NI43-101 Technical Report on

LAKE GILES IRON ORE PROJECT
Western Australia

Prepared For
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GLOSSARY OF TERMS

%	Percentage
2D	Two Dimensional
3D	Three Dimensional
AC	Air Core Drilling
Ag	The chemical symbol for the element silver
Al	The chemical symbol for the element aluminium
Anticline	A description of folding of rocks which has produced a convex shape
Argillaceous siltstones	A group of fine grained sedimentary rocks, including clays, shales, mudstones, and marls
As	The chemical symbol for the element arsenic
Azurite	A mineral that is made up of copper, up to 55% Cu, with carbonate and water
B	The chemical symbol for the element boron
Ba	The chemical symbol for the element barium
BCM	Bank Cubic Metres, a measure of volume applied to unbroken rock
BOCO	Base of complete oxidation
Be	The chemical symbol for the element beryllium
Bi	The chemical symbol for the element bismuth
Brecciated	Describes rock made up of angularly broken or fractured rock generally indicating a fault plane
Ca	The chemical symbol for the element calcium
Cd	The chemical symbol for the element cadmium
cm	Centimetre
Co	The chemical symbol for the element cobalt
Conglomerate	A sedimentary rock made up of various size particles from small pebbles to large boulders rounded other rock fragments cemented together
Cr	The chemical symbol for the element chromium
Cu	The chemical symbol for the element copper
Datamine	A proprietary computer program to model, view, analyse and report on survey, geological and mining data
Disseminated	Ore carrying fine particles, usually sulfides scattered throughout the rock.
DC	Diamond Core drilling
DBA	Database Administrator
E	Easting Coordinate
Fe	The chemical symbol for the element iron
Ga	The chemical symbol for the element gallium
Hg	The chemical symbol for the element mercury
H&S	Hellman & Schofield (created previous Mineral Resource estimates at Lake Giles.)
JORC	An acronym for Joint Ore Reserve Committee which administers the JORC Code, the Australasian Code for reporting of Exploration Results, Mineral Resources and Ore Reserves. Sets the regulatory enforceable standards for the Code of Practice for Public Reports to the Australian Stock Exchange. The Code is endorsed by the Minerals Council of Australia, The Australasian Institute of Mining and Metallurgy, and the Australian Institute of Geoscientists.
K	The chemical symbol for the element potassium
kg	Kilogram

km2	Square kilometres
kms	Kilometres
Kt	Thousand tonnes
La	The chemical symbol for the element Lanthanum
Lithology	General rock description based usually on hand specimen
m	Metre
m^3	Cubic metre
Massive	A term used to describe a large occurrence of a pure mineral species, often with no structure
Mg	The chemical symbol for the element magnesium
Mineral Reserve	The term for the economic quantities and grade of valuable materials as strictly applied in compliance with the definition in the National Instrument 43-101
Mineral Resource	The term for the estimate of the quantities and grade of valuable materials but with no economic considerations as strictly applied in compliance with the definition in the National Instrument 43-101
Mineralisation	The presence of minerals of possible economic value or the description of the process by which the concentration of valuable minerals occurs
mm	Millimetre
Mn	The chemical symbol for the element manganese
MN	Magnetic North
Mo	The chemical symbol for the element molybdenum
N	Northing Coordinate
Na	The chemical symbol for the element sodium
Ni	The chemical symbol for the element nickel
Ore	A natural aggregate of one or more minerals which, at a specified time and place, may be mined and sold at a profit or from which some part may be profitably separated
P	The chemical symbol for the element phosphorus
Pb	The chemical symbol for the element lead
Porphyry	An igneous rock with relatively large crystals set in a finer grained background mass
ppm	Parts per million (same as grams per tonne)
Protolith	Original lithology
Recovery	A measure in percentage terms in the efficiency of a process, usually metallurgical, in gathering the valuable minerals. The measure is made against the total amount of valuable mineral present in the ore
RC	Reverse Circulation drilling
RL	Reduced Level (same as elevation coordinate)
S	South Coordinate
S	The chemical symbol for the element sulphur
Sandstone	A sedimentary rock consisting of sand size grains, generally the mineral quartz, which is in a consolidated mass
Sb	The chemical symbol for the element antimony
Sc	The chemical symbol for the element scandium
Sericite	A mica mineral – product of hydrothermal alteration

SG	Specifc Gravity, used in all Sections (except Section 16) to mean in situ bulk density of rock material a property of rock material used to calculate the mass of rock material by multiplying SG and volume
Silica	A compound of silicon and oxygen, generally occurring in the form of mineral called quartz
sq kms	Square kilometres
Sr	The chemical symbol for the element strontium
Stratiform	Describes a layered or tabular shaped body of mineralized rock within a sedimentary rock and implies that the layering of the mineralisation is parallel to the bedding planes in that sedimentary rock
T	Tonne
Kt	Thousand tonnes
Mt	Million tonnes
Th	The chemical symbol for the element thorium
Ti	The chemical symbol for the element titanium
Tl	The chemical symbol for the element thallium
TN	True North
Tuff	General term for rocks that consist of fragmental material thrown into the air by explosive volcanic activity
U	The chemical symbol for the element uranium
V	The chemical symbol for the element vanadium
W	Westing Coordinate
Zn	The chemical symbol for the element zinc

Item 3 Summary

3.1 Introduction

The Lake Giles project is located approximately 150 kilometres north-west of Kalgoorlie-Boulder in the state of Western Australia (Figure 1). The project contains a series of magnetite bearing banded iron formation (BIF) units with the potential to host economic deposits of iron ore. Exploration to date has comprised surface mapping, geophysical studies and RC drilling programs. The results of this work at the project have been the subject of several Mineral Resource estimates, and this technical report presents the results of the most recent upgrade to Mineral Resource estimation at the Moonshine prospect within the Lake Giles project.

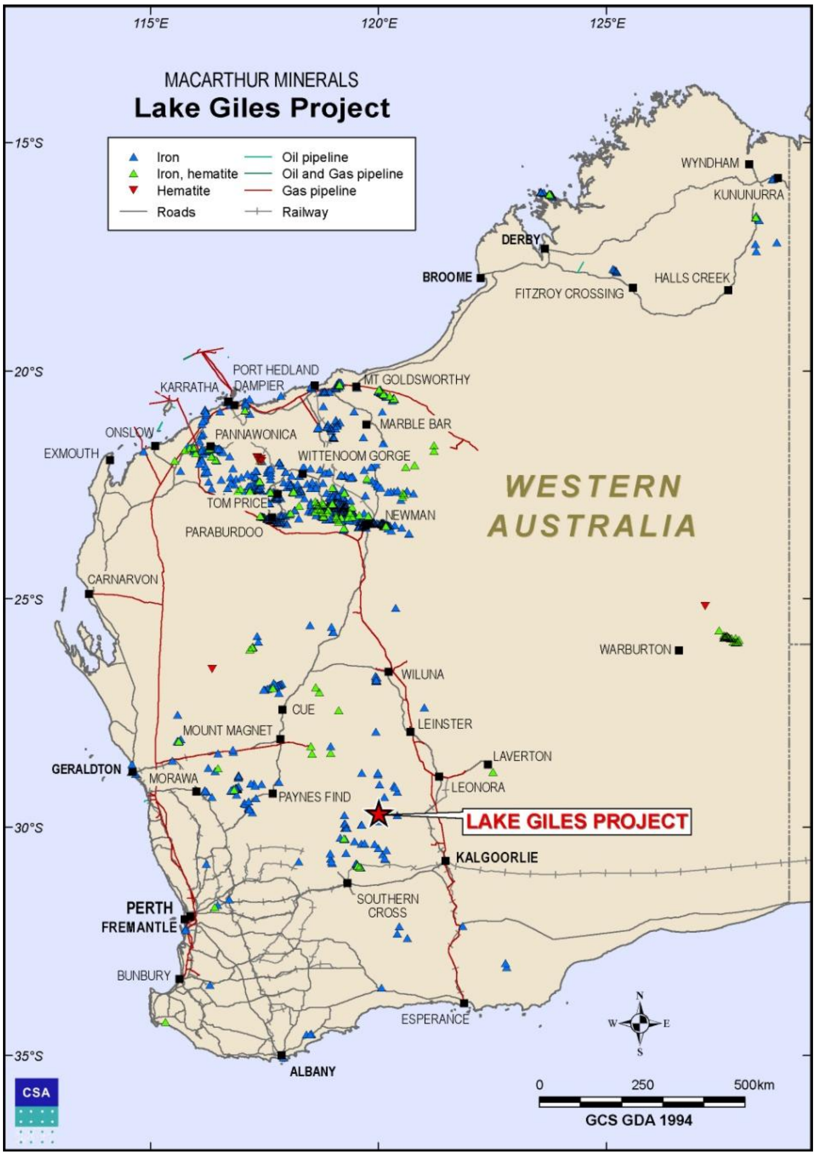

Figure 1. Location of the Lake Giles Project Western Australia

3.2 Project Ownership

The Lake Giles project area comprises 12 contiguous Exploration Licences and 13 Mining Leases which are all held by Macarthur Minerals Limited ('Macarthur'). This report addresses Mineral Resource estimation of iron mineralisation within Mining Leases M30/206, M30/207 and M30/228.

3.3 Project Geology

The Mineralisation at the Lake Giles project lies within the Yerilgee Greenstone Belt of the Southern Cross Province of the Archean Yilgarn Craton. The Yerilgee Greenstone Belt comprises a sequence of high magnesium basalts, ultramafic volcanic rocks, and sedimentary rocks including banded iron formations. The lithologies have undergone metamorphism to greenschist facies, and multiple stages of deformation including intense folding, and shearing. The iron mineralisation styles identified at Lake Giles include secondary pisolite mineralisation, primary magnetite mineralisation associated with un-oxidised banded iron formation (BIF) and ultramafic rocks, and goethite-hematite mineralisation associated with oxidized BIF. This report covers the BIF hosted magnetite mineralisation that has been the focus of Macarthur's recent exploration activities.

3.4 Exploration

Between 1968 and 1972, a number of exploration companies explored the Lake Giles area for nickel sulphide mineralisation, and from 1993 to 1998 the area was explored for gold mineralisation by several companies.

Macarthur has focused its exploration activities on testing for iron ore mineralisation which provides the basis of the current report. This exploration has included geological mapping, geophysical surveying, auger sampling of pisolite targets and reverse circulation percussion (RC) and diamond core drilling of magnetite iron ore targets. These activities were undertaken between 2005 and July 2009.

3.5 Mineral Resource Estimation at Lake Giles

An initial Inferred Mineral Resource Estimate was completed for the Snark, Clark Hill North, and Clark Hill South deposits, by geological consultants Hellman and Schofield ('H&S') in October 2007 which formed the basis for a Technical Report for the project (Abbott, 2007a, 2007b).

In June 2008, upon the completion of reverse circulation (RC) and diamond drilling programs targeting the Clark Hill North area, H&S updated resource estimates for the project (Abbott, 2008a).

In September 2008, following completion of RC drilling in the Sandalwood area, H&S estimated Mineral Resources for the Sandalwood deposit (Abbott, 2008b, 2009a).

Between April 2006 and June 2008, Macarthur drilled 89 RC drill holes and 5 diamond holes targeting magnetite mineralisation within BIF and adjacent ultramafic rocks at the Snark, Clark Hill South, Clark Hill North and Sandalwood deposits. These drill holes are described in the Technical Report completed in January 2009 (Abbott, 2009a).

Following the completion of assay and data compilation for a further 68 RC holes drilled as part of the Phase 7 RC drilling program, a Mineral Resource estimate was completed for the Moonshine deposit, contained within the Technical Report completed in May 2009 (Abbott & van der Heyden 2009).

Analytical data available for mineralized portions of the RC holes include X-Ray fluorescence (XRF) assay results, and Davis Tube Recovery analyses which measure the proportion of sample recoverable by magnetic separation. Material concentrated by the Davis Tube tests was assayed by XRF for iron and other elements of interest.

Mineral Resource estimates since 2007 for the Lake Giles magnetite iron ore project have included estimates of the tonnage and grade of mineralisation that might be recovered by magnetic concentration on the basis of Davis Tube analyses routinely performed on drill samples. Mineral Resource estimates for the Moonshine deposit which form the basis for this report follow this analysis and reporting format.

Further metallurgical work would be required to design a process to maximize economic recovery of magnetite from the mineralisation of this project area, and the concentrate grade results are not the outcome of an economic evaluation of the deposits.

The mineralisation models used for the current estimate are based on interpretations by Macarthur and comprise steeply dipping to vertical zones of magnetite mineralisation within banded iron formation (BIF) and ultramafic rocks. The interpreted mineralisation wireframes that form the basis of the resource estimates extend from the base of oxidation to the 200mRL, approximately 300m below surface. Inferred Mineral Resources estimated for the Lake Giles Project deposits at Moonshine, Clark Hill North and Sandalwood deposit are shown in Table 1.

The figures shown in this table are rounded to reflect the accuracy of estimates and exhibit rounding errors. The Inferred Mineral resources reported in this document for the Moonshine prospect were completed using Ordinary Kriging**.**

Table 1. Inferred Mineral Resource Estimate - Summary of In-situ tonnes and grades for Lake Giles Project.

Domain	Feed Mtonnes	Head Fe %	DTR %	Concentrate Mtonnes	Cons Fe %	Cons P %	Cons SiO2 %	Cons Al2O3 %	Cons LOI %	Cons S %
Snark	26.3	27.5	22.5	5.92	64.3	0.027	9.60	0.15	-2.50	0.270
Clark Hill North	130.0	25.8	33.2	43.16	62.1	0.040	12.50	0.16	-2.58	0.230
Sandlewood	335.0	31.1	33.1	110.885	64.0	0.031	9.64	0.07	-2.77	0.160
Moonshine	510.9	27.8	25.5	130.3	65.7	0.017	6.00	0.09	-2.50	0.442
Clark Hill South	48.5	21.9	20.8	10.1	61.8	0.020	10.70	0.18	-2.20	0.220
TOTAL	1050.7	28.3	28.6	300	64.5	0.025	8.27	0.10	-2.58	0.311

The figures reported in Table 1 are for BIF hosted magnetite below the base of complete oxidation (BOCO) down to the 200 m RL, where drilling is within 0.6 times the primary search radius of the drillholes, or the 250 mRL otherwise. Much of this material is an extrapolation of material below the drilled intercept based on the geological model. Strike extension was based on mapped BIF extents.

The Lake Giles project is advancing in evaluation, with all Mineral Resource estimates still at Inferred status. Macarthur has not established the economic viability of the Mineral Resources, and no Mineral

Reserve estimates have been produced for the deposits. Macarthur Minerals is preparing conceptual economica analyses. The extent to which mining, metallurgical, marketing, infrastructure, permitting, marketing and other financial factors may affect Mineral Resource Estimates is not yet well defined.

3.6 Recommendations

CSA recommendations for further work programs include;

3.6.1 Drill Program Quality Management

Macarthur has recently adopted CSA's recommendation for a drillhole sampling QA/QC program:

> Future drilling should have a well-designed QAQC program which should include field duplicates, certified reference material (CRM), blank samples and check assays from alternate laboratories. At a minimum, field duplicates and CRM's should be inserted at a rate of one in twenty samples. Blanks should be inserted randomly wherever high grade material is intersected and umpire assays from alternate labs should be completed at a rate of one in twenty samples throughout any subsequent programs.

3.6.2 Additional Drillholes for Indicated Mineral Resource

Further drilling will need to be carried out if the Mineral Resource estimate is to be upgraded to Indicated status. The drilling program design should meet the following guidelines as a minimum:

- At a section spacing of 200m or less.
- On each 200m section, two drillholes giving intercepts that cover the full width of the BIF below the BOCO.
- Additional drillholes should aim to confirm the extrapolated depth extensions of the mineralised lithology. The holes should also aim to delineate the orientation of the interpreted steeply structure. The drillhole intercepts for this purpose should cover mineralisation projected below the present Mineral Resource base depth of 250mRL down to 200mRL.

3.6.3 Improvements to Mineral Resource modelling

The following list of suggestions would improve the confidence level and reliability of the resource estimate:

- Increase the number of density measurements; this should include measurement of core samples, downhole density logging and pyncnometer readings.
- Additional assays should be taken above the BOCO to test whether partially oxidised material might potentially yield magnetic concentrate. Although the magnetite yields will be less than fresh BIF there is potential for earlier production of concentrate which may improve project economics.

3.7 Conclusions

The validity of the database used for Mineral Resources estimates of mineralisation at the Moonshine deposit has been confirmed via checks for internal consistency and accuracy. As a result of these checks the author considers that the drill hole data has been adequately validated and is appropriate for use in the estimation of an Inferred Mineral Resource which is the subject of this technical report.

Previous technical reporting of Mineral Resource estimates for the Moonshine deposit (Abbott & van der Heyden 2009) raised concerns relating to the adequacy of supervision in drilling and sampling and its suitability for use in the estimation of higher confidence resource categories.

Macarthur have implemented revised field procedures which address these previously reported concerns and have undertaken significant efforts to improve operating practice in the current drilling phase. Having reviewed these revised field procedures and independently verified their execution as part of a site visit, the author is satisfied that the current sample preparation, security and analytical procedures form an adequate basis for the estimation of Inferred Mineral Resources at the Moonshine deposit.

As a part of these newly implemented field procedures, aspects of resource definition drilling at the Moonshine deposit has been re-logged as part of Macarthur's efforts to upgrade the quality of the drillhole information and to improve the data collection process. The oxide boundary was re-digitised based on the new logging of weathering, magnetism of drill chips, the DTR % recovery and the calculated % Fe recovered.

Although adequate for estimation of Inferred Resources, work required to define Indicated Mineral Resources at the Moonshine deposit will require systematic pattern drilling on a regular spacing, as well as the ongoing use of quality field procedures and monitoring of sampling and assaying.

Item 4 Introduction

This Technical Report has been commissioned by Macarthur Minerals Ltd (Macarthur) for the purpose of updating the Company's investors on its Moonshine deposit at the Lake Giles Project. The report conforms to the standard of the Canadian National Instrument 43-101 'Standards of Disclosure for Mineral Projects' (NI 43-101), and with the JORC Code.

CSA Global has prepared this report under the supervision of Mr Chris Allen. The report is based on data and information gathered by Macarthur and supplied to CSA in an update dated the 20th October 2009. Mr Chris Allen is the qualified person responsible for the preparation of this report and the resource estimation, Item 19. The author is a professional geologist, with extensive experience in the exploration and evaluation of mineral properties in Australia. Mr Andrew Spinks of Macarthur is the responsible person for the geology and geological interpretation for Moonshine on which the resource estimate has been based.

Mr Chris Allen visited the Lake Giles site in July 2007 to review the current geological interpretation, data collection and QAQC procedures, and to verify that the supplied data correctly represents the mineral deposit being modelled.

The report author and Qualified Person is:

Mr Chris Allen. Mr Allen has a BSc degree from the University of Western Australia and is a full member of the Australian Institute of Geoscientists. He is the person responsible for Mineral Resource Estimates completed on the Moonshine deposit and documented within this technical report. He has visited the Lake Giles Project from 28th to the 30th July 2009.

CSA Global Pty Ltd is an Australian owned company providing geological and mining consulting services to the mineral resource sector. The organisation is well resourced with an established office in Perth, Western Australia and has undertaken work for a number of substantial international mining houses. CSA comprises a team of technical professionals dedicated to providing excellence of service in their field of expertise. Neither CSA nor the authors of this report have or have had previously any material interest in Macarthur or related entities or interests. CSA's relationship with Macarthur is solely a professional association between client and independent consultant. The report has been prepared in return for fees based on agreed commercial rates and the payment of these fees is in no way contingent on the results of this report.

Item 5 Reliance on Other Experts

CSA has based this Technical Report of the Lake Giles Project and Moonshine deposit on information provided by Macarthur Minerals Ltd and the references listed in Item 23. This report relies on other experts for the description of project tenure, regional geology and environmental considerations. The report includes third party technical reports and relevant published and unpublished third party information.

The Mineral Resource Estimates rely heavily on surface mapping to determine the extent of the mineralized units. The mapping used was supplied by Macarthur. CSA have carried out more detailed mapping of some of the Lake Giles prospects after the resource estimates were completed.

CSA has made all reasonable endeavours, including a site visit and review of the Macarthur data, to confirm the authenticity and completeness of the technical data on which this report is based, however CSA can not guarantee the authenticity or completeness of such third party information.

The report author is not qualified to comment on any legal, environmental, political or other issues relating to the status of the Lake Giles tenements, or for any marketing and mining considerations related to the economic viability of the Lake Giles mineralisation.

Descriptions of the project tenure were provided to CSA by Macarthur in two reports by McMahon Mining Title Services Pty Ltd (McMahon 2007a, 2007b). Macarthur has warranted to CSA that the information provided by Macarthur Minerals to CSA for preparation of this report correctly represents all material information relevant to the project.

Item 6 Property Description and Location

6.1 Project Location and Tenement Status

The mineralized zones covered by this Technical Report lie within three Mining Leases designated as M30/206, M30/207 and M30/228 with a combined area of 2,380 hectares.

Figure 2 shows the extents of these tenements relative to the mineralized domains currently interpreted for Lake Giles. This figure shows only the tenements hosting the currently interpreted mineralized domains. Macarthur has continuous tenement coverage between the northern and southern groups of deposits at the Lake Giles project.

Table 2 shows the area, and annual expenditure commitments of the tenements relevant to this current report. The information in Table 2 is derived from McMahon (2007a) and an updated spreadsheet supplied by Macarthur in May 2009. Unless otherwise specified, all coordinate references in this report are specified in Geocentric Datum of Australia 1994 (GDA94) coordinates. The Lake Giles tenements are centered on approximately 788,300 mE, 6,683,000 mN which is equivalent to 119o 59' E, 29o 57' south (longitude, latitude) , and are located approximately 150 kilometres to the northwest of the city of Kalgoorlie-Boulder in Western Australia as shown in Figure 1.

The boundaries of Exploration Licenses are defined by graticular sections representing blocks equivalent to one degree of latitude and one degree of longitude with an approximate area of 285 hectares. The locations of Exploration License boundaries are specified in lease applications, but lease boundaries are not physically marked on the ground. Mining Lease boundaries are defined by the location of corner claim pegs with approximate coordinates based on GPS readings recorded in claim documentation.

6.2 Environmental Liabilities

The report author is not qualified to comment on any environmental and legal considerations relating to the status of the Lake Giles tenements. McMahon (2007a) reports that all the tenements are currently in good standing.

Cooper (2007) reports that no environmental liabilities exist for the project, and that exploration activities are monitored by the relevant department of the West Australian Government.

Portions of the northern Exploration Licences E30/230 and E30/240 at the Lake Giles Project are overlain by the Mt Manning Nature Reserve. This reserve was granted in April 2000, and is identified by Western Australian Government reference number 36208. Cooper (2005) reports that any exploration and mining proposed within the Mt Manning Nature Reserve must satisfy additional, more stringent environmental conditions, and would be subject to additional permitting requirements than for activities within the Exploration Licenses outside the reserve. The iron ore mineralisation that is the focus of this report does not encroach on the nature reserve.

McMahon (2007b) reports that there are no registered Native Title claims over the Lake Giles Project.

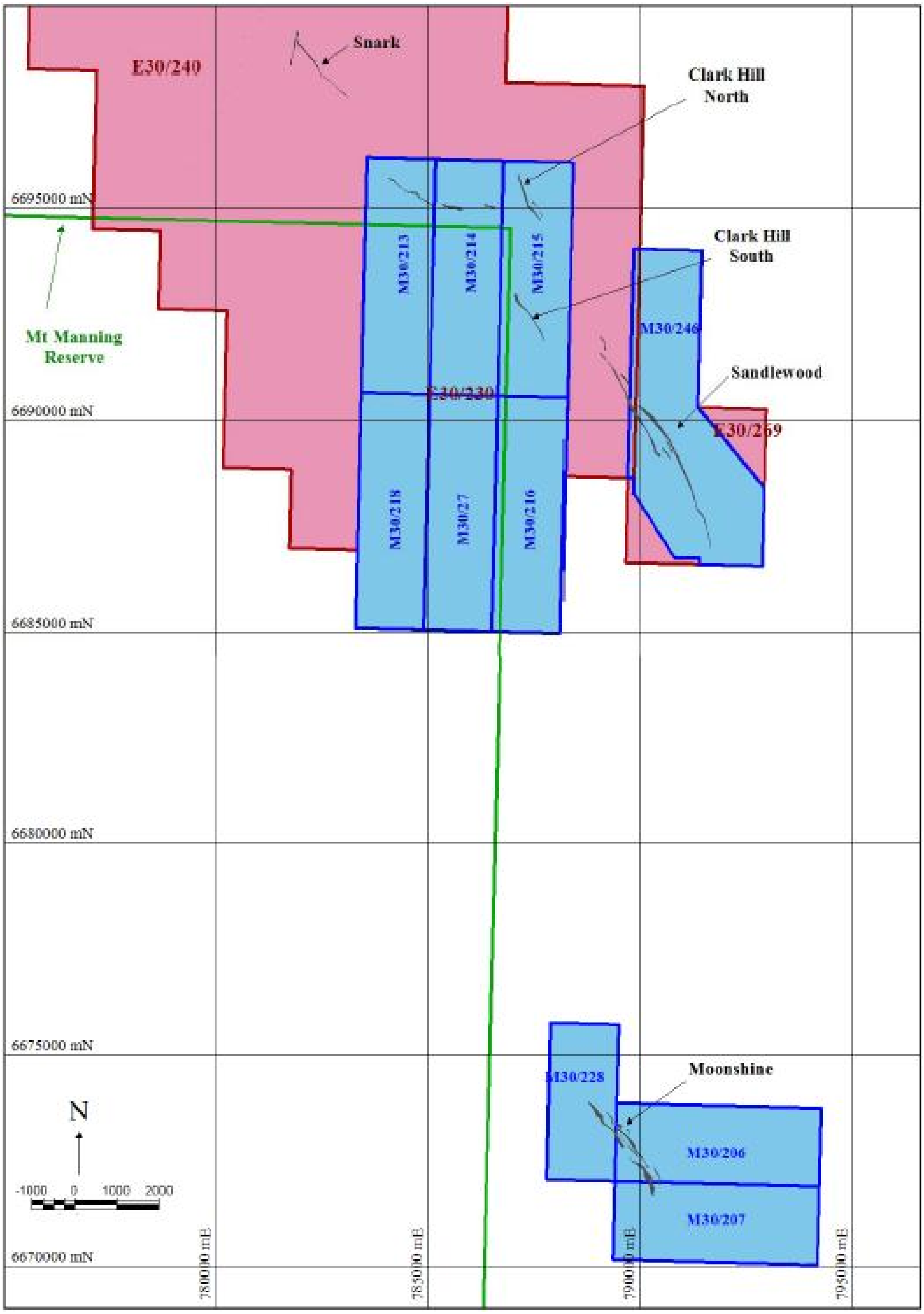

Figure 2. Tenement diagram for the Lake Giles Project.

Table 2. Tenement Summary for the Lake Giles Project

Tenement	Area (Hectares)	Exploration Commitment (A$)	Granted Date	Expiry Date	Rent (A$)
E30/230	5,361	$70,000	28-Apr-00		$8,193
E30/240	12,216	$123,000	23-Oct-00	22-Oct-09	$18,662
E30/269	1,787	$30,000	18-Apr-05	17-Apr-10	$1,442
M30/0206	893	$89,300	02-Jul-07	01-Jul-28	$13,359
M30/0207	892	$89,200	02-Jul-07	01-Jul-28	$13,344
M30/0213	894	$89,400			$13,374
M30/0214	894	$89,400			$13,374
M30/0215	894	$89,400			$13,374
M30/0216	893	$89,300			$13,359
M30/0217	893	$89,300			$13,359
M30/0218	893	$89,300			$13,359
M30/0228	595	$59,500	02-Jul-07	01-Jul-28	$8,901
M30/0246	1,363	$136,300			$20,390

Item 7 Accessibility, Climate, Local Mineral Resources, Infrastructure and Physiography

7.1 Project Access

The Lake Giles Project is situated approximately 450 kilometres to the east-northeast of Perth, the capital city of the state of Western Australia, and approximately 150 kilometres to the north-west of Kalgoorlie-Boulder in the Eastern Goldfields region (**Figure 1**).

The project can be accessed from Kalgoorlie via the sealed Menzies Highway north for 130 kilometres, then west from the town of Menzies for 115 kilometres along the graded Diemals road. Alternatively the project can be accessed from Perth, via sealed roads to Southern Cross and Bullfinch, then north and west for 200 kilometres along the Diemals road. Kalgoorlie is serviced by daily commercial flights from Perth. Access within the project area is by a number of tracks cleared by previous explorers, and more recently by Macarthur. These tracks may become impassable after heavy rain.

7.2 Physiography and Climate

Low ridges associated with BIF units dominate the topography of the Lake Giles area, commonly rising up to approximately 50 metres above the surrounding plains. The range of topographic relief within the project area is 85 metres, varying from 430 to 515 metres above sea level. Adjacent to the low ridges are flat to gently undulating areas of sheetwash and soil covered areas. Vegetation of the region is dominated by mulga scrub with local patches of low to medium Eucalyptus woodland and areas of salt tolerant shrub and spinifex.

Mean monthly temperature ranges and rainfall readings are available for the Bureau of Meteorology field station at Diemals Station, approximately 65 kilometres west northwest of the Lake Giles project which operated between 1970 and 1994 (Australian Bureau of Meteorology, 2007). The semi-arid climate of the Lake Giles region is characterized by warm dry summers with average maximum daily temperatures of 35°C from December to February, and rare thunderstorms. For an average of 32 days per year the maximum daily temperature exceeds 40°C. Winter months are relatively mild with average daily temperature ranges of 5 to 18°C from June to August.

Annual rainfall averages 275 millimetres, with most rain falling during the winter months, or associated with rare heavy falls during the summer associated with the remnants of tropical storms which pass inland from the northwestern coast of Western Australia. In the Kalgoorlie region, mining and exploration activities are conducted throughout the year, with infrequent generally short disruptions during and after periods of heavy rain.

7.3 Local Infrastructure and Services

The Lake Giles Project is serviced from the city of Kalgoorlie-Boulder, with a population of 28,000 people (Australian Bureau of Statistics, 2007, which provides services to a large number of operating mines and exploration operations in the region.

Some limited facilities are available in Menzies including fuel, accommodation, and meals. A railway line passes through, and road freight lines deliver to the town.

Item 8 History

8.1 General

The Lake Giles Project area has relatively little past exploration, and that has mostly been for gold or nickel. There is no historic mining in the project area.

8.2 Previous Exploration at the Lake Giles Project

Since the late 1960's, several companies have held exploration rights to the Lake Giles project area. The following summary of tenement ownership is derived from Revell 2006, Farmer (1997a, 1998a, 1998c), and Busbridge (1998a, 1998b). Exploration activities undertaken during each phase are described in more detail in Section 12 of this report. Between 1968 and 1972, the area covered by the current Lake Giles Exploration Licenses was explored primarily for nickel sulphide mineralisation by Amax Exploration (Australia) Inc, Consolidated Goldfields Australia Limited, Geotechnics Pty. Ltd. on behalf of Welcome Stranger Mining Company Limited, Kia Ora Gold Corp. NL and Delta Minerals NL and Le Nickel (Australia) Exploration Pty Ltd.

From 1993 to 1998, the Lake Giles region was explored, primarily for gold by several companies, generally operating in joint ventures. In May 1993, Battle Mountain Australia Incorporated (Battle Mountain) was granted Exploration License E30/93 which partially overlaps with the southern portion of the area now covered by Macarthur's currently granted Exploration License E30/240.

In August 1993, Aztec Mining Company Limited (Aztec), a subsidiary of Normandy Exploration Limited (Normandy) was granted Exploration License E30/100 over an area immediately to the west of E30/230, and in December 1993 Aztec were granted E30/99 which encompasses the area now covered by E30/240. In 1995-1996, Noble Resources NL (Noble) formed a Joint Venture with Battle Mountain to explore E30/93, with Noble managing exploration activities. Noble's interest in the joint venture was subsequently transferred to Barclay Holdings Ltd, a wholly owned subsidiary of Titan Resources NL. Titan withdrew from the joint venture in 1998, and Battle Mountain surrendered the tenement in 1998. In September 1994, Evanston Mines NL formed the Dodanea joint venture with Aztec to explore E30/99 and E30/100. Following Evanston's unsuccessful float, Evanston's share of the joint venture passed to Noble Resources, and subsequently after an asset swap, on to sister company Titan Resources in February 1997. In June 1998 Titan withdrew from the joint venture, and in December 1998 Normandy surrendered the tenements.

From late 1998 to 2003 the area covered by the Lake Giles Project was consolidated into the "Lake Giles Project" by Mr. Tony Dalla-Costa who was granted a number of tenements covering the area. The two tenements which are the main focus of this report, E30/230 and E30/240 were granted in November 1998 and August 1999. In 2003, the tenements comprising the Lake Giles project were purchased from Mr. Tony Dalla- Costa by Internickel Australia Pty Ltd. In early 2004 Internickel was purchased by Adex Holdings Limited, who subsequently changed its name to Internickel Australia Pty Ltd. Macarthur purchased the project from Internickel in late 2005.

8.3 Previous Mining

No historical mineral resource or reserve estimates exist for the Lake Giles project.

No mining has been undertaken in the project area to date, and no mineral resources were estimated prior to Macarthur's involvement in the project. In October 2007, H&S estimated Inferred Mineral Resources for the Snark, Clark Hill North, Clark Hill South deposits, and produced a Technical Report for the project (Abbott, 2007a, 2007b). In June 2008, after a Macarthur undertook RC and diamond drilling programs targeting the Clark Hill North area, H&S updated resource estimates for the project (Abbott, 2008a). In September 2008, following completion of RC drilling in the Sandalwood area, H&S estimated Mineral Resources for the Sandalwood deposit (Abbott, 2008b). **Table 3** presents summaries of the previous and current Mineral Resource estimates for the Lake Giles project. Each of these estimates used a simple polygonal which was adopted due to the broad and irregular drill spacing. It is anticipated that more rigorous estimation methodologies such as block Kriging will be considered after completion of more closely spaced drilling. The figures shown in this table are rounded to reflect the accuracy of estimates and exhibit rounding errors.

8.4 Historical Exploration

Between 1968 and 1972, a number of exploration companies explored the Lake Giles area, primarily for nickel sulphide mineralisation and from 1993 to 1998 the area was explored for gold mineralisation by several companies. These historical exploration activities have limited direct relevance to the definition of magnetite associated iron mineralisation which is the focus of this report.

8.4.1 Nickel exploration 1968-1972

The 1968 to 1972 phase of nickel focused exploration is reported by Ward (1970a, 1970b, 1970c) and Ward & Pontifiex (1970). Exploration undertaken during this period included grid establishment, geological mapping, rock chip sampling, magnetic, electromagnetic and induced polarisation geophysical surveying, and petrographic analysis of rock samples. Exploration drilling undertaken in the Lake Giles region for this period comprised seven diamond drill holes to a maximum depth of 127 metres, and totaling 523 metres, and 15 open hole percussion drill holes to a maximum depth of 60 metres for a total of 658 metres. Since Geotechnic's grid has not been re-established, the exact locations of their drill holes are unknown. It is unclear where these drill holes lie in relation to the areas of current interest for iron ore mineralisation. Rock chip sampling conducted by Geotechnics during this phase of exploration returned assays from samples of outcropping BIF with iron assay results of 36.1% to 63.5% (Cooper, 2005). Although these results provided an indication of the project's exploration potential they were not followed up, and no exploration specifically targeting iron mineralisation was conducted until Internickel Australia Pty Ltd commenced exploring the tenements in 2000.

8.4.2 Gold Exploration

The 1990's phase of gold exploration at Lake Giles covered superseded Exploration Licenses E30/93, E30/99 and E30/100 and is described by Anon (1994, 1995), Farmer (1997a,1997b,1998a, 1998b, 1998c, 1998d), Smith & Govey 1995, and Busbridge (1998a, 1998b). Since much of the exploration activities from this phase utilized poorly identified local grids, the location of this work relative to the current iron mineralisation targets is unclear. Major exploration activities undertaken during this period are summarized below.

• 1993-94: Aztec collected 715 soil samples, 31 stream sediment samples and 901 soil auger samples from E30/99 and E30/100. The soil samples identified several zones of anomalous gold values including a peak values of 53 ppb gold. The anomalous gold zones were tested by 80 RAB drill holes totaling 3,442 metres which returned only weakly anomalous gold grades with best intersections of 25 metres at 0.4 g/t gold in hole DON06 and 5 metres @ 0.18 g/t gold in hole DOS6 (Smith & Govey, 1995, Busbridge, 1998b)

• 1993-94: Battle Mountain established a grid over E30/93 defined in Australian Map Grid (AGD) coordinates, and collected 37 rock chip samples and completed soil sampling at 50 by 500 meter spacing, with selective infill to 50 by 100 metres for a total of 1,175 soil samples. The soil sampling identified seven anomalous zones with maximum gold grades of 3 to 12 ppb gold (Anon, 1994).

• 1994-95: Battle Mountain drilled 41 RAB holes for a total of 1,897 metres targeting gold soil anomalies identified as the Soapbox and Enfield prospects in E30/99. Only low level anomalous gold values were reported from this work, with a best result of 4m @ 0.20 g/t gold in drill hole DOP8 at the Soap Box deposit within a small quartz filled ultramafic hosted shear zone (Anon, 1995).

• 1996-97: Titan Resources commissioned Telsa Airborne Geoscience Pty Ltd to complete an airborne magnetic and radiometric survey over E30/93, E30/93 and E30/100. The survey was flown at nominally 50 meter flight height, and 100 meter line spacing (Farmer 1997a, 1997b, 1998a).

• 1996-97: Titan Resources completed 537 soil auger holes, to a depth of 1 to 1.5 metres within E30/93, acquired Landsat imagery of the area, and interpreted a regolith map for E30/93 and E30/99. (Farmer 1997a, 1997b, 1998a, 1998c).

• 1997-1998: Titan Resources collected 331 soil samples on a 50 by 80 meter spaced grid within E30/99. This sampling failed to define further zones of anomalous gold values, and following Titan's withdrawal from the joint venture, Normandy surrendered the tenement in September 1998 (Busbridge, 1998a).

• 1997-1998: Titan Resources commissioned G&D drilling of Perth to undertake a vacuum drilling program within E30/100 with holes drilled to 1 meter depth on a 100 by 400 and 400 by 200 meter spacing (Busbridge, 1998b). A total of 1,275 samples preferentially collected from the pedogenic carbonate layer of each auger hole were analyzed giving a best result of a single point at 0.2 parts per million (ppm) gold. Following Titan's withdrawal from the Dodanea joint venture, Normandy surrendered the tenement in August 1998 (Busbridge, 1998b).

8.5 Macarthur exploration activities

Recent exploration activities associated with iron ore exploration undertaken by Macarthur, and previous companies as described by Revell (2006), Fox (2001), Fox (2002), Fox (2003) are summarized in Table 3. Iron ore associated exploration of the Lake Giles Project commissioned by Macarthur since 2005 includes geological mapping, geophysical surveying, auger sampling of pisolite targets and RC drilling of magnetite ore targets. Since July 2006 Macarthur have drilled 89 RC drill and five diamond holes targeting magnetite mineralisation associated with BIF units and ultramafic rocks. Analytical data for mineralized portions of Macarthur's RC holes include XRF assay results and Davis Tube Recovery tests, which measure the proportion of sample extractable by magnetic separation. Material concentrated by the Davis Tube test was assayed by XRF for iron and other elements of interest.

Assay results have now been received for the five diamond holes drilled by Macarthur at Clark Hill North in 2008. These results will be incorporated in the next update of the Mineral Resource estimate for Clark Hill North.

Table 3. Recent iron ore associated exploration

Period	Activity
1993-1998	Aeromagnetic surveys commissioned by Normandy, while exploring for gold.
2000-2004	Compilation and review of historic exploration data, and limited field work including geological mapping and rock chip sampling. Primary focus of this work was exploration for nickel sulphide targets.
2004	Helicopter "HOISTEM" electromagnetic survey, at 200 meter line spacing, totaling 950 kilometers.
2005-2006	Geological mapping and reconnaissance rock chip and auger sampling of exploration targets including pisolite and BIF iron targets.
June 2006	Auger sampling of pisolite iron targets, with approximately 229 holes drilled to around 4 meters depth on a 100 meter east-west by 500 meter north-south pattern
July 2006	Phase One RC drill program comprising 7 holes (LGRC01 to LGRC07) for a total of 937 meters.
Aug – Sep 2006	Phase Two RC drill program comprising 20 holes (LGRC08 to LGRC26) for a total of 3,007 meters.
Jan-Feb 2007	Phase Three RC drill program comprising 16 holes (LGRC27 to LGRC42) for a total of 3,502 meters.
Sept 2007 – Jan 2008	Phase Four RC drill program comprising 21 holes (LGRC57 to LGRC78) for a total of 3,703 meters.
March-April 2008	Phase Five diamond drill program comprising 5 holes (LGDH63, LGDH65, LGDH68, LGDH69 and LGDH77) for a total of 1,003 meters.
Feb-June 2008	Phase Six RC drill program comprising 26 holes (LGRC79 to LGRC104) for a total of 5,608 meters.

Item 9 Geological Setting

9.1 Regional Geology

The following description of the regional geological setting of the Lake Giles Project area is derived from Revell (2006) Cooper (2006a), Greenfield (2001) and Walker & Blight (1983). The Lake Giles project area overlies much of the Yerilgee greenstone belt which is up to 60 kilometres thick and located within the Southern Cross Province of the Achaean Yilgarn Craton. The Yilgarn Craton is characterized by lenticular greenstone belts commonly partially enveloped by foliated and gneissic granitoids. The Yerilgee greenstone belt is dominated by mafic volcanic rocks, with subordinate felsic and mafic intrusive rocks, and minor sedimentary and felsic volcanic rocks. The rocks have been metamorphosed to greenschist facies, and subjected to multistage deformation with the development of an early, layer-parallel fabric which was deformed during a period of mainly east west compression coincident with a major period of granitoid intrusion.

9.2 Lake Giles Prospect and Local Geology

9.2.1 Structural Setting

Margins of the Yerilgee greenstone belt are defined by major north-northwest trending fault zones. Rocks exposed in the Lake Giles area have intensely folded with large synclinal structures on both the eastern and western sides of the belt. Several sinistral fault zones with a north-westerly trend have been mapped in the area, and these structures are interpreted to successively repeat the layered succession. The synclinal folds have north-westerly and north-northwesterly trending, steeply dipping fold axes and, where mapped in detail, plunge to the north at 30 to 60°. Folding appears to be contemporaneous with faulting, and is interpreted to represent drag fold structures.

9.2.2 Geological Model

Geological understanding of the Lake Giles project area has been gained from mapping of surface exposures (Figure 3), and geological logging of RC drill holes by Macarthur geologists. The most comprehensive geological mapping of the project area was undertaken by Fox(2003) with local areas mapped in detail by Cooper(2006a). In September 2008, Macarthur geologists undertook reconnaissance traverse mapping of a small area of the Sandalwood deposit. The following description of the deposit scale geological setting of the Lake Giles Project area is derived from Revel (2006), Cooper (2006a) and Greenfield (2001).

9.2.3 Rock Units

The basal unit exposed in the Lake Giles area comprises a sequence of high magnesium basalts which is at least one kilometer thick and intruded by gabbroic sills and overlain by komatiitic ultramafic volcanic rocks, and sedimentary sequences dominated by BIF. The sedimentary sequence is overlain by further high magnesium basalts with rare interflow BIFs. These basalt units are overlain by cherty, silicified

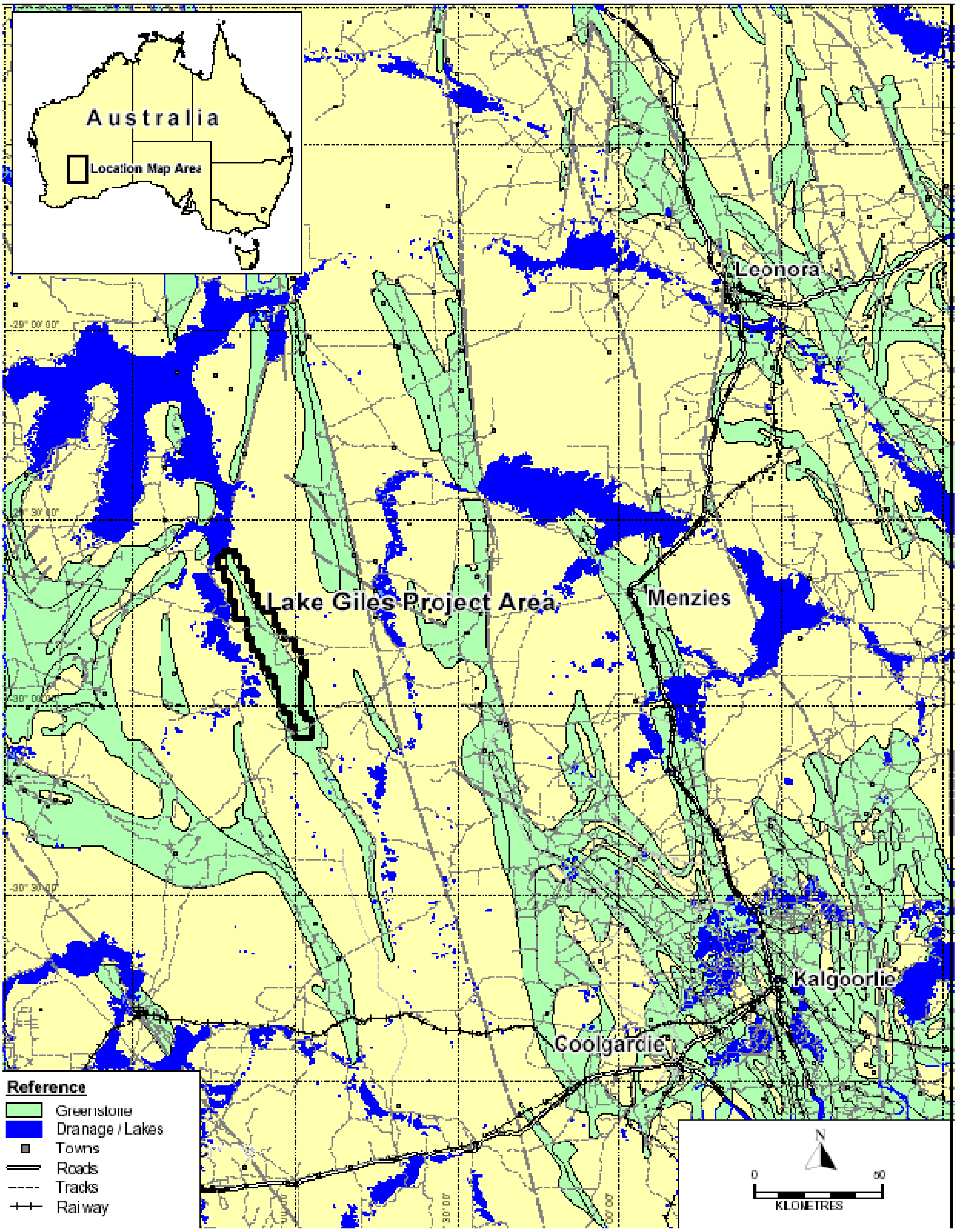

Figure 3. Lake Giles Regional Geology

and graphitic sedimentary rocks forming the top of the exposed sequence at Lake Giles. All rock units within the Lake Giles area have undergone metamorphism to greenschist facies and have been subjected to multiple phases of structural deformation. The major rock types exposed at Lake Giles are described in more detail below.

Ultramafic rocks

Metamorphosed ultramafic rocks identified in the project area include komatiite, peridotite and undifferentiated ultramafic rocks observed in weathered outcrop and recognized by remnants of talc, tremolite and chlorite. The komatiite comprises serpentine and tremolite with minor chlorite and magnetite. Exposures of this rock type in the northern part of the project area show pseudomorphs of olivine blades up to eight centimetres in length. Peridotite occurs adjacent to units of high magnesium basalt and in close association with BIF. Outcropping exposures of oxidized peridodite display cumulate textures with pseudomorphs after olivine crystals up to one centimeter in diameter.

Gabbroic mafic rocks

The lower sequence of high magnesium basalts is commonly intruded by generally coarse grained sills gabbroic composition.

High Magnesium Basalt

Fine-grained mafic rocks are common in the greenstone belt and contain features that indicate an extrusive origin, such as pillow structures and amygdales. The rocks are usually metamorphosed to between lower greenschist and rarely to lower amphibolite facies.

Felsic Porphyry

Felsic porphyry occurs as a large body in the core of a major syncline in the northern part of Lake Giles area, and as much smaller dyke like bodies in the south of the area. The porphyry generally comprises plagioclase phenocrysts within in fine-grained groundmass of quartz, plagioclase, green hornblende and potassium feldspar.

Sedimentary Rocks

Sedimentary rocks form a relatively minor portion of the Lake Giles sequence, and are dominated by BIF units. Less common sedimentary rocks include bands of shale generally associated with BIF, and quartzite and interbedded sandstone and siltstone.

Item 10 Deposit Types

10.1 Mineralisation Types

This report and Macarthur's current exploration efforts are focused on defining iron ore mineralisation hosted within units of BIF and within peridotite rocks adjacent BIF units. The exploration potential for residual soil and palaeochannel pisolite iron mineralisation, and other commodities such as nickel sulphide mineralisation described in previous reports (e.g. Anon, 1994, 1995; Farmer, 1997a,1997b,1998a,1998b,1998c,1998d,1998e; Ward & Pontifex, 1970; Copper, 2005, 2006a, 2006b) is not part of this report.

As presented in Figure 3, a number of extensive BIF units have been mapped in the Lake Giles area. The BIF units can be clearly traced from aeromagnetic surveys (Figure 4), and commonly form variably prominent ridges. BIF associated iron mineralisation occurs within the surface, oxidized zone associated with goethite and hematite alteration of oxidized BIF, and deeper fresh rock magnetite mineralisation below generally 50 metres depth. Historic reconnaissance rock chip sampling by Geomechanics, and more recently by Internickel confirmed the presence of elevated iron grades associated with BIF units.

10.2 Exploration Strategy

Preliminary evaluation by Macarthur in 2006 (pers. comm. N. Revell, Macarthur Director) did not identify an economically viable direct shipping oxide iron ore deposit. However, Macarthur's preliminary evaluation suggested that, with magnetic concentration, the un-oxidized, magnetite associated mineralisation has a greater chance of providing a viable operation.

Since mid 2006, Macarthur's exploration strategy has been focused on RC drilling of BIF targets, identified from surface mapping and aeromagnetic surveys. Drilling has been generally targeted at fresh magnetite mineralisation below the oxidized zone. As shown in Figure 3, BIF units occur within zones of high magnesium basalt, and in close association with ultramafic rocks.

Exploration targets of particular interest include zones where geological mapping shows that complex structures have developed BIF sequences with locally increased apparent thickness. Macarthur's exploration drilling focuses on targets delineated from surface geological mapping, geophysics and the surface topography. Drill holes have been planned to target mineralized zones below the base of oxidation to a maximum depth of approximately 220 metres below surface. To minimize ground disturbance and vegetation destruction, all of Macarthur's drilling to October 2007 was sited on previously formed access tracks, with only minor clearing required to provide appropriate drill sites. Since October 2007, Macarthur have cleared several new access tracks and drill sites to allow drilling to be undertaken at a more regular spacing.

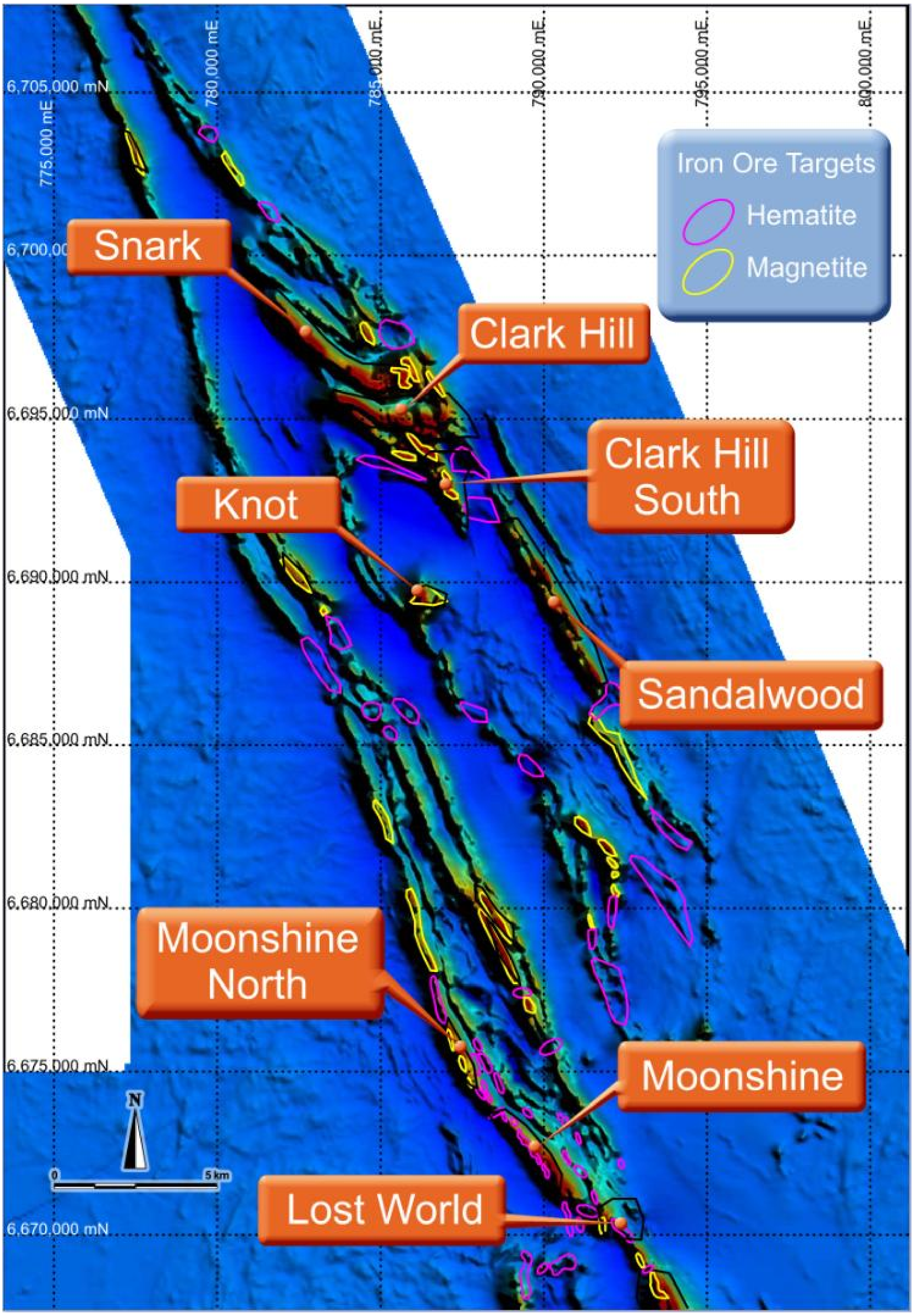

Figure 4. Aeromagnetic survey image of Lake Giles Project.

Item 11 Mineralisation

11.1 Lake Giles Mineralised Zones

Macarthur have focussed their exploration of BIF associated magnetite mineralisation at a number of mineralized zones, which as shown in Figure 2, have been designated as the Snark, Clark Hill North, Clark Hill South, Sandalwood and Moonshine zones. Other mineralized styles at Lake Giles, including the exploration potential for residual soil and palaeochannel pisolite iron mineralisation, and their commodities such as nickel sulphide mineralisation described in previous reports (e.g. Anon, 1994, 1995, Farmer, 1997a, 1997b, 1998a, 1998b, 1998c, 1998d, 1998e, Ward & Pontifex, 1970 Copper, 2005, 2006a, 2006b) are not part of this report. The BIF units are often associated with variably developed ridges, with commonly prominent outcropping exposures.

Figure 5 shows a typical example of prominently outcropping BIF units. As demonstrated by Figure 3, BIF units occur within zones of high magnesium basalt, and in close association with ultramafic rocks including peridotite. The focus of Macarthur's iron ore exploration date has been on wider BIF units within structurally complex broader zones of ultramafic rocks.

11.2 Moonshine

Macarthur has undertaken a 108 hole RC program at the Moonshine prospect between June 2007 and October 2009. The drill spacing for this program is variable due to access issues and has necessitated holes being drilled at varying azimuths. The variable spacing and azimuths mean there are few "regular" cross sectional traverses. Along strike drill spacing ranges from 50 metres to 300 metres, generally averaging about 130 metres.

Although Moonshine has a relatively uneven drill density and the drill traverses do not always cross the full width of the mineralized zones, additional information from surface mapping clearly defines the structure and provides adequate width definition of the mineralized zones for the Inferred Mineral Resource to be estimated.

Mineralized domains interpreted for Moonshine comprise three main, continuous northwest trending BIF zones designated as the West, Central and East zones, and two subsidiary central zones designated as the Far East and Northeast zones. The mineralized BIF zones are interpreted to be steeply dipping to subvertical as shown by field observations and appear to be surrounded by mostly peridotites and other ultramafic units. The BIF units include narrow poorly mineralized zones of internal peridotite which are included in the lens models as internal waste.

The resource domains have a strike length defined to date of 7 kilometres, up from 3.4 km (Allen2009). The West Lode ranges from 50m to 160m thick, averaging about 80m thick, while the East Lode ranges from 10m to 100m thick averaging approximately 40 metres thick. The upper extents of the mineralized wireframes were trimmed to the base of oxidation at an average of 70 metres below surface, and interpreted to 200 mRL at depth representing the base of the deepest mineralized drill intersection at

Moonshine and approximates 300 metres below surface. The deepest 50m interpreted from 250mRL to 200mRL has been excluded from the Mineral Resource estimate for the present.

Figure 5 shows an example of outcropping Moonshine mineralisation demonstrating the sub-vertical orientation of the mineralisation, and generally prominently outcropping exposure of the mineralisation.

Figure 5. Prominently outcropping BIF unit at Lake Giles

11.2.1 Oxidised Zone Interpretation and model

The oxide boundary was re-digitised based on the new logging of weathering, magnetism of drill chips, the DTR % recovery and the calculated % Fe recovered (Figure 6).

Some holes had much deeper weathering (eg on the western end of some sections), and low recovery pushed the interpolated recoveries down nearby. The boundaries were adjusted to exclude the samples with this effect.

The wireframe modelled surface was filled with cells and added to the block model with the field OXID (3 for above the weathered surface, 1 for below).

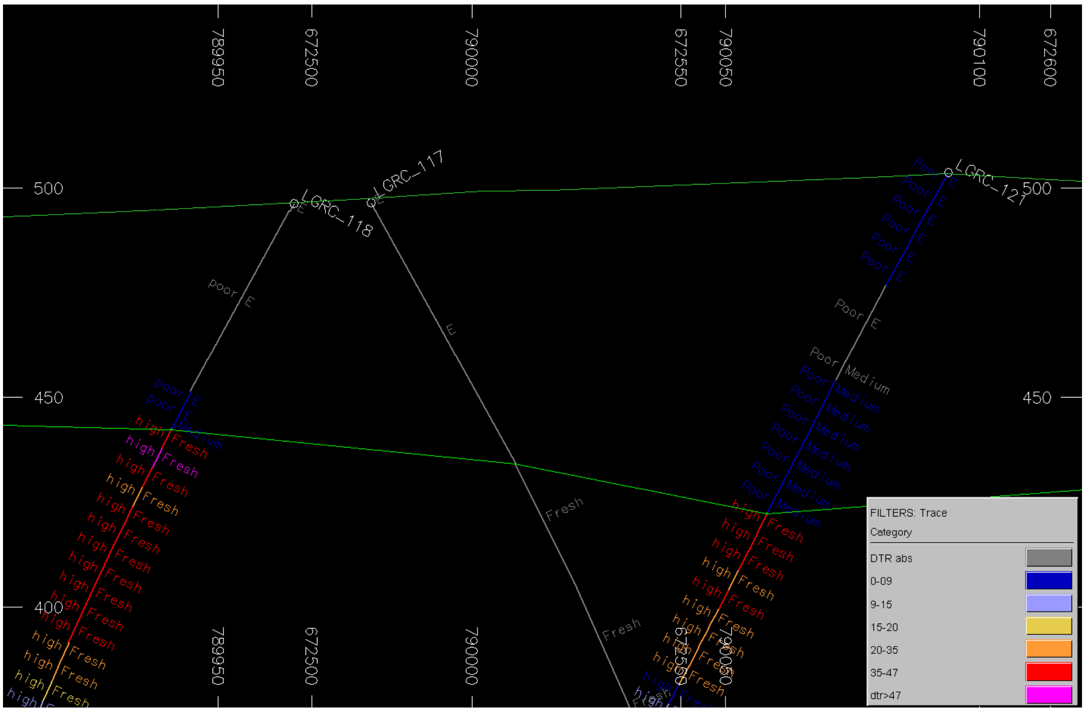

Figure 6. Section 10 showing the criteria used for BOCO modelling. Holes coloured on DTR, magnetism log annotated on left, weathering log on right

Item 12 Exploration

This section of the report describes exploration activities undertaken, or commissioned by Macarthur from 2006 to 2009 specifically targeting BIF associated magnetite mineralisation. Macarthur's exploration for other commodities and residual soil and palaeochannel pisolite iron mineralisation as described in previous Technical Reports by Cooper (2005, 2006, 2007, 2008) is not part of the current report. This section is derived from Cooper (2005, 2006a, 2006b, 2007, 2008), Abbott (2007a, 2008a, 2009a) and Revell (2006).

12.1 Geological Mapping and Sampling

During March 2006, Ian Cooper of Cooper Geological Services Pty Ltd inspected six sites where historic sampling showed elevated iron values associated with outcropping oxidized BIF. Three of these areas, initially designated as Northern Southern and Central areas, which were interpreted to have the greatest resource potential, were geologically mapped at 1:25,000 scale and rock chip sampled by Cooper. Cooper's mapping and sampling is detailed in the October 2007 Technical Report, and summarized in this report.

The Northern Area identified by Cooper was subsequently designated as the Snark Mineralized zone by Macarthur. Cooper's Central and Southern areas represent a south eastern extension to the Snark mineralisation which has been tested by only two drill holes (LGRC03 and LGRC04) and is not included in the current Inferred Mineral Resource Estimate.

Cooper's 2006 rock chip sampling showed iron grades ranging from 38.1% to 62.5%, with assays from 36 of the 45 sample locations returning values of above 50% iron. The sampling confirmed the presence of elevated iron grades associated with BIF units as indicated by historic sampling. Cooper's geological mapping as presented in Figure 7 for the Northern Area indicated areas of possible thickening of ironstone units, and Cooper recommended drilling these zones.

Geological mapping of the resource areas by Macarthur geologists includes traverse mapping of a portion of the Sandalwood deposit and broad-scale mapping of the Moonshine BIF units. Figure 9 and Figure 10 present mapped BIF outlines relative to the mineralized domains interpreted from drilling for Sandalwood and Moonshine respectively.

Macarthur's geological mapping aided interpretation of the BIF zones at Sandalwood, Clark Hill North and Moonshine (Figure 8, Figure 9, Figure 10) and for these deposits increased confidence in the mineralisation interpretation which is based primarily on drill hole logging and analytical results.

For portions of the Moonshine area away from the main BIF ridges, there is very little outcrop and geological mapping of these areas may not be reliable. Therefore, although reasonable correlation between geological mapping and drilling results should be expected for the main BIF zones, some discrepancies can be expected for the smaller zones characterized by poor outcrop.

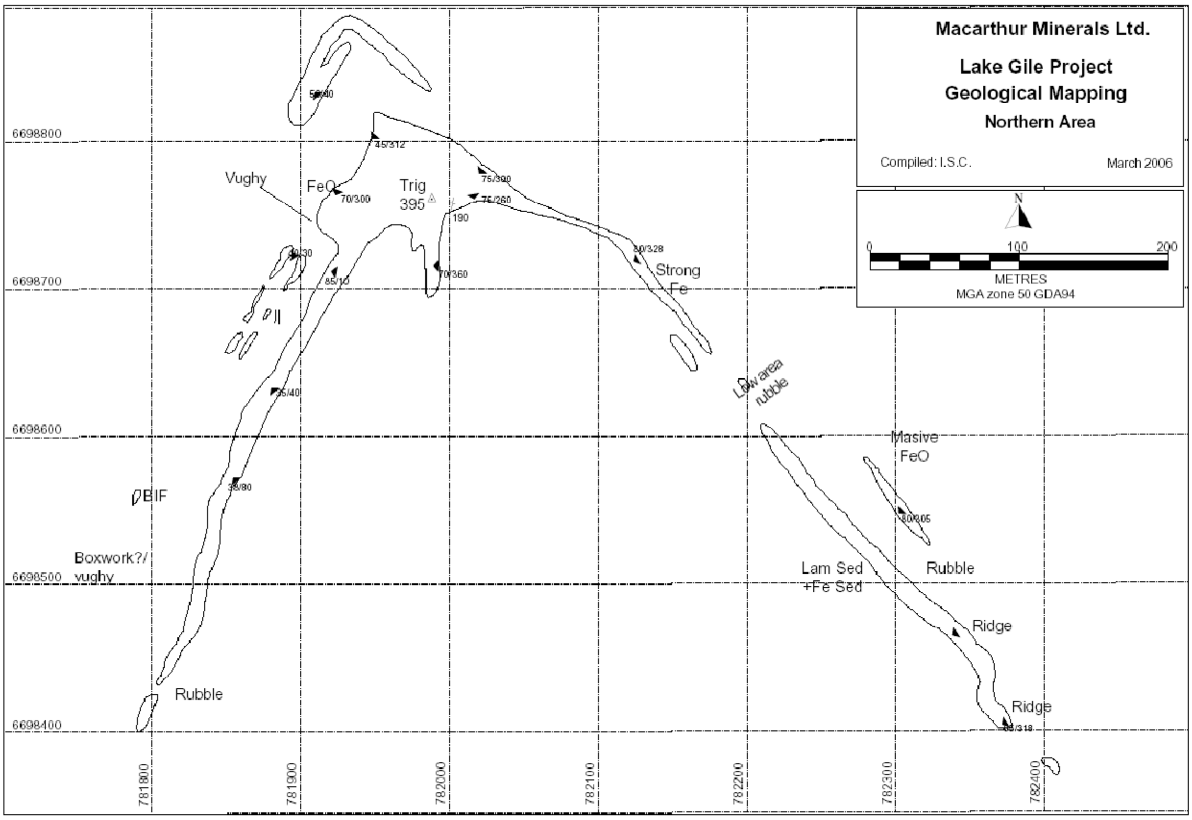

Figure 7. Outcrop mapping of the Snark deposit, Lake Giles

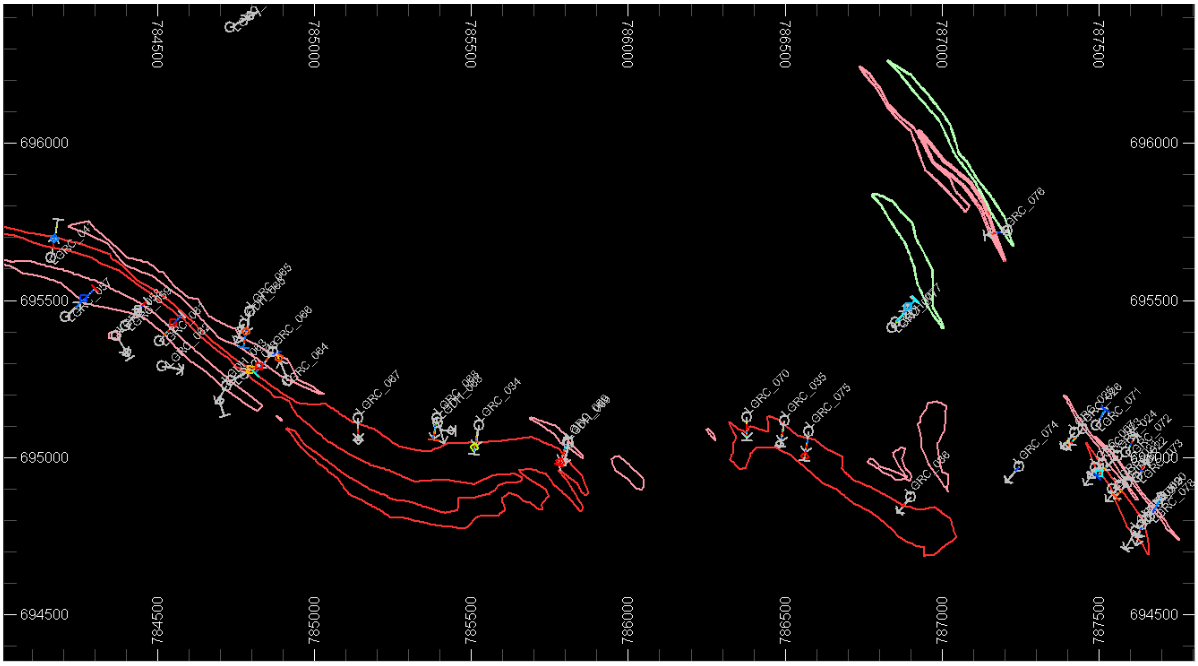
Figure 8. Outcrop mapping of the Clark Hill North deposit, Lake Giles

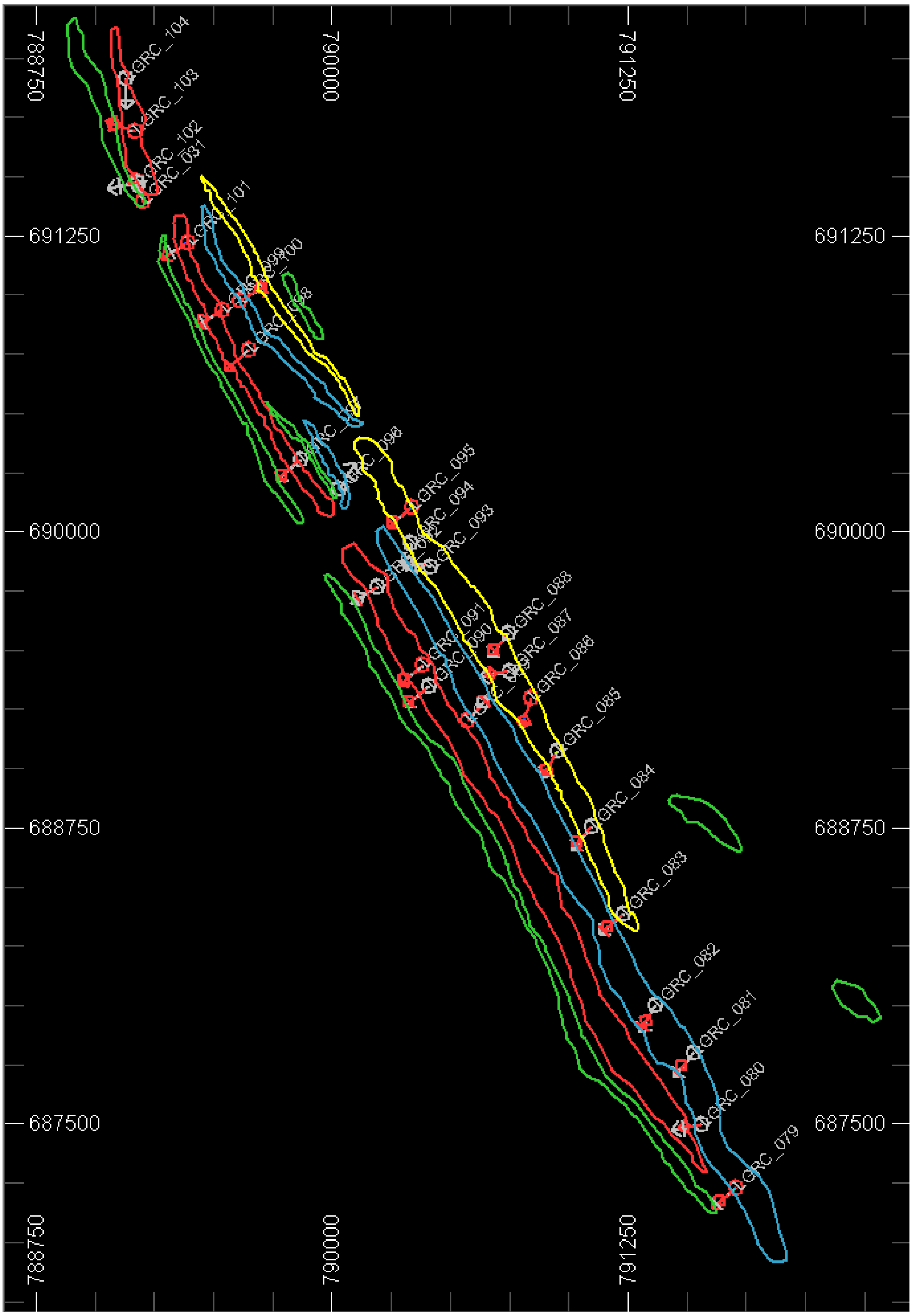

Figure 9. Outcrop mapping of the Sandalwood deposit, Lake Giles

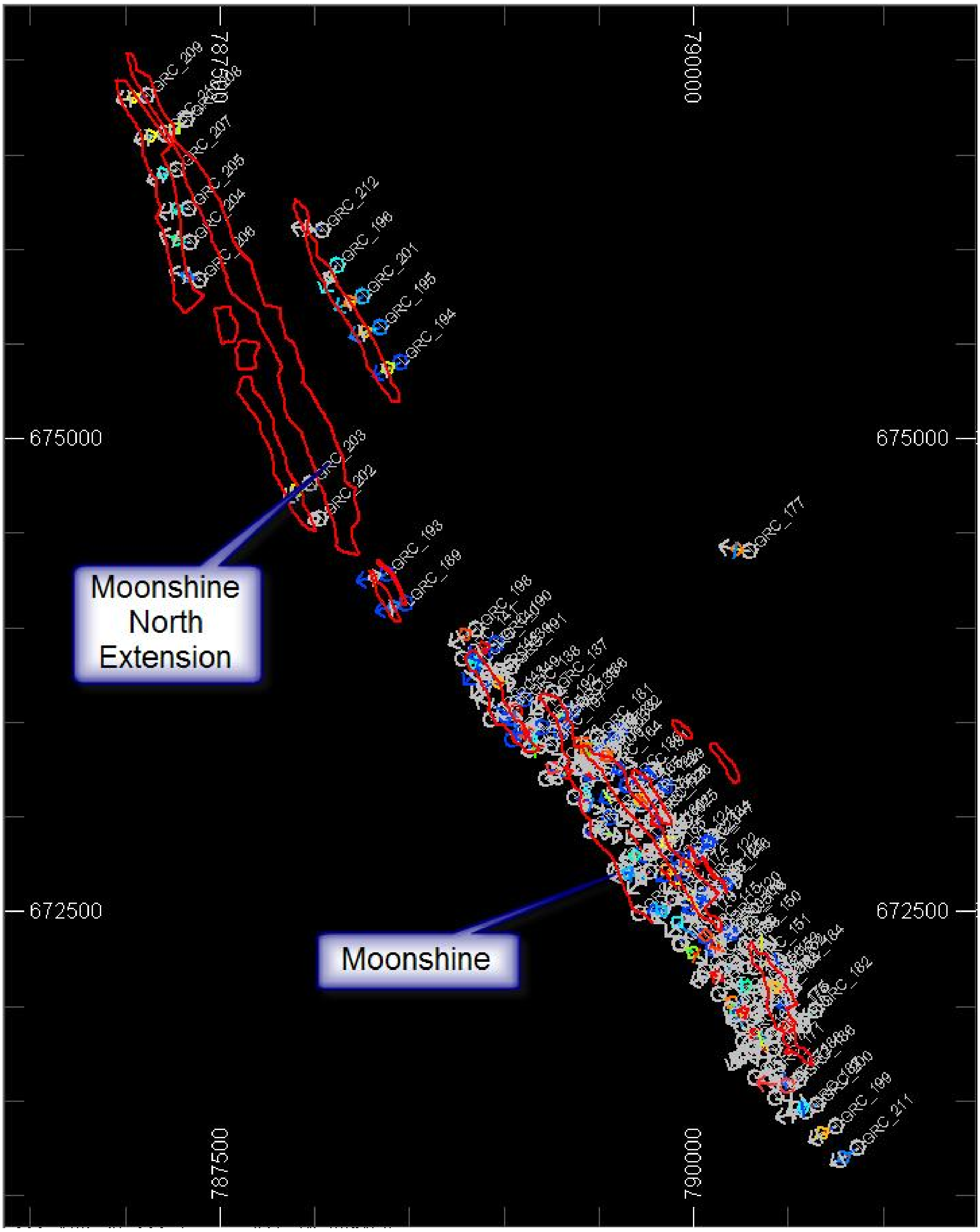

Figure 10. Outcrop map showing Moonshine and Moonshine North Extension BIF.

12.2 Macarthur Reverse circulation and diamond drilling

Exploration drilling commissioned by Macarthur is described in more detail in Section 13. Between July 2006 and June 2009, Macarthur commissioned six phases of RC drilling, and one phase of diamond drilling for a total of 182 drill holes for 35,495 metres. Details of each phase are described in Abbott & van der Heyden (2009). Analytical data available for mineralized portions of RC holes drilled by Macarthur include Davis Tube Recovery tests which measure the proportion of sample recoverable by magnetic separation. Material concentrated by the Davis Tube test was assayed by XRF for iron and other elements of interest.

Assay results have been received for five diamond holes drilled by Macarthur in 2008 and will be incorporated in a forthcoming revision of the Clark Hill North Mineral Resource estimate. Data for these holes includes 122 water immersion density measurements.

Drill hole coverage of the mineralized zones is widely and irregularly spaced with spacing between drill holes varying from less than 100 metres to approximately 700 metres. Many drill traverses are tested by just one drill hole which does not cover the full width of mineralisation.

Item 13 Drilling

This section of the report describes exploration drilling undertaken or commissioned by Macarthur during 2006, 2007 and 2008 specifically targeting magnetite mineralisation. Earlier exploration drilling targeting gold and nickel exploration, and Macarthur's auger drilling testing residual soil and palaeochannel pisolite iron mineralisation as described in previous Technical Reports by Cooper (2006, 2007) is not part of the current report.

13.1 Drilling completed by Macarthur

Macarthur's drilling to date at Lake Giles totals 204 RC holes and 5 diamond holes totals 209 holes for 41,307 metres (Table 4). Further details of the drilling by phase and locality are provided in Abbott & van der Heyden (2009).

Table 4. Drilling completed at Lake Giles to 20 October 2009.

Row Labels	Count of Holes	Sample Intervals	Total metres
ClarkHNorth	53	1,511	8,589
ClarkHSouth	5	215	1,270
Moonshine	108	3,648	22,430
Sandlewood	27	1,029	6,050
Snark	16	487	2,969
Total	209	6,890	41,307

With the exception of six vertical drill holes (LGRC14, LGRC37, LGRC105, LGRC106, LGRC115 and LGRC135), and single holes inclined at 68 and 75 degrees (LGRC06 and LGRC31), all of Macarthur's drill holes were inclined at approximately 60 degrees. Most of the inclined drill holes were oriented approximately perpendicular to the local strike of the target mineralized zone.

Macarthur's RC drilling was sampled at 1m intervals and generally composited to 5m down-hole length samples for analysis. Since the mineralized zones are interpreted to be steeply dipping to sub vertical down-hole intervals from the generally 60 degree and steeper inclined drill holes overstate true mineralisation widths. The relationship between down-hole and true widths varies with each drill hole, but as described in Section 13.6 averages at a factor of around 2.8:1 (down-hole: true).

13.2 Moonshine Drill Program Results

The Moonshine area has been sampled by 108 RC holes drilled by Macarthur between June 2008 and October 2009. Of these drill holes, about 100 intersect the currently interpreted mineralized domains. No diamond holes have been drilled at Moonshine. Drill spacing is variable and does not completely transsect the mineralisation on some traverses. Along strike drill spacing ranges from to locally less than 50 metres to approximately 300 metres averaging approximately 110 metres. The majority of Moonshine drill holes were inclined at -60° from horizontal and drilled towards the northeast or southwest, approximately perpendicular to the mineralisation strike. A small number of vertical and down dip holes do not efficiently test the mineralisation or provide a robust basis for resource estimation.

13.3 Moonshine and Sandalwood Drill Hole Intercepts

Table 5 and Table 6 present a summary of drill hole intersections with the mineralized domain interpretation that formed the basis of the current Mineral Resource estimates. These tables show both down-hole, and true mineralized domain widths measured from drill traverse mid points. The average intercept grades shown in these tables were weighted by sample length, density, and for Davis Tube concentrate grades, by sample mass recovery. These tables exclude mineralized intercepts for holes which were not included in the Inferred Mineral Resource estimates, on the basis of being located in sparsely drilled areas, or a lack of assay data. The mineralized domains were interpreted on the basis of geological logging and Davis Tube analyses. The geological logging and analyses are generally consistent with material logged as unoxidised BIF, or magnetic peridotite. The Davis Tube mass recoveries from these samples suggest potentially economic accumulations of magnetite are present.

Table 5. Drillhole intercepts from Moonshine

BHID	FROM	TO	LENGTH	Lode	Head FE	DTR %	Cons FE	Cons P	Cons SIO2	Cons AL2O3	Cons LOI	Cons S
LGRC_105	76	149	73	West	21.6	18.2	63.3	0.024	5.83	0.20	1.95	9.89
LGRC_106	55	84	29	East	28.8	12.8	66.5	0.027	6.25	0.15	-1.83	0.09
LGRC_107	70	90	20	West								
LGRC_108	50	110	60	West	32.1	30.9	67.9	0.016	4.88	0.02	-2.16	0.09
LGRC_108	114	140	26	West	17.0	19.5	66.2	0.020	7.62	0.03	-2.89	0.62
LGRC_109	40	135	95	West	26.7	28.7	67.7	0.014	5.71	0.09	-2.89	0.15
LGRC_109	160	200	40	West	16.4	14.0	64.1	0.021	8.96	0.05	-1.36	4.13
LGRC_110	135	195	60	West	13.8	8.2	59.9	0.015	8.03	0.99	3.06	13.38
LGRC_112	70	95	25	West	27.1	28.2	66.2	0.009	6.52	0.13	-2.60	0.14
LGRC_112	122	250	128	West	19.9	18.7	67.0	0.014	6.49	0.03	-2.89	1.33
LGRC_113	50	138	88	West	32.6	37.6	68.5	0.015	4.98	0.01	-2.89	0.01
LGRC_114	80	160	80	West	9.7	1.9	62.0	0.007	10.50	0.65	-1.60	3.10
LGRC_115	55	240	185	West	28.7	31.4	64.5	0.023	8.68	0.28	-1.85	1.94
LGRC_116	175	250	75	West	26.4	27.5	63.6	0.025	8.14	0.36	-0.82	4.32
LGRC_118	60	188	128	West	25.3	28.6	66.4	0.013	6.63	0.05	-2.55	1.15
LGRC_120	60	72	12	East	21.9	16.7	63.3	0.056	10.70	0.42	-2.50	0.07
LGRC_120	188	276	88	West	28.5	33.6	64.6	0.020	7.86	0.21	-1.32	3.67
LGRC_121	90	144	54	East	28.3	29.3	63.3	0.037	10.91	0.14	-2.17	0.07
LGRC_121	175	195	20	West	25.7	20.7	65.2	0.021	6.38	0.38	-1.33	4.09
LGRC_122	62	91	29	East	31.6	1.6	64.4	0.024	9.20	0.07	-0.80	0.01
LGRC_122	95	140	45	East	26.1	20.8	65.5	0.037	7.95	0.19	-2.38	0.09
LGRC_122	190	217	27	West	24.3	24.0	64.1	0.030	8.51	0.42	-1.87	2.46

Continued on next page

Table 5 ctd. Drillhole intercepts from Moonshine

BHID	FROM	TO	LENGTH	Lode	Head FE	DTR %	Cons FE	Cons P	Cons SIO2	Cons AL2O3	Cons LOI	Cons S
LGRC_123	160	190	30	West	27.6	26.9	65.6	0.024	5.92	0.19	-0.93	4.88
LGRC_123	203	250	47	West	32.1	42.4	68.2	0.012	5.10	0.05	-3.02	0.24
LGRC_124	90	100	10	East	24.2	12.7	65.8	0.037	6.65	0.15	-1.65	0.64
LGRC_124	162	195	33	West	27.3	28.6	64.1	0.026	7.72	0.29	-1.17	3.95
LGRC_124	200	229	29	West	34.1	47.6	67.1	0.015	6.45	0.01	-3.05	0.17
LGRC_125	195	256	61	West	31.9	40.3	69.4	0.009	3.50	0.07	-2.98	0.59
LGRC_128	75	96	21	East	24.3	14.6						
LGRC_130	215	228	13	West	22.3	14.0	63.2	0.027	8.93	0.59	-1.85	2.25
LGRC_131	65	90	25	East	30.6	37.5	60.2	0.061	15.60	0.08	-2.04	0.02
LGRC_131	145	166	21	East	15.3	12.0	57.7	0.039	18.90	0.28	-2.55	0.02
LGRC_133	60	90	30	East	28.0	20.2	68.0	0.030	4.82	0.09	-2.50	0.09
LGRC_133	198	276	78	West	26.6	24.9	65.7	0.022	5.67	0.28	-1.24	4.25
LGRC_134	80	95	15	East	22.9	16.6	61.3	0.051	13.85	0.10	-2.05	0.03
LGRC_134	155	180	25	East	20.6	23.2	59.7	0.043	15.98	0.14	-2.58	0.26
LGRC_135	66	164	98	East	27.9	29.5	66.8	0.026	6.49	0.11	-2.62	0.93
LGRC_136	65	75	10	East	25.4	33.3	54.6	0.045	22.65	0.08	-1.65	0.01
LGRC_136	105	150	45	East	26.2	28.2	67.0	0.030	6.43	0.11	-2.69	0.80
LGRC_138	60	90	30	West	25.8	16.8	67.2	0.024	5.30	0.22	-2.18	0.45
LGRC_138	110	202	92	West	28.0	33.0	68.9	0.017	3.99	0.04	-3.04	0.34
LGRC_139	130	144	14	West	15.6	0.3						
LGRC_139	172	182	10	West	9.5	0.8						
LGRC_140	105	140	35	West	13.8	8.9	63.9	0.011	11.48	0.05	-2.53	0.33
LGRC_140	186	192	6	West	8.2	0.4						
LGRC_141	85	162	77	West	16.1	14.2	62.9	0.010	12.12	0.03	-2.64	0.53
LGRC_142	115	234	119	West	30.3	29.8	69.3	0.014	3.41	0.03	-2.86	0.09
LGRC_143	174	250	76	West	11.1	6.8	66.0	0.009	7.80	0.02	-2.73	2.57
LGRC_144	40	198	158	West	23.8	19.2	65.8	0.018	7.95	0.04	-2.60	0.61
LGRC_145	36	240	204	West	21.4	15.6	65.5	0.020	7.71	0.05	-2.03	1.41
LGRC_146	140	150	10	East	21.6	26.5	54.0	0.073	23.40	0.08	-2.10	0.04
LGRC_146	185	195	10	East	18.6	19.0	66.0	0.047	3.05	0.37	-2.80	0.00
LGRC_148	46	98	52	West	29.5	33.7	68.2	0.012	4.60	0.05	-2.83	0.07
LGRC_148	100	195	95	West	24.1	25.5	65.8	0.014	8.04	0.03	-2.52	1.30
LGRC_149	130	135	5	West	15.0	1.3						
LGRC_150	60	75	15	East	35.3							
LGRC_150	102	110	8	East	28.2	37.6	58.0	0.051	18.14	0.12	-2.35	0.06
LGRC_150	130	155	25	East	29.5	40.6	59.8	0.063	15.62	0.05	-2.38	0.02
LGRC_151	60	145	85	East	28.5	27.2	64.9	0.040	8.98	0.13	-2.66	0.09
LGRC_152	138	210	72	East	32.2	45.5	61.6	0.052	13.86	0.12	-2.45	0.13
LGRC_153	164	240	76	West	23.6	21.3	63.2	0.028	7.07	0.34	1.12	9.16
LGRC_154	110	121	11	East	23.7	28.5	63.6	0.030	10.85	0.24	-2.94	0.01
LGRC_155	90	207	117	West	23.7	27.0	64.9	0.011	9.65	0.04	-2.98	0.22

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Table 5 ctd. Drillhole intercepts from Moonshine

BHID	FROM	TO	LENGTH	Lode	Head FE	DTR %	Cons FE	Cons P	Cons SIO2	Cons AL2O3	Cons LOI	Cons S
LGRC_156	53	191	138	West	28.4	26.4	67.6	0.010	5.33	0.02	-2.54	0.32
LGRC_157	60	162	102	West	20.5	17.3	64.5	0.016	9.49	0.06	-2.38	1.15
LGRC_158	54	78	24	West	20.1	7.8	63.0	0.017	10.07	0.28	-1.46	0.66
LGRC_159	50	174	124	West	32.3	40.6	68.5	0.011	4.36	0.01	-2.76	0.20
LGRC_160	60	233	173	West	20.2	19.7	67.5	0.021	5.80	0.02	-3.11	0.45
LGRC_161	45	217	172	West	34.6	40.7	68.2	0.013	4.84	0.01	-2.53	0.00
LGRC_162	65	227	162	West	33.7	41.1	68.0	0.012	5.58	0.03	-2.75	0.04
LGRC_163	56	210	154	East	30.6	30.6	67.0	0.027	6.50	0.03	-2.85	0.33
LGRC_165	75	204	129	East	27.3	24.9	65.8	0.035	7.87	0.11	-2.67	0.20
LGRC_166	83	173	90	East	29.4	30.9	65.4	0.033	8.27	0.04	-2.72	0.08
LGRC_166	178	188	10	East	26.3	31.2	57.6	0.045	19.00	0.13	-2.45	0.02
LGRC_167	74	165	91	East	30.5	33.0	64.6	0.036	9.38	0.02	-2.62	0.07
LGRC_167	186	235	49	East	30.6	32.6	65.2	0.031	8.75	0.02	-2.93	0.16
LGRC_169	87	98	11	West								
LGRC_171	58	63	5	West	19.6							
LGRC_174	82	128	46	West	18.7	16.1	63.9	0.011	9.67	0.05	-2.39	0.92
LGRC_174	160	176	16	West	13.9	6.8	62.7	0.010	7.99	0.39	-1.69	3.82
LGRC_175	22	152	130	East								
LGRC_178	66	126	60	West	24.4	15.4	62.6	0.021	9.02	0.37	-0.03	1.73
LGRC_180	128	193	65	West	25.4	28.0	66.3	0.011	4.86	0.19	-0.76	5.43
LGRC_181	50	55	5	East	21.1	8.8	57.4	0.030	18.02	0.10		0.03
LGRC_181	88	121	33	East	22.3	25.4	61.8	0.038	13.16	0.10	-2.74	0.04
LGRC_183	60	168	108	West	29.5	29.8	65.4	0.013	7.42	0.19	-2.59	0.34
LGRC_184	68	111	43	East	14.4	15.1	58.3	0.026	17.42	0.33	-2.49	0.06
LGRC_184	179	201	22	East	22.9	21.3	63.9	0.029	9.05	0.41	-2.47	0.93
LGRC_185	30	148	118	West	21.6	18.2	65.2	0.011	7.13	0.05	-2.81	0.98
LGRC_186	63	145	82	West	20.4	22.9	64.7	0.009	8.51	0.00	-2.61	1.03
LGRC_187	66	90	24	West	11.9	7.8	51.4	0.011	27.13	0.19	-1.86	0.34
LGRC_189	55	142	87	West	24.8	28.0	67.6	0.009	5.40	0.00	-2.75	0.56
LGRC_190	59	214	154.5	West	26.4	27.4	67.0	0.010	5.84	0.08	-2.79	0.72
LGRC_191	104	246	142	West								
LGRC_192	31	84	53	West	21.6	14.0	64.5	0.010	3.76	0.06	2.32	10.97
LGRC_192	129	234	105	West	28.3	33.2	68.5	0.009	3.80	0.00	-2.80	0.49
LGRC_193	77	109	32	West	16.4	13.1	62.1	0.014	12.25	0.03	-2.61	0.63
LGRC_194	94	201	107	East	31.4	28.9	66.3	0.024	7.11	0.05	-2.83	0.51
LGRC_195	113	178	65	East	31.5	24.0	67.3	0.020	5.53	0.01	-2.73	0.43
LGRC_196	65	145	80	East	31.9	26.8	67.8	0.019	5.06	0.05	-2.65	0.24
LGRC_197	200	220	20	West	21.2	20.2	66.5	0.012	5.81	0.02	-3.20	0.57
LGRC_198	113	162	49	West	25.7	24.2	66.0	0.010	7.19	0.12	-2.89	1.31
LGRC_199	63	211	148	West	26.0	31.3	67.7	0.007	4.95	0.05	-3.02	0.55

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Table 5 ctd. Drillhole intercepts from Moonshine

BHID	FROM	TO	LENGTH	Lode	Head FE	DTR %	Cons FE	Cons P	Cons SIO2	Cons AL2O3	Cons LOI	Cons S
LGRC_200	54	182	128	West	19.5	21.7	65.3	0.010	8.53	0.01	-2.87	0.67
LGRC_201	88	178	90	East	32.0	29.7	66.5	0.021	7.01	0.05	-2.89	0.41
LGRC_202	68	79	11	West	45.6	54.5	69.0	0.008	3.31	0.22	-2.61	0.16
LGRC_203	70	146	76	West	35.1	35.4	67.6	0.011	4.13	0.20	-1.83	2.00
LGRC_204	100	149	49	West	22.9	22.1	67.7	0.011	5.21	0.06	-2.89	0.88
LGRC_205	85	198	113	West	26.4	28.5	68.8	0.007	3.95	0.03	-2.89	0.62
LGRC_206	60	149	89	West	28.3	31.3	68.8	0.008	4.16	0.03	-3.03	0.29
LGRC_207	84	189	105	West	23.0	25.0	65.6	0.009	8.44	0.02	-2.87	0.67
LGRC_208	135	156	21	East	27.2	26.3	65.2	0.029	7.85	0.12	-2.27	1.37
LGRC_208	209	252	43	West	23.3	18.5	64.1	0.013	7.38	0.20	-0.65	5.16
LGRC_209	109	201	92	West	22.9	23.5	68.2	0.008	4.82	0.04	-2.83	0.72
LGRC_210	95	193	98	West	23.8	24.7	67.0	0.008	6.21	0.04	-2.72	0.81
LGRC_211	93	144	51	West	31.9	40.9	68.6	0.007	4.36	0.05	-3.16	0.27
LGRC_212	61	135	74	East	31.3	27.1	67.3	0.021	5.81	0.06	-2.98	0.21

Table 6. Drillhole intercepts from Sandalwood

BHID	FROM	TO	LENGTH	Head Fe	DTR_PC	Cons Fe	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
LGRC_079	190	244	54	34.2	41.9	62.5	0.024	12.70	0.05	-2.78	0.21
LGRC_081	119	234	115	32.7	29.6	65.9	0.039	7.42	0.03	-2.41	1.39
LGRC_082	80	112	32	33.3	39.6	63.5	0.047	11.09	0.03	-2.74	0.18
LGRC_082	138	194	56	33.6	36.4	66.4	0.038	7.06	0.02	-2.89	0.44
LGRC_083	45	68	23	30.0	32.6	59.6	0.037	15.97	0.19	-2.24	0.01
LGRC_083	88	118	30	32.9	43.0	63.6	0.036	11.13	0.04	-2.91	0.10
LGRC_084	60	106	46	27.1	24.1	66.3	0.027	7.65	0.05	-2.89	0.05
LGRC_084	132	175	43	30.6	33.6	65.2	0.021	9.00	0.01	-2.78	0.10
LGRC_085	60	90	30	33.6	30.7	64.1	0.034	9.95	0.03	-2.03	0.05
LGRC_085	125	150	25	27.7	32.3	62.9	0.036	11.96	0.12	-2.74	0.32
LGRC_085	170	248	78	31.4	41.4	63.4	0.031	11.55	0.03	-2.96	0.09
LGRC_086	64	96	32	33.6	45.6	63.0	0.050	11.83	0.03	-2.57	0.13
LGRC_086	120	140	20	29.7	40.7	61.1	0.054	14.38	0.07	-2.78	0.09
LGRC_086	188	198	10	38.9	50.7	68.7	0.017	4.46	0.05	-3.19	0.13
LGRC_087	85	116	31	28.6	29.7	63.4	0.040	10.54	0.14	-2.96	0.04
LGRC_087	135	157	22	30.8	37.2	62.2	0.030	12.80	0.09	-2.87	0.03
LGRC_088	90	198	108	29.0	31.3	66.5	0.036	6.84	0.07	-3.07	0.20
LGRC_089	80	88	8	32.4	30.4	64.1	0.022	10.00	0.01	-2.80	0.04
LGRC_089	118	158	40	32.8	41.1	62.1	0.030	13.25	0.03	-2.75	0.11
LGRC_090	80	103	23	28.7	31.5	59.0	0.034	17.09	0.07	-1.95	0.08
LGRC_090	167	216	49	32.3	31.3	67.4	0.021	6.01	0.04	-2.99	0.44
LGRC_091	78	120	42	33.1	36.9	64.2	0.031	10.33	0.05	-2.62	0.05
LGRC_091	195	250	55	32.7	28.7	67.6	0.032	5.94	0.04	-3.01	0.45
LGRC_092	55	69	14	28.6	36.1	59.8	0.021	16.23	0.10	-2.41	0.03
LGRC_092	208	214	6	27.4	20.9	69.4	0.016	3.00	0.05	-2.80	0.75
LGRC_093	74	85	11	28.8	27.4	67.0	0.024	6.02	0.07	-3.06	0.06
LGRC_093	129	158	29	31.5	34.0	65.2	0.030	7.81	0.42	-2.67	0.04
LGRC_095	105	155	50	29.4	31.9	65.0	0.025	9.78	0.10	-2.96	0.11
LGRC_097	80	92	12	22.8	21.0	64.9	0.023	9.10	0.24	-3.03	0.01
LGRC_097	174	222	48	32.9	32.1	67.1	0.026	6.54	0.03	-3.11	0.28
LGRC_098	80	136	56	33.3	34.8	64.1	0.025	10.40	0.06	-2.75	0.25
LGRC_099	81	105	24	28.4	33.3	64.2	0.033	9.72	0.06	-2.76	0.06
LGRC_100	60	85	25	33.4	24.0	62.1	0.024	12.46	0.02	-1.32	0.04
LGRC_101	80	90	10	29.3	33.0	67.0	0.022	6.60	0.10	-3.04	0.01
LGRC_102	55	85	30	32.0	28.5	68.3	0.018	4.86	0.05	-2.99	0.23
LGRC_104	55	108	53	31.1	32.0	63.9	0.020	10.71	0.05	-2.75	0.04

13.4 RC Drilling Procedures

The following summary of drilling and sampling protocols adopted during Macarthur's RC drilling programs is derived from Revell (2007) and from previously published Technical Reports Abbott (2009a) and the Macarthur (2009) Standard Operating Procedure for RC drilling.

All holes from Phases One to Three were drilled by Ausdrill Limited with supervision by Macarthur field personnel. The Phase Four to Seven RC and diamond drilling was completed by Orbit Drilling Pty Ltd with supervision by Macarthur field personnel and contractors. Similar field procedures were adopted for all RC drilling phases.

Planned drill hole collar positions were marked by GPS, and if clearing was required to provide a suitable drill site, then planned collar positions were re-marked after clearing. To assist with drill rig alignment, two sighter pegs were placed at appropriate distances from the collar position using a sighter compass. After drilling, most (155) drill hole collars, including all drill holes included in the current Inferred Mineral Resource estimates were surveyed by high accuracy Real Time Kinematic GPS (RTKGPS). RTKGPS surveys, which were undertaken by surveyors from Minecomp Pty Ltd are accurate to within 50 millimetres in three dimensions.

For six RC holes in the Snark area, and one diamond hole at Clark Hill North, collar coordinates were surveyed with a hand held GPS unit. These holes were not included in the Inferred Mineral Resource estimates.

After the drill rig set up on each hole, Macarthur staff checked hole inclinations with a clinometer. Most drill holes were down-hole surveyed with a single shot down-hole camera lowered down the rod string.

Survey intervals generally ranged from 24 to 184 metres. Due to magnetic interference from the drill rods, azimuth readings from the down-surveys are unreliable, and were not recorded. Drill hole orientations are therefore assumed to run at the planned azimuth, with only dips varying.

Macarthur's field geologists log the RC holes directly into a Microsoft Excel spreadsheet. These spreadsheet files are then reviewed, and summarized by Macarthur geologists and the summary logs entered into Macarthur's drill hole database. The summarizing includes some combination of shorter units into broader zones.

13.5 Diamond Drilling Procedures

The five diamond drill holes were geologically logged by contract geologists. The diamond core logging and condition of the core is described by Mazen, 2008 and Abbott, 2008a. The geological logging included geotechnical logging incorporating structural measurements. Since these holes are all at Clark Hill North the update of the Moonshine Mineral Resource estimate does not incorporate data from these diamond drillholes other than density data and they do not form a significant component of the current review.

Mazen's (2008) diamond drilling report describes core as being poorly presented, and covered in mud and drilling grease with trays for LGDH063 mislabeled, and substantial amounts of core placed in trays the wrong way around, or in incorrect trays. Core orientation marks were poorly marked on the core, with hole LGDH063 having no orientation marks at all.

Mazen considered data from LGDH077 as unreliable due to the exceptionally poor condition of this hole. H&S understand that the poor condition of the diamond core reflects a lack of geological supervision during drilling, and that Mazen's involvement was limited to logging the core after drilling. For the diamond core structural logging format used at Lake Giles, the orientation of planar features are defined by alpha angles which can be measured from the core axis, and beta angles which require the bottom or top of the core axis to be defined by a core orientation line. Although both the alpha and beta angles are required to define a feature's orientation, if the strike of a feature is known, some information about the dip can be inferred from just the alpha angle.

Due to the poor core orientation marking, very few structural measurements have both alpha and beta angles, giving just six fully oriented measurements for bedding, and seven for contacts. The measured contacts appear to include contacts other than features directly related to orientation of the mineralized zones, so the number of fully oriented measurements defining the orientation of mineralized zones is actually much lower.

Accurately defining structural orientations from alpha and beta angles requires robustly and consistently marked, core orientation lines with continuity between runs of core. The poor orientation marking for the Lake Giles core reduces confidence in reliability of the few fully oriented measurements. Alpha angle measurements are less susceptible to errors associated with poorly marked up core.

All of the diamond holes drilled at Lake Giles were targeted at western and central Clark Hill North mineralisation, where the mineralized zones appear to trend dominantly east west, approximately perpendicular to the orientation of the drill holes.

13.6 Density Measurements

13.6.1 Density Measurements

Macarthur provided density data of two types:

- Pycnometer measurements from RC drill chips.
- Whole diamond core measured by the weight-in-water, weight-in-air method.

The pycnometer (or specific gravity bottle) method of determining density can give the particle density of a powder, to which the usual method of weighing cannot be applied. The powder is added to the pycnometer, which is then weighed, giving the weight of the powder sample. The pycnometer is then filled with a liquid of known density, in which the powder is completely insoluble. The weight of the displaced liquid is then determined, and hence the specific gravity of the powder.

The whole-core method usually involves a square-cut piece of diamond core, but can be done on rough chunks. The sample is weighed in air and weighed again suspended in water, and the specific gravity directly calculated. If the sample is porous or absorbs water it can be coated in wax or spray lacquer ore even plastic cling film. For square cut diamond core the length and diameter can be measured with calipers to calculate volume as a cross check.

Macarthur did not provide descriptions of the density methods used, and the density readings provided all came from other deposits in the same area.

H&S (2009) analysed densities from the provided data, broken down by drilling campaign and by measurement type. The plotted density against Fe and used the regression line to estimate density of the model cells.

Density samples were taken from Clark Hill and Snark but not taken at Moonshine. To improve the density data, Macarthur have initiated a downhole geophysical logging program.

13.6.2 Lake Giles density measurements

The density measurements were graphed by H&S against Fe. From their graphs a regression line was determined and the regression used in the model to estimate density from Fe.

A number of density measurements appear doubtful, either too low (e.g. 0.817) or too high (e.g. 5.523). These should be checked against original lab reports to ensure they are correctly entered.

CSA separated the samples by logged rock type, and generated histograms and scatter plots for the BIF as well as all rocktypes together (Figure 11, Figure 12). The mean value for all samples was 3.3, and for logged BIF samples was 3.4. A fixed value of 3.3 was selected for modelling.

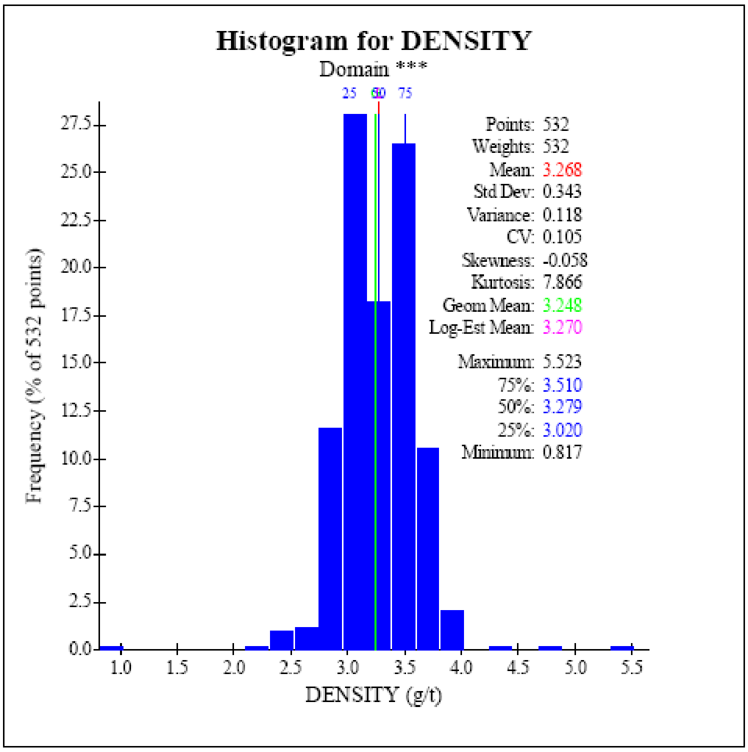

Figure 11. Histogram of all density measurements for all samples

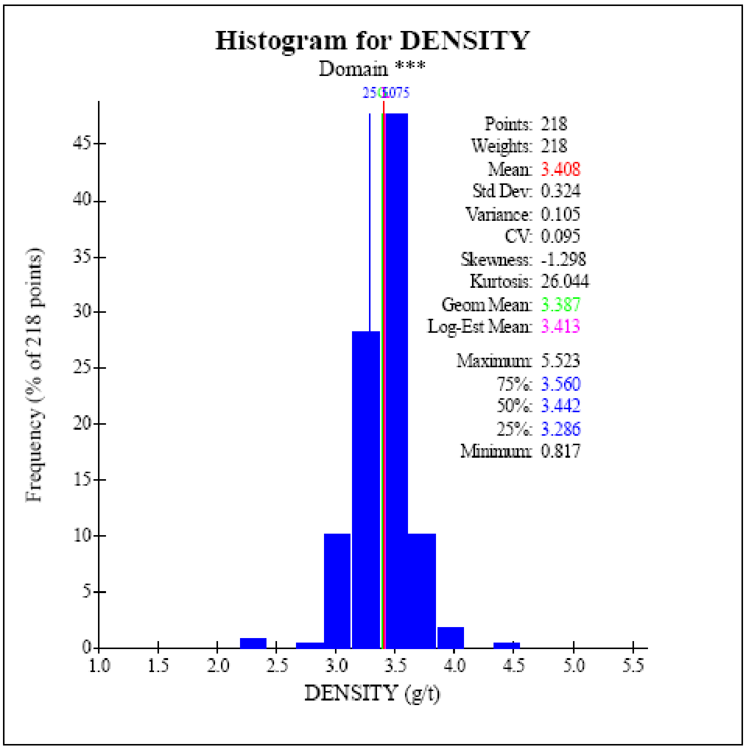

Figure 12. Histogram of all density measurements for BIF samples only

13.6.3 Density relationship with other variables

Scatterplots show a clear relationship of density to Fe content (Figure 13). Apart from a number of outliers that appear so improbably that they should be excluded as possible bad data. H&S (2009) found differences in the results from different drilling phases so a plot was generated of FE vs density for the three groups of results for diamond core (Phase 5), RC Phases 1-3 and RC phases 4 and 6 (Figure 13).

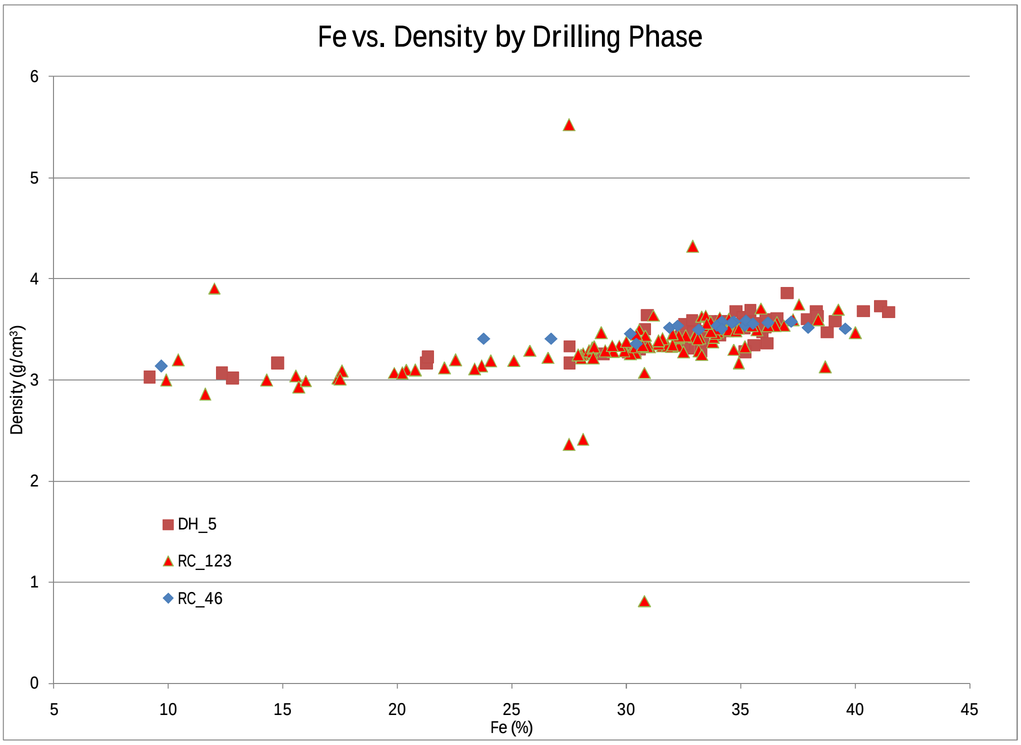

Figure 13. Scatter plot of Fe vs. Density by drilling phase

Item 14 Sampling Method and Approach

14.1 Sampling Procedure for Reverse Circulation Drilling

The RC drill programs which provide the sampling data for the current Mineral Resource estimates were supervised by Macarthur's field staff, or contractor field staff. Field procedures were similar for all drilling phases. The following description of sampling procedures is derived from Revell (2006) and discussions with Mr. Nick Revell. Drilling practices were focused on maximizing sample recovery and minimizing sample contamination. At the end of each six meter drill rod, drilling paused while compressed air was blown through the rods to flush cuttings from the hole, sample hoses and cyclone to minimize sample contamination, and to ensure there were no blockages in the sample stream. The cyclone was regularly inspected and cleaned as necessary. Samples were collected over one meter down-hole intervals and a sub-sample collected in a calico bag by splitting through a three tier riffle splitter. The calico bag sub-samples were labeled with the drill hole and depth range and placed on top of the remnant bulk sample in labeled plastic bags in rows of 20 alongside the drill collar. The plastic bags were folded to minimize subsequent sample contamination (e.g. Figure 14). For drill phases one to three which represent the RC drilling undertaken between July 2006 and February 2007, Macarthur geologists used a sampling spear to take a representative sample from each plastic bag, which were then composited to 5m sample intervals for DTR assaying.

For drill phases four, six and seven which represent the RC drilling undertaken between September 2007 and December 2008, the individual one meter rifle split calico bag samples were submitted to the assay laboratory. The five meter composite samples for assaying were composited by the assay laboratory from the one meter samples on an equal weight basis. Identifying sample numbers were assigned to samples by drill hole and depth, for example sample LGRC_03_185_190 represents the 185 to 190 meter interval from drill hole LGRC03.

Figure 14. Consistently high recoveries result in well-filled sample bags.

14.2 Sampling Recovery

Although Macarthur's RC drilling procedures did not include routine recording of sample recoveries, Macarthur report (pers. com Nick Revell, September 2007), that sample recovery was generally very good. The reported high sample recoveries are consistent with observations by H&S during site visits in August 2007 and July 20008. H&S inspected the remaining bagged sample material for a number of drill holes and noted that recovered sample volumes were consistently high. Sample bags were typically well-filled (Figure 14**)** demonstrating the generally high, and consistent sample recovery.

14.3 Sampling Procedure for Diamond Core Drilling

Diamond core drilling has not been carried out in the period since the previous review. The procedures for the five diamond holes drilled at Clark Hill North are documented in Abbott & van der Heyden (2009) and Macarthur's (2009a) Diamond Drilling and Geotechnical Logging Standard Operating Procedures.

Item 15 Sample Preparation, Analyses and Security

15.1 Diamond and Reverse Circulation Drill Samples

From Abbott & van der Heyden (2009) : “Sample preparation and assaying for the Phase One to Phase Three RC samples is detailed in the October 2007 Technical Report (Abbott, 2007b).

For the Phase One to Three RC drilling, the generally five meter sub-samples were collected by spear sampling of from one meter bulk sample bags. These samples were submitted to either Genalysis (Phase One to Two) or Amdel (Phase Three) for preparation and head grade analysis. All Davis Tube recovery analysis was performed by Amdel laboratories.

For the Phase Four, Six and Seven RC drilling, the generally five meter assay samples were produced from one meter riffle split samples by the assay laboratory on an equal weight basis. All head grade and Davis Tube recovery analyses were undertaken by Amdel laboratories.

One metre samples are labelled before filling at the drill, collected by Macarthur Minerals geologists from the drill site and transported by a Macarthur contractor to the laboratory.

The sample preparation process is detailed in Figure 15, taken from Macarthur Minerals drill sampling procedure (Macarthur 2009).

The National Association of Testing Authorities (NATA) has accredited both Genalysis and Amdel laboratories in accordance with ISO/IEC 17025, which includes the management requirements of ISO9001:2000.”

CSA consider that the sample preparation, security and analytical procedures adopted by Macarthur provide an adequate basis for the Inferred Mineral Resource estimates.

15.2 QA/QC Sample data collection

Allen (2009) made recommendations for further QA/QC samples to be collected as part of the drilling process and that recommendation has been implemented by Macarthur. The analysis of QA/QC samples from recent drilling has not been completed at the report date.

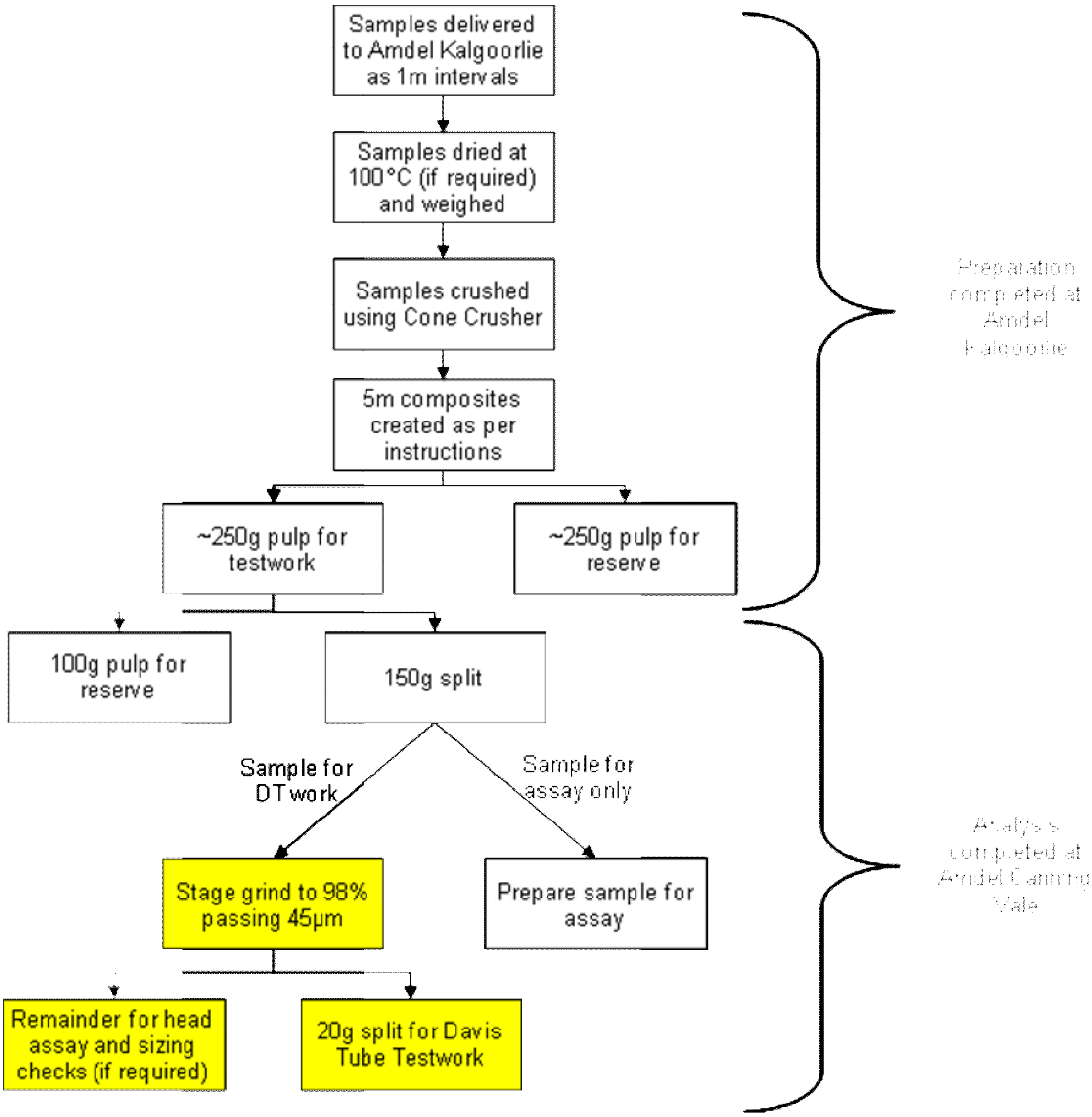

Figure 15. RC drill sample preparation. From the Macarthur Minerals drill sampling procedure.

15.3 Standards

According to Abbott & van der Heyden (2009) the assay laboratory inserted Certified Reference Material samples in the assay sequence for quality control of assay process. However, no data for these samples were supplied to CSA.

15.4 Blanks

No blank samples were inserted in the sampling process.

15.5 Drillhole Data Summary

15.5.1 Drillhole Data Summary

Drilling has been carried out over seven phases, with the seventh phase presently in progress.

Drillhole data was supplied to CSA as a Microsoft Access database. It was exported as comma-separated text files (csv format) and imported to Datamine.

Table 7. Summary table of holes drilled per deposit with metres drilled and number of assays

Deposit	Count of Holes	Sample Intervals	Total metres	Mean length	Metres Analysed by XRF	Metres analysed for DTR
ClarkHNorth	53	1511	8,589	5.7	3,283	2,645
ClarkHSouth	5	215	1,270	5.9	294	458
Moonshine	108	3648	22,430	6.1	13,580	12,105
Sandlewood	27	1029	6,050	5.9	3,719	3,832
Snark	16	487.0	2,969	6.1		
Total	209	6,890	41,307	Total	20,876	19,040

The assay tables in the database included fields for XRF analyses for the whole rock, plus Davis Tube recovery in weight percent, and separate Davis Tube Head grade and concentrate grade analyses.

A table of duplicate samples was included.

MMS had recently re-surveyed drillholes using an Eastman camera, and had ground surveyors pick up drillhole collars up to LGRC_172. MMS have also re-logged the Moonshine drillholes.

15.5.2 Data Verification, Corrections and Loading

On loading the data a number of text strings and character values were identified and substituted. Most of these were of two classes:

- Below limit of detection analyses expressed as <0.01, <0.020, <0.005 and so on. These were substituted with a numeric value of half the stated limit value.
- Character strings such as - , nd, I.S., L.N.R. and X. These strings were substituted with absent values. Information on the original meanings of these codes was not available.

For a substantial number of drillholes the sample intervals had been partly or wholly incorrectly coded as 1-5, 6-10 – ie five metre intervals were coded as four metre samples with one metre gaps. This was investigated and corrected by Macarthur.

15.5.3 *Drill Sample Collection*

The majority of drillholes are RC holes were sampled in 1m intervals foir their entire length. Intervals considered of interest for possible mineralisation were composited to 5m sample intervals (varying locally from 2m to 15m) for analysis.

The composite samples were created for phases one to three using sample spears into the 1m plastic bags of drill cuttings, and a single sample submitted for analysis. For later drilling phases, a calico sample bag split from each 1m drill sample using a three tier riffle splitter was submitted to the laboratory, and these 1m sample bags were then given a preliminary crushing and a 5m composite created of equal weight from each 1m bag.

15.5.4 *QAQC Review*

QAQC has been covered for the drilling to date in Revell (2007) and Abbott & van der Heyden (2009). CSA reviewed the available data in Allen (2009) and made a number of recommendations which have been implemented by Macarthur.

The following QA/QC review is from Allen (2009).

CSA were supplied the following data from which cross-checks of the assaying quality might be done:

- A table of duplicate samples including DTR results separate from the assay tables.
- Two sets of whole-rock assays, i.e. original XRF assays and XRF head grade assays repeated for the Davis Tube data.

A well-designed QAQC program might additionally include taking duplicate samples (e.g. every 20 samples), inserting certified standard reference material samples (CRM), and inserting blank samples. The program might also have check samples re-analysed at a different laboratory.

Initial QA-QC protocol implemented by MacArthur provided a low level of QAQC data. H&S (2009) report that drilling has been carried out in seven campaigns, with variations in sampling protocols in each phase.t One area that may provide unreliable data are the 5m DTR composites collected during Phases 4 and 6. As all of these composites were created on an equal weight basis using a sampling spear, this method is not considered a reliable method of sampling. This practice has been rectified in the most recent Phase 7 RC program. Macarthur has undertaken a major effort to improve operating practice in the current drilling phase, not covered by H&S (2009a).

According to H&S (2009) certified reference materials (CRM) have been inserted in each batch of drill samples for Phases Three to Seven by the laboratory and analysed in the same way as the drill samples. The data from these CRM assays have not been supplied to CSA or H&S.

CSA reviewed the correlation between the original head XRF grades and the DTR head grade assays by creating scatter plots of some major components (Figure 16 to Figure 19). These would be expected to show whether the same samples were assayed, and whether the re-sampling process introduced any variation. The graphs show very good correlation for most samples.

A handful of samples lie on a displaced trend line which might indicate a calibration issue in a those few sample assays. These data points are in two groups; the most obvious four are all sequential samples from LGRC_001, intervals from 130-135,135-140,140-145 and 145-147. The Totals of assays from these four intervals are much lower for the XRF grades compared with the head grades (typically 78%-81% instead of 98%-100%), indicating some issues with assay quality, or data entry errors. It is unlikely to be related to physical sample compositing because the totals would still add up to similar values in that case.

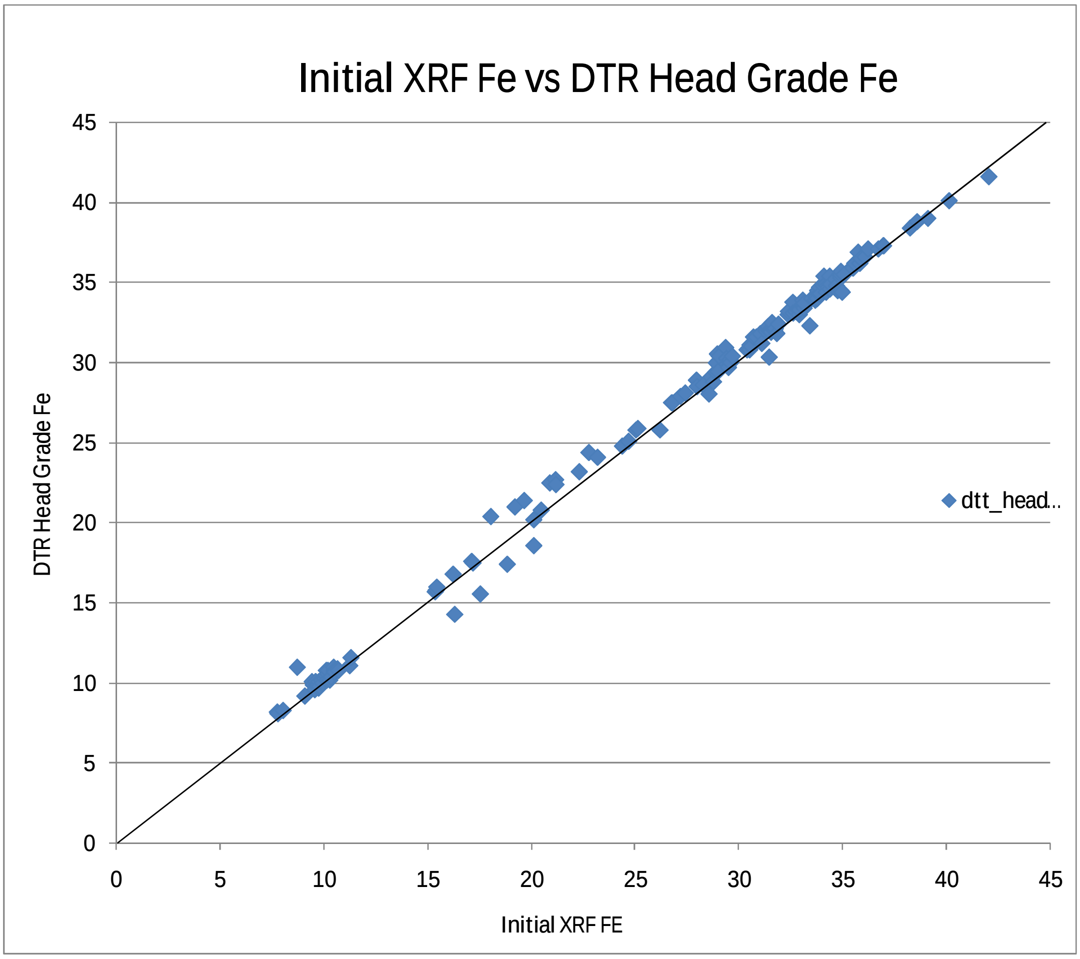

Figure 16. Scatter plot of initial XRF Fe against DTR head grade assay Fe

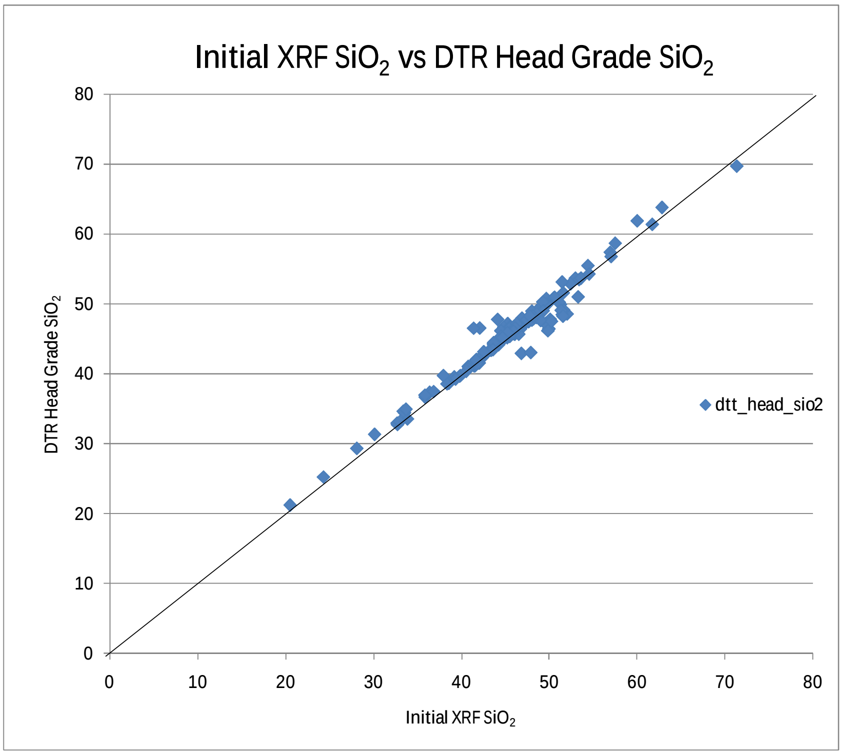

Figure 17. Scatter plot of initial XRF SiO_2 against DTR head grade assay SiO_2

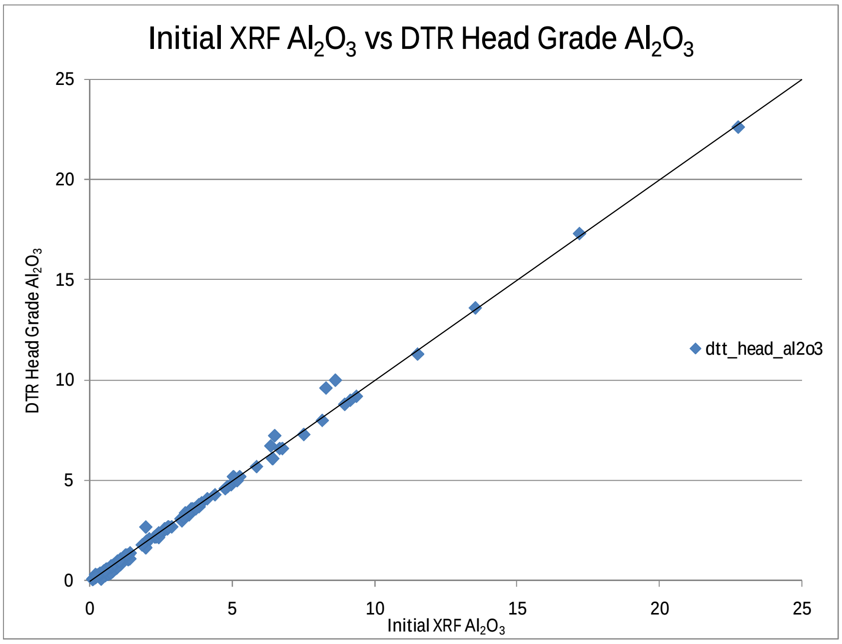

Figure 18. Scatter plot of initial XRF Al_2O_3 against DTR head grade assay Al_2O_3

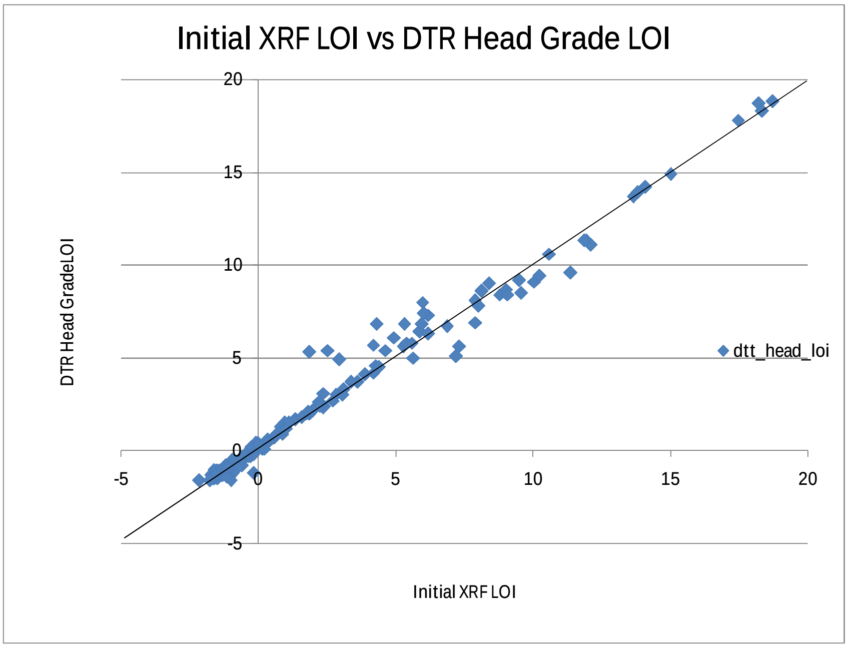

Figure 19. Scatter plot of initial XRF LOI against DTR head grade assay LOI

The duplicate sample table was separately evaluated. H&S (2009) broke the duplicate sample assays down by drilling phase and created scatter plots to compare the original and duplicates. This showed wide variations between original and repeat assays in the earlier phases, but a narrow level of variations in Phase 7 which comprises the most recent samples and 40% of the samples used in this Mineral Resource estimate..

The Duplicate assay table reveals a number of issues in the earlier phases.

- Duplicate DTR mass recovery values have been done without duplicate concentrate assays in a substantial number of cases.
- Some samples have been 'duplicated' at different intervals – ie 1m intervals in some samples in the Assay table and some different intervals are 1m samples in the duplicates table.
- A few duplicates have extremely divergent concentrate assays – eg:
  - LGRC_066 175-180m has DTR mass recoveries of 1.11% vs 21.5%
  - LGRC_141 130-135m has Concentrate SiO_2 of 9.2% vs 20.3%
  - LGRC_063 118-120m has DTR mass recoveries of 21.4% vs 15.5%

  These should be investigated further, and re-assays used to eliminate the suspect results from the database.

For those samples which have duplicate values, the scatter in the graphs (Figure 20-Figure 23) is quite wide for phases before Phase 7 (LGRC_141 or lower). It is likely the poor correlation in the earlier drilling phases is the result of spear sampling for the 5m composites.

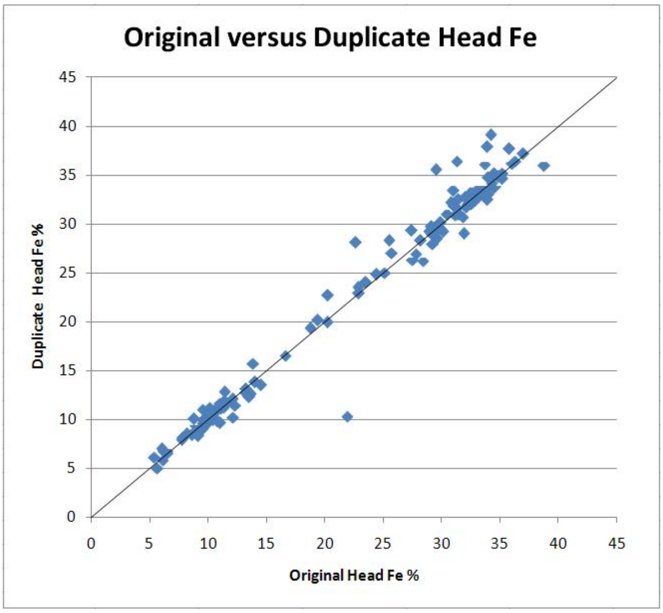

Figure 20. Scatter plot of original vs duplicate Head Fe grade

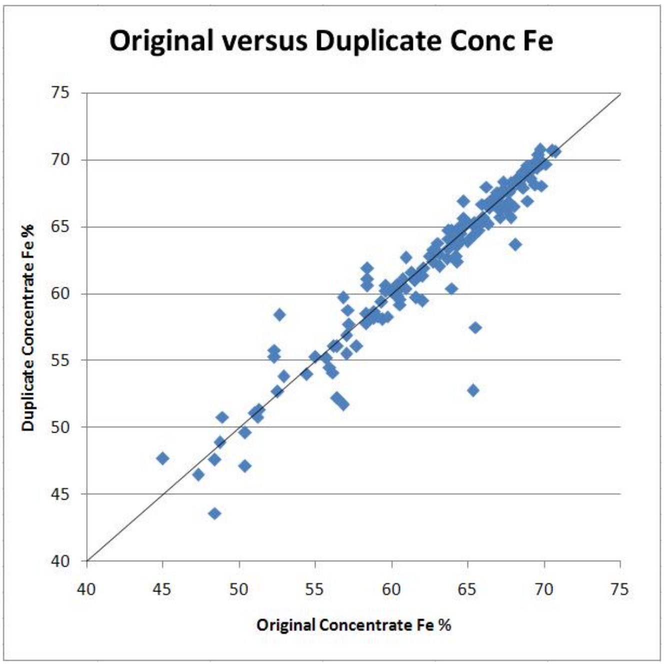

Figure 21. Scatter plot of original vs duplicate Concentrate Fe grade.

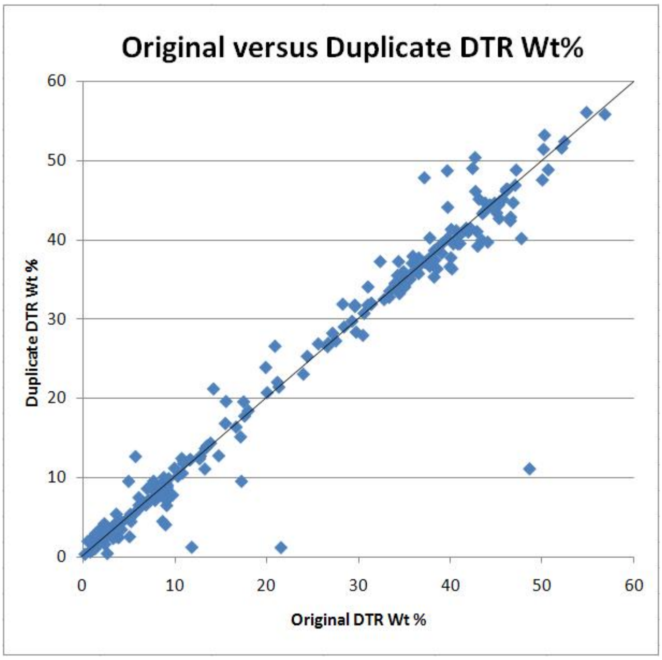

Figure 22. Scatter plot of original vs duplicate Davis Tube Recovery (DTR) grade

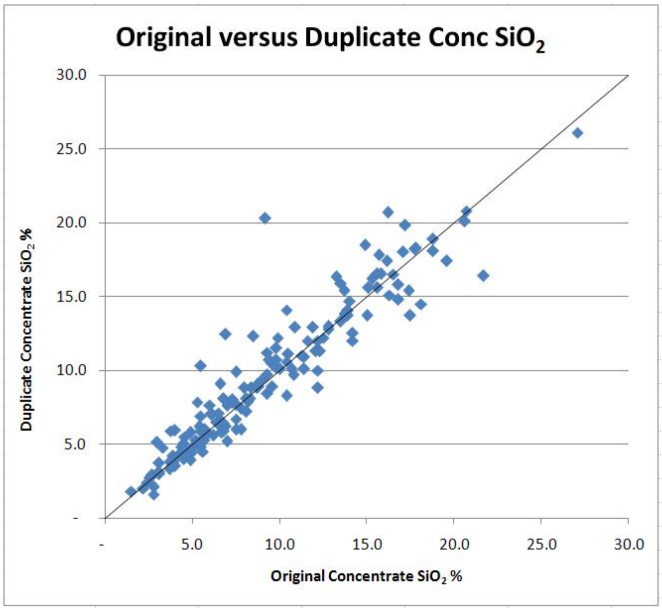

Figure 23. Scatter plot of original vs duplicate Concentrate SiO_2 grade

Overall, the QAQC data indicatethe data is generally sound but highlights that the spear sampling method is unreliable. The results of the duplicate samples would indicatethe duplicate sample assays have been the same material as the original sample assays, and that the assay values are by and large repeatable with fairly close correlation.

The number of problems identified with earlier drilling phases would suggest that the earlier drilling results would be suitable only for an Inferred Mineral Resource.

Item 16 Data Verification

16.1.1 Other sources of information

CSA has made use of certain technical, financial and legal information in preparing this report. The technical information as provided to and taken in good faith by CSA has not been independently verified by means of re-calculation. CSA has however:

Conducted a review and assessment of all material technical issues likely to influence the future performance of the Project:

- Had discussions and enquiries with key personnel on site and Macarthur management;
- Reviewed the estimation and classification of Mineral Resources as developed by H & S Consulting;
- Reviewed the estimation and classification of Mineral Resources as developed by CSA Global ;
- Satisfied itself that such information is both appropriate and valid.

According to Abbott & van der Heyden (2009):

"Macarthur recently revised field procedures to improve confidence in the reliability of drilling results (pers. comm. A. Spinks). The revised procedures include greater supervision of drilling and sampling activities. H&S have not observed the revised procedures and since the changes have only been recently implemented, drilling information obtained under the revised procedures has not yet been compiled for review."

Mr Chris Allen of CSA visited the Lake Giles Project Area on the 20th-30th July 2009 and conducted the following activities with Mr Andrew Spinks and Mr David Drabble of Macarthur Minerals:

- Visited the drill rig and observed setting up, collaring, sample taking and subsampling.
- Observed drill logging and reviewed some of the remaining bagged RC drill samples; and
- Walked a considerable number of traverses at Moonshine, Moonshine North, Clark Hill North, Sandalwood and Clark Hill South; and satisfied himself that the drill holes were in the positions and the relationship to mapped outcrop described in the supplied data.

CSA considers that with respect to all material technical-economic matters it has undertaken all necessary investigation, both in terms of level of investigation and level of disclosure, to satisfy the reporting requirements of NI 43-101. CSA has performed all necessary validation and verification of the information provided by Macarthur in order to place an appropriate level of reliance on such information.

Item 17 Adjacent Properties

Adjacent properties were not considered in the preparation of this report, nor is there any specific information in respect of adjacent properties known to Macarthur.

Item 18 Mineral Processing and Metallurgical Testing

18.1 Metallurgical Testwork

Promet (2008) have carried out a preliminary metallurgical study based on samples from 14 RC holes drilled at Clark Hill North, Clark Hill South and Snark deposits, and two pisolite samples reported in Abbott & van der Heyden (2009).

The main features of this work are:

- The Fe of the metallurgical test sample intervals and the Davis Tube mass recovery of the metallurgical samples supplied to Promet were higher than the bulk of the intervals used for resource estimation, at 34.4%, 24.9% and 35.3% Fe and mass recoveries of 47.3%, 21.9% and 39.9%. This indicates that the samples were selected from the best high grades rather than to represent the average of the mineralisation.

- The SiO_2 grades of the recovered concentrate were in all Promet's tests higher than 10%, despite grind sizes down to 25 microns (Figure 24). In contrast, the drill sample Davis Tube assays showed a majority of results lower than 10%, averaging 9.9% in East Lode samples and 6.6% in the much larger West Lode.

- A reverse flotation test indicates that for the 25 micron grind, a concentrate of less than 5% SiO_2 can be achieved at a product weight recovery of 65%.

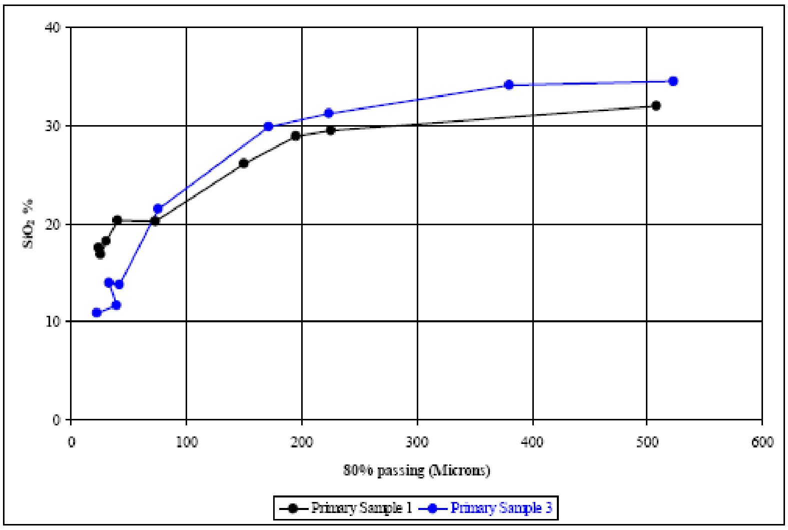

Figure 24. Silica grade versus grind size, from Promet (2008).

Item 19 Mineral Resource Estimates

This report updates the Mineral Resource estimates provided previously by Abbott & van der Heyden (2009) with a re-estimate of the Moonshine deposit, the largest of the deposits in the Lake Giles project area. The details of estimation of Mineral Resources for the other deposits in the project area are provided in Abbott & van der Heyden (2009).

The following sections detail the work carried out on Moonshine by CSA. The work includes:

- Determining suitable spatial domains for statistical work;
- Summary univariate statistics;
- Digitising the sectional interpretation;
- 3D wireframe modelling of the interpretation;
- Spatial statistics;
- Building and interpolating a block model; and
- Evaluating the block model for a Mineral Resource estimate.

19.1 Summary Statistics

19.1.1 Moonshine Domains

The Moonshine orebody consists of two main lenses referred to as the West Lode and East Lode. The two lenses are offset by faulting at several locations.

The two lenses are apparently continuous at one point, either because they are one unit folded or as a result of fault thickening. Statistics on the fault blocks of the two lodes indicate that the east and west lodes are different domains, but that the fault blocks can be treated as a single population within each lode.

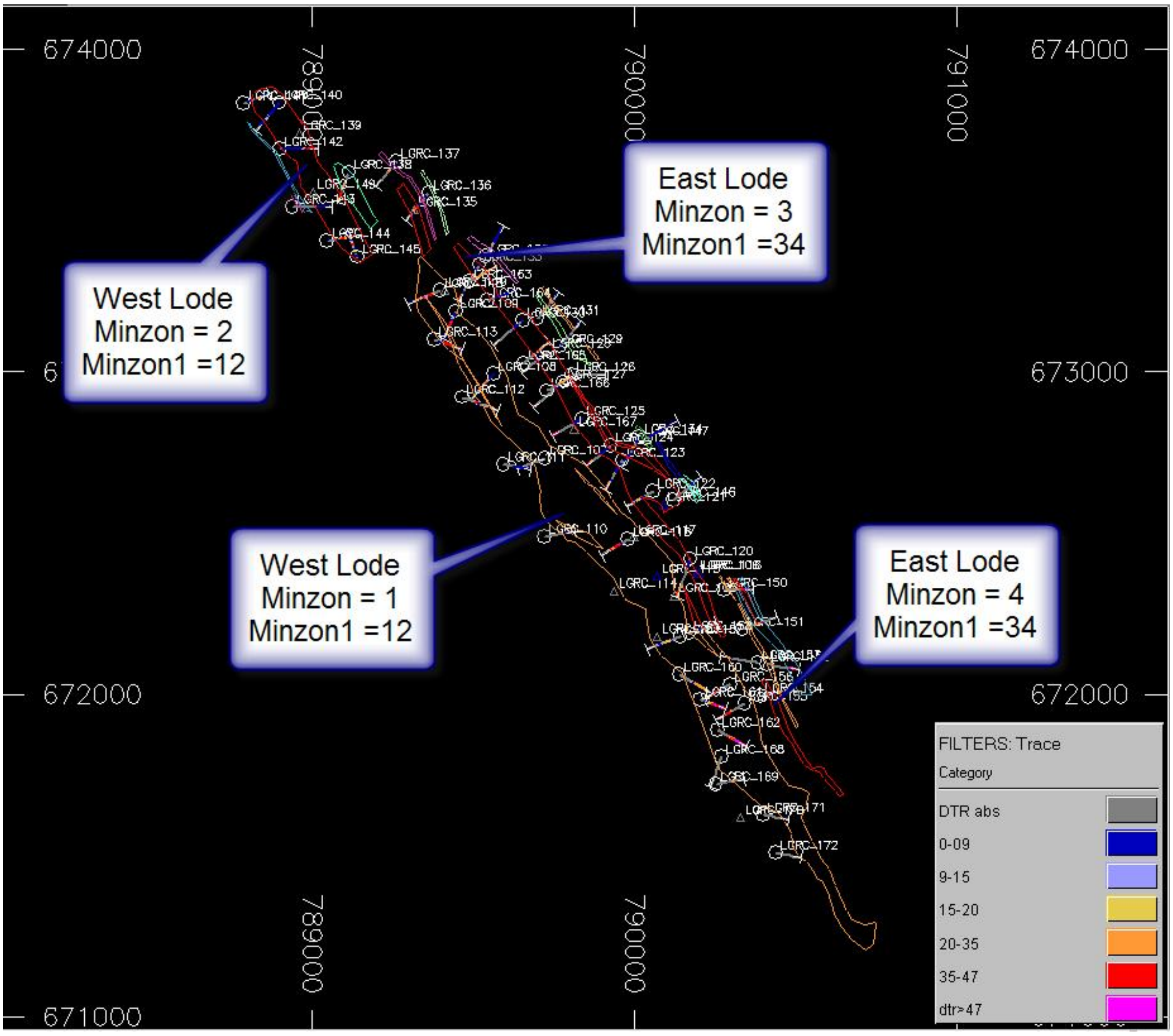

Figure 25. Lodes and statistical domains at Moonshine

19.1.2 Statistical Summary Tables

Mean Fe grades of the BIF for the West and East Lodes for drill samples below the base of complete oxidation (BOCO) are 26.2% Fe and 28.4% Fe respectively, with Davis Tube Recovery (DTR) of 26.3% and 24.9% (Table 8 and Table 9). East Lode has slightly higher Al2O3 and LOI, likely a result of its thinner BIF units alternating with ultramafics.

No head grades for P had been entered in the database due to restrictions on the number of fields in software used by previous workers. Although P in concentrate grades is more important, this assay should be entered in future.

Table 8. Mean head grades for BIF lodes and waste below the BOCO

	Fe	P	SiO_2	Al_2O_3	LOI	S	DTR
West Lode	26.2	-	54.6	1.21	1.41	1.017	26.3
East Lode	28.4	-	50.9	1.73	2.00	0.190	24.9
Waste	13.9	-	51.8	4.17	5.91	0.401	9.9

Table 9. Mean concentrate grades for BIF lodes and waste below the BOCO

	Fe_C	P_C	SiO_2_C	Al_2O_3_C	LOI_C	S_C	DTR
West Lode	66.3	0.017	6.611	0.11	-2.15	1.699	26.3
East Lode	64.2	0.037	9.839	0.10	-2.44	0.227	24.9
Waste	60.8	0.026	11.692	0.33	-1.81	1.129	9.9

19.1.3 Histograms and Cumulative Distributions - Moonshine

Grade histograms showed a distinct difference in character between the West Lode (flagged as Domain 12) and East Lode (Domain 34). Note marked bimodality in Domain 12 (West Lode), indicating significant thicknesses of high-Fe and low-Fe BIF (Figure 26, Figure 27).

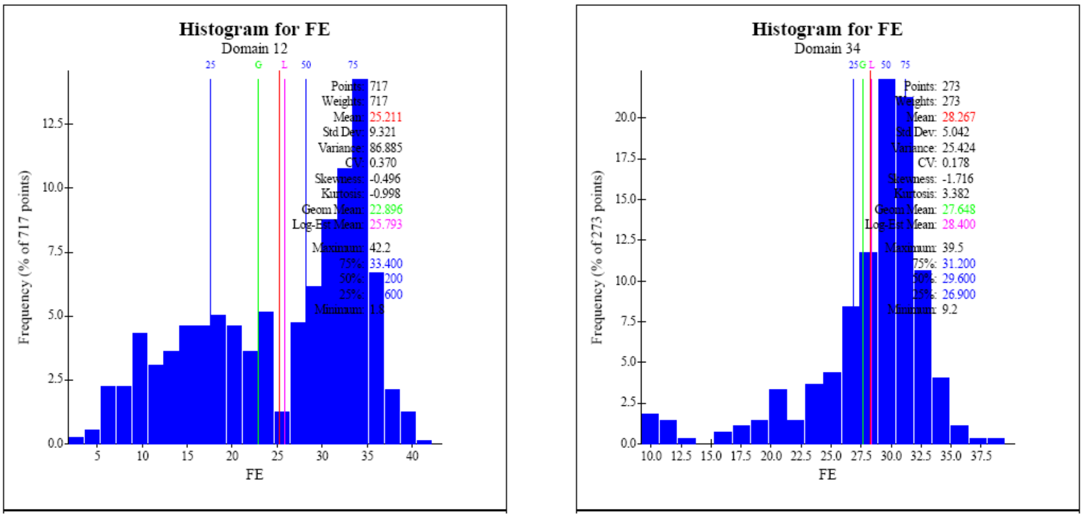

Figure 26. Head Fe histograms for West Lode (12) and East Lode (34)

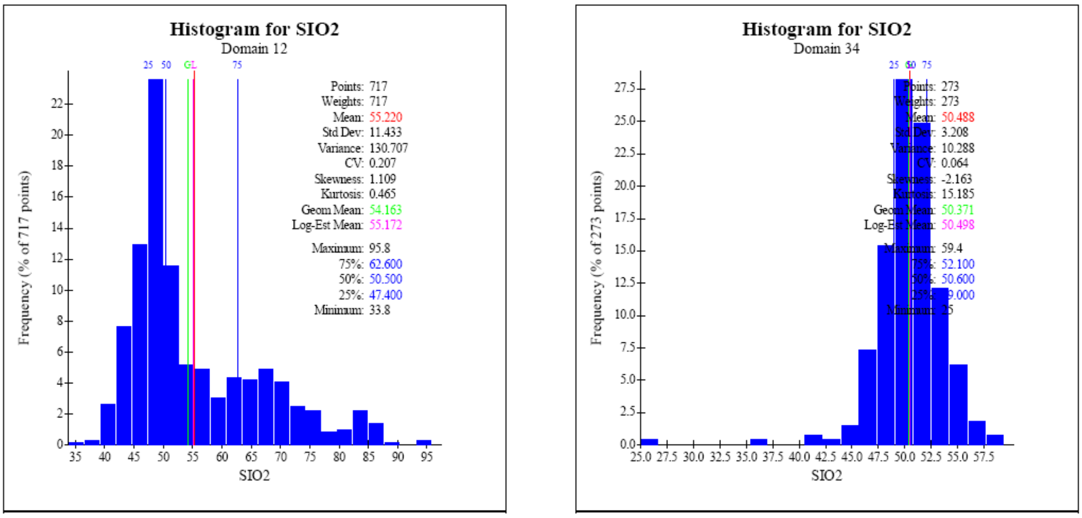

Figure 27. Head SiO_2 histograms for West Lode (12) and East Lode (34)

Davis Tube Recovery showed the same bimodal pattern for the West Lode, with about 30% below a nominal 15% DTR cutoff (Figure 28) .

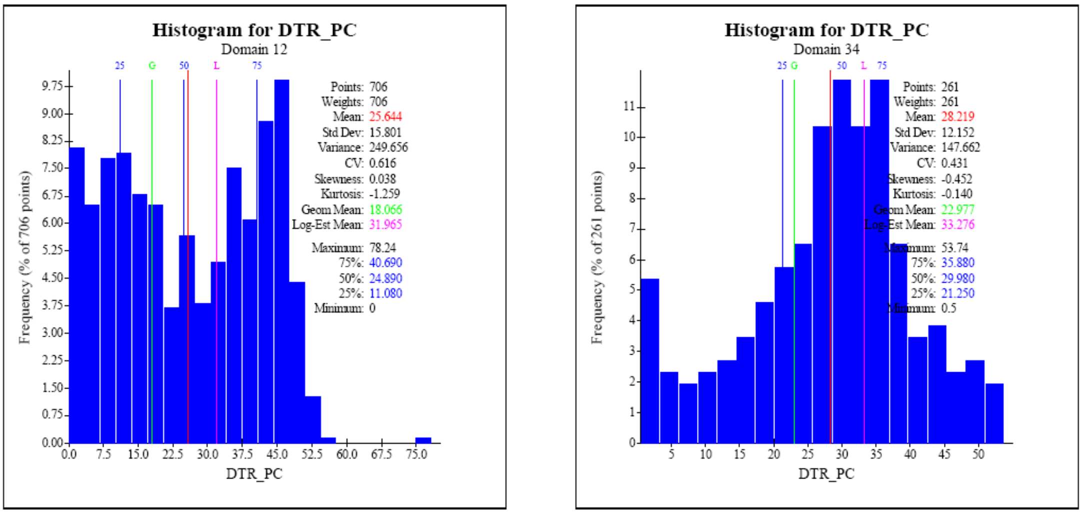

Figure 28. Davis Tube Recovery histograms for West Lode (12) and East Lode (34)

Davis Tube concentrate assays are to a large extent the product of the grind size. A clean concentrate (ie very low contaminant assays) would indicate that the grain size of the magnetite is cleanly liberated from the quartz grains at that grind size.

From Abbott & van der Heyden (2009), the grind size used for the Davis Tube test procedure is 45 microns.

Concentrate Fe grades show a relatively clean product from the West Lode, but higher contaminant levels in the East Lode (Figure 29 to Figure 32). Silica is the major contaminant, and a number of East Lode concentrates have relatively elevated levels (Figure 30).

Phosphorus has low levels in concentrate (Figure 31), and S has a significant number of higher values (eg over 1%, Figure 32).

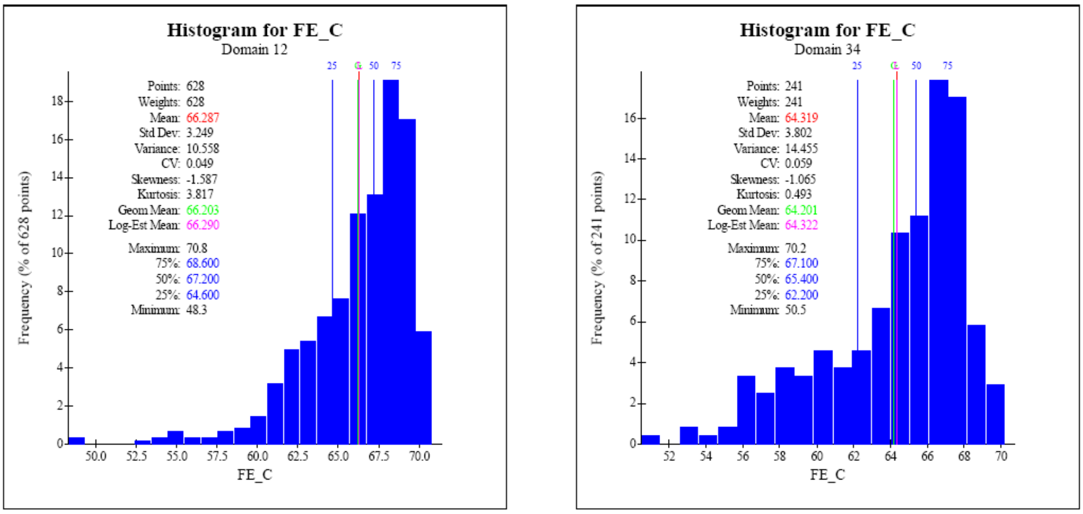

Figure 29. Concentrate Fe histograms for West Lode (12) and East Lode (34)

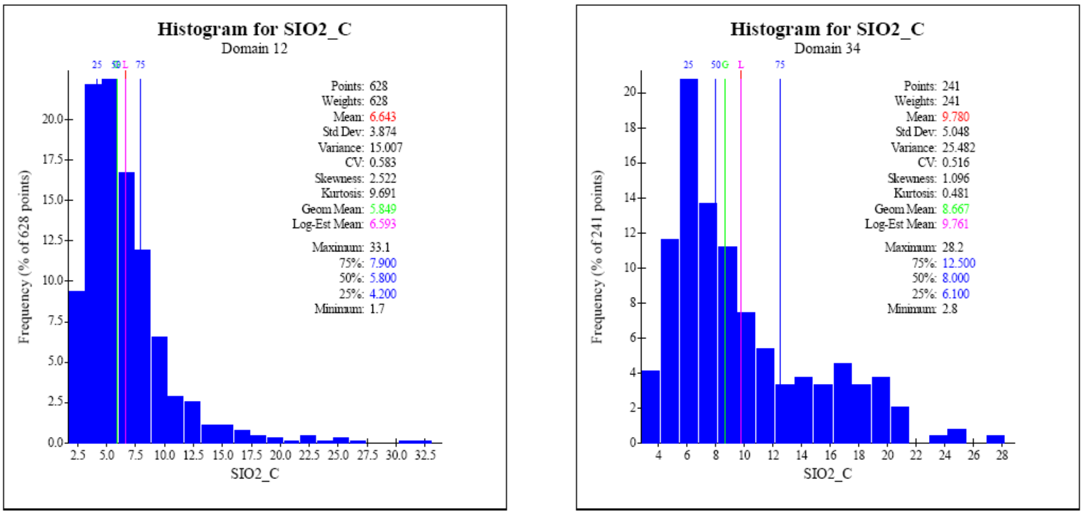

Figure 30. Concentrate SiO_2 histograms for West Lode (12) and East Lode (34)

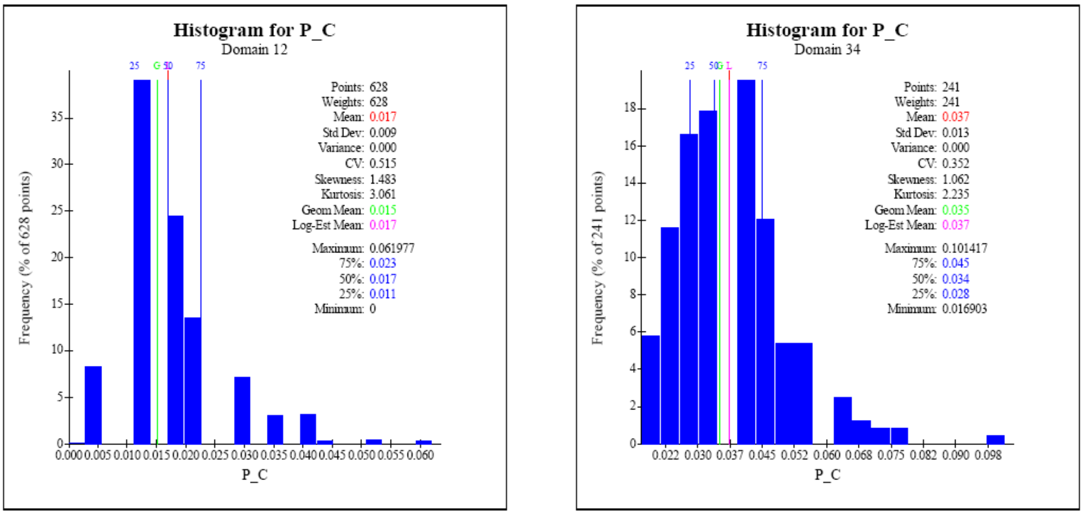

Figure 31. Concentrate P histograms for West Lode (12) and East Lode (34)

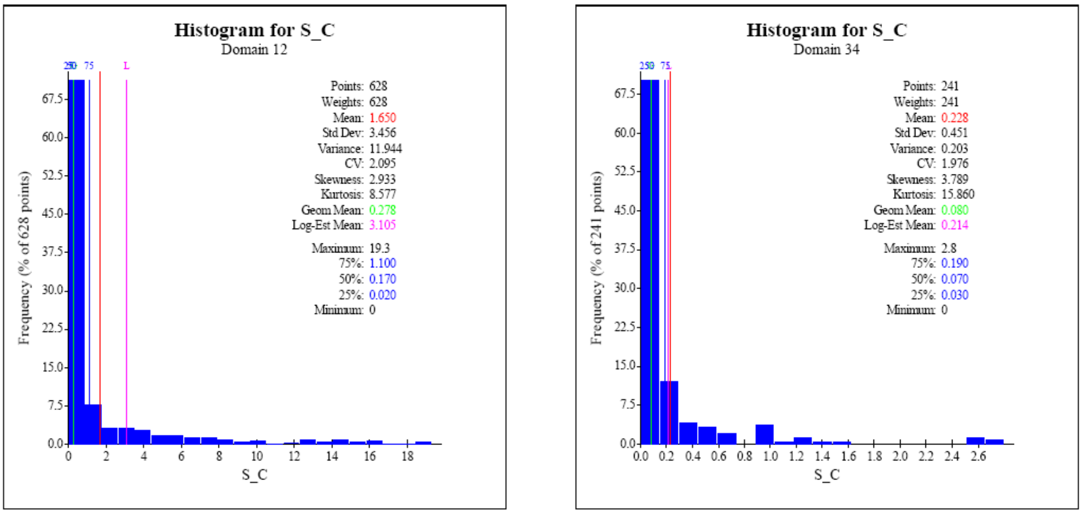

Figure 32. Concentrate S histograms for West Lode (12) and East Lode (34)

19.1.4 Clark Hill North Histograms and Cumulative Distributions

Clark Hill North shows a strong bimodality for feed Fe and to a lesser extent DTR, indicating that the lenses include approximately 25% of low-Fe material (Figure 33, Figure 34).

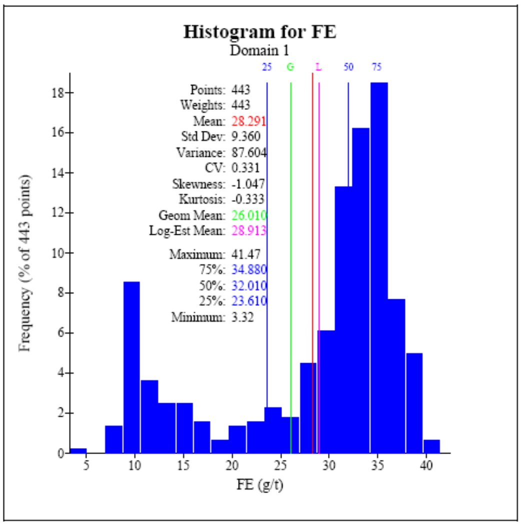

Figure 33. Feed Fe histogram for Clark Hill North

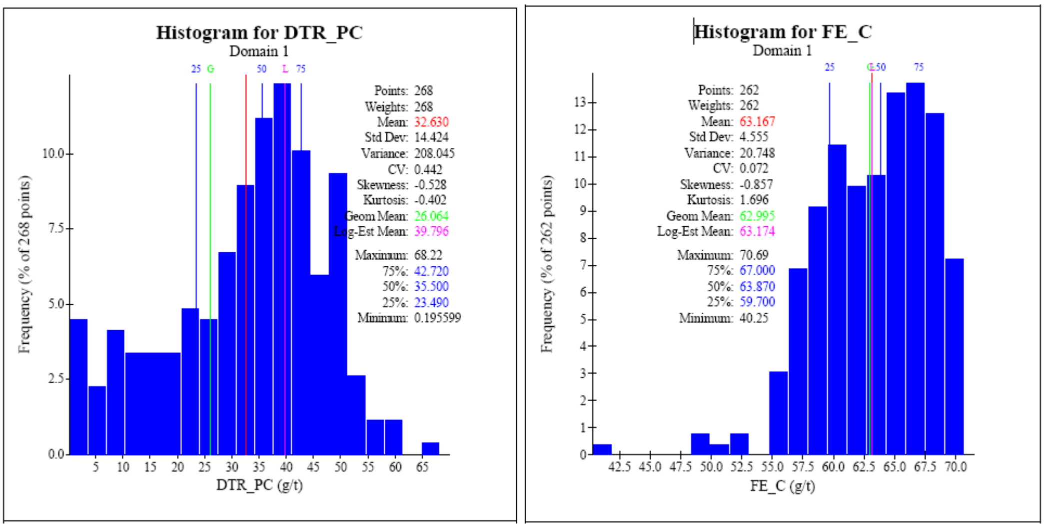

Figure 34. DTR and Concentrate Fe histograms for Clark Hill North

19.1.5 Sandalwood Statistics, Histograms and Cumulative Distributions

The data from Sandalwood were tabulated as statistics by individual lens and as a whole. The consistent strike, minimal number of drillholes (often only one per section) and relative consistency of the major lens assays were difficult to treat other than in one overall statistical domain.

Table 10. Sandalwood statistics for head grades

Statistic	DTR_PC	FE	P	SIO2	AL2O3	LOI	S
Samples	281	281		281	281	281	281
Minimum	0.6	12.1		25.10	0.02	-1.80	0.00
Maximum	57.2	47.3		60.20	11.00	4.10	2.60
Mean	**33.0**	**30.9**		**48.4434**	**1.5806**	**-0.6263**	**0.1819**
Standard deviation	11.3518	5.6609		4.0232	2.3257	0.9222	0.2950
CV	0.3435	0.1835		0.0830	1.4714	-1.4724	1.6217
Variance	128.8640	32.0459		16.1860	5.4088	0.8505	0.0870
Skewness	-0.3724	-1.2774		-0.9667	1.9021	1.7784	4.6563
Log samples	281	281		281	281	47	281
Log mean	3.39	3.41		3.8766	-0.6830	-0.3614	-2.5514
Log variance	0.3423	0.0500		0.0080	2.4971	0.8983	2.0747
Geometric mean	29.79	30.19		48.2608	0.5051	0.6967	0.078
10%	19.2	23.3		44.80	0.08	-1.40	0.008
20%	22.5	26.4		46.20	0.12	-1.30	0.022
30%	27.1	30.1		47.00	0.16	-1.20	0.040
40%	30.5	31.8		47.60	0.23	-1.10	0.075
50%	34.2	32.6		48.50	0.32	-1.00	0.110
60%	36.8	33.3		49.00	0.65	-0.70	0.130
70%	39.3	34.0		49.80	1.70	-0.40	0.160
80%	43.1	34.8		50.90	3.10	-0.10	0.240
90%	47.9	35.8		53.10	5.00	0.50	0.370
95%	50.2	36.5		54.70	7.10	1.10	0.670
97.50%	52.1	37.6		56.40	7.40	1.90	0.920
99%	54.8	39.5		59.40	10.60	2.80	2.000

Table 11. Sandalwood statistics for Davis Tube concentrate grades

Statistic	DTR_PC	FE_C	P_C	SIO2_C	AL2O3_C	LOI_C	S_C
Samples	281	275	275	275	275	275	275
Minimum	0.6	51.7	0.005	1.50	0.01	-3.70	0.002
Maximum	57.2	70.9	0.079	25.90	0.70	0.20	6.800
Mean	**33.0**	**64.7**	**0.031**	**9.4738**	**0.0692**	**-2.7706**	**0.272**
Standard deviation	11.3518	3.4491	0.0138	4.6178	0.0949	0.5014	0.6245
CV	0.3435	0.0533	0.4424	0.4874	1.3712	-0.1810	2.2974
Variance	128.8640	11.8960	0.0002	21.3242	0.0090	0.2514	0.3900
Skewness	-0.3724	-0.2491	0.6794	0.2720	3.3714	2.7801	6.1632
Log samples	281	275	275	275	275	1	275
Log mean	3.3940	4.1683	-3.5730	2.1032	-3.4281	-1.6094	-2.6142
Log variance	0.3423	0.0029	0.2462	0.3347	1.7223	0.0000	2.8945
Geometric mean	29.7852	64.6058	0.0281	8.1920	0.0324	0.2000	0.0732
10%	19.2	60.3	0.014	3.30	0.01	-3.20	0.007
20%	22.5	61.6	0.020	4.80	0.01	-3.10	0.014
30%	27.1	62.4	0.023	6.10	0.02	-3.00	0.029
40%	30.5	63.7	0.027	7.80	0.02	-2.90	0.045
50%	34.2	64.7	0.029	9.50	0.04	-2.90	0.089
60%	36.8	65.9	0.034	11.00	0.05	-2.80	0.125
70%	39.3	67.1	0.037	12.60	0.08	-2.70	0.170
80%	43.1	68.2	0.041	13.80	0.12	-2.60	0.340
90%	47.9	69.1	0.050	15.40	0.15	-2.40	0.650
95%	50.2	69.9	0.056	16.80	0.26	-1.70	1.200
97.50%	52.1	70.4	0.068	18.10	0.37	-1.20	1.700
99%	54.8	70.7	0.068	20.20	0.46	-0.40	3.600

19.2 Density Applied to Mineral Resource models

Because of reservations on the density data, CSA elected to use a conservative fixed density in the model. The density value applied in the model was 3.3 g/cm^3 for all BIF based on the mean figure for all data supplied (Figure 11). For waste a density of 3.2 was applied.

19.3 Spatial Statistics

19.3.1 Moonshine Spatial Statistical Review

Variograms for the Moonshine drill hole assay data were generated and modelled by Dr Beilin Shi. The variograms created were normal variograms in all cases. They were modelled in Snowden Supervisor software and exported to Datamine format for use in interpolation.

All variograms were traditional variograms, without transformations using 20° latitude (40° included) in the plane of search and no restriction perpendicular to the search.

19.3.2 Domains for Variography

Based on the univariate statistics for the lenses, the domains selected were the two lodes, West Lode and East lode, coded as MINZON1 12 and 34 respectively (Figure 25). Variograms were not modelled for data above the oxidised surface or for waste outside the BIF domains.

19.3.3 Head Grade Variograms

Variograms were created for Fe, SiO2, Al2O3, LOI, S. No head grades for P were available.

The major axis for Fe was along strike with a range of 372m (West Lode) and 307m (East Lode); semi-major down dip ranges of 160m and 148m respectively; and minor axis ranges across strike of 92m and 68m. Other major elements ranged form 250m (SiO2, East lode) to 697m (LOI, East Lode).

Table 12. Variogram model details for head grades

Domain	Description	Major Axis	Minor Axis	Semi-Major	Nugget	Sill2	Range1	Range2	Range3
		Strike	Down-Dip	Across Strike		Outer Variogram range			
West Lode	FE	155	75	90	0.2	0.6	372.5	160	92
East Lode	FE	155	75	90	0.3	0.5	307.5	148	68.5
West Lode	SIO2	145	70	90	0.1	0.6	249	126	66
East Lode	SIO2	155	75	90	0.2	0.6	409	148	57
West Lode	AL2O3	155	70	90	0.2	0.55	418.5	211	96.5
East Lode	AL2O3	155	70	90	0.2	0.6	545	99	44.5
West Lode	LOI	145	80	90	0.2	0.6	649	51	32.5
East Lode	LOI	145	80	90	0.1	0.7	697.5	141.5	44.5

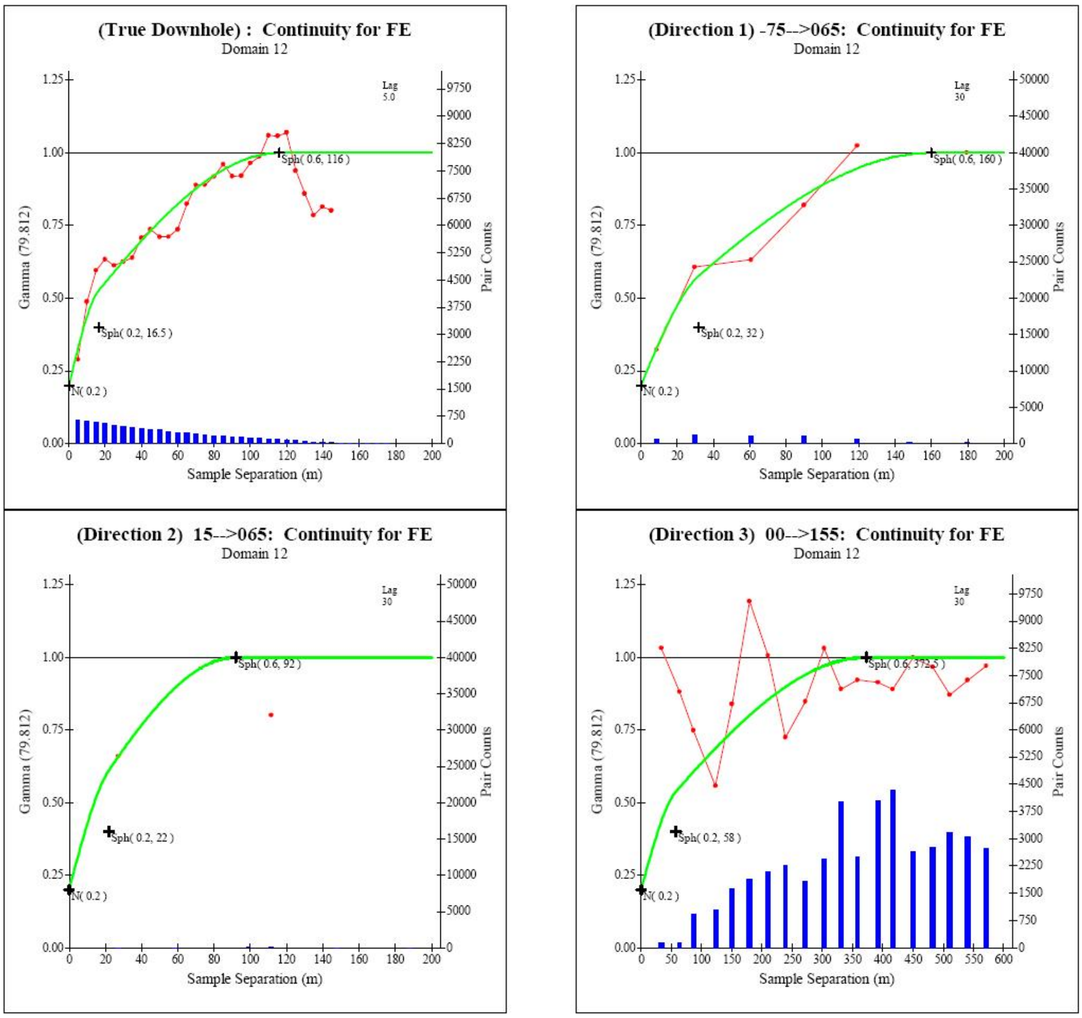

Figure 35. Normal variograms and variogram models for Head Fe, West Lode

19.3.4 Davis Tube Recovery Variograms

The variogram modelled for Davis Tube weight recovery (DTR_PC) had similar ranges to Fe, with major axis along strike at around 400m and 370m range for East and West lodes respectively, 109m and 152m semimajor axis down dip and 77m and 72m for the minor axis ranges.

Table 13. Variogram model details for Davis Tube Recovery

Domain	Description	Major Axis	Minor Axis	Semi-Major	Nugget	Sill2	Range1	Range2	Range3
		Strike	Down-Dip	Across Strike		Outer Variogram range			
West Lode	DTR_PC	150	75	90	0.1	0.72	396	109	77.5
East Lode	DTR_PC	155	75	90	0.15	0.75	372.5	151	72

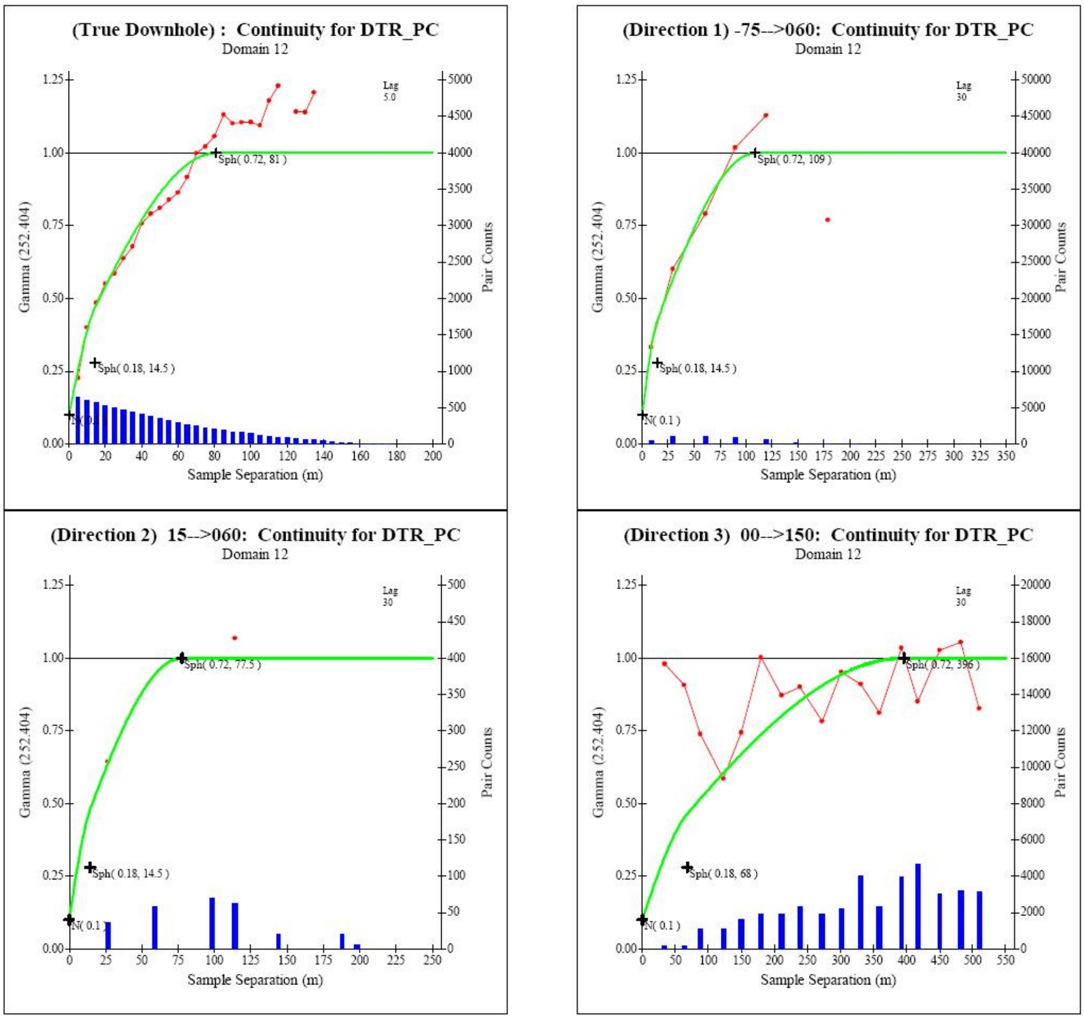

Figure 36. Normal variograms and variogram models for Davis Tube Recovery (wt%) – West Lode

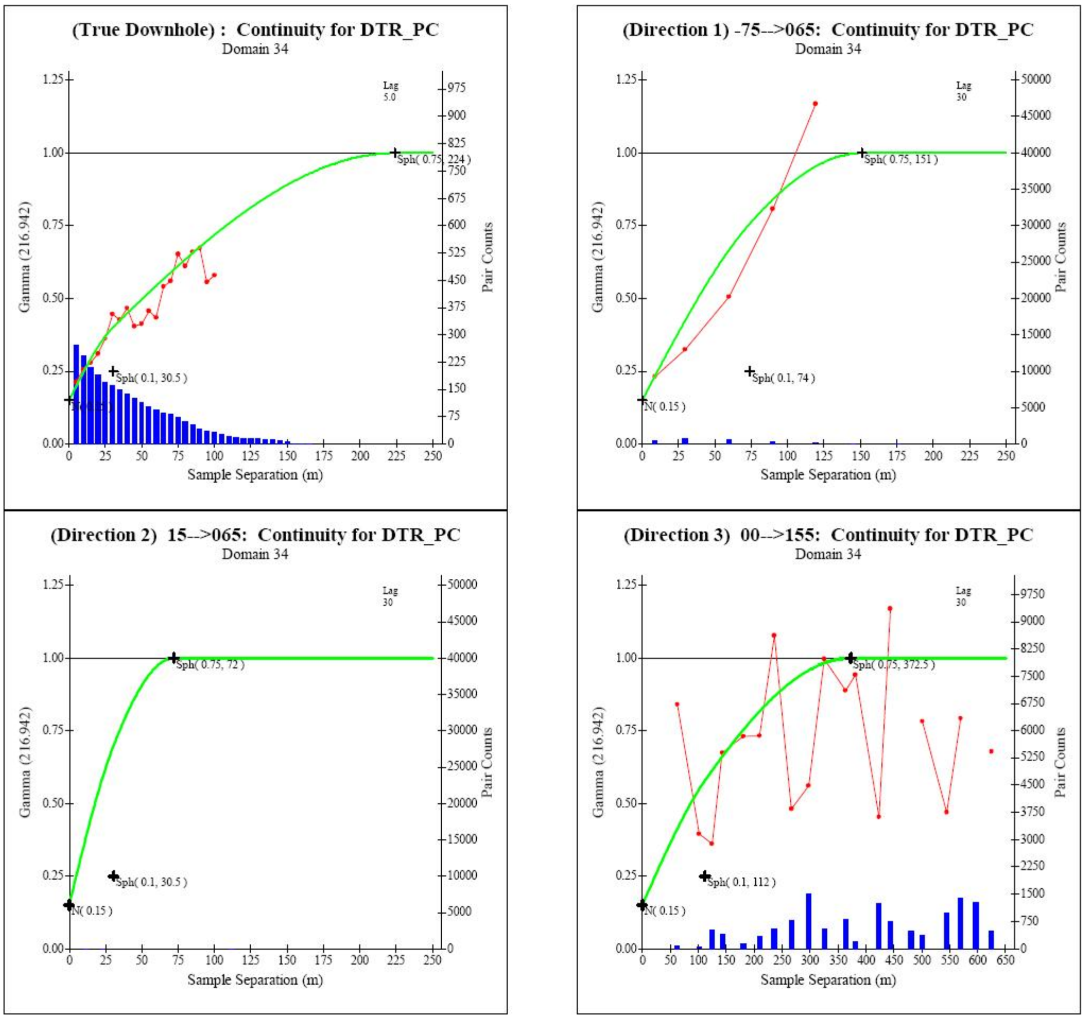

Figure 37. Normal variograms and variogram models for Davis Tube Recovery (wt%) – East Lode

19.3.5 Davis Tube Concentrate Variograms

Variograms were generated for concentrate Fe, P, SiO_2, Al_2O_3, LOI and S. Ranges for concentrate grades varied around 440m along strike, 175m down dip and varied widely across strike, generally exceeding the lens thickness.

Variograms were modelled with a two-component spherical variogram model. The models were tabulated and exported in Datamine format for grade interpolation.

Table 14. Variogram model details for DTR concentrate grades

Domain	Description	Major Axis	Minor Axis	Semi-Major	Nugget	Sill2	Range1	Range2	Range3
		Strike	Down-Dip	Across Strike		Outer Variogram range			
West Lode	FE_C	145	80	90	0.2	0.58	434.5	295.5	135
East Lode	FE_C	155	80	90	0.1	0.68	465	166.5	103.5
West Lode	P_C	140	80	90	0.22	0.36	489	86.5	338.5
East Lode	P_C	140	80	90	0.27	0.26	109	171.5	82
West Lode	SIO2_C	155	65	90	0.3	0.45	408.5	45	100
East Lode	SIO2_C	150	75	90	0.15	0.67	446	135	48
West Lode	AL2O3_C	150	65	90	0.1	0.86	438.5	160.5	141
East Lode	AL2O3_C	160	70	90	0.2	0.58	502	62	45.5
West Lode	LOI_C	150	80	90	0.1	0.7	467	71	87
East Lode	LOI_C	80	245	60	0.08	0.72	160.5	469.5	500.5
West Lode	S_C	150	75	90	0.08	0.84	395	126.5	116
East Lode	S_C	155	65	90	0.03	0.52	648	103.5	33

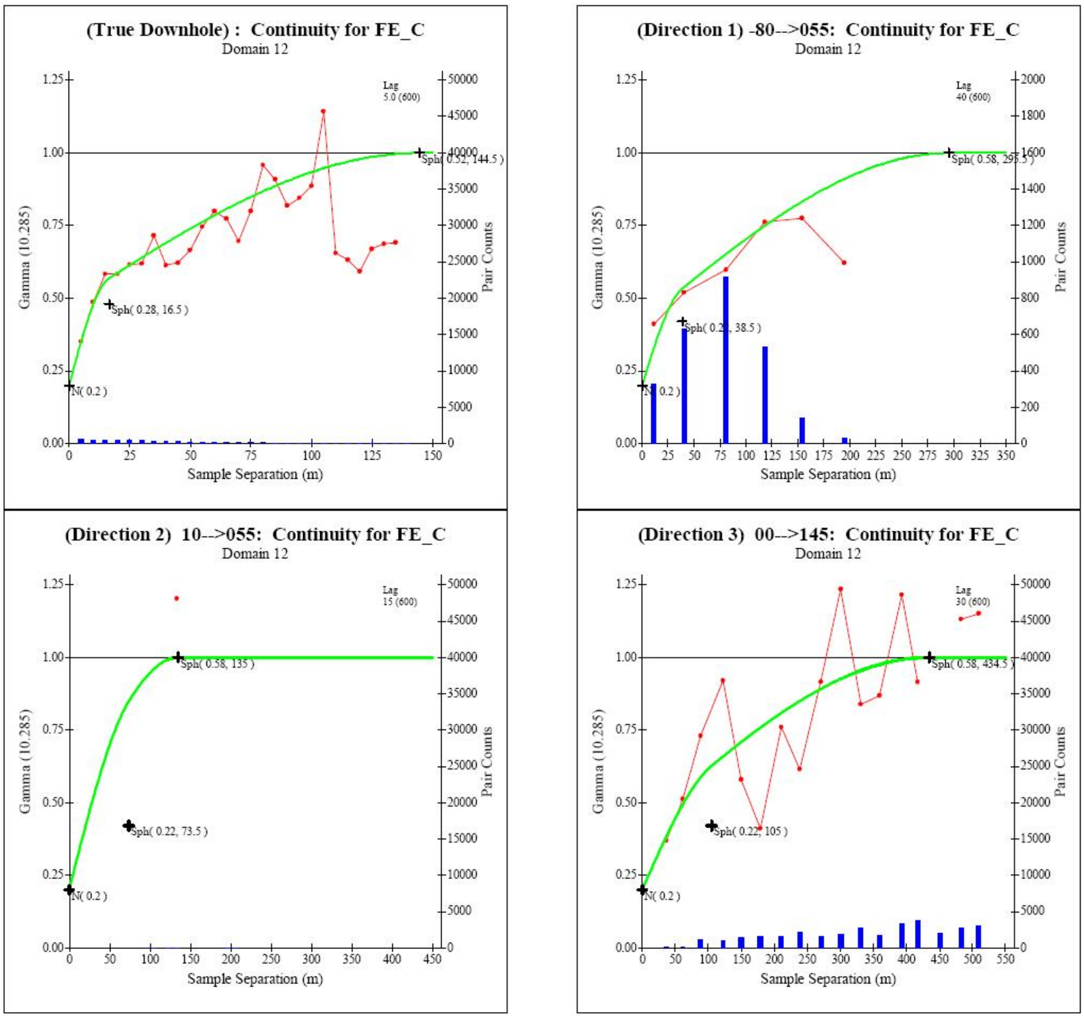

Figure 38. Normal variograms and variogram models for Concentrate Fe

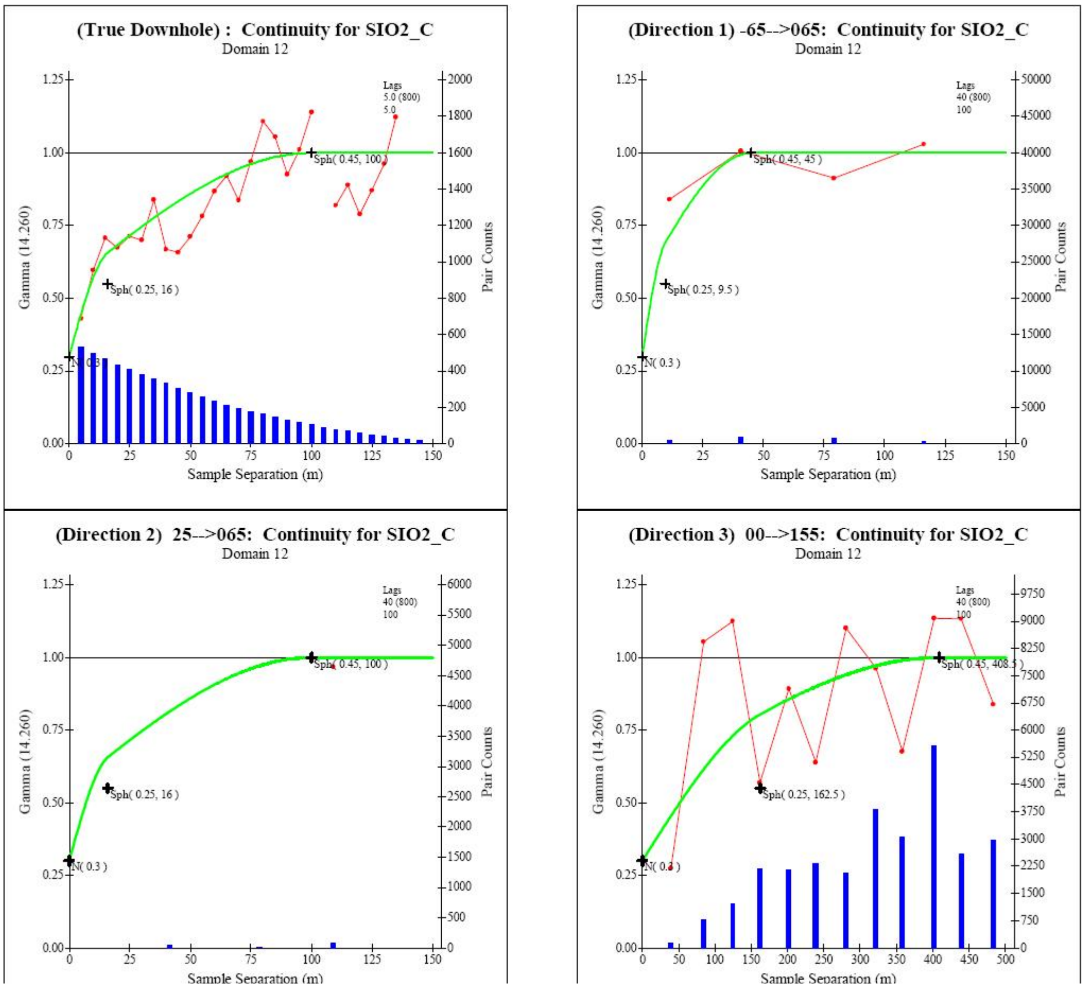

Figure 39. Normal variograms and variogram models for Concentrate SiO2

19.3.6 Sandalwood Spatial Statistical Review

Variograms for the Sandalwood drill hole assay data were generated treating the entire deposit as a single domain due to the relatively few drillholes per section and relatively consistent strike. The variograms created were normal variograms in all cases. They were modelled in Snowden Supervisor software and exported to Datamine format for use in interpolation.

All variograms were traditional variograms, without transformations using 20° latitude (40° included) in the plane of search and no restriction perpendicular to the search.

19.3.7 Domains for Variography

Variograms for the Sandalwood drill hole assay data were generated treating the entire deposit as a single domain due to the relatively few drillholes per section and relatively consistent strike. Variograms were not modelled for data above the oxidised surface or for waste outside the BIF domains.

19.3.8 Sandalwood Head Grade Variograms

Variograms were created for Fe, SiO2, Al2O3, LOI, S. No head grades for P were available. The variograms were poorly formed due to very sparse data and the dominant component available to model was the downhole variogram.

The major axis modelled for Fe was along strike with a range of 143m ; semi-major down dip range of 155m; and minor axis range across strike of 82m. Other major elements ranged from 203m along strike (SiO2) to 812m (LOI).

Table 15. Sandalwood variogram model details for head grades

Description	Major Axis	Minor Axis	Semi-Major	Nugget	Sill2	Range1	Range2	Range3
	Strike	Down-Dip	Across Strike		**Outer Variogram range**			
FE	130	280	90	0.55	0.37	143.5	155	82.5
SIO2	130	280	90	0.55	0.24	203.5	420.5	174.5
AL2O3	130	310	90	0.22	0.38	623.5	128	29
LOI	150	280	90	0.28	0.49	812.5	131.5	413.5

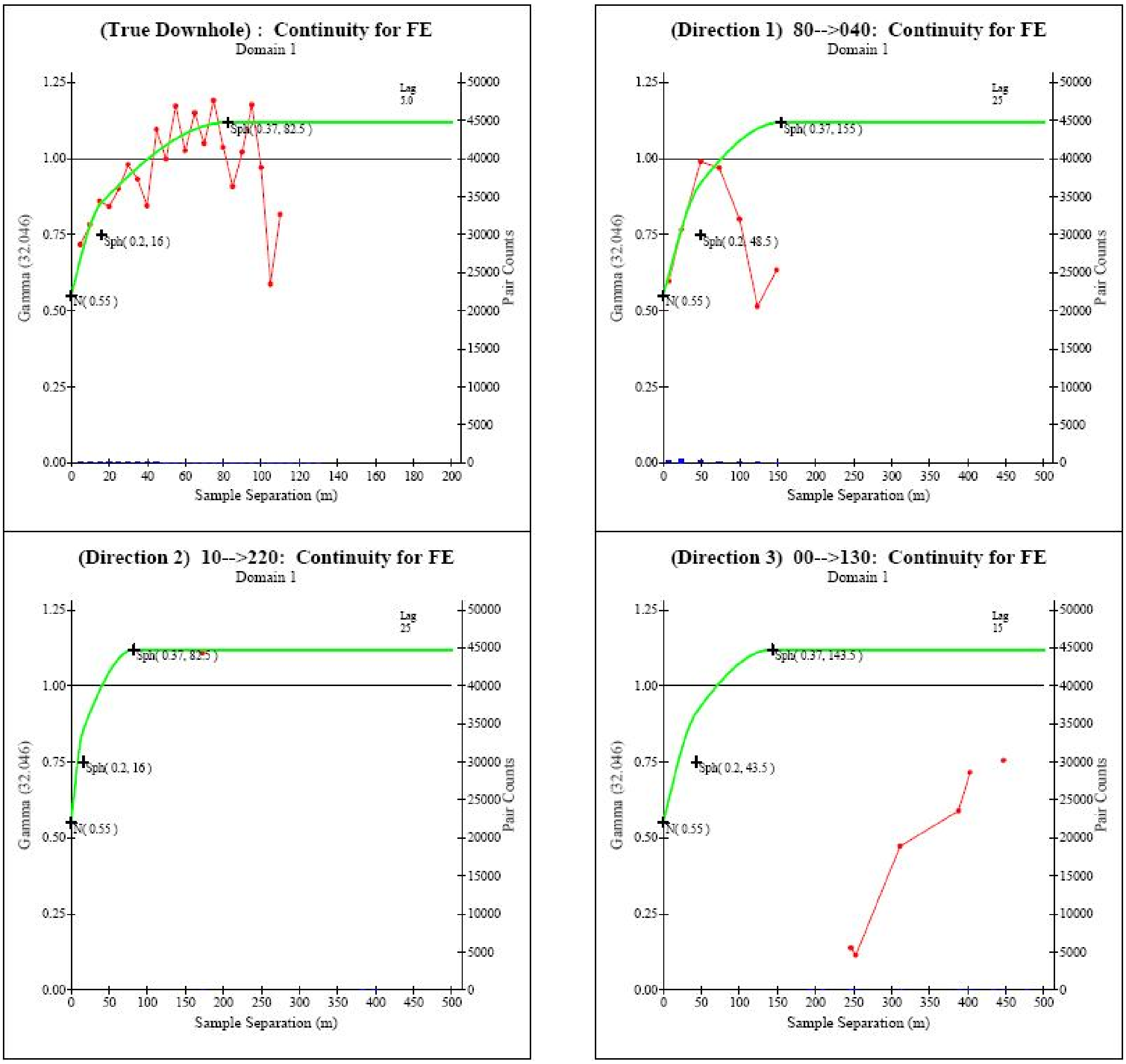

Figure 40. Normal variograms and variogram models for Head Fe, Sandalwood

19.3.9 Sandalwood Davis Tube Recovery Variograms

The variogram modelled for Davis Tube weight recovery (DTR_PC) had similar ranges to Fe, with major axis along strike at around 92m, 92m semimajor axis down dip and 88m for the minor axis ranges. Again, variograms were poorly formed and the dominant component available to model was the downhole variogram.

Table 16. Sandalwood variogram model details for Davis Tube Recovery

Description	Major Axis	Minor Axis	Semi-Major	Nugget	Sill2	Range1	Range2	Range3
	Strike	Down-Dip	Across Strike		Outer Variogram range			
DTR_PC	130	280	90	0.45	0.42	92.5	88	92.5

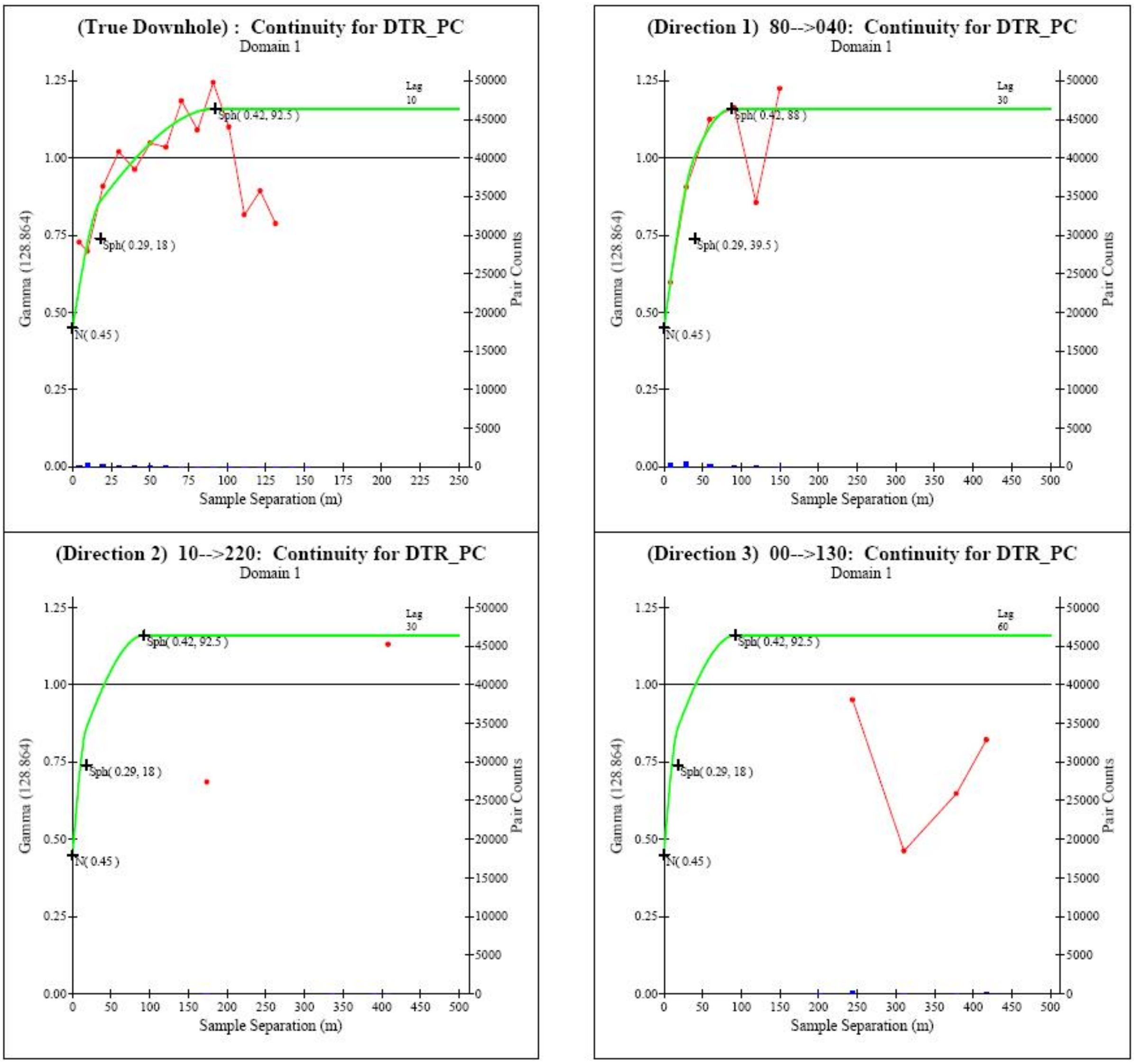

Figure 41. Normal variograms and variogram models for Davis Tube Recovery

19.3.10 Sandalwood Davis Tube Concentrate Variograms

Variograms were generated for concentrate Fe, P, SiO_2, Al_2O_3, LOI and S. Ranges for concentrate grades varied around 230m – 330mm along strike, 58m – 103m down dip and varied widely across strike. Variograms were very poor and the main component available to model was the downhole variogram.

Variograms were modelled with a two-component spherical variogram model. The models were tabulated and exported in Datamine format for grade interpolation.

Table 17. Variogram model details for DTR concentrate grades

Description	Major Axis	Minor Axis	Semi-Major	Nugget	Sill2	Range1	Range2	Range3
	Strike	Down-Dip	Across Strike		Outer Variogram range			
FE_C	130	280	90	0.16	0.3	333	58	236.5
P_C	130	280	90	0.14	0.36	140	64.5	108
SIO2_C	140	280	90	0.22	0.38	230	103.5	88.5
AL2O3_C	130	280	90	0.35	0.54	367.5	86	339
LOI_C	130	280	90	0.1	0.55	255	77	255
S_C	170	290	90	0.55	0.26	628.5	133	365.5

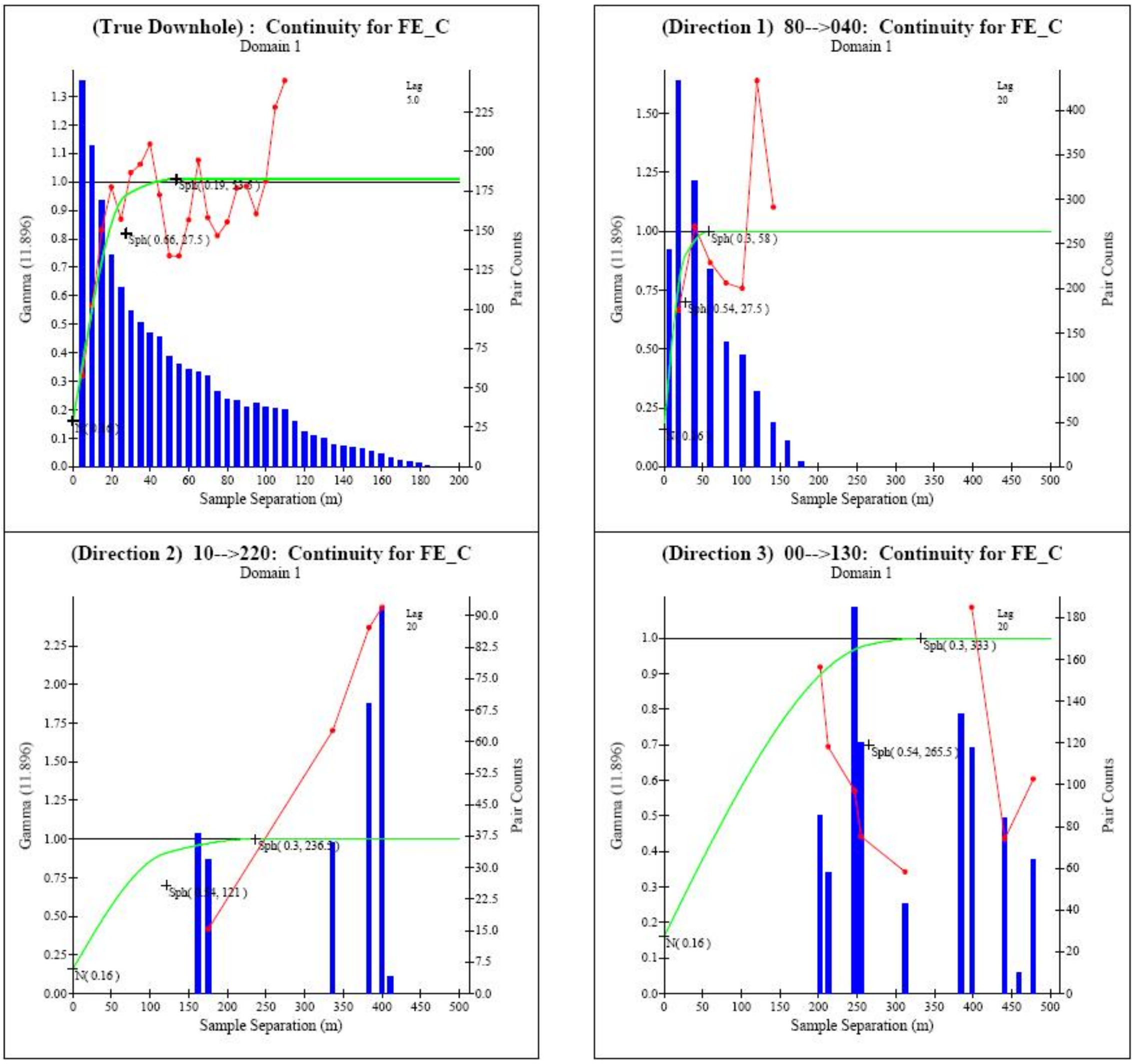

Figure 42. Normal variograms and variogram models for Sandalwood Concentrate Fe

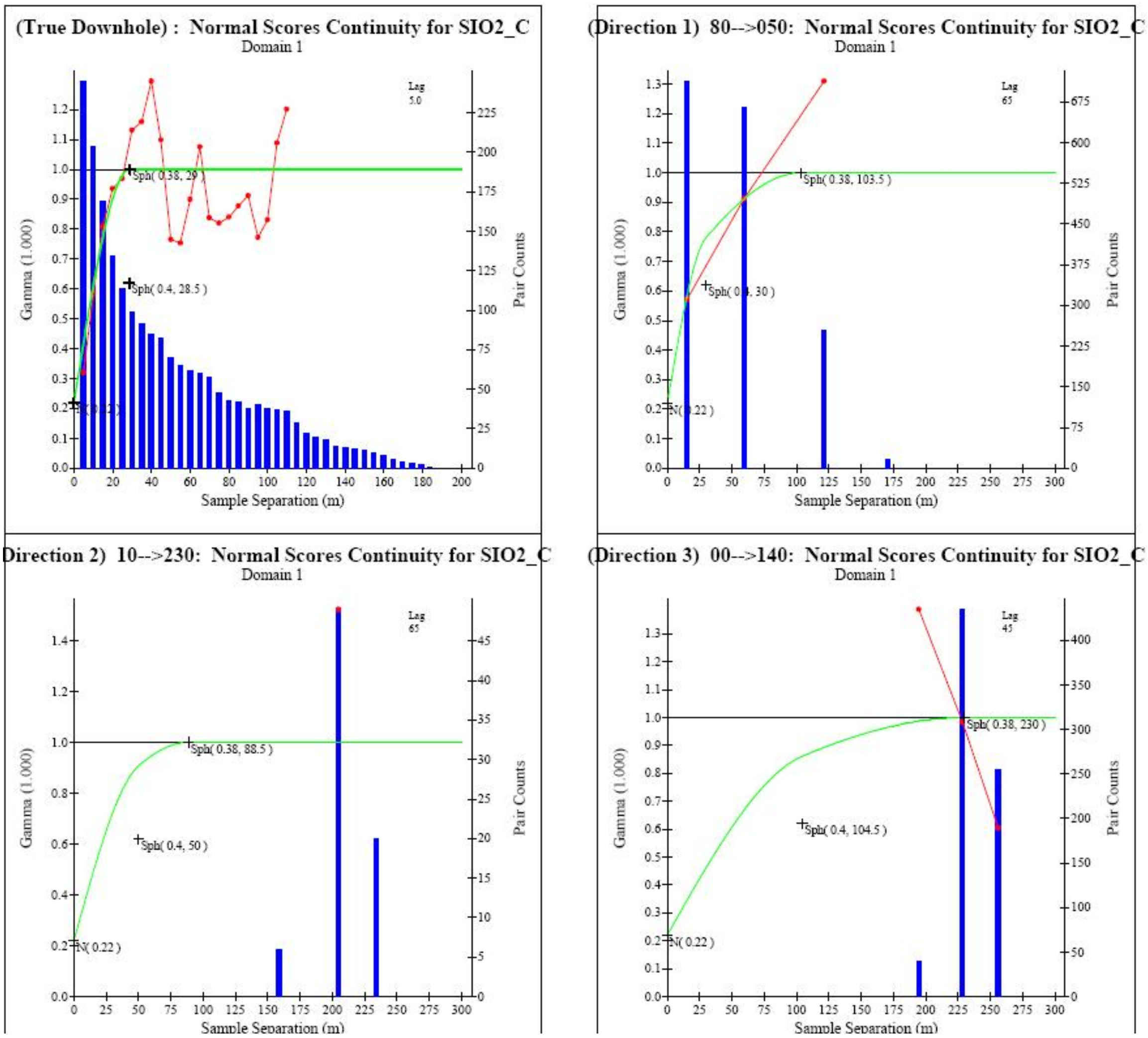

Figure 43. Normal variograms and variogram models for Sandalwood Concentrate SiO2

19.4 Block Model Design

19.4.1 Moonshine Model Design and Extents

The block model was created in Datamine using the limits and cell sizes in Table 18. The model was increased from 3.4 km x 3.8 km to 5.1 km x 7.0 km to include the Moonshine North area, an increase in strike length of 3.4 km over the July 2009 Moonshine model.

The parent cell size selected was 25m x 25m x 10m, and subcells created down to 5m x 5m x 2m to model the wireframed lenses.

Table 18. Moonshine Model limits and cell sizes

	X	Y	Z
Origin	786,300	670,400	180
Maximum value	791,400	677,400	520
Extent	5,100	7,000	340
Block Size	25	25	10
Sub-block size	5m	5m	2m

19.4.2 Model Fields and Zone Coding

The fields created in the model were as follows:

1. MINZON – subdivides the model into the east and west lodes, north and south fault blocks (1, 2 for West Lode, 3, 4 for East Lode) and waste (99).

2. MINZON1 – groups MINZON 1 and 2 together as 12 and 3 and 4 together as 34.

3. OXID – 1 above the BOCO surface, absent below.

4. CLASS – all set to 3 for Inferred.

19.4.3 Sandalwood Model Design and Extents

The block model for Sandalwood was created in Datamine using the limits and cell sizes in Table 18. The parent cell size selected was 50m x 50m x 10m, and subcells created down to 5m x 5m x 2m to model the wireframed lenses.

Table 19. Sandalwood model limits and cell sizes

	X	Y	Z
Origin	788,400	686,800	180

Maximum value	792,500	696,500	520
Extent	3,400	3,800	340
Block Size	50	50	10
Sub-block size	5m	5m	2m

19.4.4 Model Fields and Zone Coding

The fields created in the model were as follows:

5. MINZON – subdivides the model into the east and west lodes, north and south fault blocks (1, 2 for West Lode, 3, 4 for East Lode) and waste (99).

6. OXID – 1 above the BOCO surface, 3 below.

7. CLASS – all set to 3 for Inferred.

19.4.5 Sandalwood lenses with few drillholes- downwards volume and tonnage adjustment.

Significant parts of some lenses of the Sandalwood deposit have inadequate drilling for interpolation of grades but are mapped to a good level of confidence. Some sections have only one drillhole, but several major lenses of mineralised BIF have been mapped on that section. These parts of the deposit were interpreted as steeply dipping, parallel with adjacent lenses that have more drilling and consistent with drillholes further along those lenses. Grades at Sandalwood are reasonably consistent and the mapping provides a degree of confidence in the interpretation of the geometry of those lenses sufficient for an Inferred Mineral Resource.

These lenses are interpreted to depth based on few drillholes. To ensure that the interpreted BIF lenses were not overestimated in size compared with the drilled areas of the lenses, the drilled areas were flagged with wireframes projected from the surface mapping. A count was made of the samples which were BIF vs the count of samples of other rocktypes, and the ratio of the two values factored to reduce the volume estimate of the portions of lenses with little drilling. The result was that of 653 samples indicated by the projected volume below the BIF mapped outlines, 375 or 57% were BIF. The remainder included intercepts of porphyry, which form a concordant layer of the BIF lens packages.

Accordingly, tonnes for the parts of interpreted BIF lenses based on mapping were factored down by 57%.

These parts of the mineralised lenses were modelled with an additional field so as to identify them clearly, the field PARTORE being set to 1.

19.5 Grade Interpolation

19.5.1 Grade Interpolation Method

Grades at all areas were interpolated using Ordinary Kriging, with the same search envelope used for all assays but each assay with its own variogram model.

Head grades were estimated for Fe, SiO_2, Al_2O_3, LOI, S and DTR. Davis Tube concentrate grades were estimated for Fe, P, SiO_2, Al_2O_3, LOI and S.

19.5.2 Moonshine Grade Interpolation Parameters

The search parameters were based on the DTR variogram. The same ellipse was used for all assays, with radii of 300m x 100m x 100m.

A minimum number of 12 composites was used to interpolate each cell, with a maximum of 6 per drillhole. Maximum number of composites was 30 (Table 20).

Variogram models are shown in tables in the Variography section above, in Table 12, Table 13 and Table 14.

Table 20. Search Parametres for grade interpolation

Domain	Description	Strike Radius	Cross Strike Radius	Perp. to plane radius	Rotation 1 around Z	Rotation 2 around Y	Rotation 3 around X
West	All elements	300	100	100	40	90	-80
East	All elements	300	100	100	80	90	90

Domain	Factor for Pass 2	Factor for Pass 3	Min Samp	Max Samp	Max per Drill hole	Min Samp Pass 2	Max Samp Pass 2	Min Samp Pass 3	Max Samp Pass 3
West	3	12	12	30	6	8	30	8	30
East	3	12	12	30	6	8	30	8	30

19.5.3 Absent Grades

Gaps in drillhole assays were left as absent data for grade interpolation in the previous (July 2009) model. In preparing the November 2009 update it was recognised that these gaps are generally left because the magnetic susceptibility is low, so not assaying those intervals will bias the grade estimation slightly upwards. For this revision of the model the absent samples were assumed to have low DTR and a fixed suite of grades were substituted (Table 21).

Table 21. Fixed grades substituted for missing grades in ore intercepts - Moonshine.

Assay	Assigned Grade
FE	22.0
SIO2	42.5
DTR_PC	5.0
FE_C	55.0
SIO2_C	6.00

19.5.4 Top and Bottom Cut Grades

Top cuts were applied to Concentrate Fe, P, S, SiO2, Al2O3 and DTR, and to whole-rock S and Al2O3. The top cuts prevent extreme values having a disproportionate impact on the estimated block grades.

Table 22. List of top and bottom cut grades

Grade	Type of Cut	Cut value	No. of samples	No. samples cut
FE_C	Bottom cut	53.0	869	4
P_C	Top cut	0.070	869	5
S	Top cut	6.500	990	16
S_C (West lode)	Top cut	10.00	628	29
S_C (East Lode)	Top cut	1.60	241	5
SiO2_C (West Lode)	Top cut	25.0	628	5
SiO2_C (East Lode)	Top cut	28.5	241	1
Al2O3	Top cut	11.0	990	10
Al2O3_C	Top cut	1.20	869	6
DTR_PC	Top cut	60.0	966	1

In general top cuts were selected and applied if there was an extended tail on the distribution, at a point where the normal distribution shape might reasonably be projected to the histogram X axis. Minimal cuts were preferred (Figure 44, Figure 45, and Figure 46).

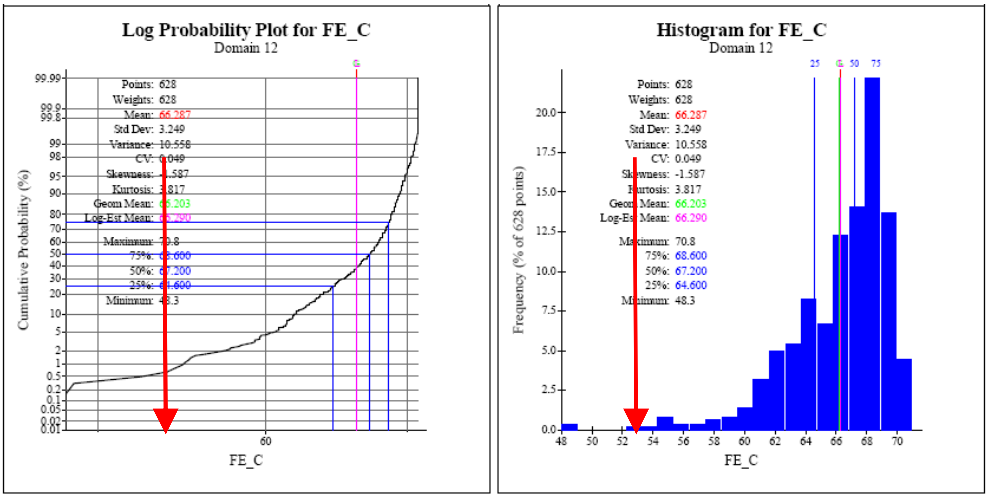

Figure 44. Cumulative frequency curve and histogram for Concentrate Fe showing top cut

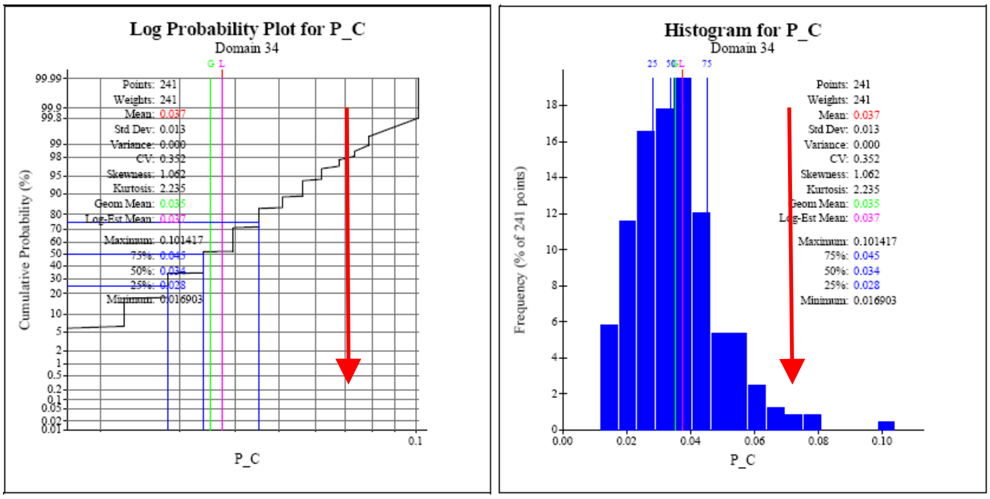

Figure 45. Cumulative frequency curve and histogram for Concentrate P showing top cut

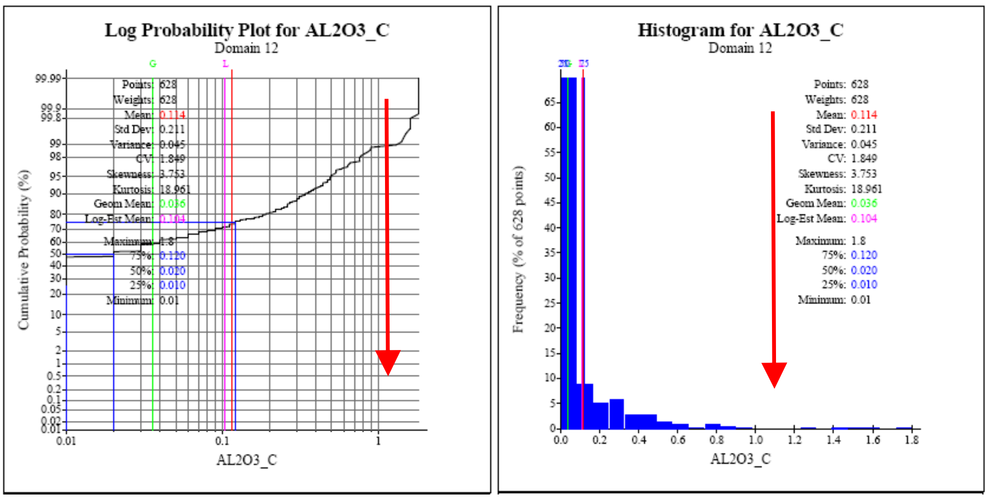

Figure 46. Cumulative frequency curve and histogram for Concentrate Al2O3 showing top cut

19.5.5 *Validation of Interpolated Grades*

The in-situ head grades and DTR concentrate grades were interpolated using Ordinary Kriging (OK) and validated by:

- comparing composite grades and model grades in sliced steps in plan and cross-section;
- by generating stepped comparisons of composites to model grades in each direction;
- by comparing mean of each zone for composite and assay data; and
- by comparing grade distributions for each of the assayed elements.

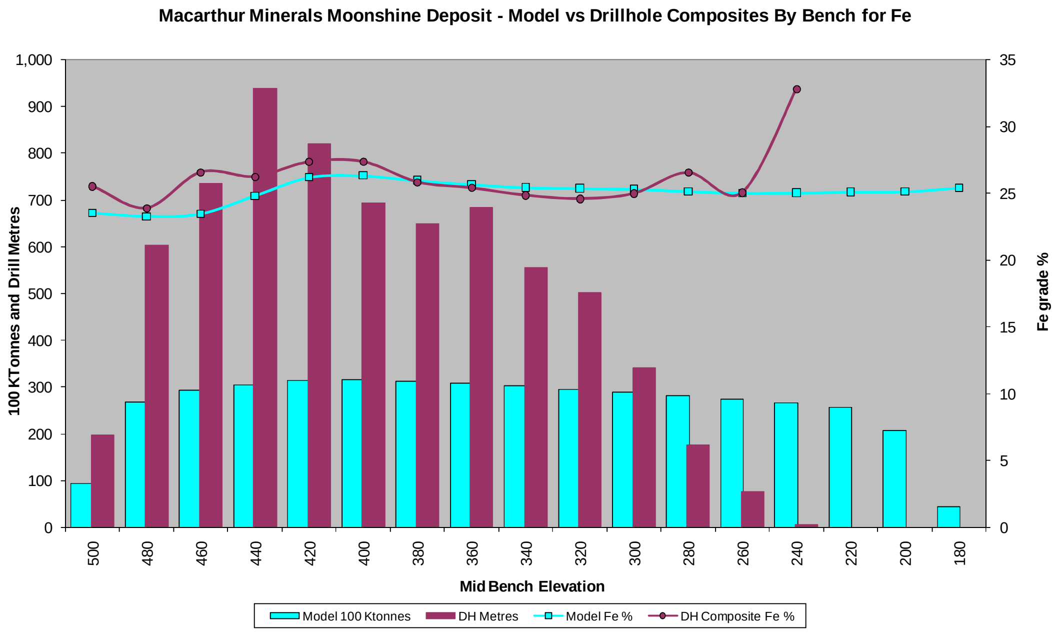

Figure 47. Validation graph of model vs drillhole composite grades for head Fe

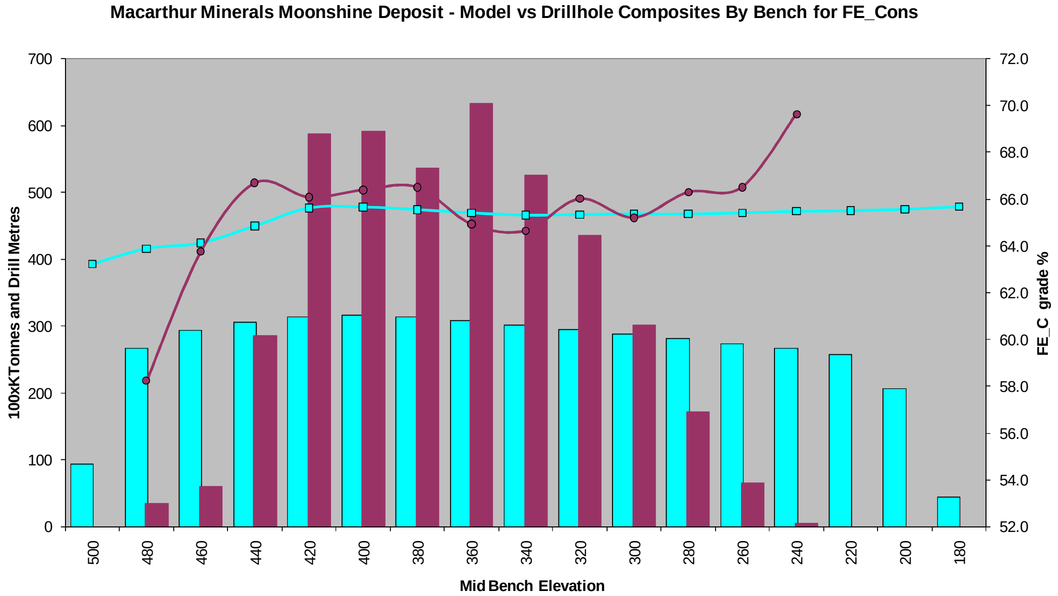

Figure 48. Validation graph of model vs drillhole composite grades for concentrate Fe

19.6 Magnetic concentrate estimated grades

The modelled concentrate grades (Table 23) are based on laboratory Davis Tube weight recovery and concentrate grades, not metallurgical test samples. They are based on analytical results only, and do not reflect economic evaluation of the deposit.

Table 23. Moonshine Davis Tube concentrate grades above 250 mRL for 15% DTR cutoff.

	DTR Wt%	Cons FE	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
West Lode	28.7	66.5	0.016	6.4	0.13	-2.30	1.33
East Lode	27.1	63.4	0.039	10.9	0.12	-2.48	0.20
Grand Total	28.3	65.7	0.022	7.6	0.12	-2.35	1.04

19.7 Sandalwood Grade Interpolation

19.7.1 Grade Interpolation Method

Grades were interpolated using Ordinary Kriging, with the same search envelope used for all assays but each assay with its own variogram model.

Head grades were estimated for Fe, SiO_2, Al_2O_3, LOI, S and DTR. Davis Tube concentrate grades were estimated for Fe, P, SiO_2, Al_2O_3, LOI and S.

19.7.2 Grade Interpolation Parameters

The search parameters were based on the DTR variogram. The same ellipse was used for all assays, with radii of 330m x 130m x 40m. A narrow search ellipse was selected to try to model variability across the mineralised lenses. Because it was so narrow, it was necessary to subdivide the lenses into three strike orientations, and rotate the search to suit each.

A minimum number of 12 composites was used to interpolate each cell in the first pass, with a maximum of 6 per drillhole. Maximum number of composites was 30 (Table 20). Numbers were reduced for the second pass so areas with only one drillhole would be modelled with variation that related to that drillhole.

Variogram models are shown in tables in the Variography section above, in Table 12, Table 13 and Table 14.

Table 24. Search Parameters for grade interpolation - Sandalwood

Domain	Description	Strike Radius	Cross Strike Radius	Perp. to plane radius	Rotation 1 around Z	Rotation 2 around Y	Rotation 3 around X
1	All elements	330	40	330	159	90	88
2	All elements	330	40	330	149	90	88
3	All elements	330	40	330	159	90	88

Domain	Factor for Pass 2	Factor for Pass 3	Min Samp	Max Samp	Max per Drill hole	Min Samp Pass 2	Max Samp Pass 2	Min Samp Pass 3	Max Samp Pass 3
1	3	12	12	30	6	8	30	8	30
2	3	12	12	30	6	8	30	8	30
3	3	12	12	30	6	8	30	8	30

19.7.3 Absent Grades

Gaps in drillhole assays were left as absent data for grade interpolation at Sandalwood. This was later recognised as likely to produce a slight upward bias and substitute values used for the Moonshine upgrade.

19.7.4 Top and Bottom Cut Grades

Top cuts were applied to Concentrate Fe, S and SiO2, and to whole-rock Al2O3. The top cuts prevent extreme values having a disproportionate impact on the estimated block grades.

Table 25. List of top and bottom cut grades, Sandalwood

Grade	Type of Cut	Cut value	No. of samples	No. samples cut
FE_C	Bottom cut	48.0	332	1
S_C	Top cut	1.30	332	16
SiO2_C	Top cut	25.0	332	5
Al2O3	Top cut	11.0	430	13
DTR_PC	Top cut	None	422	0

In general top cuts would be selected and applied if there was an extended tail on the distribution, at a point where the distribution shape might reasonably be projected to the histogram X axis. Minimal cuts were preferred (Figure 45, and Figure 46). The Sandalwood data did not have long tails or high outliers for most grades and only a few top cuts were applied.

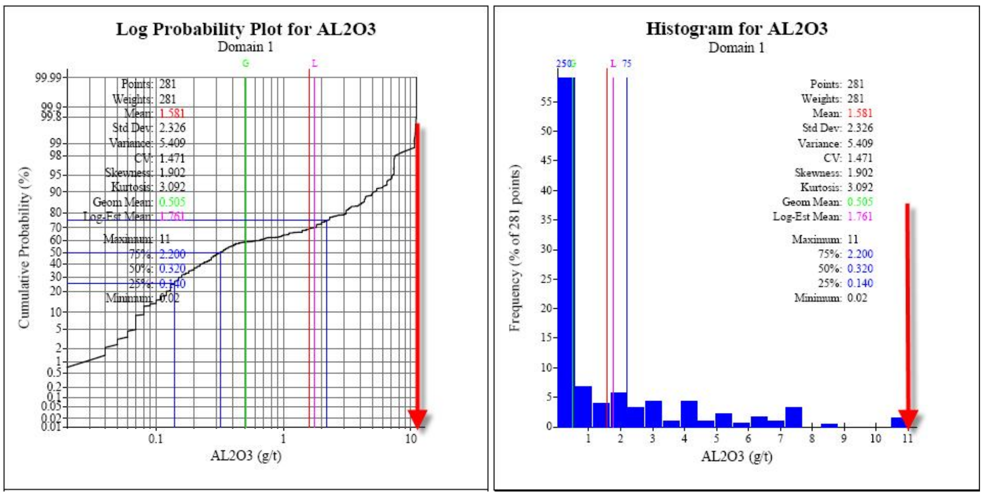

Figure 49. Cumulative frequency curve and histogram for Head AL2O3 showing top cut

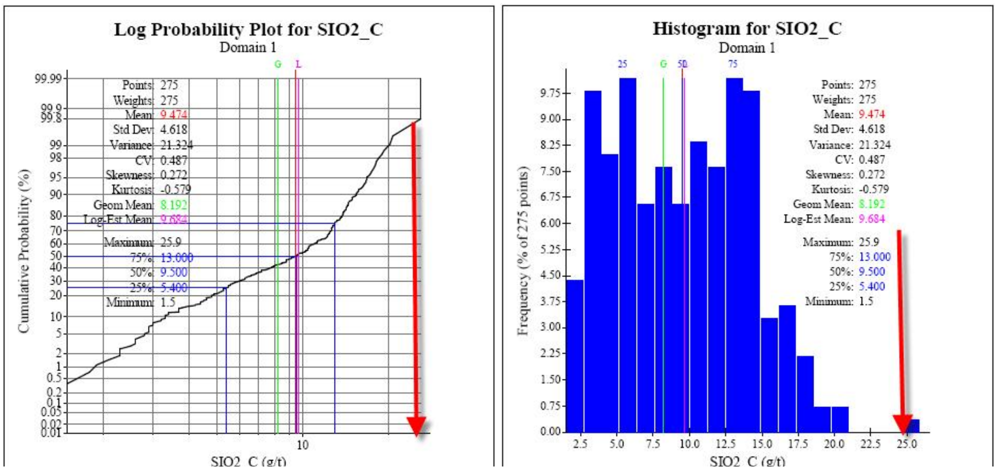

Figure 50. Cumulative frequency curve and histogram for Concentrate SiO2 showing top cut

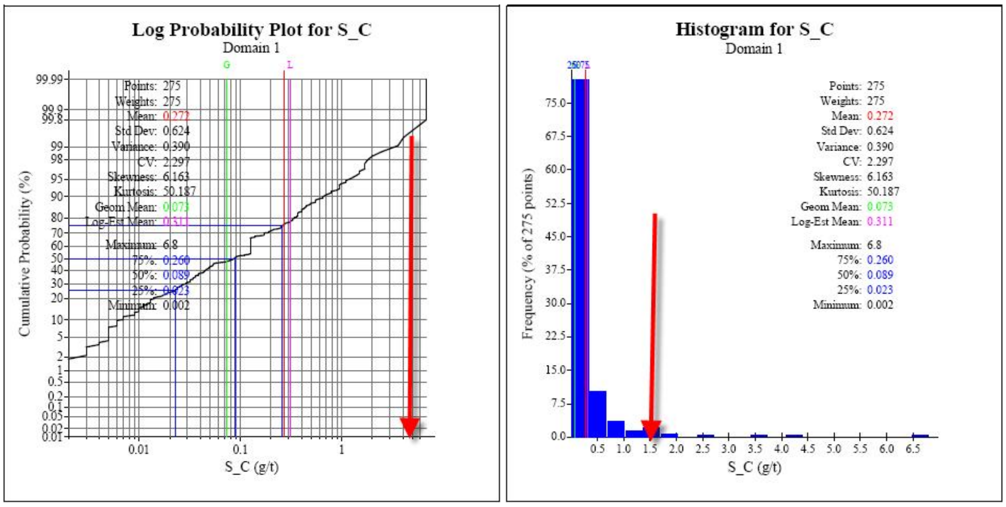

Figure 51. Cumulative frequency curve and histogram for Concentrate Al2O3 showing top cut

19.7.5 Validation of Interpolated Grades

The in-situ head grades and DTR concentrate grades were interpolated using Ordinary Kriging (OK) and validated by:

- comparing composite grades and model grades in sliced steps in plan and cross-section;
- by generating stepped comparisons of composites to model grades in each direction;
- by comparing mean of each zone for composite and assay data; and
- by comparing grade distributions for each of the assayed elements.

19.7.6 Areas of insufficient drilling for grade interpolation

The extremely thin drilling over the deposit means that grade estimates in many areas are poorly supported.

A first interpolation run was completed with a wide cross-strike search to allow the maximum number of cells to be interpolated. Validation stepping through the cross-sections demonstrated the grades were excessively smoothed and that high grades from the deep end of holes were being overused to estimate grade in lenses with minimal drilling.

To overcome this, the interpolation search radius was reduced to 40 metres, which meant that the drillhole variation was modelled better across the lenses around drillholes. Areas of lenses without drillholes were instead assigned the fixed mean grades of the BIF below BOX (Table 26).

Because the BIF is relatively uniform as shown by the grade distributions we can be reasonably confident in the overall grade estimate.

Significant parts of some lenses of the Sandalwood deposit have inadequate drilling for interpolation of grades. Some sections have only one drillhole, but several major lenses of mineralised BIF have been mapped crossing that section. Grades were assigned to these lenses based on the mean grades for the drill samples in Sandalwood below BOX (Table 26).

Table 26. Sandalwood fixed grades applied to BIF where drilling is not sufficient to interpolate.

Assay	Assigned Grade
FE	31.1
SIO2	48.2
AL2O3	1.48
LOI	0.64
S	0.16
DTR_PC	32.8
FE_C	65.0
P_C	0.032
SIO2_C	9.13
AL2O3_C	0.07
LOI_C	-2.80
S_C	0.222

These areas were flagged in the model with a field value FIXED=1 to make it clear which lenses and cells are involved.

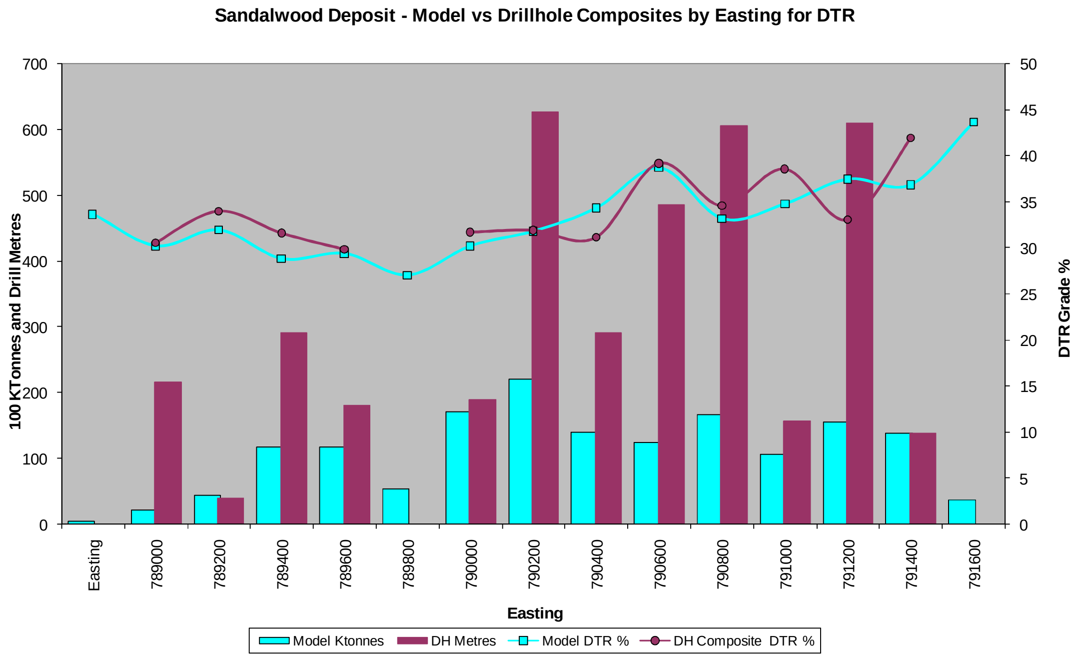

Figure 52. Validation graph of model vs drillhole composite grades for Davis Tube Recovery

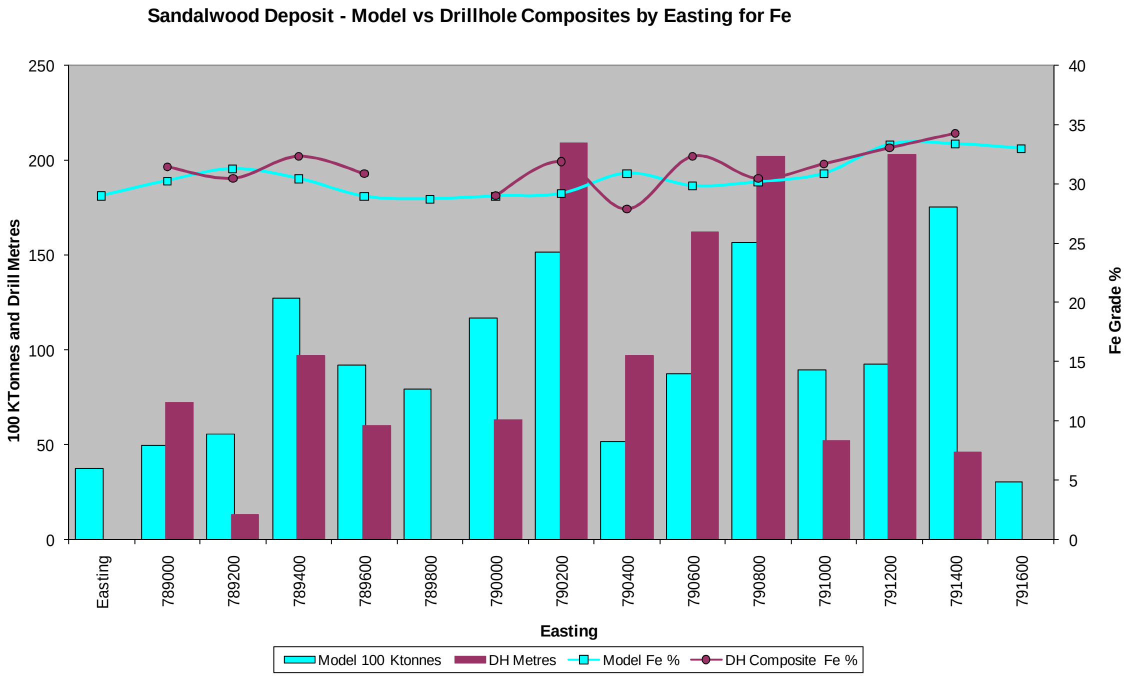

Figure 53. Validation graph of model vs drillhole composite grades for head Fe

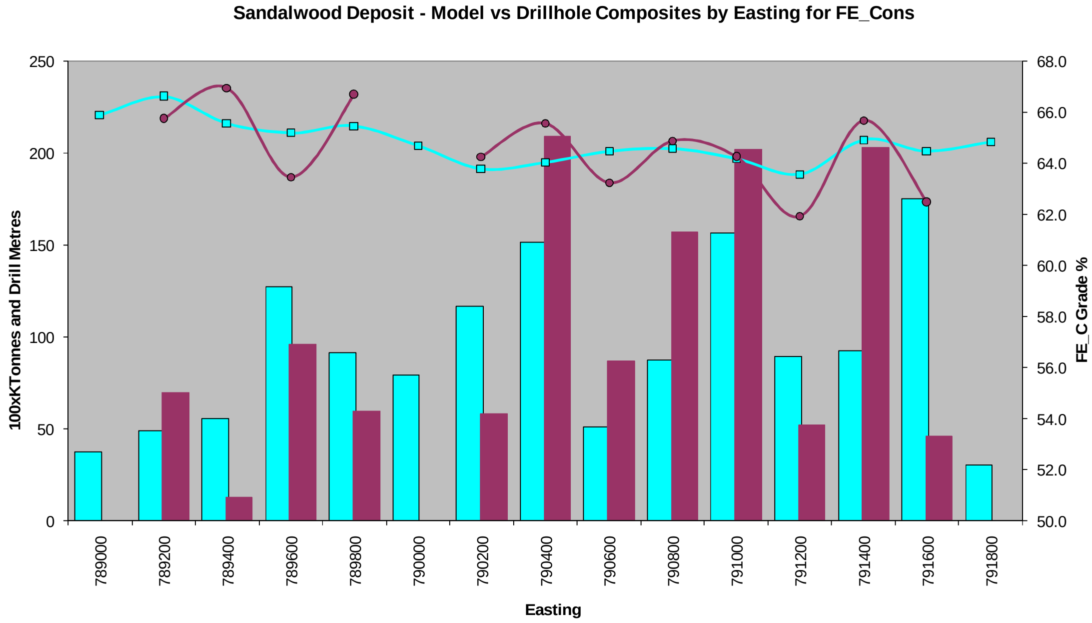

Figure 54. Validation graph of model vs drillhole composite grades for concentrate Fe

19.8 Mineral Resource Estimates for Lake Giles Deposits

19.8.1 Mineral Resource Estimate for Moonshine

Resource Classification	Million Tonnes	DTR %	Feed FE	Feed P	Feed SiO2	Feed Al2O3	Feed LOI	Feed S
Inferred	510	25.4	27.5	0.046	51.08	1.34	1.08	-

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Table 28).

These figures are for BIF below the base of complete oxidation (BOCO) down to the 250 m RL approximately 240m below surface, and where within 0.6 times the search radius of drillholes above the 200 mRL. A cutoff of 15% Davis Tube Recovery (DTR) was applied.

Table 27. Summary of Moonshine In-situ tonnes and grades

Resource Classification	Million Tonnes	DTR %	Feed FE	Feed P	Feed SiO2	Feed Al2O3	Feed LOI	Feed S
Inferred	510	25.4	27.5	0.046	51.08	1.34	1.08	-

Table 28. Summary of Moonshine Davis Tube concentrate grades

Resource Classification	Million Tonnes	DTR %	Cons FE	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
Inferred	510	25.4	66.0	0.018	6.17	0.10	-2.50	0.442

19.8.2 Resource tables by Depth and Unit

Resource tables by Lode at Moonshine and Moonshine North are shown in Table 29 and Table 30and for grade-tonnage data by DTR% cutoff in Table 31 and Table 32.

Table 29. Moonshine In-situ tonnes and grades by Lode

Lode	Million Tonnes	DTR %	Feed FE	Feed P	Feed SiO2	Feed Al2O3	Feed LOI	Feed S
West Lode	301	27.4	26.3	0.039	52.66	1.47	1.27	-
East Lode	209	22.7	29.1	0.055	49.01	1.17	0.82	-
Total Inferred	510	25.4	27.5	0.046	51.08	1.34	1.08	-

Table 30. Moonshine Concentrate tonnes and grades by Lode

Lode	Million Tonnes	DTR %	Cons FE	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
West Lode	301	27.4	66.0	0.013	5.88	0.12	-2.36	0.485
East Lode	209	22.7	65.9	0.027	6.63	0.08	-2.73	0.375
Total Inferred	510	25.4	66.0	0.018	6.17	0.10	-2.50	0.442

Table 31. Grade-tonnage data for feed grades

Cutoff DTR%	Million Tonnes	DTR %	Feed FE	Feed P	Feed SiO2	Feed Al2O3	Feed LOI	Feed S
0	581.1	23.8	26.5	0.044	52.17	1.40	1.19	-
10	564.2	24.2	26.7	0.045	51.96	1.37	1.16	-
12	547.6	24.6	26.9	0.045	51.76	1.35	1.13	-
14	523.9	25.1	27.3	0.046	51.32	1.35	1.09	-
15	510.0	25.4	27.5	0.046	51.08	1.34	1.08	-
16	495.3	25.6	27.7	0.046	50.86	1.34	1.06	-
18	465.3	26.2	28.1	0.047	50.52	1.31	1.02	-
20	419.8	26.9	28.5	0.047	50.16	1.26	0.98	-
22	314.7	29.0	28.5	0.045	50.10	1.35	1.03	-

Table 32. Grade-tonnage data for DTR concentrate grades

Cutoff DTR%	Million Tonnes	DTR %	Cons FE	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
0	581.1	23.8	65.2	0.018	6.69	0.11	-2.42	0.463
10	564.2	24.2	65.2	0.018	6.67	0.11	-2.43	0.459
12	547.6	24.6	65.3	0.018	6.65	0.11	-2.43	0.454
14	523.9	25.1	65.4	0.018	6.62	0.11	-2.44	0.446
15	510.0	25.4	65.4	0.018	6.59	0.11	-2.44	0.441
16	495.3	25.6	65.5	0.018	6.57	0.11	-2.44	0.435
18	465.3	26.2	65.6	0.018	6.52	0.11	-2.45	0.426
20	419.8	26.9	65.8	0.018	6.44	0.10	-2.47	0.417
22	314.7	29.0	66.1	0.017	6.30	0.10	-2.50	0.408

19.8.3 Mineral Resource Estimate for Clark Hill North

The Mineral Resource for Clark Hill North is shown in Table 33 and Table 34.

Table 33. Summary of Clark Hill North In-situ tonnes and grades above 250 mRL

Resource Classification	Million Tonnes	DTR %	Feed FE	Feed P	Feed SiO2	Feed Al2O3	Feed LOI	Feed S
Inferred	130	33.2	25.8	0.040	42.58	1.74	0.14	-

Table 34. Summary of Clark Hill North Davis Tube concentrate grades above 250 mRL

Resource Classification	Million Tonnes	DTR %	Cons FE	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
Inferred	130	33.2	62.1	0.040	12.46	0.16	-2.58	0.230

19.8.4 *Mineral Resource Estimate for Sandalwood*

The Mineral Resource at Sandalwood is estimated at 335 Mtonnes of potential magnetite benficiation feed at 31.1% Fe, with a mass recovery of 33.1%. Davis Tube concentrate grades are 64.6% Fe, 9.63% SiO2, 0.031% P and 0.196%S (Table 35, Table 36).

These figures are for BIF below the base of complete oxidation (BOCO) down to the 250 m RL approximately 240m below surface, or where drilling extends deeper to 0.6 x the search radius below the drillhole. A cutoff of 15% Davis Tube Recovery (DTR) was applied.

Table 35. Summary of Sandalwood Inferred Mineral Resource in-situ tonnes and grades

	Million Tonnes	DTR %	Feed FE	Feed P	Feed SiO2	Feed Al2O3	Feed LOI	Feed S
Total Inferred	335	33.1	31.1		48.4	1.47	-0.60	0.084

Table 36. Summary of Sandalwood Davis Tube concentrate grades above 250 mRL

	Million Tonnes	DTR %	Cons FE	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
Total Inferred	335	33.1	64.6	0.031	9.63	0.07	-2.77	0.196

The Sandalwood deposit has been well defined with contact mapping and structure but drilled only partially, as discussed in Section 19.7.6. The Inferred Mineral Resource includes slightly over 50% of its tonnes in lenses that are defined for a substantial part of their length by mapping (Table 37,Table 38).

Table 37. Sandalwood Inferred Resource by Level of Information - in-situ tonnes and grades

Resource Data	Million Tonnes	DTR %	Feed FE	Feed P	Feed SiO2	Feed Al2O3	Feed LOI	Feed S
Mapped and Drilled lenses	161	33.4	31.1		48.6	1.45	-0.55	-
Mapped Lenses	174	32.8	31.1		48.2	1.48	-0.64	0.162
Total Inferred	335	33.1	31.1		48.4	1.47	-0.60	0.084

Table 38. Sandalwood Inferred Resource by Level of Information – DTR Concentrate grades

Resource Data	Million Tonnes	DTR %	Cons FE	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
Mapped and Drilled	161	33.4	64.3	0.031	10.16	0.06	-2.74	0.169
Mapped Lenses	174	32.8	65.0	0.032	9.13	0.07	-2.80	0.222
Total Inferred	335	33.1	64.6	0.031	9.63	0.07	-2.77	0.196

The sparse drilling does not allow modelling to represent the grade variation in the deposit very well. DTR grade-tonnage data was generated for the Sandalwood deposit, but the relatively consistent drilling grades and the sparse drilling resulted in an excessively uniform model of the deposit. The relatively few cells at low DTR grades, are shown as overly consistent grade and tonnage over a wide range of cutoffs (Table 39,Table 40).

Table 39. Grade-tonnage results – Feed grades

Cutoff DTR%	Million Tonnes	DTR %	Feed FE	Feed P	Feed SiO2	Feed Al2O3	Feed LOI	Feed S
0	335.3	33.1	31.1		48.4	1.47	-0.60	0.084
15	335.3	33.1	31.1		48.4	1.47	-0.60	0.084
20	332.8	33.2	31.1		48.4	1.47	-0.60	0.085
25	323.9	33.5	31.1		48.4	1.47	-0.66	0.087

Table 40. Grade-tonnage results – Davis Tube Concentrate grades

Cutoff DTR%	Million Tonnes	DTR %	Cons FE	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
0	335.3	33.1	64.6	0.031	9.63	0.07	-2.77	0.196
15	335.3	33.1	64.6	0.031	9.63	0.07	-2.77	0.196
20	332.8	33.2	64.6	0.031	9.64	0.07	-2.77	0.195
25	323.9	33.5	64.6	0.031	9.64	0.07	-2.79	0.195

Table 41. Tonnage by Bench RL results – Feed grades

	Million Tonnes	DTR %	Feed FE	Feed P	Feed SiO2	Feed Al2O3	Feed LOI	Feed S
210	1.1	33.1	31.1		48.2	1.54	-0.65	0.152
220	7.0	34.2	31.6		48.0	1.33	-0.73	0.125
230	13.2	34.8	31.8		48.0	1.20	-0.79	0.110
240	21.5	34.3	31.7		48.0	1.26	-0.77	0.112
250	31.5	33.8	31.5		48.1	1.35	-0.76	0.107
260	38.7	33.6	31.3		48.2	1.41	-0.73	0.104
270	43.3	33.5	31.3		48.3	1.43	-0.72	0.101
280	48.0	33.4	31.2		48.3	1.44	-0.72	0.097
290	54.1	33.4	31.2		48.4	1.46	-0.71	0.092
300	62.6	33.2	31.1		48.4	1.49	-0.68	0.087
310	69.6	33.2	31.0		48.5	1.50	-0.67	0.083
320	75.2	33.2	31.1		48.5	1.48	-0.65	0.080
330	79.5	33.1	31.0		48.5	1.48	-0.62	0.079
340	82.6	33.1	31.0		48.4	1.49	-0.61	0.078
350	85.5	33.1	31.1		48.4	1.49	-0.59	0.077
360	89.6	33.1	31.1		48.4	1.47	-0.57	0.078
370	92.3	33.0	31.1		48.4	1.47	-0.57	0.079
380	93.2	33.0	31.1		48.4	1.47	-0.57	0.079
390	91.7	33.0	31.0		48.4	1.49	-0.56	0.079
400	90.0	33.0	31.0		48.4	1.52	-0.53	0.078
410	83.7	33.1	31.1		48.4	1.49	-0.50	0.080
420	52.0	33.5	31.2		48.3	1.42	-0.52	0.094
430	19.7	33.5	31.0		48.2	1.43	-0.52	0.106
440	1.1	33.1	30.9		48.3	1.52	-0.54	0.133

Table 42. Tonnage by Bench RL results – Davis Tube concentrate grades

Bench 10mRL	Million Tonnes	DTR %	Cons FE	Cons P	Cons SiO2	Cons Al2O3	Cons LOI	Cons S
210	1.1	33.1	65.0	0.0	9.19	0.07	-2.81	0.220
220	7.0	34.2	64.7	0.0	9.57	0.06	-2.78	0.244
230	13.2	34.8	64.7	0.0	9.65	0.06	-2.79	0.252
240	21.5	34.3	64.7	0.0	9.59	0.06	-2.80	0.238
250	31.5	33.8	64.8	0.0	9.43	0.06	-2.81	0.232
260	38.7	33.6	64.7	0.0	9.49	0.07	-2.80	0.222
270	43.3	33.5	64.7	0.0	9.47	0.07	-2.80	0.218
280	48.0	33.4	64.7	0.0	9.49	0.07	-2.80	0.215
290	54.1	33.4	64.7	0.0	9.49	0.07	-2.80	0.210
300	62.6	33.2	64.8	0.0	9.50	0.07	-2.79	0.203
310	69.6	33.2	64.7	0.0	9.56	0.07	-2.79	0.199
320	75.2	33.2	64.7	0.0	9.59	0.07	-2.78	0.198
330	79.5	33.1	64.7	0.0	9.60	0.07	-2.77	0.195
340	82.6	33.1	64.6	0.0	9.66	0.07	-2.77	0.193
350	85.5	33.1	64.6	0.0	9.68	0.07	-2.77	0.192
360	89.6	33.1	64.6	0.0	9.67	0.07	-2.77	0.190
370	92.3	33.0	64.6	0.0	9.67	0.07	-2.77	0.189
380	93.2	33.0	64.6	0.0	9.66	0.07	-2.77	0.186
390	91.7	33.0	64.6	0.0	9.67	0.07	-2.77	0.182
400	90.0	33.0	64.6	0.0	9.72	0.07	-2.77	0.180
410	83.7	33.1	64.5	0.0	9.76	0.07	-2.76	0.180
420	52.0	33.5	64.4	0.0	9.94	0.06	-2.73	0.181
430	19.7	33.5	64.4	0.0	9.87	0.06	-2.75	0.173
440	1.1	33.1	64.4	0.0	9.81	0.08	-2.74	0.191

19.8.5 Resource Classification - Moonshine

The Moonshine Mineral Resource estimate is classified as an Inferred Mineral Resource under the JORC (2004) standard. The data on which the resource is based is sufficient to estimate the Mineral Resource as an Inferred Mineral Resource.

19.8.6 Resource Classification - Sandalwood

Slightly over 50% of the Sandalwood Mineral Resource is modelled primarily on the detailed contact mapping and structural interpretation, confirmed by drilling along strike in the same lens or drilling that transects adjacent lenses. These lenses consist of relatively uniform mineralised BIF lithology. This is shown by

1) drill sample assays over the length of the deposit, and

2) consistent steeply-dipping structure as confirmed by mapping, drill logging and section interpretation by Macarthur and CSA geologists.

The tonnage attributed to these lenses has been factored down to 57% of volume to allow for narrowing of the BIF units and the presence of concordant porphyry lenses.

The Sandalwood deposit has sufficient information to estimate a Mineral Resource and allow it to be categorised as an Inferred Mineral Resource under the JORC (2004) standard with the relatively minimal drilling information available.

19.8.7 Resource Classification - Recommendations

To bring the Mineral Resource estimate to an Indicated standard, CSA recommend

- Additional drilling to transect the BIF horizons at a section spacing of 200m or less, in two intercepts covering the full width of the BIF, completely below the BOCO. Additional drillholes should also confirm the depth extension of the mineralised lithology, with some intercepts at and below the present depth of 250mRL.
- Density work on samples from Moonshine, Sandalwood and other deposits, downhole density logging and cross-checking with core and/or pycnometer densities.
- All drilling should have a well-designed QAQC program which should include:
    - Field duplicates taken at rate of one in twenty samples
    - Certified reference material should be submitted with all samples at a rate of one in twenty samples;
    - Blank samples should be inserted in areas of high grade mineralisation at a rate of one in 50 samples; and
    - A series of umpire assays should be submitted to alternate lab after analysis at the primary lab at a rate of one in twenty samples.

19.9 Mineral Resource estimate for Lake Giles Project area

19.9.1 Mineral Resource Estimate

The combined estimate for the Lake Giles project Inferred Mineral Resource is increased by the revised Moonshine and Sandalwood estimates to now total 1,050 Mtonnes of potential magnetite beneficiation feed at an Fe head grade of 28.3% and a DTR of 28.6% (Table 43).

19.9.2 Davis Tube Concentrate grades

The concentrate grades estimated are based on laboratory Davis Tube recovery concentrate values only, and do not reflect an economic assessment of alternative mineral processing options. Given that these concentrate grades show relatively high SiO_2 grades CSA consider that they should be presented to qualify the Mineral Resource estimates shown. The Davis Tube concentrate recovery and grades for each deposit with an Inferred Mineral Resource estimate are shown in Table 43.

The Concentrate Mtonnes shown in Table 43 is shown only for comparison with announced results at this and other projects, and reflects only the Davis Tube Recovery results times the estimated Mineral Resource tonnes. It does not take into account an optimised mine design or a mineral processing sequence designed for this material.

Table 43. Estimated Mineral Resource tonnes, Fe grades and concentrate grades for Lake Giles project.

Domain	Feed Mtonnes	Head Fe %	DTR %	Concentrate Mtonnes	Cons Fe %	Cons P %	Cons SiO2 %	Cons Al2O3 %	Cons LOI %	Cons S %
Snark	26.3	27.5	22.5	5.92	64.3	0.027	9.60	0.15	-2.50	0.270
Clark Hill North	130.0	25.8	33.2	43.16	62.1	0.040	12.50	0.16	-2.58	0.230
Sandlewood	335.0	31.1	33.1	110.885	64.0	0.031	9.64	0.07	-2.77	0.160
Moonshine	510.9	27.8	25.5	130.3	65.7	0.017	6.00	0.09	-2.50	0.442
Clark Hill South	48.5	21.9	20.8	10.1	61.8	0.020	10.70	0.18	-2.20	0.220
TOTAL	1050.7	28.3	28.6	300	64.5	0.025	8.27	0.10	-2.58	0.311

Item 20 Other Relevant Data and Information

20.1.1 General

This section is not applicable to the current report.

Item 21 Interpretation and Conclusions

The technical systems adopted by Macarthur at the Project prior to the Phase 7 drilling program could have been improved, however Macarthur Minerals Limited have made considerable effort to remediate this by using better procedures in Phase 7 and future programs. The following list includes suggestions that should be adopted in all future programs:

- Better drillhole target planning to penetrate the mineralisation perpendicular to dip and strike to enable true widths to be established unambiguously;
- More holes need to penetrate the entire width of mineralisation to better delineate the mineralisation model;
- All RC samples need to be collected by riffle splitter or cone splitter;
- Provision of QAQC field repeat assays from duplicate samples and recomposited field samples.
- Improved data entry, storage and validation systems.

With respect to Mineral Resources estimated at the Lake Giles Project, CSA has concluded that the geological interpretation for geology, weathering and mineralisation domains at Moonshine are adequate for the estimation of Inferred Mineral Resources.

Item 22 Recommendations

The following work programmes are recommended or are in progress for the Lake Giles Project.,

22.1 Existing Program of Works

Macarthur Minerals have the following work in progress or planned for the near future:

Macarthur plan to continue exploration drilling in the Lake Giles area, with an initial focus on holes aimed at improving geological understanding in the Moonshine area (pers. comm. Mr Andrew Spinks, Consulting Geologist to Macarthur).

Macarthur are close to the completion of a programme of 6,500 metres of RC drilling at the time of writing this technical report. Most of this drilling has been planned to target Moonshine mineralisation, and some areas along strike to north and south of Moonshine.

In addition, Macarthur have initiated a program of downhole logging for survey, density, caliper and gamma logs.

Table 44 details the estimated costs of the proposed drilling programs as provided by Macarthur. Unit cost estimates in this table are based on Macarthur's experience of drilling to date at Lake Giles.

Table 44. Estimated costs of proposed drilling

Item	Estimate
Amount of Drilling (metres)	6,500
Drilling Cost ($AUD/m)	$200.00
Site preparation and access ($AUD/m)	$16.00
Personnel costs ($AUD/m)	$40.00
Field consumables ($AUD/m)	$12.00
Assaying costs ($AUD/m)	$30.00
Total	$1,937,000

22.2 Sample Collection for Quality Management

CSA recommend that in future the drill program should have industry standard QAQC data collection added to the normal procedures. This is essential for raising the Mineral Resource category to Indicated or Inferred. This will require at minimum:

- Collection of field duplicate samples at regular intervals, for instance one in twenty samples. Given that DTR assays are carried out on composites of five one-metre samples, repeat composites would be appropriate field duplicates. Alternatively, sets of five re-split one-metre samples could be submitted to the laboratory.

- Submission of suitable Certified Reference Material (CRM) samples at regular intervals.
- Submission of blank samples; and
- Undertake a routine program of umpire assays.

22.3 Additional Drillholes for Indicated Mineral Resource

In planning to reach Indicated Mineral Resource status additional drillholes should be planned that:

- Check on existing interpretation
- Provide at least two holes on each 200m spaced section that transect the entire BIF zone below the base of oxidation.
- Provide at least two deep holes (350-400 m below surface) to confirm the interpretation to a minimum depth extent.
- Core drillholes to provide density data and preliminary metallurgical processing samples.

22.4 Improvements to modelling

Density measurements should be improved by:

- taking pycnometer values at Moonshine;
- Drilling diamond core at Moonshine and taking core densities;
- Downhole geophysical density logging.

The next revision of the model should include DTR grade modelling of the oxide or transition zone, with a view to obtaining treatable tonnes earlier in possible future mine development.

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Item 24 Date and Signature Page

The following people are responsible for supervising and/or preparing this report:

24.1 Certificates

CSA Global Pty Ltd

I, Chris Allen, of City Beach, Western Australia, Australia, do hereby certify that:

I am a Senior Consultant of CSA Global Pty Ltd, 47 Burswood Road, Burswood 6100, Western Australia, Australia.

This certificate applies to the technical report entitled "NI43-101 Technical Report on Lake Giles Iron Ore Project, Western Australia" dated 17th December 2009 prepared for Macarthur Minerals Limited (the "Technical Report").

I hold a BA (Honours) in Geology from the University of Western Australia, graduated in 1987. I have worked as a geologist for 13 years, 10 of those years being in iron ore including magnetite deposits. I am a full member of the Australian Institute of Geoscientists.

I have read the definition of "qualified person" set out in National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("**NI 43-101**") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I am a "qualified person" for the purposes of NI 43-101.

I have visited the Lake Giles project from 28th to 30th of July 2009.

I have authored and take overall responsibility for this report and for Items 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20, 21, 22 and 23.

I am independent (as defined by Section 1.4 of NI 43-101) of Macarthur Minerals Limited.

I have not had prior involvement with the property that is the subject of the Technical Report.

I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance with that instrument and form.

As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 21st day of August, 2009 at Perth, Western Australia, Australia.

Chris Allen
Senior Geological Consultant

CSA Global Pty Ltd

Item 25 Additional Requirements for Technical Reports on Development Properties

This section is not applicable to the current report.