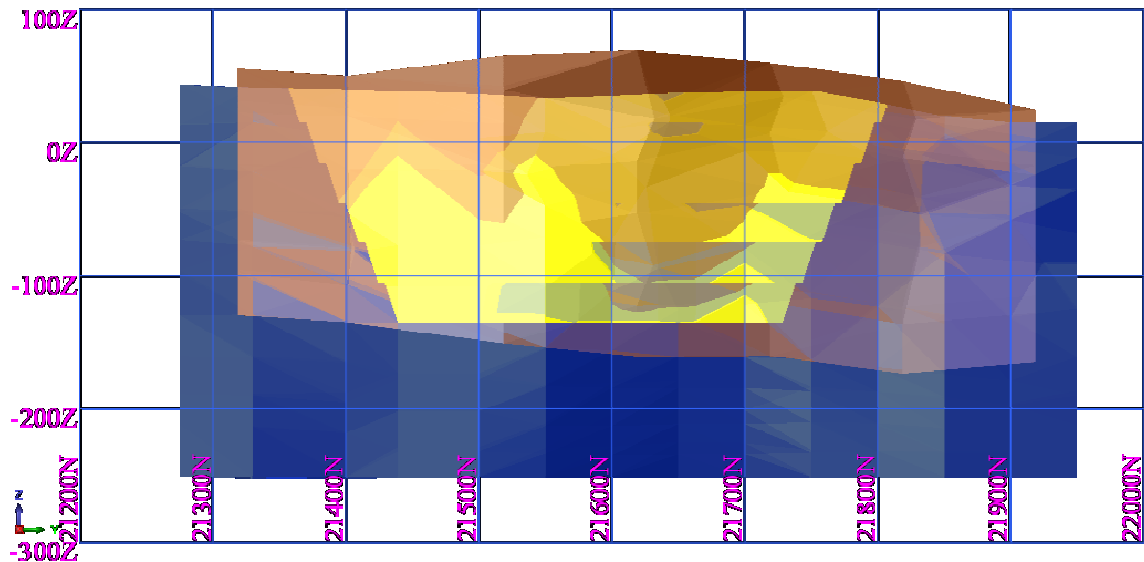
The original magnetite resource for the Nelson Bay prospect was estimated in 2007 using a sectional polygonal model based on five diamond drillholes and a ground magnetic survey (a sixth hole stopped short of the target zone). Four of the five intersecting drillholes had core samples analysed for the recoverable magnetic fraction using the DTR method. A mineralisation wireframe was interpreted from the drilling and topographic data. The base of oxidation for the mineral lode was estimated at approximately 20m below surface (30m down dip), based on localised partial oxidation of the lode in a 1967 Pickands Mather drillhole (N401). The maximum down dip extent of the lode was interpreted as 260m (approximately 200m below surface) based on Pacific Nevada's drillhole NBR001 and Geopeko's historical geophysical modelling.

The 2010 interpretation for the iron mineralisation was based on an additional five diamond drillholes into the magnetite lode and twelve diamond drillholes into the oxidised portion of the lode, plus some additional surface rock chip sampling. The extra oxidised holes and the repeat of N401 have led to a revised interpretation of the base of oxidation for the magnetite lode, which is now put at 40-42m below surface (approximately 50m in the down dip extent). The newer drilling also suggested minor hanging wall and footwall modifications to the interpretation of the lode, generally narrowing the mineralisation at its northern and southern ends and partially within it.



Figure 31 shows the changes associated with the 2010 resource definition i.e. the effect of lowering the base of oxidation for the magnetite lode and increasing its down dip extent.

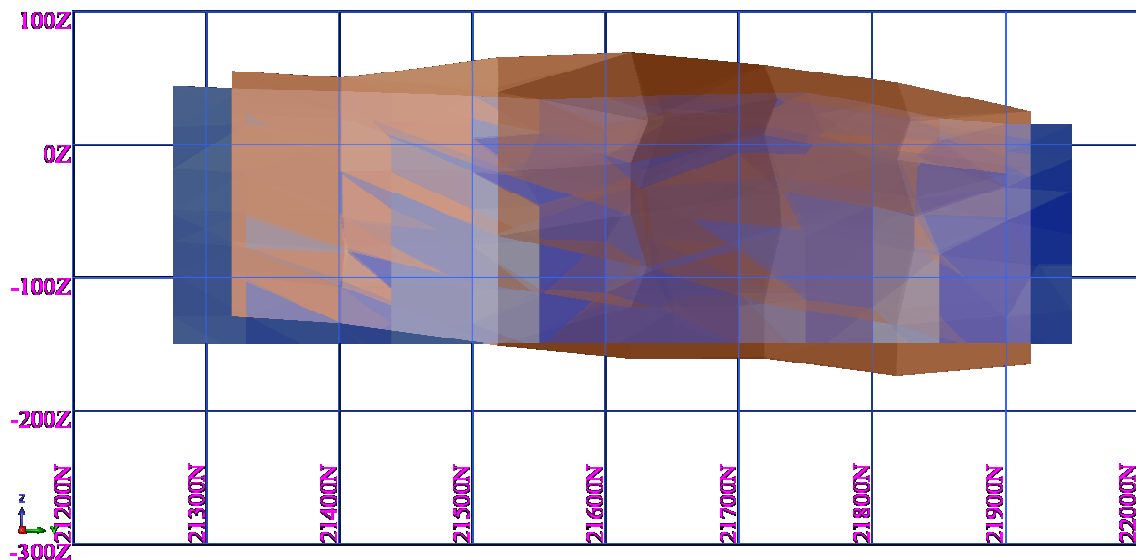
**Figure 31 Magnetite Body Changes in Resource Shape**



(brown = 2007 magnetite interpretation; blue = 2010 magnetite interpretation; yellow = designed 2011 pit)

A measure of the impact of trimming the 2010 mineral shape to approximately match the 2007 shape is included below as Figure 32.

**Figure 32 Magnetite Body Resource Estimation Comparison Shapes**

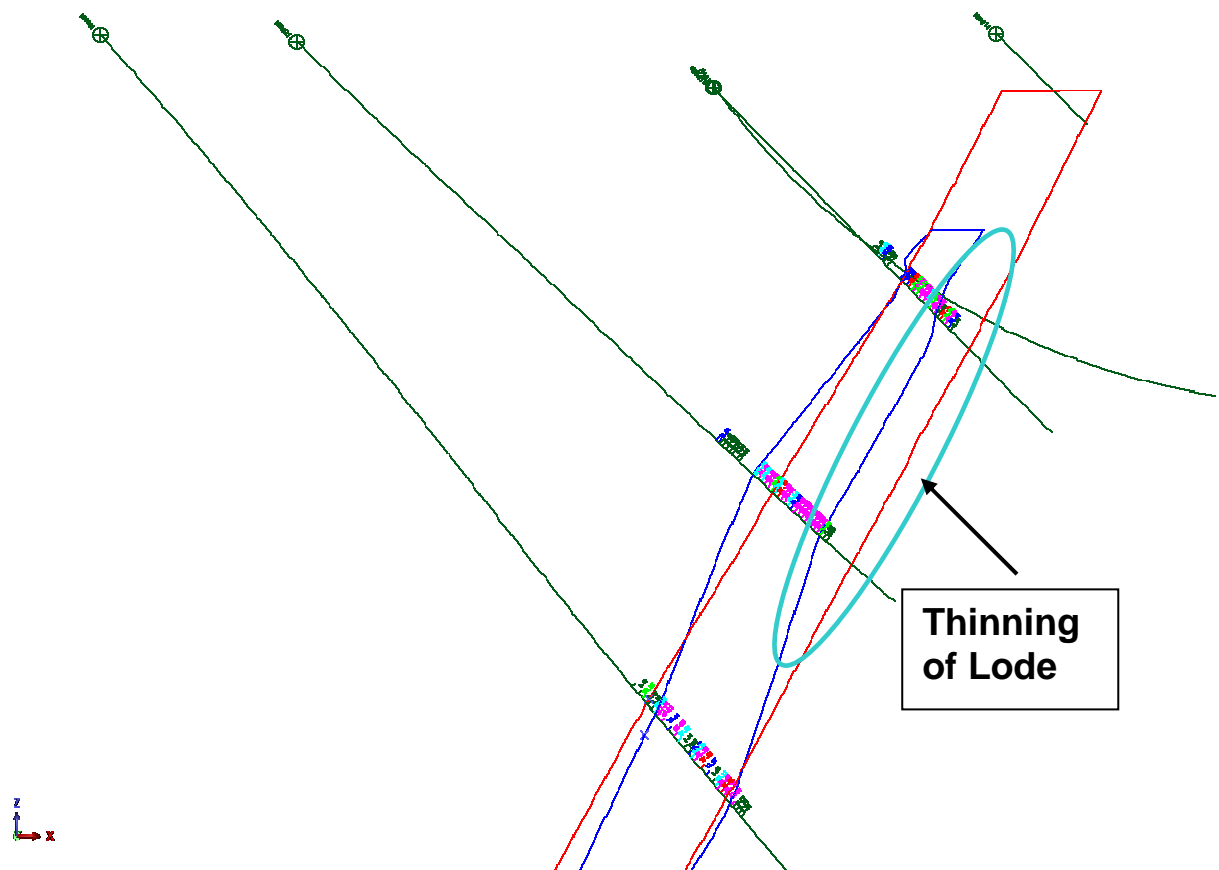


(brown = 2007 magnetite lode interpretation; blue = 2010 trimmed magnetite lode interpretation)

Comparison of the two volumes for the shapes indicates that the volume of material associated with the 2007 interpretation is approximately 1.8 million m<sup>3</sup>. The volume of material associated with the 2010 interpretation, roughly matching the 2007 strike and dip length dimensions, is approximately 1.2-1.3 million m<sup>3</sup>.

This difference in volume is due to two aspects, namely the thinning effect of the N401 redrill (NBR0018) and the deepening of the base of oxidation. The original N401 has no DTR results and iron assays were used to interpret the thickness of the lode and its likely magnetite content. The drilling of NBR018 produced a narrowing of the lode in the central area of the deposit (Figure 33). The use of iron assays as a substitute for magnetite grades is not recommended as displayed by N401/NBR018 and NBR002. NBR021 has also indicated a slight narrowing of the lode.

**Figure 33 Thinning of 2010 Magnetite Resource Shape**



(red wireframe = 2007 interpretation; blue wireframe = 2010 interpretation)

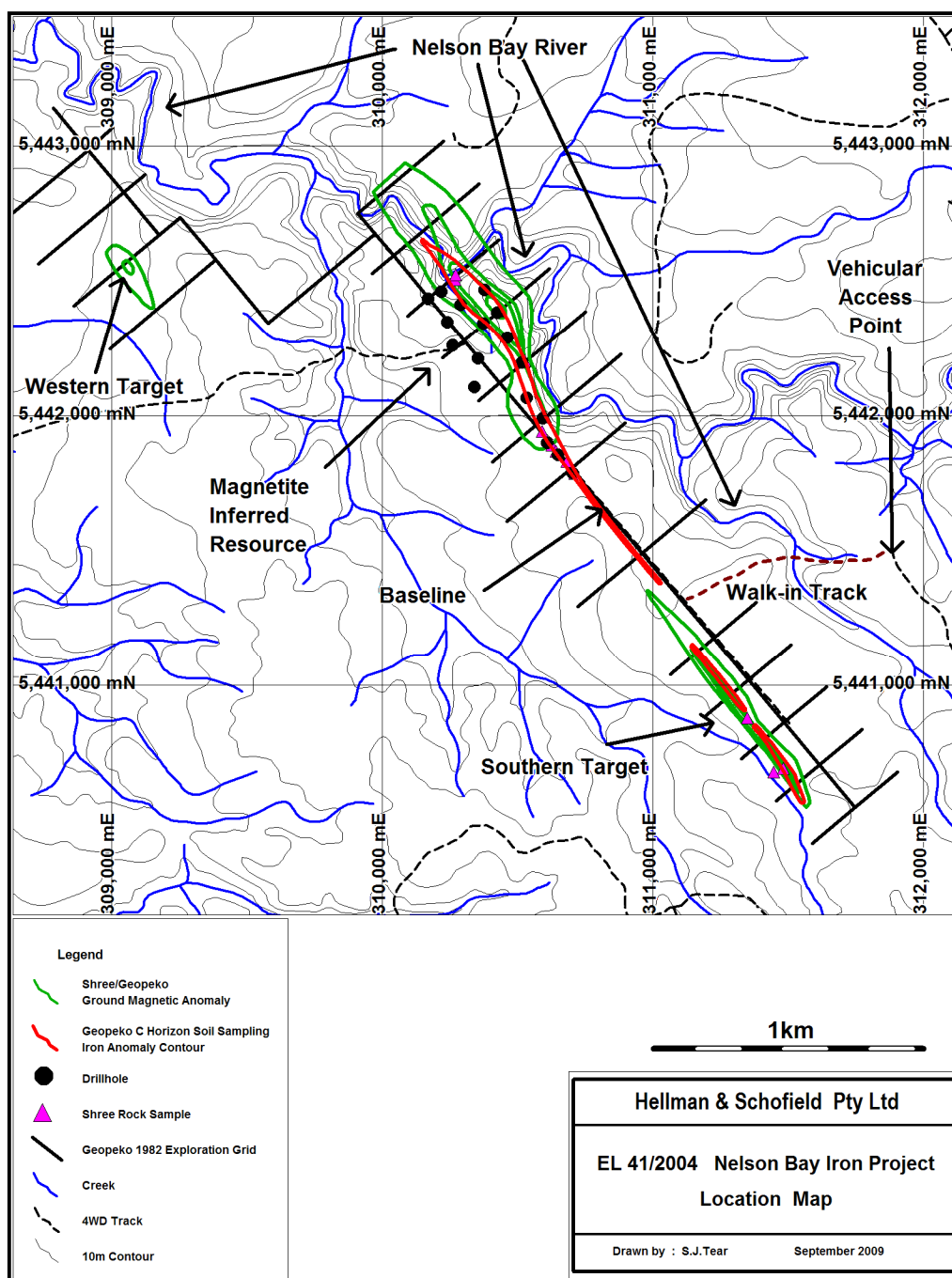
In the 2007 resource report Phase 1 of a test programme for the magnetite was completed. The main purpose of the tests was to establish whether a heavy media material could be produced from the proposed ore. The testwork included composite chemical analysis, dry magnetic separation at 600 Gauss, Davis Tube analyses at 1000 Gauss (wet magnetic separation), bond work index, and liberation sizing assessment for waste rejection. The additional testwork for the magnetite assessment was conducted to provide information for future scoping and feasibility studies.

The results indicated that material equivalent to the composite sample from Nelson Bay River deposit could be ideally suited for the production of a marketable magnetite concentrate for either heavy media markets or pellet production.

## 7. Exploration Potential

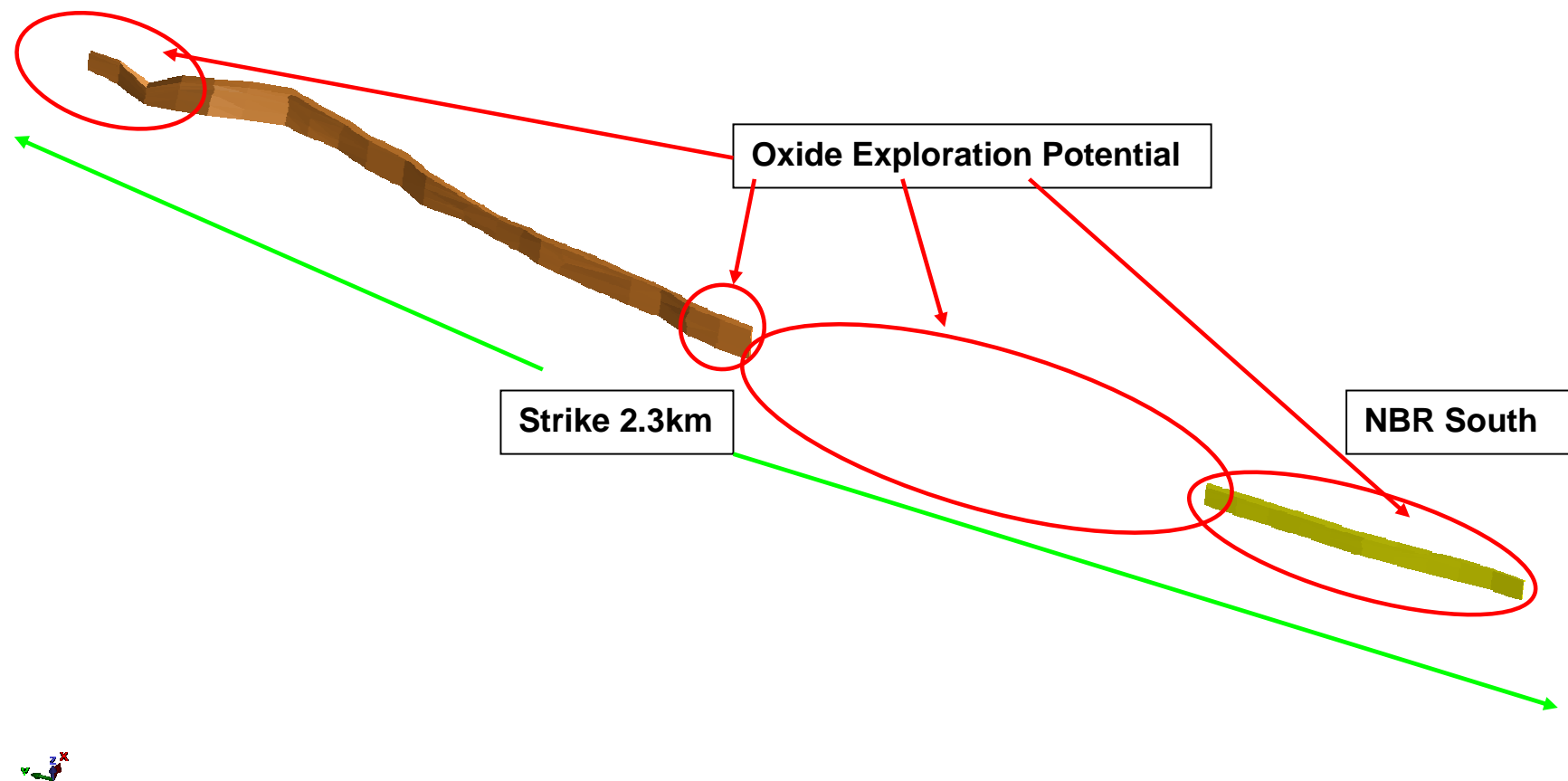
Shree have completed a single drillhole, NBR023, testing the southern magnetic anomaly. This hole intersected a 10m wide zone of partially oxidised Skarn Dyke-hosted low grade magnetite/iron mineralisation, 10-15m below surface associated with modest recoveries. This indicates the continuity of the Skarn Dyke for over 1.5km grid south of the main oxide mineralisation (Figure 34). It also allows for the expectation of additional DSO-type material to occur south of the current DSO resource (Figure 35), although there may be width and possibly depth limitations to any potential oxide mineralisation.

**Figure 34 Nelson Bay Iron Project Exploration Potential**



(figure from Shree prospectus 2009)

**Figure 35 Nelson Bay Iron Project Oxide Iron Exploration Potential**

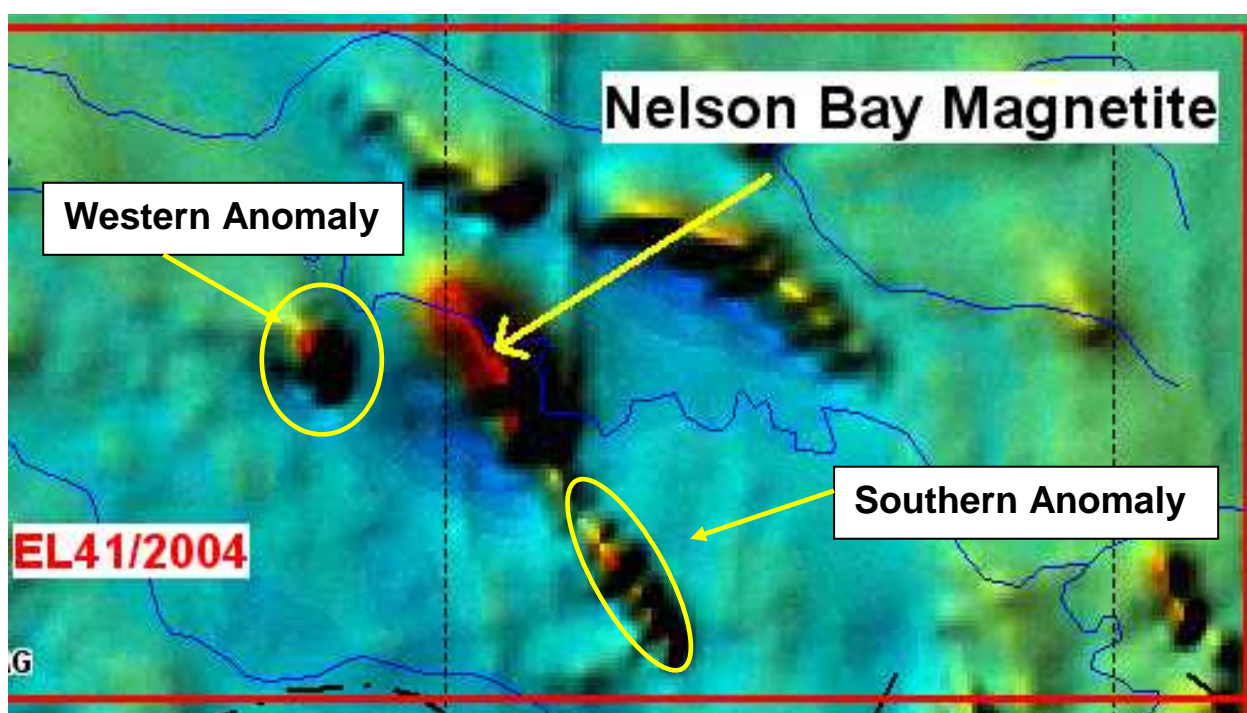


Immediate oxide resource potential exists at the ends, preferably at the southern end, of the current resource where modelling failed to allocate blocks grades within the mineral wireframe. The drilling of NBR023 at the Southern Anomaly indicated the possibility of oxide mineralisation to exist in this area although it may be of lower grade being associated with magnetite mineralisation as per the Beneficial material further north.

Exploration Potential for the magnetite at Nelson Bay exists as (Figure 36):

1. An airborne magnetic anomaly to the west of the main magnetite body. The small size of the contoured anomaly may be due to the flight line spacing (approx 200m) and it is possible that the possible magnetite body could be 200m long.
2. At depth in fresh rock for the Southern Anomaly.

**Figure 36 Nelson Bay Iron Project Magnetite Exploration Potential**



A more optimistic option is to review the weak magnetic anomaly north and north east of the main magnetic body (Figure 23) to see if there potential for additional oxide iron resource.



## **8. Future Work**

Prior to any further drilling it is important that a set of field procedures are documented and that any subsequent logging is maintained to the standard recently managed for the 2010 drilling.

### **8.1 Infill drilling**

Infill drilling is required on both the Magnetite Lode and the Oxide Iron material.

In the case of the Oxide Iron mineralisation it is important to try and better establish the base of complete oxidation as this will significantly affect the size of the resource and hence impact to some degree on the size of the magnetite resource. Areas of uncertainty also need further testing e.g. around NBR011 and some attempt made to complete two holes per section.

The option of RC drilling might be considered for some of the Oxide Iron infill work however the following items should be noted:

1. Wet RC samples are regarded as unsuitable for use in resource estimation. This is a real possibility in this part of Tasmania.
2. Some effort should be made to provide a measure of deviation with the drillholes.
3. At least two holes should be twinned with diamond drillholes, ideally those with the better recoveries.
4. Sampling using the spear method is not considered appropriate for resource estimation work. All relevant samples from the drilling should be riffle split, preferably in dry conditions.
5. Sample weights need to be recorded to provide a measure of recovery.

For the magnetite mineralisation, in order to attain Measured Resource drilling needs to be completed at least 50m intervals. Areas of some uncertainty occur around the northern end of the deposit particularly for holes NBR004 and NBR008. An additional hole on the NBR005 section is also required. In addition to this a series of holes is required to further test the interpreted deposit at depth.

### **8.2 Exploration Drilling**

Both resources have options for further drilling to extend the resource as stated in the exploration potential section.

### **8.3 Digital Elevation Model**

The current topography is based on 10m contours. It is highly likely for more detailed mining studies that a more accurate model is required.

## **8.4 Database Validation**

It is recommended that an independent audit is completed on the current drillhole database.

## **8.5 QAQC**

Any future drilling should have documented QAQC procedures. This should include the use of standards for the Oxide Iron material and the DTR magnetite concentrate grades.

In addition duplicate samples should be used to assist with determining assay accuracy. It is particularly important to complete second split duplicates with any RC sampling work.

## 9. Conclusions

Hellman & Schofield was requested by Shree Minerals Limited to complete updated resource estimates for the magnetite resource at the Nelson Bay Iron Prospect located 120km south west of Burnie in north western Tasmania. In addition maiden resource estimates are reported for the Oxide Iron mineralisation at the same deposit. The Nelson Bay prospect lies within exploration licence EL 41/2004, which is 100% owned by Shree.

The Nelson Bay iron mineralisation comprises a steeply SW dipping mafic dyke intruded into steeply NE dipping siliciclastic sediments of the Proterozoic Rocky Cape Group. The dyke has an unusual mineral assemblage of magnetite, siderite and grunerite, which is reminiscent of a skarn-type mineralogy. The deposit displays a very distinct and discrete set of airborne magnetic anomalies.

The iron mineralisation is divided into three components:

1. Fresh rock iron-rich mineralisation (referred to as Skarn Dyke) consisting of dominant magnetite, siderite and grunerite with subordinate, calcic green amphiboles, chlorite and stilpnomelane. Other gangue material includes some minor pyrite and quartz.
2. A distinctly defined fresh rock magnetite body within the Skarn Dyke, characterised by coarse grained magnetite intergrown with siderite and grunerite.
3. Oxide mineralisation consisting of strongly oxidised Skarn Dyke material comprising goethite and hematite as iron-rich clays and gossan. This unit is sub-divided into a southern DSO zone and a northern lower grade Beneficiable material. The former is the oxidised product from weathering of a magnetite-poor section of the Skarn Dyke whilst the latter is the result of weathering of the magnetite body.

Exploration work completed by Shree in 2009-2010 includes surface mapping and geochemical sampling, modelling of airborne and ground magnetic data, and limited diamond drilling.

The drilling information was supplied by Shree and was taken in good faith by H&S as a true representation of the data. H&S performed only very limited validation of this information and responsibility for quality of the data rests with Shree. The quality control procedures for assay and sampling used by Shree were not investigated by H&S, so responsibility for quality control resides solely with Shree.

Resource modelling for the magnetite and oxide iron mineralised bodies included the generation of mineral wireframes based on geological logging, geophysical modelling and nominal iron or recoverable magnetic fraction cut off grades, 30% Fe and 20% DTR respectively. Ordinary Kriging of 1m composites used 140 magnetic fraction and 110 oxide iron samples extracted from a drillhole database, constrained by the interpreted geological wireframes, to generate block models for the different resource types. This included the generation of Indicated and Inferred magnetite resources and Inferred oxide iron resources. Blocks within the wireframes that had no modelled grade were allocated the average resource grade and classified as Inferred Resource.

Earlier metallurgical testwork completed by Shree/Zelos has indicated a suitable product for sale as dense media coal washing material can be processed. Shree plans to mine the deposits using a selective mining technique in an open pit scenario and the resources have been classified according to these assumptions.

The resource estimates are as follows:

**Skarn Dyke Iron Resource Estimate**  
(30% Fe cut off and includes Magnetite Resource material)

Category	M Tonnes	Iron %
Indicated	1.8	38.6
Inferred	10.8	35.6
<b>Total</b>	<b>12.6</b>	<b>36.1</b>

**Magnetite Resource Estimate**  
(20% DTR magnetite cut off)

Category	M Tonnes	Mag %	Mag M Tonnes
Indicated	1.7	38.5	0.7
Inferred	6.1	38.2	2.3
<b>Total</b>	<b>7.8</b>	<b>38.3</b>	<b>3.0</b>

*(average density 3.71t/m<sup>3</sup>)*

The new magnetite resource estimates represents a 14% increase in the size of the resource from the 2007 estimate. This is due to an increase in the down dip interpretation partially offset by both a small narrowing of the lode in the central section and at its extremities. The new resource also contains newly defined Indicated Resources.

Maiden Mineral Resource Estimates for the Oxide Iron mineralisation are also included:

**Oxide Iron Inferred Resource Estimates**  
(30% Fe cut off)

Resource	Tonnes	Fe %	P %	SiO <sub>2</sub> %	S %	Al <sub>2</sub> O <sub>3</sub> %	LOI %	Fe (Cal)%
South	0.5	57.8	0.06	8.8	0.03	1.4	6.3	61.7
North	0.7	46.8	0.02	23.7	0.07	2.7	4.7	49.1
<b>Total</b>	<b>1.2</b>	<b>51.0</b>	<b>0.04</b>	<b>18.0</b>	<b>0.05</b>	<b>2.2</b>	<b>5.3</b>	<b>53.9</b>

*(average density 3t/m<sup>3</sup>; the use of significant figures does not imply precision)*

Exploration potential for magnetite consists of the untested western magnetic anomaly and at depth associated with the southern magnetic anomaly. Exploration potential for the oxide iron mineralisation includes the area between the current resource and the southern magnetic anomaly.

Recommendations for further work include infill drilling (>2500m) for both the magnetite and oxide resources. It is also recommended that before any new drilling is undertaken proper core handling and assay procedures are documented including planned QAQC sampling.

## **10. Expert Competency**

The data in this report that relates to Mineral Resources for the Nelson Bay Iron Deposit is based on information evaluated by Mr Simon Tear who is a Member of The Australasian Institute of Mining and Metallurgy (MAusIMM) and who has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2004 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the "JORC Code"). Mr Tear is a full-time employee of Hellman & Schofield Pty Ltd and he consents to the inclusion in the report of the Mineral Resource in the form and context in which they appear.



## 11. References

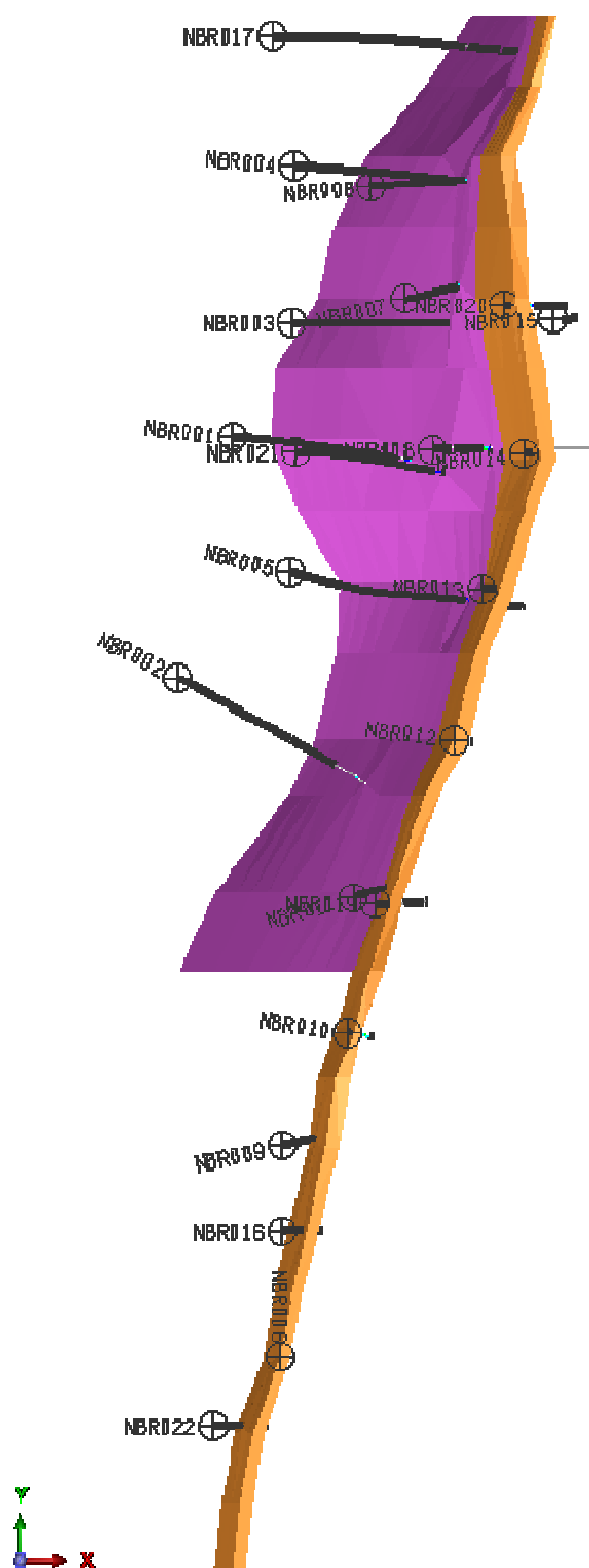
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3. Geophysics Report for Nelson Bay, D.Cowen, 2010. [NELSONBAY\\_REPORT.pdf](#)

### Zelos Reports

1. Zelos Drilling Report, W.Harder, 2007. [Report\\_R02\\_Nelson\\_Bay\\_River\\_Magnetite\\_Deposit\\_-\\_18\\_July\\_2007.pdf](#)
2. SGS DTR Work, 2006, [Davis Tube Separation on Magnetite Samples Rev 0.pdf](#)
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## **Appendix 1**

### **Plan of Wireframes showing Sigmoidal Nature to Lodes**



(purple = magnetite lode; brown = oxide iron lode ; black = drillholes)

## **Appendix 2**

### **Variogram Models**

Magnetite		Nelson Bay Iron Project				
Metal		Nugget	c1	c2	c3	
DTR_Magnetite	type		sph	sph	sph	
	variance	0	0.88	0.1	0.02	
	range - X		25	36.5	251	
	range - Y		25	29	191	
	range - Z		2.5	3.5	25	
	Z Rotation					81
	Y Rotation					4
	X Rotation					-57
Iron	type		exp	exp	sph	
	variance	0.01	0.02	0.015	0.95	
	range - X		100	100	33	
	range - Y		100	100	32	
	range - Z		3.5	4.5	3	
	Z Rotation					-10
	Y Rotation					-60
	X Rotation					0
Density	type		sph	sph	sph	
	variance	0	0.25	0.72	0.03	
	range - X		3	3.5	17	
	range - Y		28	29.5	84	
	range - Z		23	37	37	
	Z Rotation					-2
	Y Rotation					45
	X Rotation					-39



Mag Concentrate		Nelson Bay Iron Project				
Metal		Nugget	c1	c2	c3	
Alumina_con	type		exp	sph	sph	
	variance	0	0.055	0.87	0.075	
	range - X		2.5	4	5	
	range - Y		20.5	21	46	
	range - Z		19	45	45	
	Z Rotation					5
	Y Rotation					25
	X Rotation					-6
Iron_con	type		exp	sph	sph	
	variance	0	0.06	0.62	0.32	
	range - X		3.5	34.5	50	
	range - Y		8	35.5	232	
	range - Z		3	192	192	
	Z Rotation					17
	Y Rotation					-65
	X Rotation					-15
Silica_con	type		exp	sph	sph	
	variance	0	0.025	0.67	0.3	
	range - X		7	36	41	
	range - Y		7.5	15.5	214	
	range - Z		3.5	208	208	
	Z Rotation					8
	Y Rotation					-65
	X Rotation					-13
Sulphur_con	type		exp	sph	sph	
	variance	0.01	0.02	0.91	0.06	
	range - X		2.5	3	103	
	range - Y		24.5	31.5	82	
	range - Z		25	125	125	
	Z Rotation					-9
	Y Rotation					34
	X Rotation					4

Oxide Iron		Nelson Bay Iron Project				
Metal		Nugget	c1	c2	c3	
Iron	type		exp	sph	sph	
	variance	0.15	0.25	0.3	0.3	
	range - X		6	24.5	86	
	range - Y		57.5	232	357	
	range - Z		7.5	194	194	
	Z Rotation					-2
	Y Rotation					10
	X Rotation					-5
Alumina	type		sph	sph	sph	
	variance	0.01	0.86	0.1	0.03	
	range - X		3.5	4	45	
	range - Y		25	28	42	
	range - Z		3.5	5	5	
	Z Rotation					-15
	Y Rotation					-75
	X Rotation					0
Phosphorous	type		exp	sph	sph	
	variance	0.01	0.5	0.12	0.37	
	range - X		9	14	62	
	range - Y		18	107.5	298	
	range - Z		15.5	118	118	
	Z Rotation					-5
	Y Rotation					15
	X Rotation					1
Silica	type		exp	sph	sph	
	variance	0.03	0.39	0.015	0.56	
	range - X		4	15	805	
	range - Y		4	138	377	
	range - Z		10.5	258	258	
	Z Rotation					-2
	Y Rotation					45
	X Rotation					2

Sulphur	type		exp	sph	sph	
	variance	0.1	0.85	0.015	0.035	
	range - X		4	6	7	
	range - Y		4	33.5	55	
	range - Z		4	39	39	
	Z Rotation					-10
	Y Rotation					38
	X Rotation					-14
LOI	type		exp	sph	sph	
	variance	0.1	0.56	0.31	0.03	
	range - X		18.5	41.5	254	
	range - Y		3	356	490	
	range - Z		3	372	372	
	Z Rotation					-20
	Y Rotation					-44
	X Rotation					10

## **Appendix 3**

### **Block Model Attributes**

Block Model Summary nbr_131010_working.mdl Nelson Bay Iron OK Block Model 1m Composites					
Attribute Name	Type	Decimals	Background	Description	
Skarn Dyke Iron Resource					
fe_density	Float	2	-99	Skarn Density - Empty	Default used 3.5t/m3
fe_part_pc	Float	3	-999	Skarn Partial percent for wireframe	
fefeok	Float	3	-999	Ordinary Kriging Skarn iron	
ferescatok	Float	-	-99	Ordinary Kriging Skarn H&S Search Pass	
Magnetite Resource					
mag_con_al2o3ok	Float	3	-999	Mag Fraction Con for Aluminium Ordinary Kriged	
mag_con_feok	Float	3	-999	Mag Fraction Con for Iron Ordinary Kriged	
mag_con_rescatok	Float	3	-99	Mag Fraction Con for Search Pass Ordinary Kriged	
mag_con_sio2ok	Float	3	-999	Mag Fraction Con for Silica Ordinary Kriged	
mag_con_sok	Float	3	-999	Mag Fraction Con for Sulphur Ordinary Kriged	
mag_part_pc	Float	3	-999	Magnetite Partial Percent for wireframe	
magdensok	Float	3	-999	Ordinary Kriging Magnetite Density	
magok	Float	1	-999	Ordinary Kriging Magnetite grade	
magrescatok	Float	1	-99	Ordinary Kriging Magnetite H&S Search Pass	
min_type	Float	-	-99	1 = DSO 2 = Magnetite 3 = Iron Zone/Skarn Dyke	Based on centroid inside wireframe
density	Float	3	-99	Global density combining different oretypes & waste	Default 2.7t/m3 for waste rock
Oxidised Resource					
ox_density	Float	2	-99	Oxide Density - Empty	Default used 3t/m3
ox_part_pc	Float	3	-999	DSO Partial percent for wireframe	
oxal203	Float	3	-999	Ordinary Kriging DSO Aluminium	
oxfeok	Float	3	-999	Ordinary Kriging DSO iron	
oxfeok_ca	Calculated	-	-	(oxfeok/((100-oxloiok)/100))	Calcined value
oxloiok	Float	3	-999	Ordinary Kriging DSO loss on ignition	
oxpok	Float	1	-999	Ordinary Kriging DSO phosphorous	
oxrescatok	Float	-	-99	Ordinary Kriging DSO H&S Search Pass	
oxsiok	Float	3	-999	Ordinary Kriging DSO silica	
oxsok	Float	1	-999	Ordinary Kriging DSO sulphur	

## **NOTES**