MINE EARTH

The mine closure specialists

ATLAS

MIRALGA CREEK PROJECT MINE WASTE CHARACTERISATION ASSESSMENT

JANUARY 2020

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EXECUTIVE SUMMARY

Mine Earth was commissioned by Atlas Iron to assess the geochemical and physical characteristics of mine waste expected to be produced from the Miralga East, Miralga West and Sandtrax deposits at the Miralga Creek Project (the Project) and to develop associate mine waste management recommendations.

Assay information across all Project deposits is both comprehensive and spatially representative for all rock types. The key mine waste lithology types expected to be produced from the open pits are banded iron formation (BIF), chert, shale and sandstone.

The outcomes of the Phase 0, Phase 1 and Phase 2 geochemical assessments showed that:

- All mine waste types within the planned pit shells and within a 10 m buffer outside of the pit shells, were classified as non-acid-forming (NAF).
- No significant enrichment in any element was identified from multi-element and water extraction testwork. All mine waste types from all deposits should release negligible metals / metalloids during weathering

An assessment of the physical characteristics and erosion stability of mine waste from the Project showed that:

- BIFs, cherts and sandstones will be the dominant waste rock lithology types from each deposit (>95%) and these are likely to display moderate-high erosion stability.
- Shales will only represent a minor proportion (2.1%) of the total waste rock volume from Miralga West pit and are likely to display low erosion stability.

Based on the results presented in this report, Mine Earth make the following recommendations for mine waste management:

- All waste rock types (BIF, chert, shale and sandstone) from the pit shells of all Project deposits have been classified as NAF and geochemically benign and will not require management from a geochemical perspective.
- BIF will comprise the bulk (83% - 100%) of the waste rock volume to be mined from all Project deposits. BIF, chert and sandstone will likely demonstrate moderate-high erosion stability on final landform slopes and should provide useful sources of durable rock armour.
- Shale will likely demonstrate low erosion stability and is not suitable for placement on final landform surfaces.

This assessment was conducted from pre-mining drill data. The geochemical and physical properties of waste rock from the Project should be verified during mining and associated management recommendations should be revised accordingly.

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1 INTRODUCTION

Mine Earth was commissioned by Atlas Iron Pty Ltd (Atlas Iron) to assess the physical and geochemical characteristics of mine waste expected to be produced from the Miralga East, Miralga West and Sandtrax deposits at the Miralga Creek Project (the Project). Mine Earth worked closely with Dr Graeme Campbell (Graeme Campbell and Associates [GCA]) on the current assessment, with regards to the design of the geochemical testwork programmes, the interpretation of the results and as a peer reviewer for the geochemical findings within.

The objectives were to:

- Obtain representative samples from a selection of drillholes for analysis.
- Conduct a desktop assessment of the geological database to provide context for the analysis.
- Conduct and review Phase 1 (screening) and Phase 2 (detailed) laboratory analysis to identify potentially problematic mine waste materials from both geochemical and physical perspectives.
- Provide management recommendations for all mine waste materials based on the assessment results.

This report is divided into sections: background information, methods, results and recommendations.

2 BACKGROUND

The Miralga Creek project is a proposed greenfields project that is located approximately 40 km northwest of Marble Bar in the East Pilbara region of Western Australia (Figure 1). The Project will consist of five open pit mines (Miralga East 1, 2 and 3, Miralga West and Sandtrax), associated rock landforms and supporting infrastructure.

Background information relating to geology and climate is presented in this section. No previous waste characterisation has been conducted for the Project.

2.1 Geology

2.1.1 Regional Geology

The Project is located on the northern margin of the Panorama Greenstone Belt, within the East Pilbara Terrane of Western Australia. The Cleaverville Formation (within the Gorge Creek Group) hosts the Miralga deposits and consists of packages of banded iron formation (BIF), chert, shale and sandstone (Atlas Iron, 2014).

The Paddy Market Formation (within the Soanesville Group (Geoscience Australia, 2019); previously within the Gorge Creek Group (Atlas Iron, 2012)) regionally correlates with the Cleaverville Formation and hosts the Sandtrax deposit. A sequence of BIF units dominates the Paddy Market Formation at the Project (Atlas Iron, 2012).

2.1.2 Local Geology

Mineralisation at the Miralga deposits consists of predominantly goethite (with lesser hematite) enrichment and is comprised of a hydrated zone from surface to approximately 10 m depth. Primary mineralisation underlies the hydrated zone and conforms with the bedding orientation to depths of up to 100 m (Atlas Iron, 2014).

Mineralisation at the Sandtrax deposit consists of predominantly goethite (with lesser hematite) enrichment and is comprised of a low-grade hydrated zone that dips steeply to a depth of 30-50 m (Atlas Iron, 2012).

The common lithology types that are observed within the Project pits shells includes banded iron formation (BIF), chert, sandstone and shale. As moderate-high weathering extends to the base of all pits, primary / fresh rock is not expected to be encountered.

2.2 Climate

The Project area experiences an arid tropical climate with predominantly summer rainfall and cyclonic events (Atlas Iron, 2017). The Bureau of Meteorology (BoM) data for Marble Bar (the closest station to the Project) describes a mean daily minimum temperature range of 12-26°C and a mean daily maximum temperature range of 27-42°C.

The long-term average annual rainfall for Marble Bar is approximately 394 mm, although substantial variation occurs between years. Mean monthly rainfall typically peaks during the summer months and is lowest in spring. Average annual evaporation is approximately 4,100 mm (BoM, 2019).

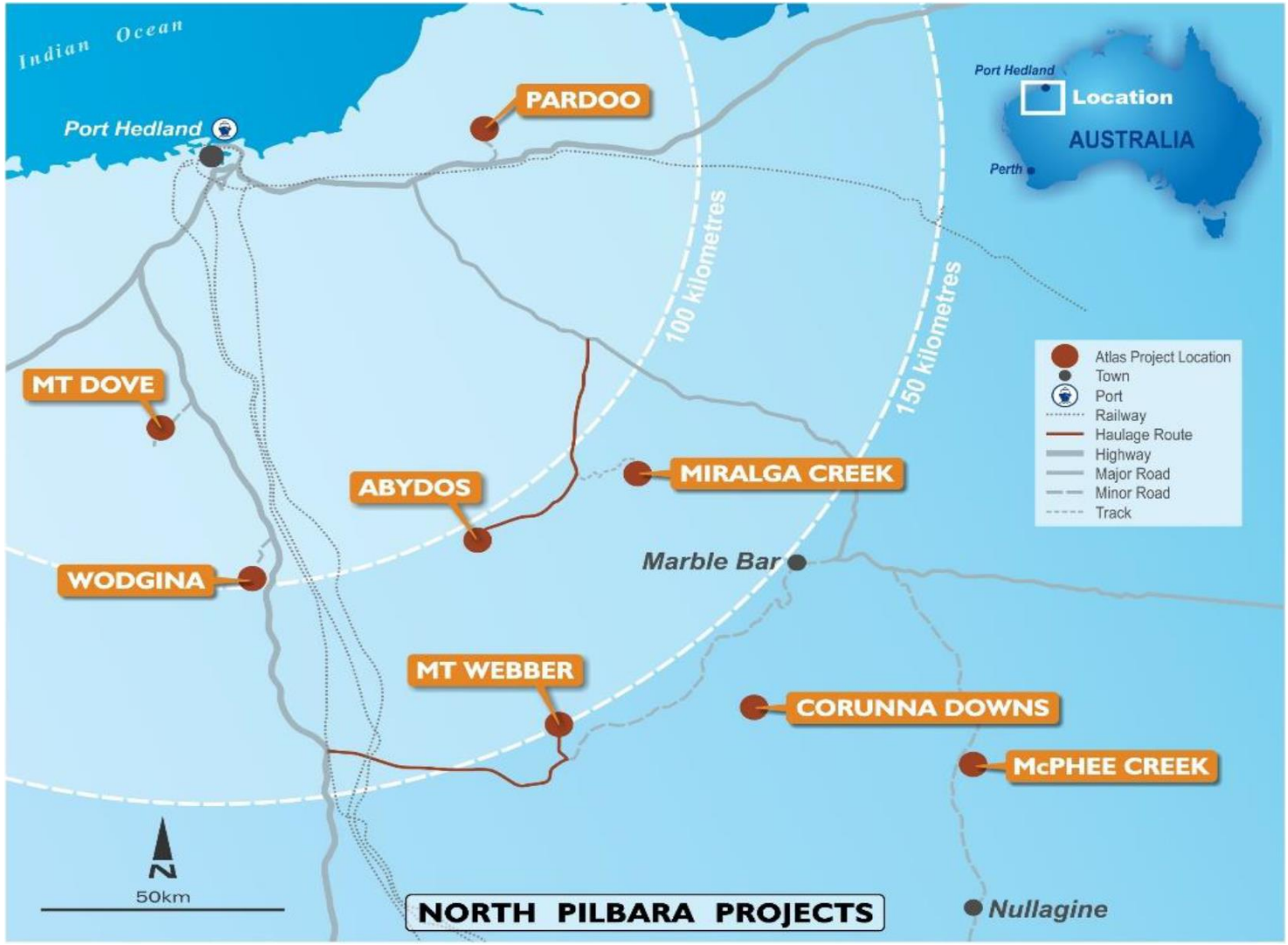

Figure 1 Location of the Project (Atlas, 2018)

3 METHODS

Mine Earth adopts a phased approach for mine waste characterisation that is consistent with the *Draft Guidance Materials Characterisation Baseline Data Requirements for Mining Proposals* developed by the Department of Mines and Petroleum Western Australia (DMP, 2016). This draft guidance document builds upon internationally accepted GARD, AMIRA and MEND acid-rock drainage standards and methodologies.

This section describes the methods that were employed to undertake Phase 0, Phase 1 and Phase 2 of the assessment.

3.1 Phase 0

Phase 0 involved a review of existing technical information and drilling databases to provide a broad understanding of the characteristics of the Project deposits.

3.1.1 Geochemistry

The drilling database for the Project was assessed to determine the spatial coverage of drill holes and associated downhole assay data across the deposits.

The spatial coverage of drill holes for each deposit is shown in Figure 2 to Figure 6.

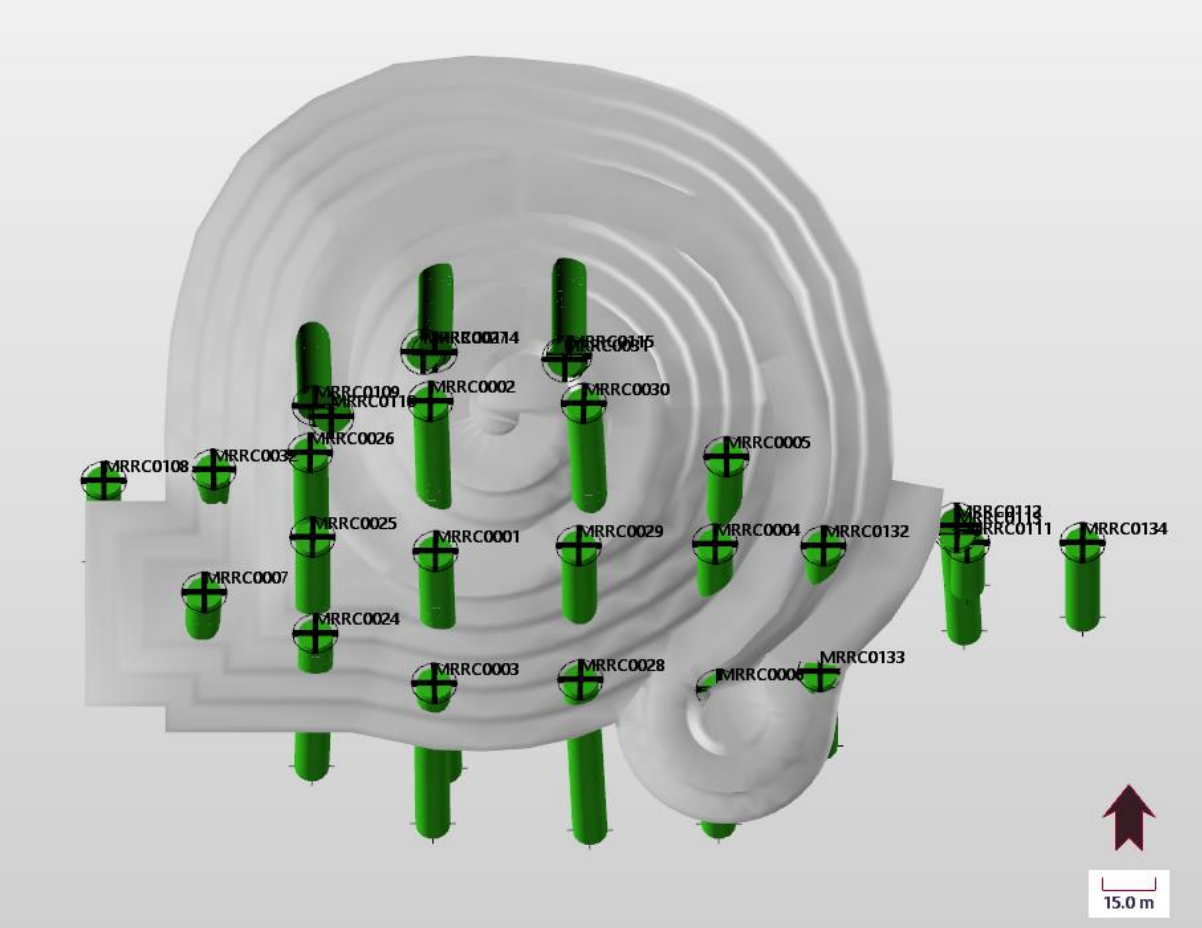

Figure 2 Spatial distribution of drillholes within Miralga East Pit 1

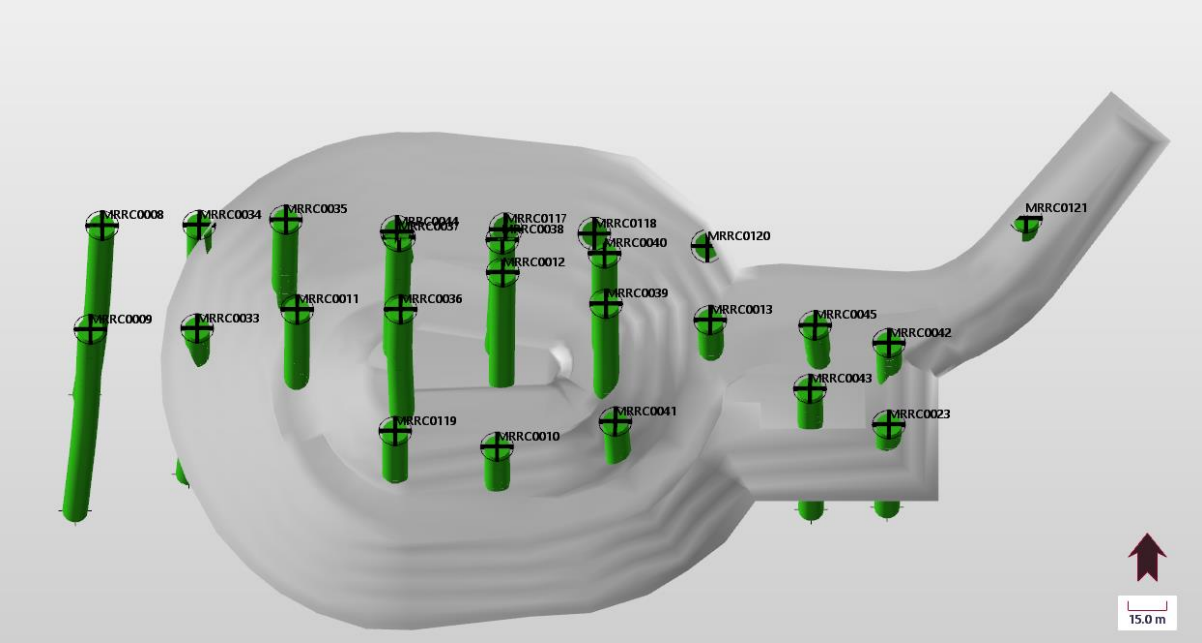

Figure 3 Spatial distribution of drillholes within Miralga East Pit 2

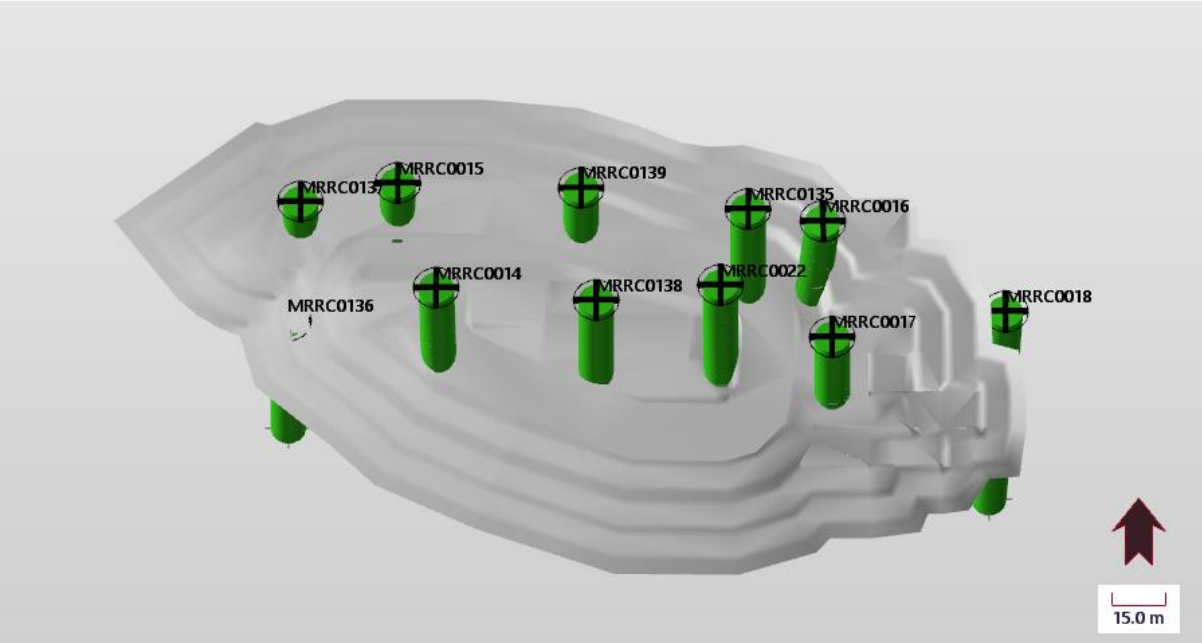

Figure 4 Spatial distribution of drillholes within Miralga East Pit 3

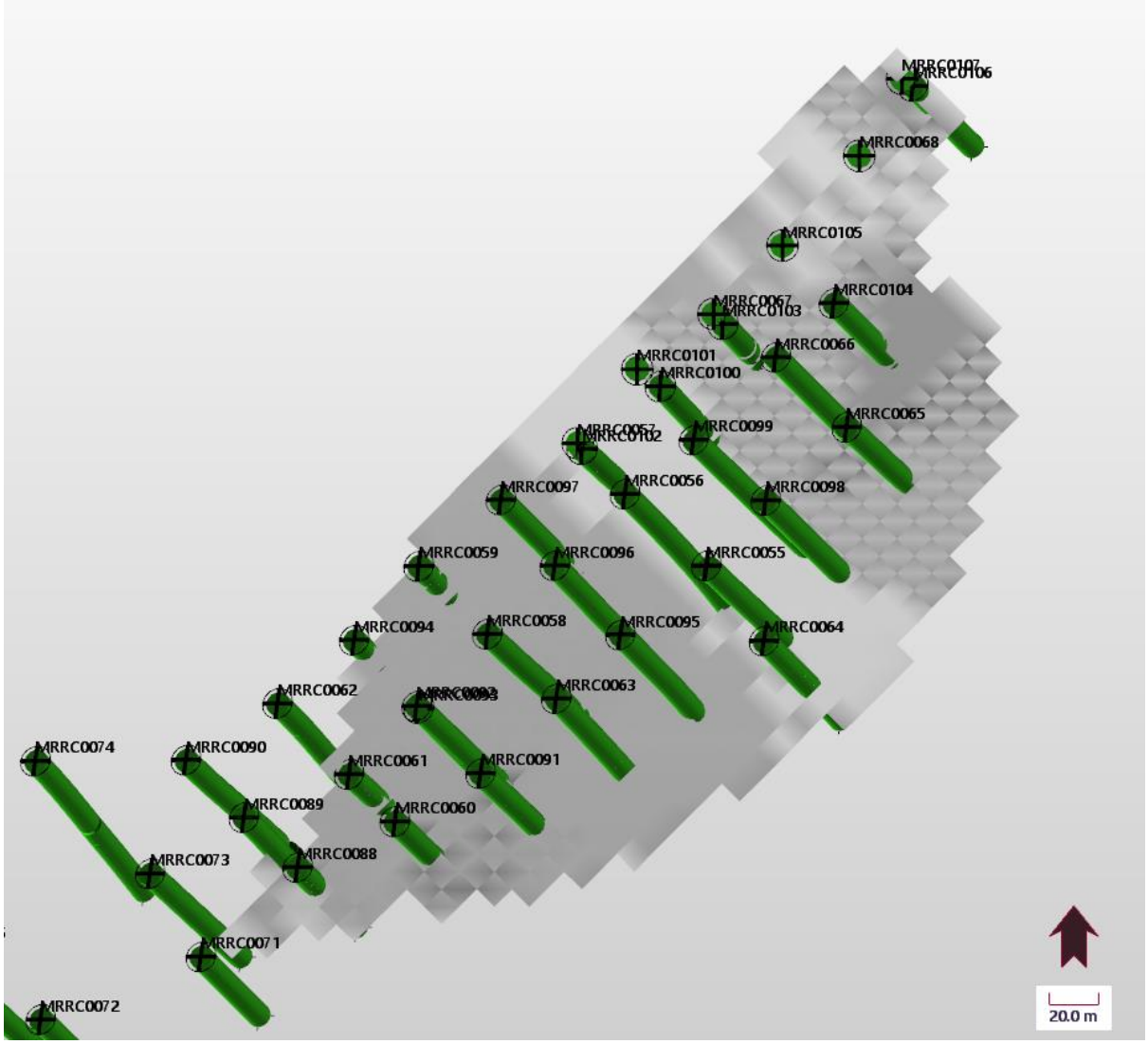

Figure 5 Spatial distribution of drillholes within Miralga West

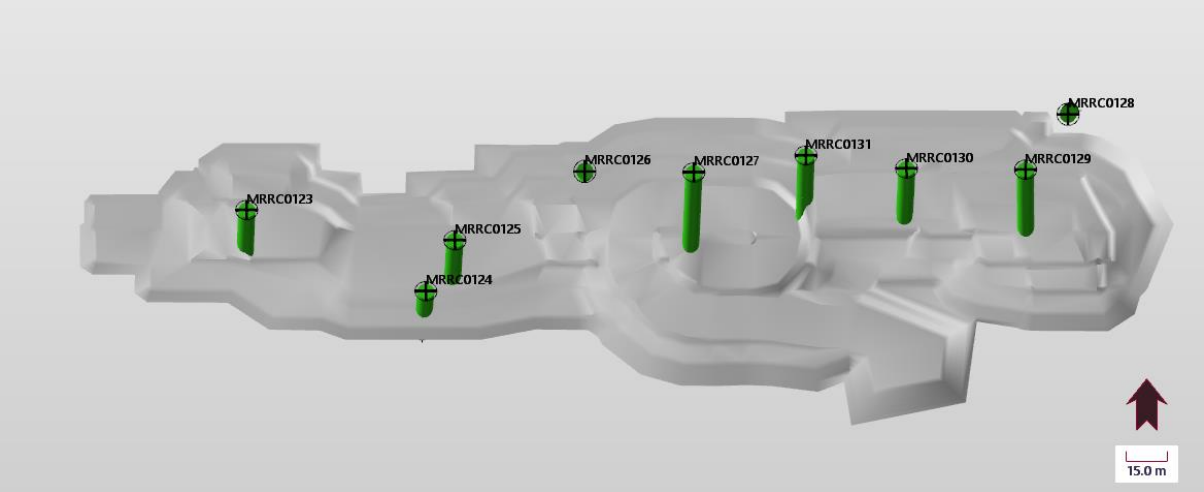

Figure 6 Spatial distribution of drillholes within Sandtrax

3.1.2 Erosion potential

The susceptibility of waste rock types to erosion and weathering was inferred by reviewing the geological characteristics of each deposit. The drilling database was used to source geological information on lithology, mineralogy, alteration, structure and oxidation extent. The mineral composition of key rock types was assessed to provide an indication of potential durability, susceptibility to dissolution and overall erodibility. Core photos were reviewed to determine rock hardness using the degree of fragmentation (low fragmentation = high hardness, high fragmentation = low hardness). Relevant information derived from the assessment of rock types and their mineral composition included:

- Rock hardness (physical durability) and susceptibility to fragmentation during mechanical disturbance. This was assessed from the Rock Quality Designation (RQD) scale (observing fracturing degree in core) and the relative abundance of component minerals and their hardness (using Mohs mineral hardness scale).
- Susceptibility of a rock type to degradation via dissolution during weathering. This was assessed from the relative abundance of component minerals and their dissolution rates (using a modified Goldich scale).
- Susceptibility to fragmentation during mechanical disturbance, assessed from the degree of structural deformation or cementation extent (for sedimentary rocks).
- Likely mineralogical products of the weathering process, to identify the potential for low stability derivatives from parent rock types including but not limited to shrink-swell clays.

Based on the characteristics observed for each rock type, the following stability categories were applied:

- Waste rock classified as “low stability” is likely to demonstrate low erosion resistance and should not be placed on final slopes of rock landforms. Low stability waste rock will require the application of rock armour if exposed on final landform slopes.
- Waste rock classified as “moderate stability” is likely to demonstrate moderate erosion resistance and may not be suitable for placement on final slopes of rock landforms. Moderate stability waste rock may require the application of rock armour if exposed on final landform slopes.
- Waste rock classified as “high stability” is likely to demonstrate high erosion resistance and should be suitable for placement on final slopes of rock landforms. High stability waste rock may provide a useful source of durable rock armour.

3.2 Phase 1

Phase 1 is a screening phase during which downhole sulphur and other elemental assay data are used to define the preliminary geochemical characteristics of and variability within representative lithologies of a deposit.

Existing assay results from 3,167 semi-continuous down hole samples from 127 drillholes were assessed during Phase 1 for the Project. Only those assay results from within the planned pit shells plus a 10 m buffer were assessed. A 10 m buffer beyond the pit shell was included so that the geochemical properties of the pit wall exposure zone could be considered. Table 1 shows the number of drillholes assessed per deposit, along with the numbers of samples logged for each lithology type per deposit.

As part of Phase 1, all samples from all drillholes were assessed for sulphur (S) and a limited range of chemical compounds and elements. The geochemical elements and oxides assessed during Phase 1 are presented in Table 2.

All Phase 1 results were reviewed by Mine Earth and Dr Graeme Campbell to define the preliminary geochemical characteristics of key lithology types for each deposit and to develop the sample selection and testwork plan for Phase 2.

Total-S values from the Phase 1 dataset provided an indication of the likely acid-formation potential of each key lithology type. Conservatively 0.1% S was employed to demarcate waste rock that may be non-acid forming (NAF) (<0.1% S) or potentially acid forming (PAF) (>0.1% S). Samples with sulphur values greater than 0.1% were candidates for further testwork during Phase 2.

Table 1 Drillhole and sample numbers for lithologies encountered from all deposits, within planned pit shells plus a 10 m buffer

Lithology	Miralga East 1	Miralga East 2	Miralga East 3	Miralga West	Sandtrax
Ore	281	301	97	595	336
BIF	189	331	130	521	290
Chert	23	5	8	9	-
Shale	-	-	-	12	-
Sandstone	-	-	-	39	-
Total samples	**493**	**637**	**235**	**1,176**	**626**
Total drillholes	**26**	**23**	**11**	**32**	**35**

Table 2 Phase 1 geochemical parameters

Parameters	Details
Acid formation potential indicator	Total Sulphur
Multi-element and oxide composition (drillhole database)	Al_2O_3, CaO, Fe, K_2O, MgO, MnO, Na_2O, P, SiO_2 and TiO_2

3.3 Phase 2

All Phase 1 results were reviewed by Mine Earth and Dr. Graeme Campbell to select a representative subset of samples for more detailed Phase 2 laboratory analysis. Phase 2 samples were subjected to both static and kinetic testwork to determine their acid-forming and metalliferous drainage characteristics, and their erosional stability characteristics.

A total of 33 samples from 24 drillholes across the deposits were selected for Phase 2 analysis. The locations of Phase 2 drillholes are displayed in Figure 7 to Figure 11. The range of geochemical and physical tests undertaken on the Phase 2 samples is presented in Table 3. Graeme Campbell and Associates, Intertek Genalysis (Intertek), SGS Australia (SGS) and Townend Mineralogy Laboratory (TML) conducted the Phase 2 geochemical testwork. Mine Earth undertook the Phase 2 physical testwork following the procedures outlined in Standards Australia (1980).

The field texture and Emerson Test Class (as an indication of potential for clay dispersion) was determined for the soil sized fraction (<2 mm) of representative BIF samples. BIF samples were selected for Phase 2 physical testwork because BIF will be the dominant waste rock lithology type to be produced from all Project pits (83-100%).

Table 3 Phase 2 testwork

Parameters	Geochemical
Acidity and salinity	pH, EC
Carbon/Sulphur	Total sulphur
	Total carbon
	Chromium-reducible sulphur
	Carbonate-carbon
Acid formation potential	Acid Neutralising Capacity (ANC)
	Net Acid Generation (NAG)
Multi-element composition	Wider suite than Phase 1
Water extraction	Analyses mineral solubility
Parameters	**Physical**
Physical	Emerson Dispersion Test and field texture

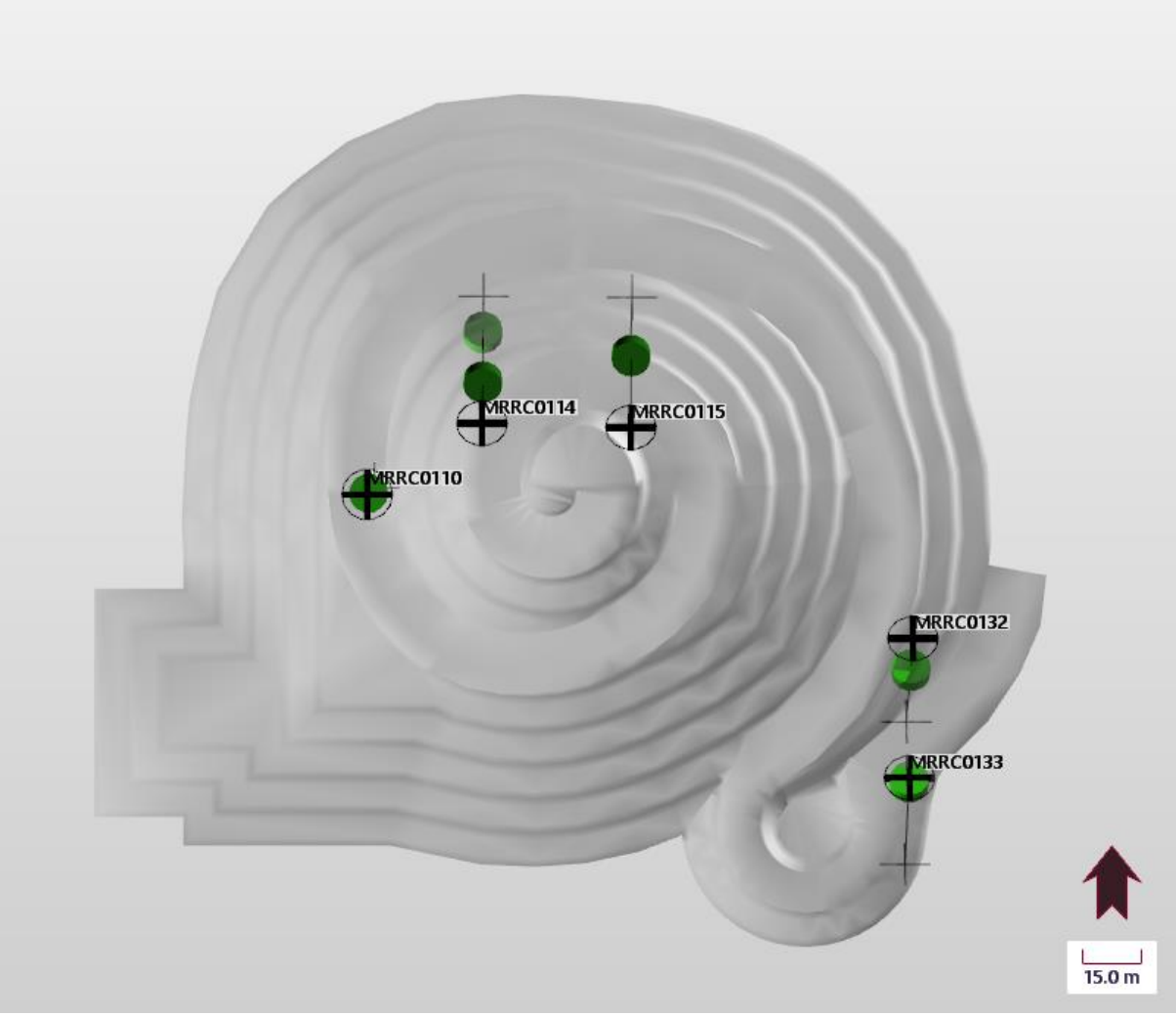

Figure 7 Phase 2 sample locations from drillholes within Miralga East Pit 1

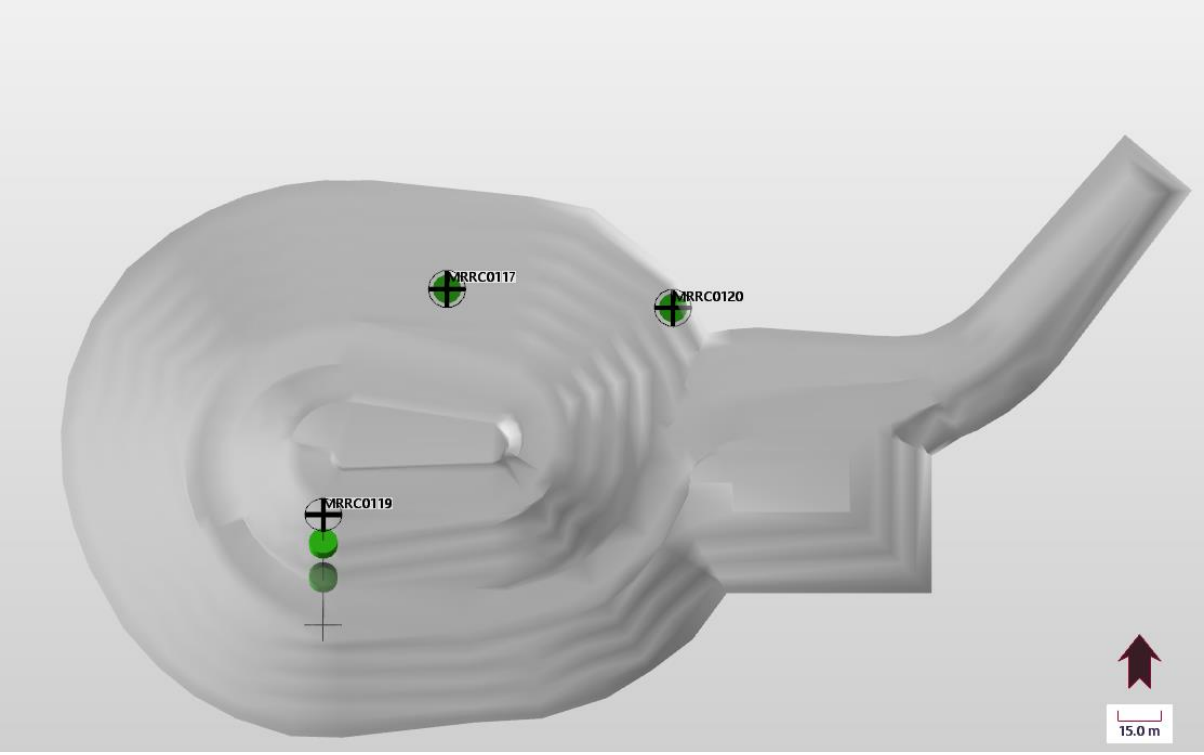

Figure 8 Phase 2 sample locations from drillholes within Miralga East Pit 2

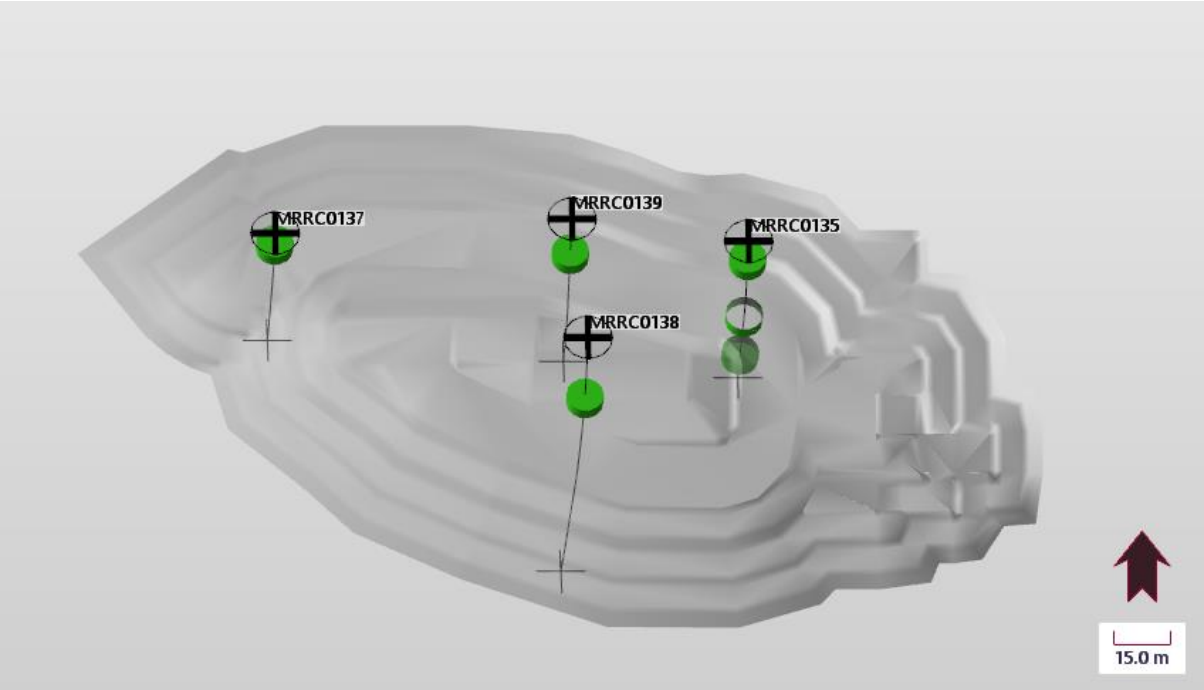

Figure 9 Phase 2 sample locations from drillholes within Miralga East Pit 3

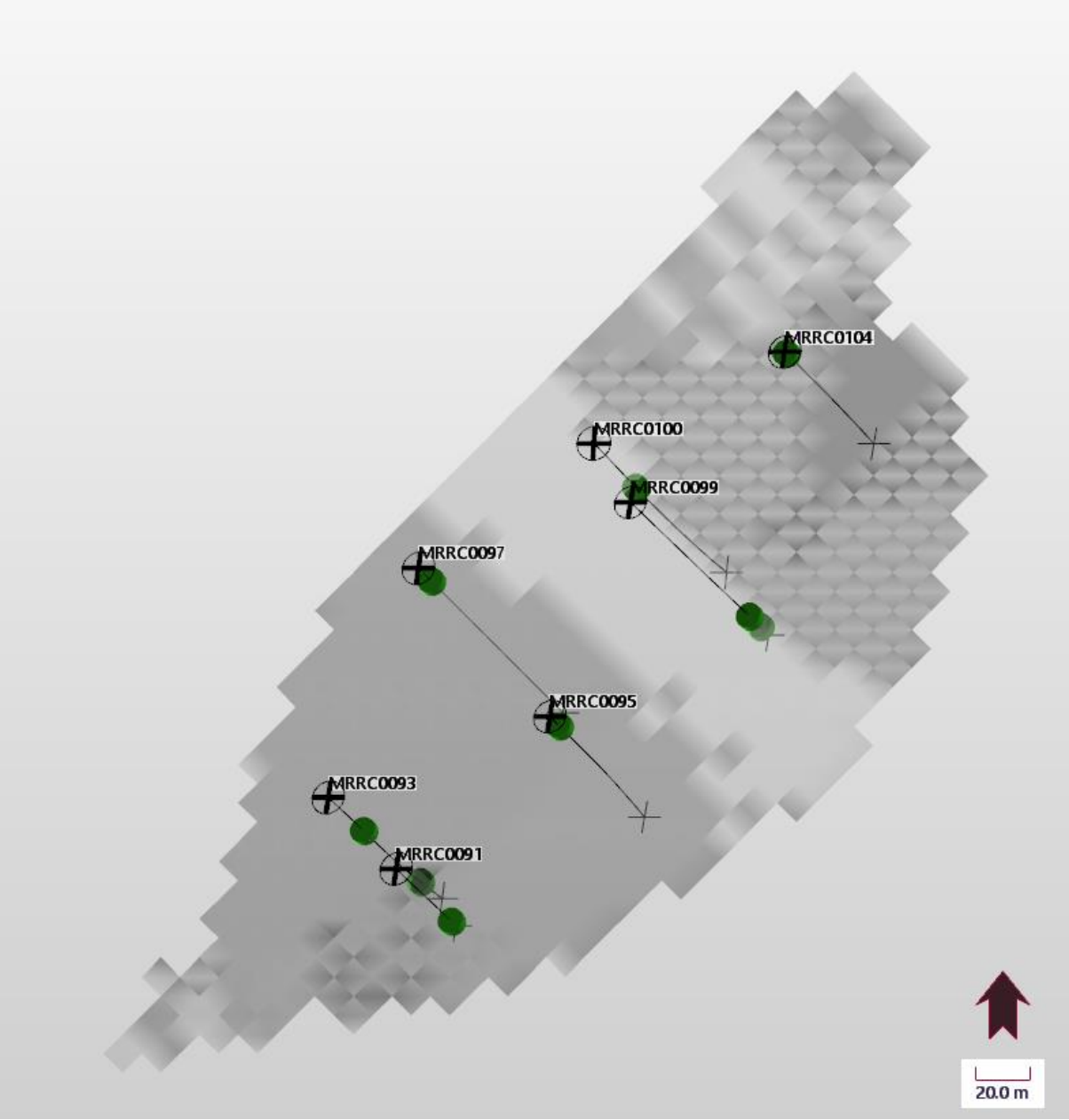

Figure 10 Phase 2 sample locations from drillholes within Miralga West

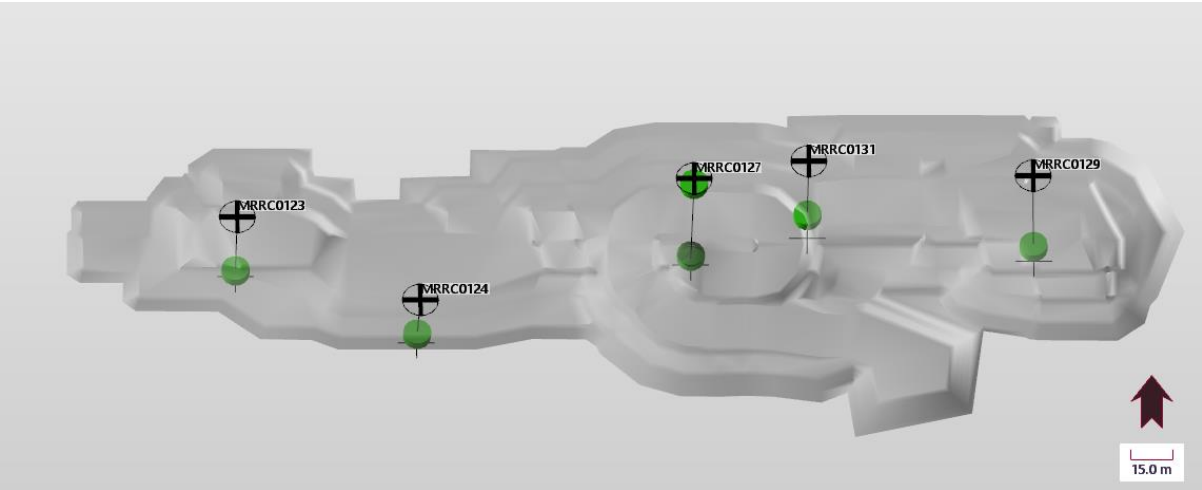

Figure 11 Phase 2 sample locations from drillholes within Sandtrax

4 RESULTS AND DISCUSSION

This section describes the results of the Phase 0, 1 and 2 assessments for the Project. The following sections describe: the potential erodibility of waste rock and anticipated volumes; sulphur distribution by deposit and rock type; acid-formation potential and solubility behaviour. Appendix A contains the Phase 1 geochemical results. Appendix B contains the laboratory reports.

Summary findings from the assessment include:

- All waste rock types within the planned pit shells, including within a 10 m buffer outside of the pit shells, were classified as NAF.
- No significant enrichment in any element was identified from multi-element and water extraction testwork. All mine waste types from all deposits should release negligible metals / metalloids during weathering
- BIFs, cherts and sandstones will be the dominant waste rock lithology types from each deposit (>95%) and these are likely to display moderate-high erosion stability.
- Shales will only represent a minor proportion (2.1%) of the total waste rock volume from Miralga West pit and are likely to display low erosion stability.

4.1 Phase 0

4.1.1 Waste rock volumes

Anticipated waste rock volumes for the main lithology types at each deposit are presented in Table 4.

Table 4 Waste rock proportions for Project deposits (sourced from Atlas, January 2020)

Lithology	Miralga East 1	Miralga East 2	Miralga East 3	Miralga West	Sandtrax
BIF	94.7%	98.7%	94.8%	83.7%	100%
Chert	5.3%	1.3%	5.2%	0.2%	-
Shale	-	-	-	2.1%	-
Sandstone	-	-	-	13.9%	-
Total	**100%**	**100%**	**100%**	**100%**	**100%**

The spatial distribution of the above lithologies for each deposit is shown in Figure 12 to Figure 16.

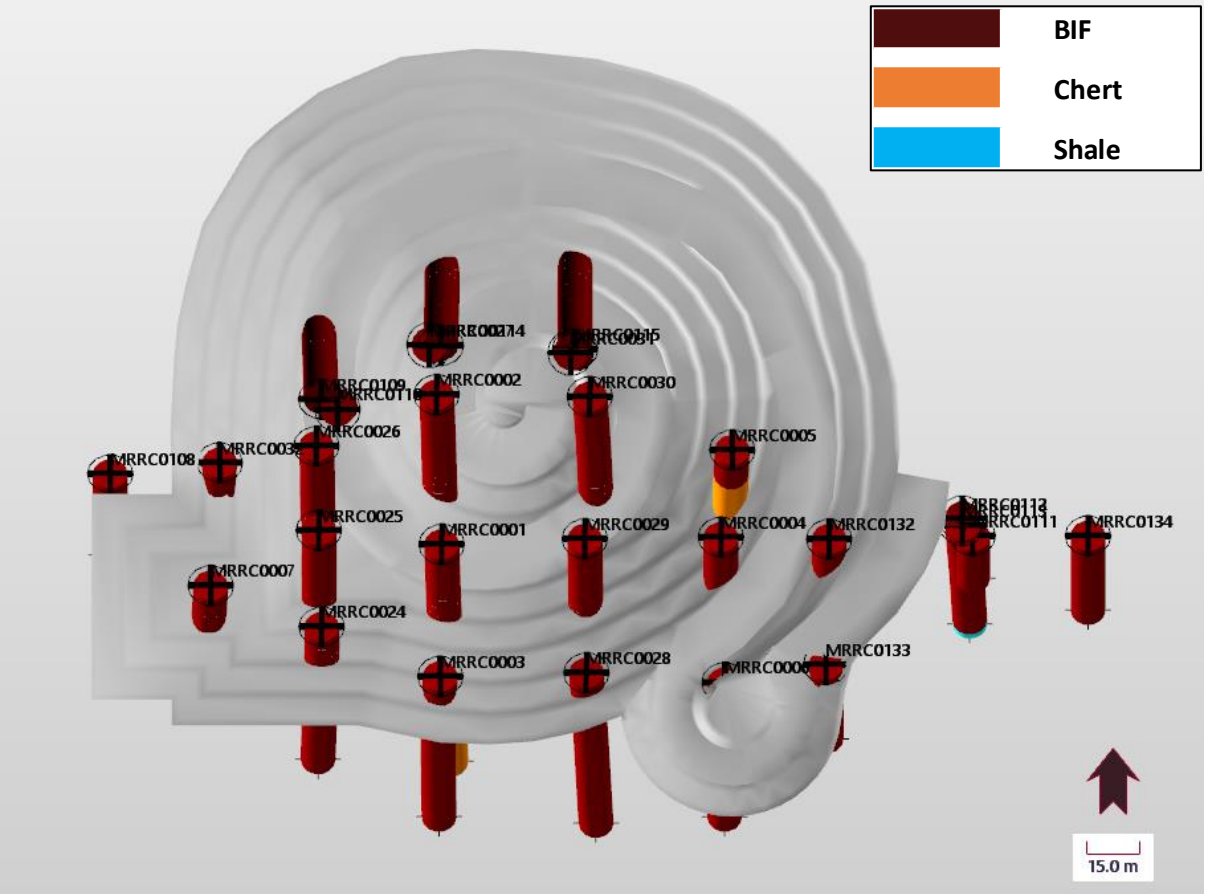

Figure 12 Lithological distribution for drillholes within Miralga East Pit 1

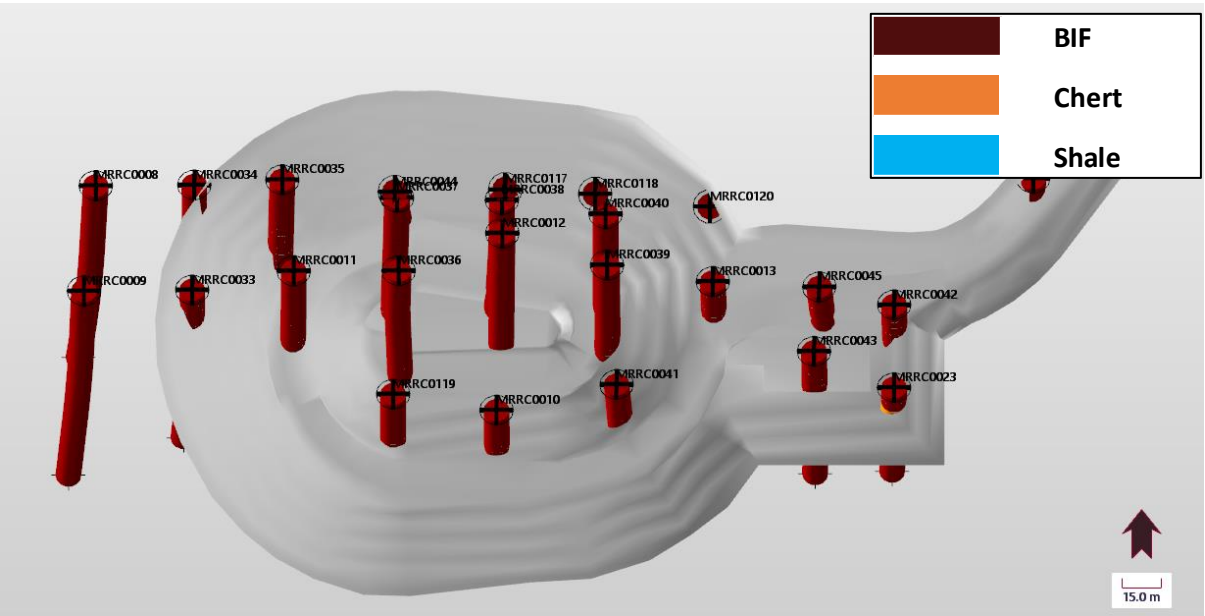

Figure 13 Lithological distribution for drillholes within Miralga East Pit 2

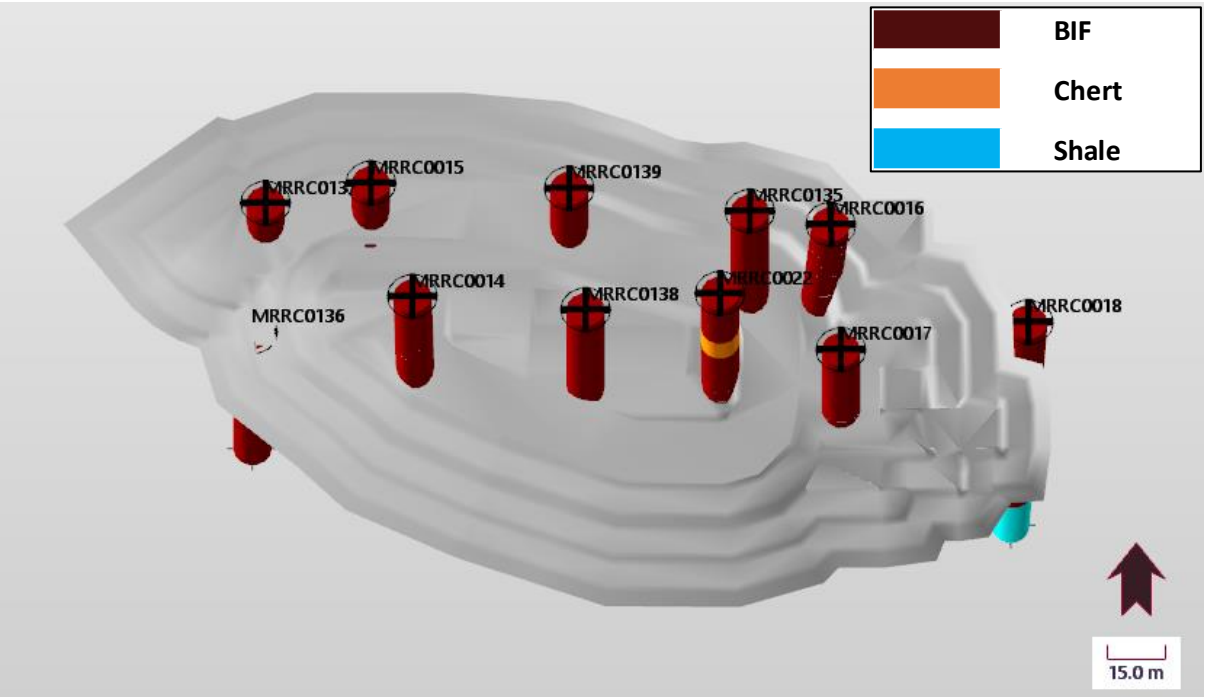

Figure 14 Lithological distribution for drillholes within Miralga East Pit 3

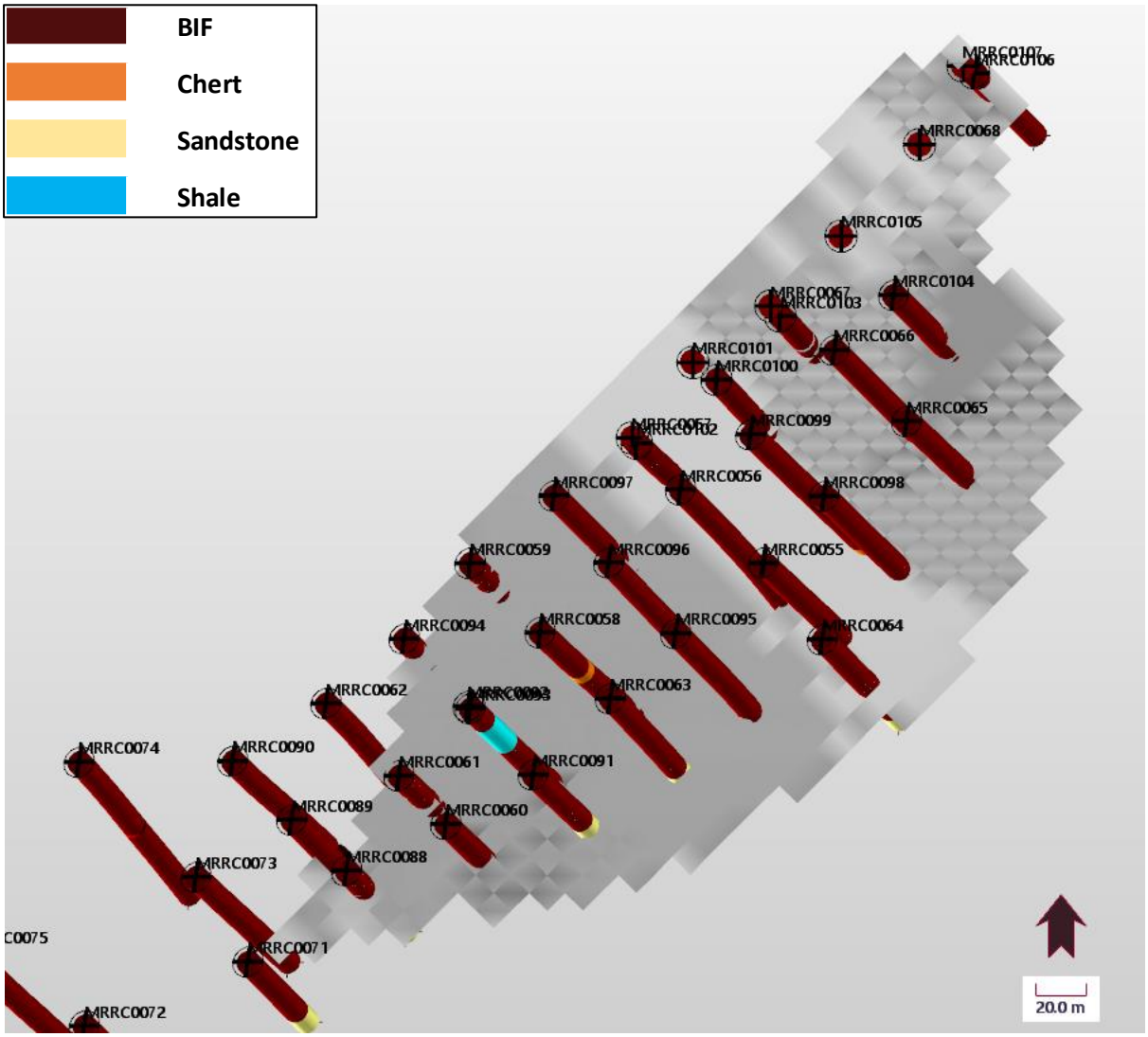

Figure 15 Lithological distribution for drillholes within Miralga West

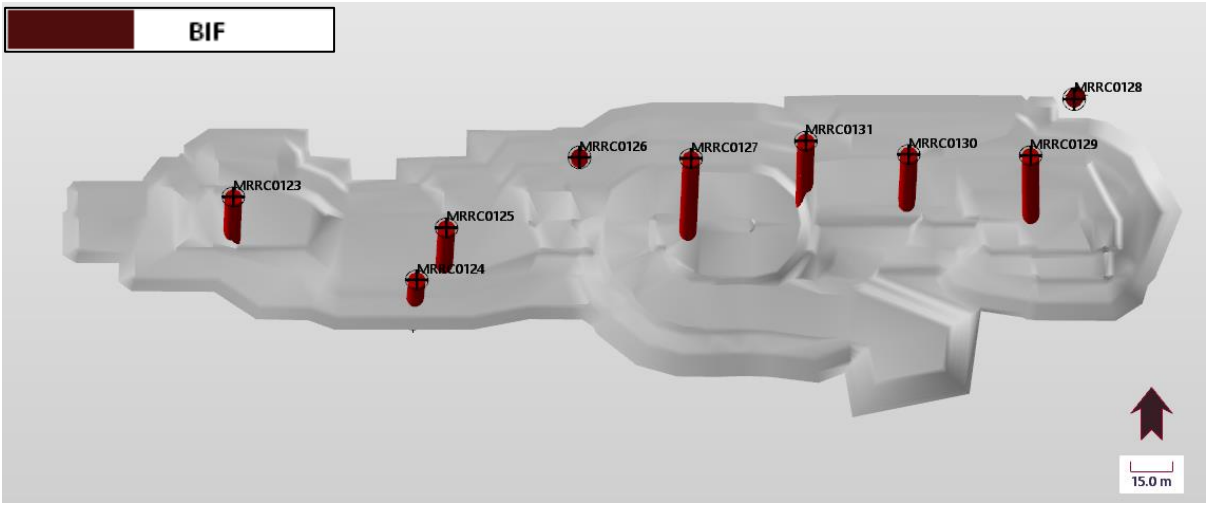

Figure 16 Lithological distribution for drillholes within Sandtrax

4.1.2 Erosion potential

The likely erosion stability classification is described below for key deposit lithologies including BIF, chert, shale and sandstone units.

BIF

BIF represents the dominant waste rock lithology type across all Project deposits. BIF units are dominated by bands of iron oxides (usually hematite and goethite) and quartz sediments (Bishop, et al., 2007). Both iron oxides and quartz display high physical (5-7 Mohs hardness) and chemical durability (Scott & Pain, 2009).

A review of core photographs from drillholes in Miralga East and West pits show that the BIF rocks have been subjected to notable supergene alteration and moderate weathering, creating numerous vugs, fractures and friable ground (Figure 17).

Most BIF waste rock from the planned pits should display moderate-high erosion stability.

Figure 17 Core photo of BIF from 82.7 – 84.7 m depth in MRDH0001

Chert

Chert is likely to make up a small proportion of the overall waste rock volume from each deposit except Miralga West (Table 4).

Chert is dominated by microcrystalline silica and is therefore quartz rich. Quartz typically exhibits high physical (7 Mohs hardness) and chemical durability (Scott & Pain, 2009).

A review of core photographs from drillholes in Miralga East and West pits show that the chert has been subjected to notable supergene alteration and moderate weathering, creating numerous vugs, fractures and friable ground (Figure 18).

Most chert waste rock from the planned pits should display moderate-high erosion stability.

Figure 18 Core photo of Chert from 34.0 – 36.5 m depth in MRDH0003

Shale

Shale should only be produced from the Miralga West deposit and will comprise a minor portion (2.1%) of the total waste rock volume from that pit (Table 4).

Shales are very-fine grained, micro-laminated sedimentary rocks that are rich in clay minerals, with lesser proportions of muscovite, quartz, feldspar and calcite (Bishop, et al., 2007). The clay minerals will generally display low Mohs hardness (2 to 5) which, when considered with the very-fine grain size and presence of micro-laminations, typically means that shales exhibit low physical durability. Chemical durability of the constituent minerals is generally high; however, the micro-laminations may act as fluid pathways allowing water-mineral interaction.

Weathering of shales can be expected to commence along cleavage planes, with disaggregation commencing via the expansion and contraction of sheet-silicates during wetting/drying cycles. Over a longer term, calcite and feldspar will begin to break down to form goethite and kaolinite (Scott & Pain, 2009). Quartz and muscovite will remain relatively unchanged during early weathering. Any further mineralogical changes can be expected over much longer time scales.

A review of core photographs from drillholes in the Miralga West pit shows that the shale has been subjected to notable weathering and is generally friable (Figure 19).

Most shale waste rock should display low erosion stability.

Figure 19 Core photo of Shale from 49.0 – 51.0 m depth in MRDH0002

Sandstone

Sandstone should only be produced from the Miralga West deposit and will comprise approximately 13.9% of the total waste rock volume from that pit (Table 4).

Sandstones are coarse-grained, quartz-feldspar dominated rocks that can display bedding (Bishop, et al., 2007). The high proportions of quartz and feldspar typically result in high physical durability (6-7 Mohs hardness) and moderate-high chemical durability. Sandstone when fresh will therefore generally exhibit high erosion stability, depending on its degree of cementation.

Core photographs containing sandstone were not available for the sandstone from the Miralga West deposit.

Where the sandstone has been weathered to the same extent as the BIF and chert rocks, it should display moderate-high erosion stability. As sandstone was not available to be viewed in drillcore, the stability of this lithology should be verified during mining.

4.2 Phase 1

Phase 1 sulphur results are presented below for the key waste rock lithology types at each deposit.

4.2.1 Sulphur

Miralga East Pit 1

A total of 493 samples were available from 26 drillholes within the pit shell plus the 10 m buffer zone (Figure 2) to provide a spatially representative Phase 1 dataset for Miralga East Pit 1.

In terms of sulphur distribution, all results were below 0.1% S. This indicates that the acid formation risk is very low (Figure 20 and Figure 21).

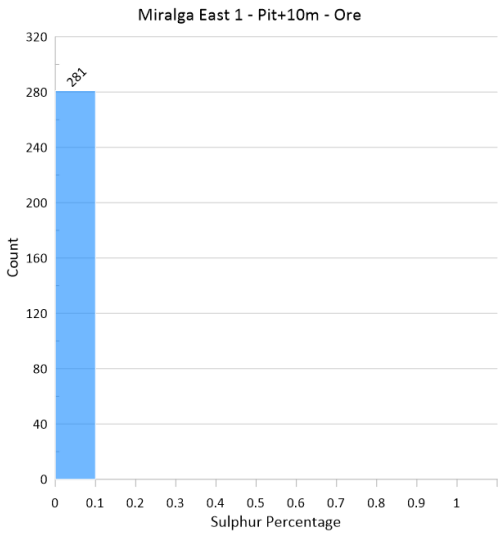

Figure 20 Histogram of sulphur distribution for ore at Miralga East Pit 1

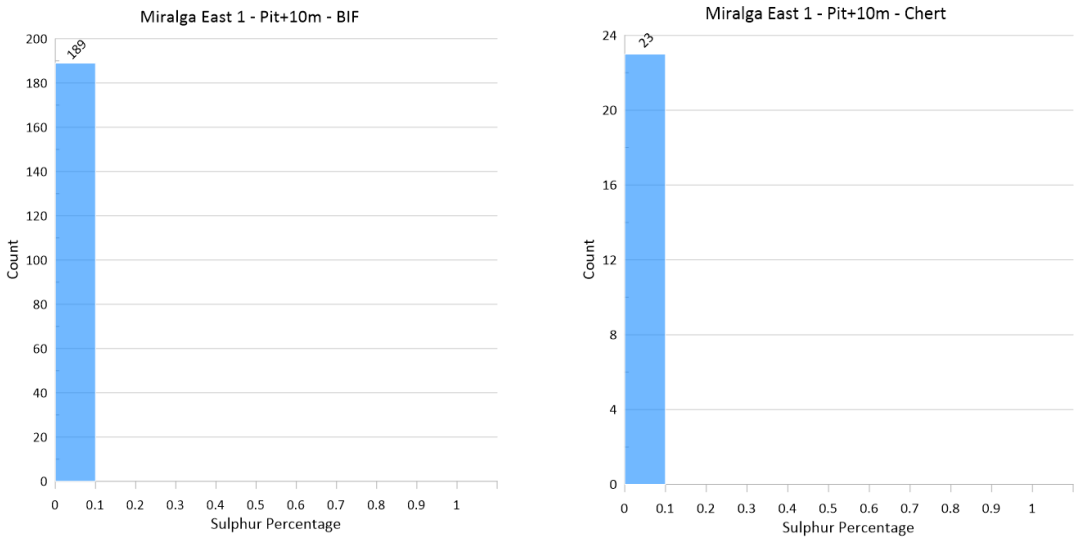

Figure 21 Histogram of sulphur distribution for waste at Miralga East Pit 1

Miralga East Pit 2

A total of 637 samples were available from 23 drillholes within the pit shell plus the 10 m buffer zone (Figure 3) to provide a spatially representative Phase 1 dataset for Miralga East Pit 2.

In terms of sulphur distribution, almost all results were below 0.1% S; one sample had a sulphur value of 0.104% S. This indicates that the acid formation risk is very low (Figure 22 and Figure 23).

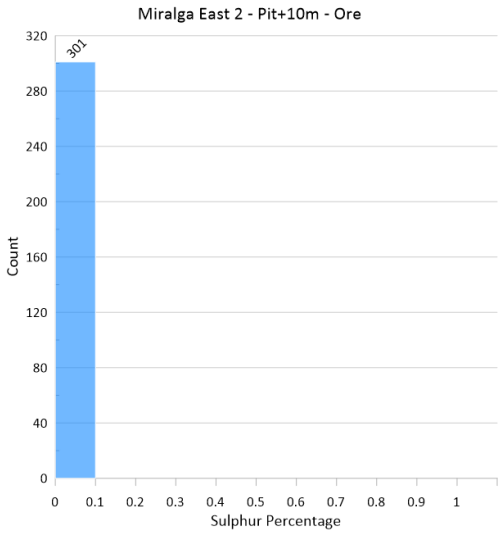

Figure 22 Histogram of sulphur distribution for ore at Miralga East Pit 2

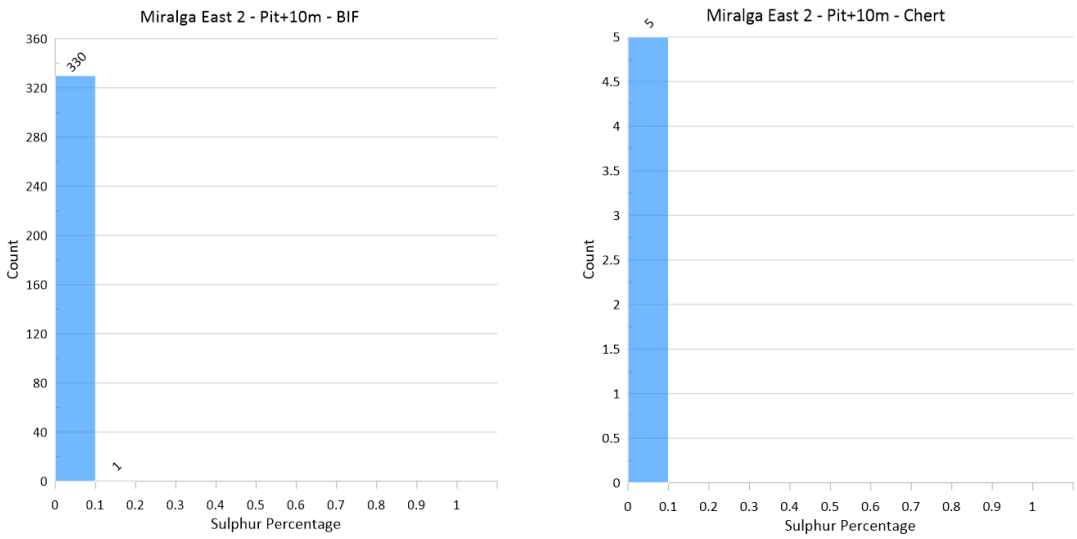

Figure 23 Histogram of sulphur distribution for waste at Miralga East Pit 2

Miralga East Pit 3

A total of 235 samples were available from 11 drillholes within the pit shell plus the 10 m buffer zone (Figure 4) to provide a spatially representative Phase 1 dataset for Miralga East Pit 3.

In terms of sulphur distribution, all results were below 0.1% S. This indicates that the acid formation risk is very low (Figure 24 and Figure 25).

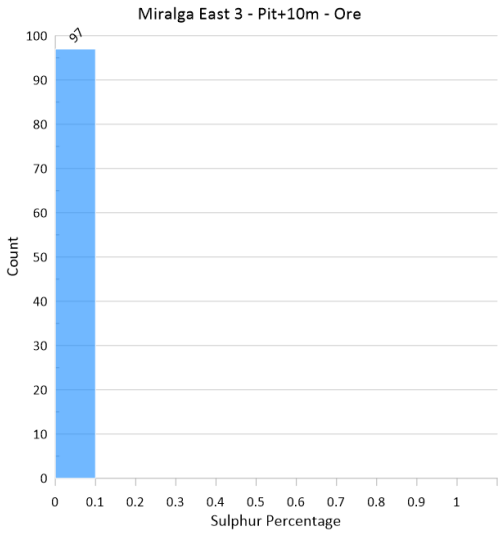

Figure 24 Histogram of sulphur distribution for ore at Miralga East Pit 3

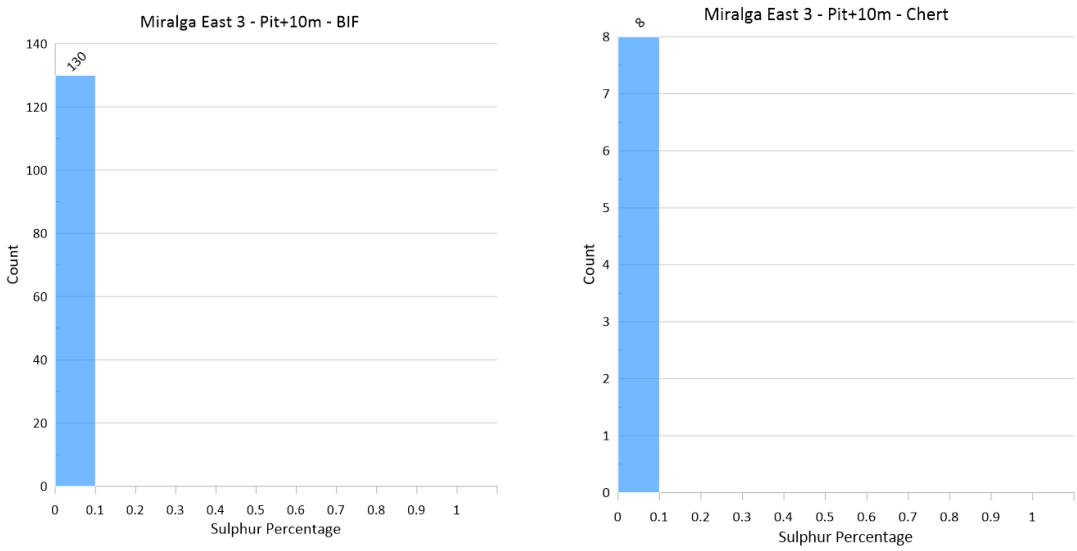

Figure 25 Histogram of sulphur distribution for waste at Miralga East Pit 3

Miralga West

A total of 1,176 samples were available from 32 drillholes within the pit shell plus the 10 m buffer zone (Figure 5) to provide a spatially representative Phase 1 dataset for Miralga West Pit.

In terms of sulphur distribution, all results were below 0.1% S. This indicates that the acid formation risk is very low (Figure 26 and Figure 27).

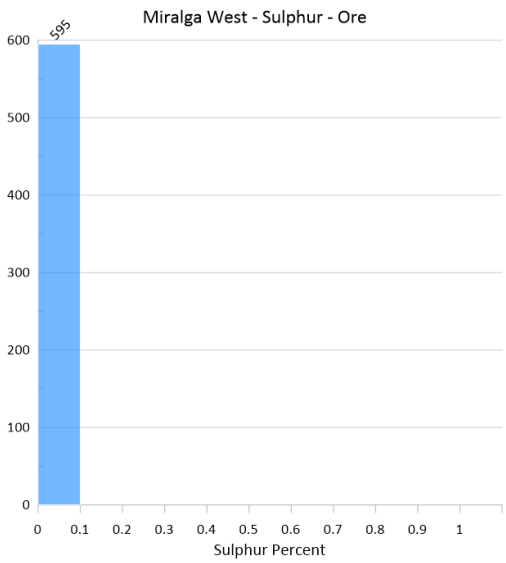

Figure 26 Histogram of sulphur distribution for ore at Miralga West

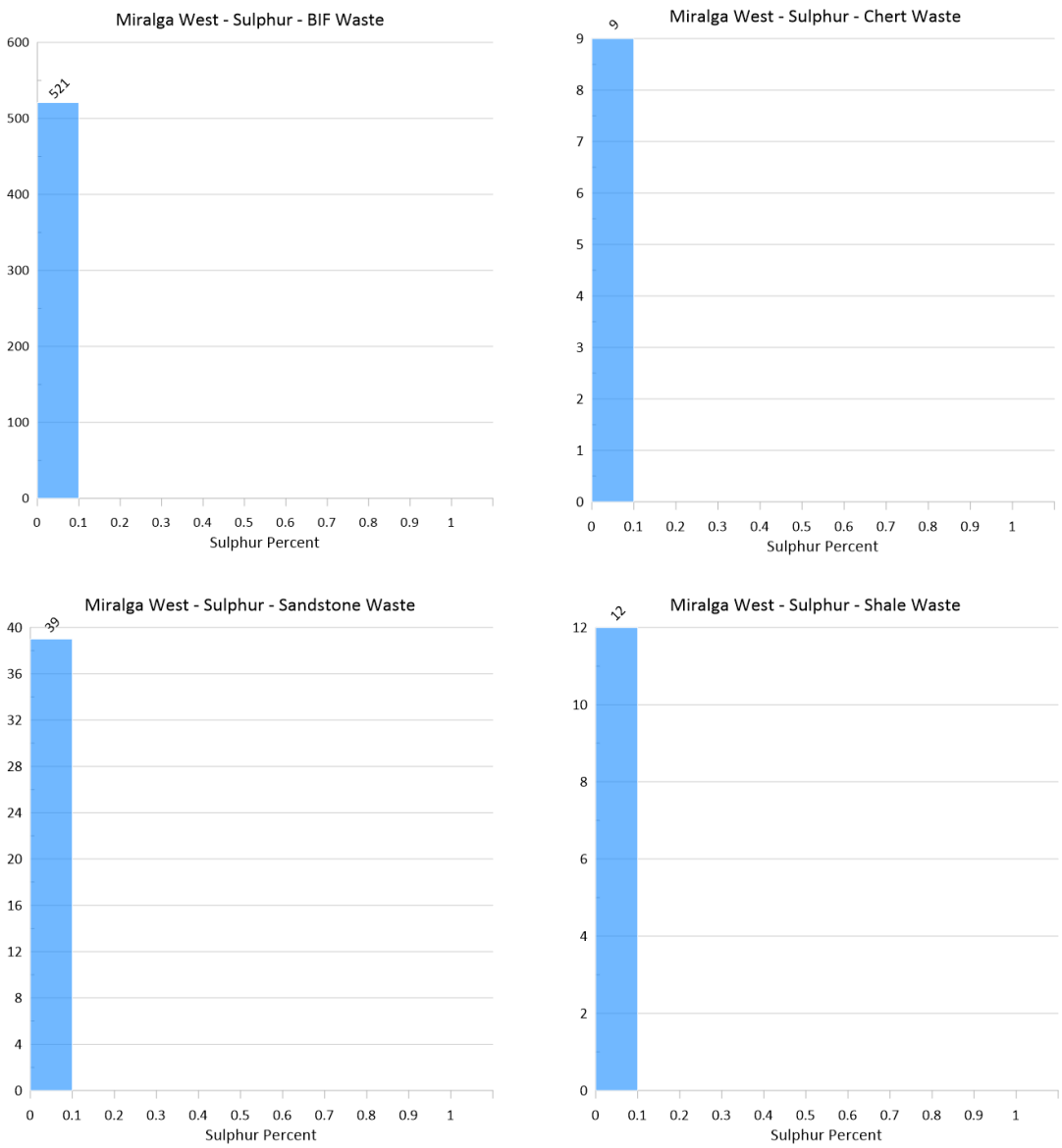

Figure 27 Histogram of sulphur distribution for waste at Miralga West

Sandtrax

A total of 626 samples were available from 35 drillholes within the pit shell plus the 10 m buffer zone (Figure 6) to provide a spatially representative Phase 1 dataset for Sandtrax Pit.

In terms of sulphur distribution, almost all results were below 0.1% S; one sample had a sulphur value of 0.104% S. This indicates that the acid formation risk is very low (Figure 28 and Figure 29).

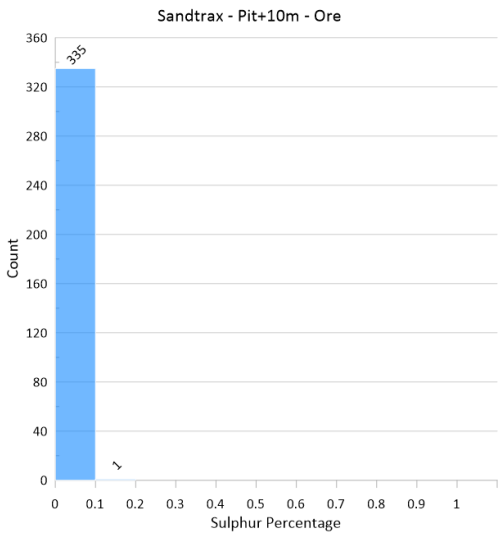

Figure 28 Histogram of sulphur distribution for ore at Sandtrax

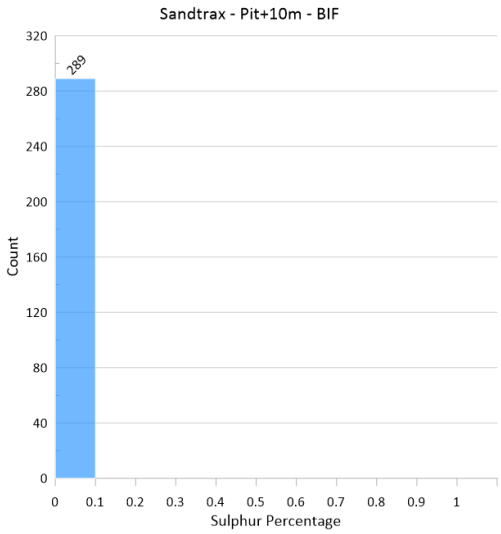

Figure 29 Histogram of sulphur distribution for waste at Sandtrax

4.3 Phase 2

The Phase 2 geochemical and physical results from each deposit are presented below. The Phase 2 results and laboratory reports are provided in Appendix B.

4.3.1 Geochemical characteristics

Miralga East

For Miralga East (pits 1-3), 18 Phase 2 samples (including four ore samples) were tested.

All samples displayed circum-neutral pH (5–9 pH) and low salinity.

Negligible sulphides were present across all Phase 2 samples, with the highest sulphur results being 0.05%. All samples were classified as NAF.

All samples displayed minor element concentrations generally either below, or close to, those typically recorded for soils, regolith and bedrock derived from unmineralised terrain (Reimann & Caritat, 1998). A number of samples displayed slightly elevated concentrations of As, Sb and Se (above 10x the respective average crustal abundance, ACA). All results were below 100x ACA and therefore the degree of enrichment is constrained.

Water extraction analysis (employing a low water:solid ratio of 2:1 [w/w] that minimises dilution effects) showed element concentrations typically below, or close to, the respective detection limits (e.g. 1-10 µg/L generally). This applies to As, Sb and Se concentrations, so that the above constrained enrichments in the solids correspond to stable forms of low solubility. This is consistent with the prominence of goethites in the samples subjected to mineralogical assessment which readily 'fix' metals / metalloids via sorption (i.e. adsorption and precipitation) reactions at circum-neutral pH.

Based on the geochemical results, the waste rocks to be produced from the Miralga East pits should be circum-neutral, non-saline and release negligible metals / metalloids during weathering.

Miralga West

For Miralga West, nine Phase 2 samples (including one ore sample) were tested.

All samples displayed circum-neutral pH (5–9 pH) and low salinity.

Negligible sulphides were present across all Phase 2 samples, with the highest sulphur results being 0.01%. All samples were classified as NAF.

All samples displayed minor element concentrations generally either below, or close to, those typically recorded for soils, regolith and bedrock derived from unmineralised terrain (Reimann & Caritat, 1998). A number of samples displayed slightly elevated concentrations of As, Sb and Se (above 10x the respective average crustal abundance, ACA). All results were below 100x ACA and therefore the degree of enrichment is constrained.

Water extraction analysis (employing a low water:solid ratio of 2:1 [w/w] that minimises dilution effects) showed element concentrations typically below, or close to, the respective detection limits (e.g. 1-10 µg/L generally). This applies to As, Sb and Se concentrations, so that the above constrained enrichments in the solids correspond to stable forms of low solubility. This is consistent with the prominence of goethites in the samples subjected to mineralogical assessment which readily 'fix' metals / metalloids via sorption (i.e. adsorption and precipitation) reactions at circum-neutral pH.

Based on the geochemical results, the waste rocks to be produced from the Miralga West pit should be circum-neutral, non-saline and release negligible metals / metalloids during weathering.

Sandtrax

For Sandtrax, six Phase 2 samples (including one ore sample) were tested.

All samples displayed circum-neutral pH (5–9 pH) and low salinity.

Negligible sulphides were present across all Phase 2 samples, with the highest sulphur results being 0.02%. All samples were classified as NAF.

All samples displayed minor element concentrations generally either below, or close to, those typically recorded for soils, regolith and bedrock derived from unmineralised terrain (Reimann & Caritat, 1998). A number of samples displayed slightly elevated concentrations of As, Sb and Se (above 10x the respective average crustal abundance, ACA). All results were below 100x ACA and therefore the degree of enrichment is constrained.

Water extraction analysis (employing a low water:solid ratio of 2:1 [w/w] that minimises dilution effects) showed element concentrations typically below, or close to, the respective detection limits (e.g. 1-10 µg/L generally). This applies to As, Sb and Se concentrations, so that the above constrained enrichments in the solids correspond to stable forms of low solubility. This is consistent with the prominence of goethites in the samples subjected to mineralogical assessment which readily 'fix' metals / metalloids via sorption (i.e. adsorption and precipitation) reactions at circum-neutral pH.

Based on the geochemical results, the waste rocks to be produced from the Sandtrax pit should be circum-neutral, non-saline and release negligible metals / metalloids during weathering.

4.3.2 Physical characteristics

The results of the field texturing and Emerson Test Class of representative BIF samples are presented in Table 5.

The soil sized fraction of the samples ranged in texture from loamy sand (with approximately 5-10% clay), to light medium clay (approximately 40-45% clay). The samples were classified as Emerson Class 5 or Class 6. The relatively low salinity of the samples (Section 4.3.1) indicates that salinity is unlikely to have a flocculating effect on the clay particles. The results indicate that the clay sized fraction of BIF samples generally had a low propensity to disperse upon saturation.

Table 5 Field texture, approximate clay content and Emerson Test Class for the <2 mm soil-sized fraction of BIF samples

Sample	Lithology	Field texture	Approximate clay content	Emerson Class	Description
MSC01	BIF	Light medium clay	40 to 45%	Class 6	Remoulded sample slakes but no dispersion of clay fraction. Soil / water suspension flocculates.
MSC02	BIF	Sandy clay loam	20 to 30%	Class 5	Remoulded sample slakes but no dispersion of clay fraction. Soil / water suspension remains dispersed.
MSC05	BIF	Loamy sand	5 to 10%	Class 5	Remoulded sample slakes but no dispersion of clay fraction. Soil / water suspension remains dispersed.
MSC06	BIF	Light clay	35 to 40%	Class 5	Remoulded sample slakes but no dispersion of clay fraction. Soil / water suspension remains dispersed.
MSC12	BIF	Light clay	35 to 40%	Class 5	Remoulded sample slakes but no dispersion of clay fraction. Soil / water suspension remains dispersed.
MSC21	BIF	Light medium clay	40 to 45%	Class 5	Remoulded sample slakes but no dispersion of clay fraction. Soil / water suspension flocculates.

5 RECOMMENDATIONS

The objectives of this assessment were to characterise the geochemical and physical properties of mine waste expected to be produced from each of the Project deposits and develop associated mine waste management recommendations.

Table 6 presents a summary of the lithological proportions, geochemical and physical characteristics, and associated management recommendations for the key Project mine waste lithology types.

Table 6 Lithological summary of geochemical and physical properties

Lithology	Relative waste rock abundance	Acid formation potential	Metalliferous drainage	Erosion stability classification	Management recommendation
BIF	83.7% - 100%	NAF	None	Moderate-High	Suitable for placement on final rock landform slopes. Potential source of rock armour.
Chert[1]	0.2% - 5.3% (no Chert in Sandtrax pit)	NAF	None	Moderate-High	Suitable for placement on final rock landform slopes. Potential source of rock armour.
Shale[2]	2.1%	NAF	None	Low	Not suitable for placement on final rock landform slopes.
Sandstone[3]	13.9%	NAF	None	Moderate-High	Suitable for placement on final rock landform slopes.
Ore		NAF	None	N/A	No management requirements for ore stockpiles.

Assay information across all Project deposits is both comprehensive and spatially representative for all rock types.

The outcomes of the Phase 0, Phase 1 and Phase 2 geochemical assessments showed that:

- All mine waste types within the planned pit shells and within a 10 m buffer outside of the pit shells, were classified as non-acid-forming (NAF).
- No significant enrichment in any element was identified from multi-element and water extraction testwork. All mine waste types from all deposits should release negligible metals / metalloids during weathering.

An assessment of the physical characteristics and erosion stability of mine waste from the Project showed that:

- BIFs, cherts and sandstones will be the dominant waste rock lithology types from each deposit (>95%) and these are likely to display moderate-high erosion stability.

[1] Miralga East and West pits only
[2] Miralga West pit only
[3] Miralga West pit only

- Shales will only represent a minor proportion (2.1%) of the total waste rock volume from Miralga West pit and are likely to display low erosion stability.

Based on the results presented in this report, Mine Earth make the following recommendations for mine waste management:

- All waste rock types (BIF, chert, shale and sandstone) from the pit shells of all Project deposits have been classified as NAF and geochemically benign and will not require management from a geochemical perspective.
- BIF will comprise the bulk (83% - 100%) of the waste rock volume to be mined from all Project deposits. BIF, chert and sandstone will likely demonstrate moderate-high erosion stability on final landform slopes and should provide useful sources of durable rock armour.
- Shale will likely demonstrate low erosion stability and is not suitable for placement on final landform surfaces. Shales will only represent a minor proportion (2.1%) of the total waste rock volume from Miralga West pit.

This assessment was conducted from pre-mining drill data. The geochemical and physical properties of waste rock from the Project should be verified during mining and associated management recommendations should be revised accordingly.

6 REFERENCES

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Appendix A

Phase 1 Results

PHASE 1 RESULTS FOR GEOCHEMICAL HOLES - MIRALGA EAST PIT 1

Phase 2	HoleID	From	To	Lith	S	Al2O3	CaO	Fe	K2O	MgO	MnO	Na2O	P	SiO2	TiO2
	MRRC0110	0	2	BIF	0.027	2.72	0.02	59.1	0.07	0.03	0.03	0.02	0.077	5.36	0.38
	MRRC0110	2	4	BIF	0.03	2.04	0.01	60.5	0.01	0.02	0.02	0.005	0.074	2.6	0.4
	MRRC0110	4	6	BIF	0.037	2.24	0.005	59.4	0.005	0.02	0.04	0.005	0.076	2.17	0.42
	MRRC0110	6	8	BIF	0.035	2.99	0.005	56.8	0.01	0.01	0.03	0.005	0.075	2.4	1.48
	MRRC0110	8	10	BIF	0.021	2.24	0.005	59.8	0.005	0.03	0.08	0.005	0.065	1.86	0.24
	MRRC0110	10	12	BIF	0.025	1.94	0.01	58.1	0.005	0.03	0.09	0.005	0.066	5.77	0.18
	MRRC0110	12	14	BIF	0.027	1.93	0.01	58.8	0.005	0.02	0.1	0.005	0.076	3.66	0.17
1	MRRC0110	14	16	BIF	0.036	1.9	0.01	59.8	0.005	0.02	0.57	0.005	0.08	2.46	0.04
	MRRC0110	16	18	BIF	0.031	1.81	0.01	59.2	0.005	0.02	0.4	0.005	0.135	2.14	0.26
	MRRC0110	18	20	BIF	0.026	2.11	0.02	59.3	0.005	0.03	0.06	0.005	0.149	1.75	0.35
	MRRC0110	20	22	BIF	0.02	2.07	0.01	59	0.005	0.01	0.02	0.005	0.173	1.34	0.33
	MRRC0110	22	24	BIF	0.012	2.06	0.005	59.3	0.005	0.005	0.07	0.005	0.164	1.21	0.26
	MRRC0110	24	26	BIF	0.013	1.77	0.005	60.1	0.005	0.01	0.09	0.005	0.165	1.48	0.05
	MRRC0110	26	28	BIF	0.009	1.41	0.005	60.3	0.005	0.01	0.07	0.005	0.201	1.79	0.03
	MRRC0110	28	30	BIF	0.008	1.96	0.01	59.2	0.005	0.01	0.06	0.005	0.205	1.82	0.04
	MRRC0110	30	32	BIF	0.008	4.15	0.01	54.3	0.005	0.01	0.05	0.005	0.123	6.54	0.17
	MRRC0110	32	34	BIF	0.009	3.04	0.005	56.5	0.005	0.01	0.05	0.005	0.135	4.47	0.06
	MRRC0110	34	36	BIF	0.011	1.55	0.005	60.9	0.005	0.02	0.05	0.005	0.179	1.41	0.03
	MRRC0110	36	38	BIF	0.006	3.16	0.02	56.1	0.005	0.07	0.04	0.005	0.081	5.89	0.1
	MRRC0110	38	40	BIF	0.0025	2.99	0.005	56.3	0.005	0.005	0.11	0.005	0.066	5.74	0.06
	MRRC0110	40	42	BIF	0.0025	1.88	0.005	58.9	0.005	0.005	0.06	0.005	0.077	2.81	0.04
	MRRC0110	42	44	BIF	0.0025	2	0.005	59.2	0.005	0.005	0.04	0.005	0.11	2.58	0.05
	MRRC0110	44	46	BIF	0.0025	3.09	0.005	57.7	0.005	0.005	0.03	0.005	0.1	3.24	0.06
	MRRC0110	46	48	BIF	0.0025	1.9	0.005	46	0.005	0.005	0.05	0.005	0.051	23.5	0.02
	MRRC0110	48	50	BIF	0.0025	1.81	0.005	46.2	0.005	0.005	0.04	0.005	0.063	23.7	0.03
	MRRC0114	0	2	BIF	0.03	3.87	0.03	55.6	0.07	0.06	0.15	0.02	0.078	4.98	0.17
	MRRC0114	2	4	BIF	0.028	3.59	0.05	55.8	0.06	0.09	0.09	0.005	0.057	4.47	0.11
	MRRC0114	4	6	BIF	0.033	3.35	0.16	55.9	0.04	0.1	0.06	0.005	0.062	4.1	0.11
	MRRC0114	6	8	BIF	0.021	2.61	0.07	52.6	0.02	0.06	0.02	0.02	0.059	11.1	0.08
	MRRC0114	8	10	BIF	0.019	2.16	0.06	53.7	0.01	0.05	0.03	0.005	0.053	10.8	0.06
	MRRC0114	10	12	BIF	0.015	1.46	0.04	55.6	0.005	0.04	0.02	0.005	0.046	10.1	0.03
	MRRC0114	12	14	BIF	0.016	1.2	0.04	58	0.005	0.05	0.03	0.02	0.044	9.3	0.02
	MRRC0114	14	16	BIF	0.017	1.15	0.04	60.2	0.005	0.05	0.02	0.005	0.079	6.62	0.02
	MRRC0114	16	18	BIF	0.019	1.28	0.06	55.4	0.005	0.06	0.02	0.02	0.118	9.91	0.005
	MRRC0114	18	20	BIF	0.021	0.97	0.04	54.6	0.005	0.07	0.02	0.03	0.102	11.8	0.005
1	MRRC0114	20	22	BIF	0.015	2.33	0.06	36	0.02	0.09	0.01	0.05	0.139	38.1	0.06
	MRRC0114	22	24	BIF	0.011	2	0.05	29.7	0.02	0.08	0.01	0.05	0.066	49.6	0.02
	MRRC0114	24	26	BIF	0.008	1.43	0.04	24.2	0.05	0.06	0.99	0.07	0.044	57.1	0.03
	MRRC0114	26	28	BIF	0.007	0.8	0.02	36.3	0.01	0.05	0.29	0.04	0.023	40.2	0.005
	MRRC0114	28	30	BIF	0.007	0.62	0.01	33.7	0.005	0.04	0.05	0.04	0.023	45	0.005
	MRRC0114	30	32	BIF	0.0025	0.26	0.01	21.8	0.005	0.03	0.04	0.03	0.012	64.9	0.005
	MRRC0114	32	34	BIF	0.0025	0.27	0.005	23	0.005	0.04	0.03	0.04	0.014	62.8	0.005
	MRRC0114	34	36	BIF	0.0025	0.39	0.005	25.3	0.005	0.04	0.03	0.02	0.015	58.9	0.005
	MRRC0114	36	38	BIF	0.0025	0.28	0.005	29.7	0.005	0.03	0.04	0.03	0.012	52.1	0.005
	MRRC0114	38	40	BIF	0.005	0.42	0.01	27.5	0.005	0.04	0.03	0.03	0.02	55.2	0.005
	MRRC0114	40	42	BIF	0.0025	0.3	0.01	23.1	0.005	0.04	0.02	0.04	0.017	62.1	0.005
	MRRC0114	42	44	BIF	0.0025	0.3	0.005	21.9	0.005	0.03	0.01	0.02	0.017	64.7	0.005
	MRRC0114	44	46	BIF	0.0025	0.31	0.005	20.9	0.005	0.04	0.01	0.03	0.018	66	0.005
	MRRC0114	46	48	BIF	0.0025	0.35	0.01	24.3	0.005	0.04	0.02	0.03	0.023	60.7	0.005
1	MRRC0114	48	50	Chert	0.0025	0.31	0.005	14.7	0.005	0.03	0.01	0.03	0.016	76	0.005
	MRRC0114	50	52	Chert	0.0025	0.17	0.02	7.67	0.005	0.05	0.005	0.03	0.013	87.5	0.005
	MRRC0114	52	54	Chert	0.0025	0.33	0.02	13.9	0.005	0.04	0.01	0.03	0.026	77.4	0.005
	MRRC0114	54	56	Chert	0.005	0.28	0.02	10.3	0.01	0.06	0.01	0.03	0.019	83	0.005
	MRRC0114	56	58	Chert	0.005	0.28	0.02	13.8	0.005	0.04	0.01	0.04	0.028	77.6	0.005
	MRRC0115	0	2	BIF	0.014	1.79	0.02	61.8	0.04	0.06	0.01	0.02	0.048	3.41	0.06
	MRRC0115	2	4	BIF	0.016	2.48	0.02	60.7	0.03	0.04	0.02	0.03	0.049	3.19	0.08
	MRRC0115	4	6	BIF	0.01	2.68	0.05	59.6	0.04	0.08	0.02	0.04	0.045	4.33	0.08
	MRRC0115	6	8	BIF	0.013	1.42	0.06	56.2	0.02	0.09	0.02	0.03	0.045	9.55	0.04
	MRRC0115	8	10	BIF	0.013	1.77	0.04	52.4	0.03	0.06	0.02	0.04	0.046	15.1	0.05
	MRRC0115	10	12	BIF	0.013	1.25	0.04	46	0.03	0.06	0.03	0.04	0.032	25.8	0.02
	MRRC0115	12	14	BIF	0.01	0.8	0.02	40.9	0.02	0.04	0.02	0.03	0.025	34.9	0.01
	MRRC0115	14	16	BIF	0.0025	0.36	0.02	35.1	0.01	0.03	0.01	0.04	0.02	46.1	0.005
	MRRC0115	16	18	BIF	0.0025	0.33	0.02	36.2	0.02	0.03	0.01	0.03	0.019	45.4	0.005
	MRRC0115	18	20	BIF	0.0025	0.4	0.02	35.1	0.02	0.04	0.01	0.05	0.023	47.2	0.005
	MRRC0115	20	22	BIF	0.0025	0.31	0.02	31.8	0.01	0.03	0.01	0.04	0.022	51.6	0.005
	MRRC0115	22	24	BIF	0.01	0.24	0.02	23.8	0.005	0.04	0.03	0.04	0.011	62.7	0.005
	MRRC0115	24	26	BIF	0.028	0.31	0.02	30.4	0.005	0.04	0.09	0.03	0.0025	52.4	0.005
	MRRC0115	26	28	BIF	0.041	0.23	0.01	32.8	0.005	0.04	0.09	0.03	0.005	49	0.005
	MRRC0115	28	30	BIF	0.033	0.26	0.01	31.1	0.005	0.04	0.08	0.03	0.005	51.8	0.005
	MRRC0115	30	32	BIF	0.052	0.26	0.01	37	0.01	0.05	0.22	0.03	0.008	42.1	0.005
	MRRC0115	32	34	BIF	0.024	0.2	0.005	31.1	0.01	0.04	0.31	0.02	0.007	50.6	0.005
	MRRC0115	34	36	BIF	0.023	0.2	0.005	27.7	0.01	0.05	0.43	0.02	0.007	56.4	0.005
1	MRRC0115	36	38	BIF	0.05	0.16	0.005	28.3	0.02	0.04	0.82	0.03	0.0025	55.3	0.005
	MRRC0115	38	40	BIF	0.023	0.09	0.005	25.3	0.02	0.04	1.3	0.03	0.0025	58.4	0.005
	MRRC0115	40	42	BIF	0.027	0.17	0.005	35	0.01	0.04	0.53	0.03	0.0025	44.4	0.005
	MRRC0115	42	44	BIF	0.022	0.11	0.005	29.7	0.005	0.02	0.28	0.02	0.0025	53.3	0.005
	MRRC0115	44	46	BIF	0.016	0.09	0.005	22.8	0.005	0.03	0.25	0.02	0.006	64.1	0.005
	MRRC0115	46	48	BIF	0.006	0.05	0.005	19.9	0.005	0.03	0.24	0.03	0.006	67.7	0.005
	MRRC0115	48	50	BIF	0.019	0.06	0.005	14.6	0.005	0.03	0.09	0.02	0.0025	77.3	0.005
	MRRC0115	50	52	BIF	0.013	0.06	0.01	16.1	0.005	0.03	0.2	0.03	0.006	74.2	0.005
	MRRC0115	52	54	BIF	0.007	0.07	0.01	18.8	0.01	0.04	0.39	0.02	0.006	69.6	0.005
	MRRC0115	54	56	BIF	0.01	0.06	0.005	19.3	0.01	0.05	0.52	0.02	0.0025	68.6	0.005
	MRRC0115	56	58	BIF	0.0025	0.06	0.01	21.1	0.005	0.04	0.23	0.02	0.0025	65.9	0.005
	MRRC0115	58	60	BIF	0.047	0.04	0.02	20.9	0.005	0.03	0.19	0.03	0.015	66.5	0.005
	MRRC0115	60	62	BIF	0.07	0.03	0.01	19	0.005	0.03	0.03	0.005	0.009	69.5	0.005
	MRRC0132	0	2	BIF	0.024	1.31	0.07	37.08	0.05	0.05	0.178	0.005	0.013	39.1	0.05
	MRRC0132	2	4	BIF	0.027	1.27	0.03	34.28	0.04	0.005	0.125	0.005	0.013	44.38	0.04
	MRRC0132	4	6	BIF	0.02	0.5	0.02	32.85	0.03	0.005	0.108	0.005	0.012	46.03	0.01
	MRRC0132	6	8	BIF	0.028	0.69	0.03	33.42	0.03	0.005	0.147	0.005	0.04	45.91	0.02
	MRRC0132	8	10	BIF	0.039	1.44	0.03	32.02	0.06	0.005	0.147	0.005	0.046	47.41	0.04
	MRRC0132	10	12	BIF	0.056	0.53	0.03	30.61	0.03	0.005	0.123	0.005	0.045	50.89	0.01
	MRRC0132	12	14	BIF	0.036	0.46	0.03	35.55	0.02	0.01	0.161	0.005	0.014	43.03	0.01
1	MRRC0132	14	16	BIF	0.055	1.16	0.03	30.73	0.03	0.005	0.072	0.005	0.01	48.83	0.02
	MRRC0132	16	18	BIF	0.031	0.91	0.03	31.44	0.04	0.005	0.076	0.005	0.022	47.49	0.02
	MRRC0132	18	20	BIF	0.063	0.8	0.04	35.96	0.04	0.005	0.087	0.005	0.054	42.12	0.02
	MRRC0132	20	22	BIF	0.086	0.53	0.04	34.56	0.03	0.005	0.09	0.005	0.027	46.22	0.01
	MRRC0132	22	24	BIF	0.091	0.97	0.02	32.65	0.03	0.005	0.068	0.005	0.013	48.99	0.02
	MRRC0132	24	26	BIF	0.07	0.62	0.02	34.26	0.03	0.03	0.088	0.005	0.01	45.48	0.01
1	MRRC0133	0	2	BIF	0.022	0.65	0.02	36.9	0.02	0.02	0.239	0.005	0.034	39.84	0.02
	MRRC0133	2	4	BIF	0.014	0.41	0.02	34.49	0.01	0.005	0.461	0.005	0.024	44.18	0.01
	MRRC0133	4	6	BIF	0.012	0.59	0.01	34.55	0.01	0.005	0.364	0.005	0.022	43.14	0.02
	MRRC0133	6	8	BIF	0.025	0.38	0.02	33.52	0.01	0.14	0.607	0.005	0.027	45.09	0.005
	MRRC0133	8	10	BIF	0.042	0.45	0.02	31.31	0.01	0.11	0.411	0.005	0.072	49.08	0.01
	MRRC0133	10	12	BIF	0.032	0.54	0.005	31.11	0.02	0.005	0.343	0.005	0.028	49.67	0.01
	MRRC0133	12	14	BIF	0.047	0.69	0.005	31.81	0.02	0.005	0.253	0.005	0.034	49.25	0.02

1 = Represents Phase 2 sample source

= Outside pit shell plus 10 m buffer zone

PHASE 1 RESULTS FOR GEOCHEMICAL HOLES - MIRALGA EAST PIT 2

Phase 2	HoleID	From	To	Lith	S	Al2O3	CaO	Fe	K2O	MgO	MnO	Na2O	P	SiO2	TiO2
	MRRC0119	0	2	BIF	0.037	2.13	0.57	57.1	0.08	0.09	0.03	0.06	0.086	7.39	0.08
	MRRC0119	2	4	BIF	0.024	1.58	0.85	59.4	0.02	0.07	0.01	0.04	0.12	2.97	0.05
	MRRC0119	4	6	BIF	0.029	1.59	0.3	59.6	0.005	0.05	0.02	0.03	0.096	2.41	0.02
	MRRC0119	6	8	BIF	0.023	1.58	0.18	59.1	0.005	0.05	0.005	0.04	0.117	2.5	0.03
	MRRC0119	8	10	BIF	0.024	2.02	0.49	57.6	0.005	0.07	0.01	0.04	0.136	3.24	0.04
	MRRC0119	10	12	BIF	0.027	2.18	0.22	51.6	0.02	0.07	0.01	0.06	0.111	13.3	0.05
	MRRC0119	12	14	BIF	0.016	1.51	0.56	58.2	0.005	0.06	0.02	0.04	0.115	6.33	0.02
	MRRC0119	14	16	BIF	0.015	1.39	0.45	58.3	0.005	0.06	0.02	0.05	0.107	6.9	0.02
	MRRC0119	16	18	BIF	0.025	1.22	0.04	58.3	0.005	0.05	0.03	0.1	0.096	6.11	0.01
1	MRRC0119	18	20	BIF	0.037	1.17	0.04	57.9	0.005	0.04	0.02	0.07	0.113	7.2	0.01
	MRRC0119	20	22	BIF	0.031	1.12	0.02	57	0.005	0.03	0.06	0.05	0.11	7.73	0.01
	MRRC0119	22	24	BIF	0.028	1.11	0.01	60.3	0.005	0.02	0.04	0.03	0.105	3.1	0.01
	MRRC0119	24	26	BIF	0.025	1.05	0.005	60.3	0.005	0.03	0.04	0.02	0.1	3.06	0.01
	MRRC0119	26	28	BIF	0.022	2.7	0.005	57.2	0.005	0.03	0.03	0.03	0.071	5.91	0.01
	MRRC0119	28	30	BIF	0.023	3.88	0.005	53.8	0.005	0.02	0.03	0.03	0.047	8.49	0.03
	MRRC0119	30	32	BIF	0.02	2.92	0.01	54.7	0.005	0.03	0.02	0.03	0.068	7.81	0.02
	MRRC0119	32	34	BIF	0.024	1.76	0.01	56.3	0.005	0.03	0.21	0.01	0.125	7.16	0.02
	MRRC0119	34	36	BIF	0.013	0.77	0.005	46.4	0.005	0.02	0.08	0.01	0.08	25.1	0.005
	MRRC0119	36	38	BIF	0.014	0.94	0.01	49.5	0.005	0.01	0.01	0.02	0.098	20.2	0.005
	MRRC0119	38	40	BIF	0.019	1.71	0.005	44.4	0.005	0.01	0.02	0.005	0.101	26.2	0.005
	MRRC0119	40	42	BIF	0.008	0.39	0.01	46.5	0.005	0.02	0.005	0.02	0.102	25.2	0.005
1	MRRC0119	42	44	BIF	0.012	0.43	0.01	43	0.005	0.01	0.01	0.03	0.089	30.7	0.005
	MRRC0119	44	46	BIF	0.007	0.28	0.005	30.2	0.005	0.02	0.01	0.03	0.066	51.5	0.005
	MRRC0119	46	48	BIF	0.008	0.21	0.01	33.7	0.005	0.01	0.005	0.03	0.121	46	0.005
	MRRC0119	48	50	BIF	0.008	0.18	0.005	38.9	0.005	0.005	0.005	0.03	0.065	38.6	0.005
	MRRC0119	50	52	BIF	0.005	0.18	0.005	53.1	0.005	0.02	0.005	0.03	0.118	14.9	0.005
	MRRC0117	0	2	BIF	0.005	0.18	0.005	5.12	0.005	0.02	0.02	0.02	0.0025	92.1	0.005
	MRRC0117	2	4	BIF	0.009	0.2	0.005	6.05	0.005	0.02	0.02	0.02	0.0025	90.5	0.005
	MRRC0117	4	6	BIF	0.01	0.08	0.005	7.19	0.005	0.01	0.02	0.02	0.0025	89.2	0.005
	MRRC0117	6	8	BIF	0.025	0.11	0.005	12.9	0.005	0.02	0.02	0.02	0.0025	80	0.005
1	MRRC0117	8	10	BIF	0.044	0.36	0.005	20.7	0.005	0.03	0.05	0.005	0.005	67.7	0.03
	MRRC0117	10	12	BIF	0.036	0.45	0.005	24.4	0.005	0.03	0.05	0.02	0.006	60.8	0.02
	MRRC0117	12	14	BIF	0.01	0.26	0.005	26.5	0.005	0.03	0.08	0.02	0.006	57.3	0.005
	MRRC0117	14	16	BIF	0.005	1.12	0.005	19.9	0.005	0.04	0.04	0.03	0.006	66.5	0.02
	MRRC0117	16	18	BIF	0.0025	1.28	0.005	19.2	0.005	0.03	0.05	0.02	0.006	67.2	0.005
	MRRC0117	18	20	BIF	0.009	0.95	0.005	25.3	0.01	0.02	0.12	0.02	0.005	58.1	0.005
	MRRC0117	20	22	BIF	0.043	0.5	0.005	26.9	0.03	0.03	0.07	0.02	0.0025	57.2	0.005
	MRRC0117	22	24	BIF	0.04	0.31	0.005	28	0.005	0.05	0.12	0.01	0.0025	56	0.005
	MRRC0117	24	26	BIF	0.033	0.27	0.005	27.4	0.005	0.04	0.09	0.02	0.0025	57.2	0.005
	MRRC0117	26	28	BIF	0.01	0.31	0.005	20.6	0.01	0.03	0.35	0.02	0.0025	66.7	0.005
	MRRC0117	28	30	BIF	0.0025	0.29	0.005	18	0.03	0.02	0.79	0.03	0.0025	70.1	0.005
	MRRC0117	30	32	BIF	0.0025	0.39	0.005	20.5	0.02	0.02	0.3	0.03	0.0025	66.3	0.005
	MRRC0117	32	34	BIF	0.006	0.44	0.005	23.2	0.01	0.01	0.35	0.01	0.005	61.3	0.005
	MRRC0117	34	36	BIF	0.027	0.32	0.005	28.3	0.02	0.02	0.41	0.02	0.005	54.4	0.005
	MRRC0117	36	38	BIF	0.006	1.17	0.005	8.65	0.04	0.03	0.21	0.03	0.005	84.2	0.02
	MRRC0117	38	40	BIF	0.009	0.53	0.005	20.3	0.07	0.02	4.68	0.03	0.006	61.1	0.005
	MRRC0117	40	42	BIF	0.032	0.22	0.005	34	0.005	0.04	0.31	0.005	0.005	46.5	0.005
	MRRC0117	42	44	BIF	0.021	0.23	0.005	29.5	0.005	0.04	0.19	0.01	0.006	53	0.005
	MRRC0117	44	46	BIF	0.02	0.16	0.005	30.5	0.005	0.05	0.15	0.02	0.005	51.5	0.005
	MRRC0117	46	48	BIF	0.043	0.26	0.005	30.3	0.01	0.04	0.19	0.01	0.006	52.3	0.005
1	MRRC0117	48	50	BIF	0.06	0.19	0.005	33.3	0.005	0.06	0.22	0.01	0.006	47.9	0.005
	MRRC0117	50	52	BIF	0.04	0.22	0.005	28.2	0.01	0.03	0.19	0.02	0.0025	55	0.005
	MRRC0117	52	54	BIF	0.015	0.21	0.005	26.3	0.005	0.02	0.09	0.02	0.011	59.2	0.005
	MRRC0117	54	56	BIF	0.012	0.14	0.005	31.7	0.005	0.11	1.16	0.01	0.0025	48.2	0.005
	MRRC0117	56	58	BIF	0.015	0.15	0.005	29.8	0.005	0.12	1.11	0.01	0.0025	51	0.005
	MRRC0117	58	60	BIF	0.01	0.17	0.005	29	0.005	0.15	1.3	0.02	0.0025	51.8	0.005
	MRRC0117	60	62	BIF	0.021	0.21	0.005	27.3	0.005	0.05	0.44	0.01	0.012	56	0.005
	MRRC0117	62	64	BIF	0.006	0.56	0.005	41	0.005	0.005	0.17	0.005	0.113	33.1	0.005
1	MRRC0117	64	66	Chert	0.0025	1.7	0.005	17.5	0.07	0.005	0.13	0.02	0.056	69.1	0.02
	MRRC0117	66	68	Chert	0.0025	0.53	0.005	4.91	0.005	0.02	0.11	0.02	0.01	91.2	0.005
	MRRC0117	68	70	Chert	0.0025	1.06	0.005	10.3	0.02	0.005	0.24	0.02	0.025	81.7	0.005
	MRRC0117	70	72	Chert	0.0025	1.81	0.005	2.17	0.04	0.005	0.16	0.03	0.008	93.8	0.005
	MRRC0117	72	74	Chert	0.0025	1.49	0.005	4.52	0.04	0.005	0.21	0.04	0.011	90	0.005
	MRRC0117	74	76	BIF	0.022	0.41	0.005	30.7	0.02	0.07	0.49	0.005	0.013	50.2	0.005
	MRRC0117	76	78	BIF	0.095	0.21	0.005	40.6	0.02	0.03	1.42	0.005	0.008	35.3	0.005
	MRRC0117	78	80	BIF	0.115	0.19	0.005	38.5	0.02	0.02	1.28	0.02	0.007	39.2	0.005
	MRRC0117	80	82	BIF	0.109	0.15	0.005	35.2	0.03	0.01	1.72	0.01	0.008	43.8	0.005
	MRRC0117	82	84	BIF	0.092	0.17	0.005	36.6	0.03	0.02	1.24	0.02	0.007	42	0.005
	MRRC0117	84	86	BIF	0.075	0.14	0.005	34	0.03	0.02	2.08	0.01	0.006	44.8	0.005
	MRRC0117	86	88	BIF	0.047	0.15	0.005	34.6	0.02	0.005	1.45	0.01	0.006	44.5	0.005
	MRRC0117	88	90	BIF	0.017	0.16	0.005	31.3	0.05	0.05	2.22	0.02	0.005	48	0.005
1	MRRC0120	0	2	BIF	0.045	1.54	3.92	27.5	0.09	0.19	0.02	0.06	0.019	46.4	0.07
	MRRC0120	2	4	BIF	0.019	0.78	0.19	14.7	0.01	0.05	0.01	0.04	0.02	74.6	0.02
	MRRC0120	4	6	BIF	0.012	0.33	0.14	16.6	0.005	0.03	0.01	0.04	0.014	72.6	0.005
	MRRC0120	6	8	BIF	0.009	0.69	0.11	27.3	0.005	0.04	0.02	0.03	0.017	55.2	0.005
	MRRC0120	8	10	BIF	0.01	0.29	0.12	28.8	0.005	0.03	0.02	0.02	0.015	53.1	0.005
	MRRC0120	10	12	BIF	0.013	0.51	0.05	24.6	0.005	0.03	0.03	0.03	0.008	59.7	0.005
	MRRC0120	12	14	BIF	0.017	1.17	0.09	23.9	0.01	0.07	0.06	0.03	0.017	59.8	0.02
	MRRC0120	14	16	BIF	0.0025	0.47	0.03	23.5	0.005	0.03	0.03	0.03	0.011	62.8	0.005
	MRRC0120	16	18	BIF	0.067	0.24	0.02	29.9	0.005	0.02	0.07	0.01	0.006	54	0.005

1 = Represents Phase 2 sample source

= Outside pit shell plus 10 m buffer zone

PHASE 1 RESULTS FOR GEOCHEMICAL HOLES - MIRALGA EAST PIT 3

Phase 2	HoleID	From	To	Lith	S	Al2O3	CaO	Fe	K2O	MgO	MnO	Na2O	P	SiO2	TiO2
	MRRC0136	0	2	BIF	0.01	3.12	0.04	52.92	0.12	0.04	0.028	0.03	0.077	9.98	0.11
	MRRC0136	2	4	BIF	0.012	2.11	0.02	56.72	0.03	0.04	0.043	0.02	0.064	4.69	0.04
	MRRC0136	4	6	BIF	0.017	1.69	0.02	57.04	0.01	0.02	0.036	0.02	0.075	4.95	0.03
	MRRC0136	6	8	BIF	0.019	2.01	0.02	55.9	0.02	0.04	0.068	0.02	0.096	6.53	0.03
	MRRC0136	8	10	BIF	0.011	2.3	0.01	56.59	0.01	0.04	0.044	0.02	0.082	5.14	0.03
	MRRC0137	0	2	BIF	0.01	2.43	0.02	51.76	0.07	0.02	0.08	0.02	0.085	11.98	0.06
	MRRC0137	2	4	BIF	0.014	2.48	0.38	53.72	0.05	0.04	0.059	0.01	0.078	8.44	0.06
1	MRRC0137	4	6	BIF	0.015	2.41	0.17	55.88	0.03	0.06	0.037	0.01	0.068	6.55	0.05
	MRRC0137	6	8	BIF	0.012	1.68	0.08	58.1	0.02	0.03	0.032	0.01	0.125	3.45	0.02
	MRRC0137	8	10	BIF	0.01	1.3	0.06	57	0.01	0.03	0.027	0.01	0.125	5.82	0.02
	MRRC0137	10	12	BIF	0.013	1.16	0.05	55.27	0.02	0.02	0.028	0.01	0.12	8.53	0.02
	MRRC0137	12	14	BIF	0.009	0.8	0.01	54.4	0.005	0.005	0.025	0.005	0.104	10.15	0.01
	MRRC0137	14	16	BIF	0.008	0.9	0.01	57.57	0.005	0.005	0.018	0.01	0.101	6.73	0.005
	MRRC0137	16	18	BIF	0.007	0.81	0.01	57.03	0.005	0.005	0.022	0.005	0.094	6.86	0.005
	MRRC0137	18	20	BIF	0.008	0.73	0.01	54.96	0.005	0.005	0.032	0.005	0.093	9.93	0.005
	MRRC0137	20	22	BIF	0.01	0.74	0.01	50.02	0.005	0.005	0.036	0.005	0.117	17.42	0.01
	MRRC0138	0	2	BIF	0.011	3.22	0.08	52.12	0.04	0.03	0.049	0.02	0.092	12.29	0.08
	MRRC0138	2	4	BIF	0.018	2.37	0.04	57.92	0.02	0.03	0.052	0.05	0.131	4.85	0.06
	MRRC0138	4	6	BIF	0.017	4	0.07	53.26	0.05	0.09	0.045	0.04	0.071	8.39	0.09
	MRRC0138	6	8	BIF	0.01	2.17	0.03	56.87	0.02	0.04	0.032	0.03	0.055	4.91	0.04
	MRRC0138	8	10	BIF	0.013	1.66	0.02	58.74	0.005	0.02	0.045	0.02	0.073	3.21	0.02
	MRRC0138	10	12	BIF	0.01	1.46	0.04	58.76	0.005	0.02	0.032	0.02	0.071	3.79	0.02
	MRRC0138	12	14	BIF	0.011	1.29	0.005	58.77	0.005	0.005	0.025	0.005	0.059	3.32	0.01
	MRRC0138	14	16	BIF	0.011	1.17	0.005	59.36	0.005	0.01	0.019	0.01	0.063	2.82	0.005
	MRRC0138	16	18	BIF	0.011	1.9	0.01	56.38	0.02	0.005	0.031	0.01	0.064	6.49	0.03
	MRRC0138	18	20	BIF	0.01	1.13	0.005	56.32	0.005	0.005	0.03	0.005	0.055	6.87	0.02
	MRRC0138	20	22	BIF	0.009	1.07	0.005	54.3	0.005	0.005	0.028	0.005	0.074	10.47	0.02
	MRRC0138	22	24	BIF	0.009	3.21	0.02	47.56	0.03	0.005	0.039	0.005	0.054	18.96	0.04
	MRRC0138	24	26	BIF	0.0025	1.25	0.02	5.47	0.05	0.005	0.172	0.005	0.02	88.37	0.05
	MRRC0138	26	28	BIF	0.0025	1.09	0.03	4.64	0.05	0.005	-0.005	0.005	0.024	91.28	0.06
	MRRC0138	28	30	BIF	0.0025	1.16	0.02	4.81	0.06	0.005	-0.005	0.005	0.018	90.75	0.05
1	MRRC0138	30	32	BIF	0.0025	0.85	0.02	2.51	0.07	0.005	-0.005	0.005	0.012	95.41	0.04
	MRRC0138	32	34	BIF	0.0025	0.7	0.02	1.41	0.06	0.005	-0.005	0.005	0.008	96.51	0.04
	MRRC0138	34	36	BIF	0.0025	0.7	0.02	2.09	0.07	0.005	-0.005	0.005	0.013	95.99	0.04
	MRRC0138	36	38	BIF	0.0025	0.78	0.01	5.99	0.06	0.005	-0.005	0.005	0.016	88.63	0.04
	MRRC0138	38	40	BIF	0.0025	0.95	0.01	9.13	0.09	0.005	0.008	0.005	0.019	84.02	0.04
	MRRC0138	40	42	BIF	0.006	0.99	0.005	36.49	0.05	0.005	0.026	0.005	0.061	38.78	0.02
	MRRC0138	42	44	BIF	0.006	0.76	0.005	55.14	0.02	0.005	0.049	0.005	0.073	10.75	0.01
	MRRC0138	44	46	BIF	0.0025	0.67	0.005	50.35	0.02	0.005	0.035	0.005	0.052	17.72	0.005
	MRRC0138	46	48	BIF	0.0025	0.88	0.005	53.04	0.02	0.005	0.04	0.005	0.051	13.18	0.005
	MRRC0138	48	50	BIF	0.0025	1.19	0.005	21.53	0.09	0.005	-0.005	0.005	0.033	63.54	0.04
	MRRC0139	0	2	BIF	0.009	2.46	0.05	18.99	0.14	0.005	0.043	0.005	0.013	65.83	0.1
	MRRC0139	2	4	BIF	0.01	2.91	0.09	23.2	0.19	0.005	0.015	0.005	0.01	57.33	0.09
	MRRC0139	4	6	BIF	0.0025	0.71	0.02	22.99	0.02	0.005	0.008	0.005	0.009	61.08	0.02
	MRRC0139	6	8	BIF	0.006	0.72	0.03	21.52	0.02	0.005	0.006	0.005	0.014	64.21	0.02
	MRRC0139	8	10	BIF	0.006	0.73	0.34	18.14	0.02	0.005	-0.005	0.005	0.01	69.07	0.03
	MRRC0139	10	12	BIF	0.006	1.13	0.27	24.84	0.06	0.005	-0.005	0.005	0.012	57.32	0.04
	MRRC0139	12	14	BIF	0.0025	0.84	0.03	22.73	0.03	0.005	-0.005	0.005	0.013	61.83	0.02
	MRRC0139	14	16	BIF	0.006	0.72	0.03	25.52	0.02	0.005	0.006	0.005	0.017	57.37	0.02
1	MRRC0139	16	18	BIF	0.005	3.48	0.26	17.01	0.36	0.005	-0.005	0.005	0.019	66.64	0.1
	MRRC0139	18	20	BIF	0.0025	1.5	0.18	20.71	0.17	0.005	-0.005	0.005	0.024	63.59	0.06
	MRRC0139	20	22	BIF	0.005	0.71	0.05	29.11	0.03	0.005	0.012	0.005	0.033	51.55	0.02
	MRRC0139	22	24	BIF	0.0025	0.6	0.1	29.55	0.03	0.005	0.006	0.005	0.028	51.24	0.02
	MRRC0139	24	26	BIF	0.0025	0.45	0.01	28.67	0.01	0.005	0.008	0.005	0.028	52.67	0.01
	MRRC0139	26	28	BIF	0.0025	0.31	0.01	9.15	0.01	0.005	-0.005	0.005	0.012	84.59	0.02
	MRRC0139	28	30	BIF	0.0025	0.44	0.01	23.84	0.005	0.005	-0.005	0.005	0.026	60.79	0.01
	MRRC0139	30	32	BIF	0.006	0.88	0.005	53.75	0.005	0.005	0.213	0.005	0.062	11.63	0.005
	MRRC0139	32	34	BIF	0.006	0.9	0.005	55.44	0.005	0.005	0.092	0.005	0.073	10.59	0.005
	MRRC0139	34	36	BIF	0.006	1.36	0.005	40.31	0.08	0.005	0.032	0.005	0.047	32.27	0.03
	MRRC0139	36	38	BIF	0.009	0.71	0.005	39.5	0.02	0.005	0.035	0.005	0.043	35.51	0.01
	MRRC0139	38	40	BIF	0.007	0.76	0.01	44.62	0.01	0.005	0.068	0.005	0.056	26.6	0.005
	MRRC0139	40	42	BIF	0.006	0.65	0.005	49.26	0.005	0.005	0.108	0.005	0.059	19.55	0.005
	MRRC0139	42	44	BIF	0.006	0.68	0.005	45.89	0.01	0.005	0.172	0.005	0.044	25.68	0.01
	MRRC0139	44	46	BIF	0.0025	0.79	0.005	48.22	0.005	0.005	0.155	0.005	0.049	20.51	0.005
	MRRC0139	46	48	BIF	0.0025	0.63	0.005	41.34	0.01	0.005	0.121	0.005	0.037	32.44	0.01
	MRRC0139	48	50	BIF	0.0025	0.78	0.01	12.72	0.02	0.005	0.032	0.005	0.019	77.77	0.03
	MRRC0135	0	2	BIF	0.01	3.92	0.03	39.93	0.11	0.005	0.013	0.005	0.043	29.93	0.2
	MRRC0135	2	4	BIF	0.006	2.52	0.02	35.77	0.04	0.005	-0.005	0.005	0.03	37.89	0.09
	MRRC0135	4	6	BIF	0.0025	3.4	0.7	17.4	0.05	0.005	-0.005	0.005	0.019	65.35	0.14
	MRRC0135	6	8	BIF	0.009	1.91	0.24	30.39	0.06	0.005	0.025	0.005	0.024	47.97	0.07
1	MRRC0135	8	10	BIF	0.012	2.65	0.98	28.35	0.16	0.03	0.012	0.005	0.033	48.2	0.08
	MRRC0135	10	12	BIF	0.008	1.12	0.05	33.25	0.05	0.005	0.009	0.005	0.05	43.27	0.04
	MRRC0135	12	14	BIF	0.006	0.57	0.01	33.71	0.02	0.005	0.012	0.005	0.046	43.66	0.02
	MRRC0135	14	16	BIF	0.007	1.08	0.03	23.25	0.05	0.005	0.008	0.005	0.034	60.87	0.05
	MRRC0135	16	18	BIF	0.008	5.14	0.3	16.62	0.23	0.03	-0.005	0.005	0.021	64.78	0.18
	MRRC0135	18	20	BIF	0.008	1.16	0.01	33.96	0.04	0.005	0.008	0.005	0.039	43.38	0.03
	MRRC0135	20	22	BIF	0.006	4.84	0.03	20.51	0.55	0.005	-0.005	0.005	0.031	59.78	0.14
	MRRC0135	22	24	BIF	0.008	1.58	0.01	34.51	0.1	0.005	0.05	0.005	0.045	41.49	0.04
	MRRC0135	24	26	BIF	0.008	0.68	0.005	40.23	0.02	0.005	0.045	0.005	0.031	33.9	0.01
	MRRC0135	26	28	BIF	0.008	0.62	0.005	48.41	0.005	0.005	0.019	0.005	0.032	20.66	0.005
	MRRC0135	28	30	BIF	0.008	0.65	0.005	48.37	0.005	0.005	0.019	0.005	0.036	20.33	0.005
	MRRC0135	30	32	BIF	0.008	0.8	0.005	51.45	0.005	0.005	0.025	0.005	0.048	15.66	0.005
	MRRC0135	32	34	BIF	0.01	1.16	0.005	47.47	0.01	0.005	0.017	0.005	0.049	21.7	0.03
	MRRC0135	34	36	BIF	0.009	1.48	0.005	38.4	0.03	0.005	0.015	0.005	0.044	35.23	0.04
	MRRC0135	36	38	BIF	0.011	1.71	0.005	51.92	0.11	0.005	0.03	0.005	0.057	14.64	0.04
1	MRRC0135	38	40	BIF	0.009	0.92	0.005	55.47	0.02	0.005	0.027	0.005	0.06	9.66	0.01
	MRRC0135	40	42	BIF	0.008	0.74	0.005	53.81	0.005	0.005	0.044	0.005	0.062	11.52	0.02
	MRRC0135	42	44	BIF	0.006	0.57	0.005	51.1	0.005	0.005	0.027	0.005	0.046	16.89	0.005
	MRRC0135	44	46	BIF	0.006	0.74	0.005	49.27	0.005	0.005	0.063	0.005	0.059	18.96	0.01
	MRRC0135	46	48	BIF	0.006	0.74	0.005	50.69	0.005	0.005	0.039	0.005	0.076	16.93	0.01
	MRRC0135	48	50	BIF	0.006	1.12	0.005	42.89	0.06	0.005	0.036	0.005	0.043	28.92	0.04
	MRRC0135	50	52	BIF	0.008	0.96	0.005	36.23	0.06	0.005	0.028	0.005	0.029	39.72	0.03
	MRRC0135	52	54	BIF	0.0025	1.08	0.005	29.53	0.03	0.005	0.075	0.005	0.039	50.38	0.03
	MRRC0135	54	56	BIF	0.0025	0.6	0.005	45.77	0.01	0.005	0.105	0.005	0.051	25.33	0.005
	MRRC0135	56	58	BIF	0.0025	0.61	0.005	52.68	0.005	0.005	0.108	0.005	0.067	14.35	0.005
1	MRRC0135	58	60	BIF	0.0025	0.9	0.005	49.36	0.01	0.005	0.161	0.005	0.072	18.19	0.005
	MRRC0135	60	62	BIF	0.0025	0.99	0.005	46.3	0.01	0.005	0.124	0.005	0.069	23.15	0.02
	MRRC0135	62	64	BIF	0.0025	0.99	0.005	51.27	0.02	0.005	0.119	0.005	0.066	16.55	0.02
	MRRC0135	64	66	BIF	0.0025	2.25	0.005	42.58	0.11	0.005	0.054	0.005	0.064	27.89	0.06

1 = Represents Phase 2 sample source

= Outside pit shell plus 10 m buffer zone

PHASE 1 RESULTS FOR GEOCHEMICAL HOLES - MIRALGA WEST

Phase 2	HoleID	From	To	Lith	S	Al2O3	CaO	Fe	K2O	MgO	MnO	Na2O	P	SiO2	TiO2
	MRRC0091	0	2	BIF	0.02	3.28	0.04	51.6	0.28	0.04	0.005	0.01	0.021	13.2	0.09
	MRRC0091	2	4	BIF	0.054	4.9	0.56	50.2	0.17	0.08	0.005	0.02	0.026	13.9	0.15
	MRRC0091	4	6	BIF	0.035	4.23	0.53	50.9	0.05	0.05	0.005	0.005	0.018	14.2	0.08
	MRRC0091	6	8	BIF	0.022	1.86	0.83	54.4	0.02	0.13	0.005	0.005	0.014	9.38	0.04
	MRRC0091	8	10	BIF	0.024	1.14	0.23	56.3	0.005	0.11	0.005	0.01	0.022	8.61	0.01
	MRRC0091	10	12	BIF	0.026	3.77	0.07	55.3	0.03	0.06	0.005	0.005	0.038	8.15	0.12
	MRRC0091	12	14	BIF	0.018	1.63	0.05	56.5	0.005	0.06	0.005	0.005	0.035	7.88	0.03
	MRRC0091	14	16	BIF	0.015	0.85	0.05	59.6	0.005	0.08	0.005	0.005	0.037	4.02	0.005
	MRRC0091	16	18	BIF	0.02	1.03	0.08	58.9	0.005	0.12	0.005	0.01	0.038	5.74	0.01
	MRRC0091	18	20	BIF	0.019	0.91	0.04	59.2	0.005	0.04	0.005	0.02	0.015	6.78	0.02
	MRRC0091	20	22	BIF	0.017	0.87	0.03	59.1	0.005	0.02	0.005	0.02	0.019	5.32	0.005
	MRRC0091	22	24	BIF	0.014	0.68	0.02	58.9	0.005	0.02	0.005	0.005	0.023	5.61	0.005
	MRRC0091	24	26	BIF	0.02	1.39	0.02	59.6	0.005	0.02	0.005	0.005	0.044	2.58	0.01
	MRRC0091	26	28	BIF	0.015	1.07	0.01	60.4	0.005	0.005	0.005	0.005	0.044	1.64	0.005
	MRRC0091	28	30	BIF	0.01	0.77	0.01	60.7	0.005	0.005	0.005	0.01	0.034	2	0.005
	MRRC0091	30	32	BIF	0.009	1.19	0.02	59.9	0.01	0.01	0.005	0.005	0.029	3.29	0.02
	MRRC0091	32	34	BIF	0.009	0.97	0.01	59.8	0.005	0.005	0.005	0.005	0.163	2.97	0.01
	MRRC0091	34	36	BIF	0.012	1.16	0.005	59.5	0.005	0.005	0.005	0.005	0.067	3.68	0.02
	MRRC0091	36	38	BIF	0.01	0.59	0.03	57.2	0.005	0.005	0.005	0.005	0.017	7.74	0.005
	MRRC0091	38	40	BIF	0.017	2.02	0.01	58.7	0.005	0.005	0.005	0.005	0.023	4.39	0.02
	MRRC0091	40	42	BIF	0.022	3.9	0.005	55.8	0.005	0.005	0.005	0.005	0.037	5.81	0.04
	MRRC0091	42	44	BIF	0.031	1.82	0.005	54.8	0.13	0.005	0.005	0.01	0.061	3.71	0.01
	MRRC0091	44	46	BIF	0.029	1.86	0.005	52.8	0.21	0.005	0.005	0.01	0.064	3.76	0.02
	MRRC0091	46	48	BIF	0.013	2.27	0.005	42.9	0.52	0.005	0.005	0.05	0.079	3.26	0.01
	MRRC0091	48	50	BIF	0.019	2.47	0.005	53.1	0.18	0.005	0.005	0.02	0.016	4.75	0.04
	MRRC0091	50	52	BIF	0.011	1.15	0.005	54.8	0.03	0.005	0.005	0.005	0.013	10.6	0.02
	MRRC0091	52	54	Sandstone	0.005	4.39	0.005	24.3	0.77	0.005	0.005	0.05	0.011	54.9	0.14
1	MRRC0091	54	56	Sandstone	0.0025	7.4	0.01	4.17	1.57	0.005	0.005	0.09	0.008	82.7	0.22
	MRRC0091	56	58	Sandstone	0.0025	16.6	0.01	4.28	4	0.05	0.005	0.16	0.01	69.6	0.41
	MRRC0091	58	60	Sandstone	0.0025	13.6	0.01	2.95	3.25	0.03	0.005	0.12	0.008	75.8	0.32
	MRRC0093	0	2	BIF	0.009	1.96	0.02	57.7	0.06	0.04	0.005	0.005	0.015	6.12	0.07
	MRRC0093	2	4	BIF	0.012	1.8	0.1	58	0.03	0.06	0.005	0.005	0.011	8.36	0.03
	MRRC0093	4	6	BIF	0.012	4.37	0.51	53.4	0.01	0.09	0.005	0.01	0.011	10.3	0.12
	MRRC0093	6	8	BIF	0.011	1.99	1.08	55.8	0.005	0.2	0.005	0.02	0.021	8.52	0.04
	MRRC0093	8	10	BIF	0.011	3.08	1.06	53.6	0.005	0.14	0.005	0.04	0.021	11.2	0.06
	MRRC0093	10	12	BIF	0.014	4.22	0.4	51.9	0.04	0.08	0.005	0.06	0.024	12.8	0.09
	MRRC0093	12	14	BIF	0.01	6.03	0.2	42.5	0.2	0.08	0.005	0.05	0.022	25.6	0.17
	MRRC0093	14	16	Shale	0.0025	7.71	0.05	28.3	0.41	0.09	0.005	0.05	0.018	46.3	0.21
	MRRC0093	16	18	Shale	0.0025	5.28	0.03	13	0.22	0.05	0.005	0.05	0.013	72.8	0.14
	MRRC0093	18	20	Shale	0.0025	5.26	0.03	11.5	0.36	0.06	0.005	0.04	0.009	74.6	0.12
	MRRC0093	20	22	Shale	0.0025	6.81	0.03	9.35	0.27	0.06	0.005	0.04	0.009	75.8	0.17
	MRRC0093	22	24	Shale	0.0025	6.8	0.03	4.61	0.26	0.07	0.005	0.06	0.006	83	0.18
	MRRC0093	24	26	Shale	0.0025	6.05	0.07	5.85	0.27	0.06	0.005	0.05	0.007	82.3	0.15
	MRRC0093	26	28	Shale	0.0025	6.14	0.04	7.89	0.18	0.06	0.005	0.05	0.008	78.8	0.14
	MRRC0093	28	30	Shale	0.0025	6.12	0.05	4.33	0.07	0.06	0.005	0.05	0.006	84.2	0.14
	MRRC0093	30	32	Shale	0.005	6.68	0.04	5.78	0.2	0.09	0.005	0.06	0.009	80.6	0.17
	MRRC0093	32	34	Shale	0.0025	7.83	0.03	4.1	0.27	0.09	0.005	0.06	0.008	82.1	0.21
1	MRRC0093	34	36	Shale	0.007	10.2	0.13	22	0.53	0.16	0.005	0.04	0.011	50.8	0.26
	MRRC0093	36	38	Shale	0.011	4.46	0.03	43.3	0.16	0.09	0.005	0.02	0.01	24.3	0.1
	MRRC0093	38	40	BIF	0.012	0.87	0.02	27.2	0.03	0.01	0.005	0.02	0.011	55.2	0.07
	MRRC0093	40	42	BIF	0.007	0.8	0.02	32.9	0.02	0.02	0.005	0.02	0.008	46	0.01
	MRRC0093	42	44	BIF	0.011	1.74	0.03	52.2	0.02	0.03	0.005	0.01	0.017	14.2	0.03
	MRRC0093	44	46	BIF	0.011	1.13	0.04	56.5	0.01	0.03	0.005	0.01	0.018	8.01	0.01
	MRRC0093	46	48	BIF	0.019	2.74	0.04	55.9	0.06	0.05	0.005	0.02	0.035	6.26	0.04
	MRRC0093	48	50	BIF	0.017	3.63	0.04	48.5	0.07	0.05	0.005	0.03	0.038	16.3	0.11
	MRRC0093	50	52	BIF	0.012	4.28	0.03	30.3	0.12	0.04	0.005	0.09	0.031	43.3	0.16
	MRRC0093	52	54	BIF	0.011	0.81	0.02	55.9	0.01	0.005	0.005	0.04	0.021	8.75	0.005
	MRRC0093	54	56	BIF	0.009	0.74	0.02	58.3	0.02	0.005	0.005	0.04	0.015	5.36	0.005
	MRRC0093	56	58	BIF	0.013	1.95	0.03	57	0.01	0.02	0.005	0.04	0.016	6.69	0.03
	MRRC0093	58	60	BIF	0.013	1.87	0.03	54.4	0.01	0.02	0.005	0.05	0.022	11	0.03
	MRRC0093	60	62	BIF	0.008	2.77	0.03	27.8	0.04	0.02	0.005	0.06	0.016	51	0.07
	MRRC0093	62	64	BIF	0.016	1.22	0.03	48.1	0.12	0.01	0.005	0.06	0.019	19.6	0.02
	MRRC0093	64	66	BIF	0.013	0.71	0.02	43.1	0.06	0.005	0.005	0.04	0.016	28.6	0.01
	MRRC0093	66	68	BIF	0.009	0.37	0.01	50	0.04	0.005	0.005	0.05	0.024	19.4	0.005
	MRRC0093	68	70	BIF	0.011	0.45	0.01	49.7	0.01	0.01	0.005	0.04	0.021	21.7	0.005
	MRRC0093	70	72	BIF	0.008	0.5	0.01	48.5	0.05	0.005	0.005	0.04	0.02	22.2	0.005
	MRRC0093	72	74	BIF	0.007	0.42	0.005	48.9	0.04	0.005	0.005	0.04	0.023	21.7	0.005
	MRRC0093	74	76	BIF	0.005	0.43	0.005	43	0.03	0.005	0.005	0.04	0.026	30.6	0.005
	MRRC0093	76	78	BIF	0.006	0.6	0.005	47.2	0.01	0.005	0.005	0.04	0.02	23.6	0.005
	MRRC0093	78	80	BIF	0.005	0.37	0.005	47.7	0.01	0.005	0.005	0.04	0.019	22.7	0.005
	MRRC0093	80	82	BIF	0.007	0.9	0.005	44.4	0.05	0.005	0.005	0.05	0.027	26	0.02
	MRRC0093	82	84	BIF	0.005	0.68	0.005	37.9	0.03	0.005	0.005	0.05	0.024	37.4	0.005
	MRRC0093	84	86	BIF	0.006	0.5	0.005	43.4	0.03	0.005	0.005	0.05	0.021	29.1	0.005
	MRRC0093	86	88	BIF	0.0025	0.53	0.005	27.6	0.06	0.005	0.005	0.06	0.015	53.5	0.005
	MRRC0093	88	90	BIF	0.0025	0.4	0.01	28.6	0.05	0.005	0.005	0.06	0.019	52.1	0.005
	MRRC0093	90	92	BIF	0.0025	0.44	0.01	20.4	0.04	0.01	0.005	0.06	0.013	65.5	0.005
1	MRRC0093	92	94	BIF	0.005	0.82	0.005	24.2	0.06	0.005	0.005	0.06	0.017	58.5	0.01
	MRRC0093	94	96	BIF	0.007	0.84	0.005	36.2	0.06	0.005	0.005	0.04	0.023	38.8	0.01
	MRRC0093	96	98	BIF	0.007	1.38	0.005	18.9	0.07	0.005	0.005	0.06	0.012	66.4	0.05
	MRRC0093	98	100	BIF	0.0025	1.44	0.005	13.5	0.08	0.005	0.005	0.06	0.008	74.1	0.02
	MRRC0093	100	102	Sandstone	0.0025	4.05	0.005	15.7	0.52	0.005	0.005	0.08	0.013	69.2	0.13
	MRRC0093	102	104	Sandstone	0.011	4.1	0.04	40.3	0.03	0.04	0.005	0.05	0.009	30.4	0.1
	MRRC0093	104	106	Sandstone	0.0025	14	0.02	6.36	2.23	0.07	0.005	0.13	0.023	70.2	0.49
	MRRC0093	106	108	Sandstone	0.0025	9.58	0.02	1.95	2.2	0.07	0.005	0.14	0.007	83.2	0.21
	MRRC0093	108	110	Sandstone	0.0025	7.77	0.02	2.62	1.84	0.06	0.005	0.13	0.006	84.5	0.16
	MRRC0093	110	112	Sandstone	0.0025	10.5	0.02	2.58	2.48	0.08	0.005	0.15	0.007	80.7	0.23
	MRRC0093	112	114	Sandstone	0.007	13	0.02	3.79	2.99	0.26	0.005	0.16	0.007	75.2	0.27

1 = Represents Phase 2 sample source

= Outside pit shell plus 10 m buffer zone

PHASE 1 RESULTS FOR GEOCHEMICAL HOLES - MIRALGA WEST

Phase 2	HoleID	From	To	Lith	S	Al2O3	CaO	Fe	K2O	MgO	MnO	Na2O	P	SiO2	TiO2
	MRRC0094	0	2	BIF	0.016	5.22	0.07	31.8	0.38	0.1	0.005	0.005	0.018	42.18	0.17
	MRRC0094	2	4	BIF	0.018	7.98	0.24	23.86	0.23	0.14	0.005	0.005	0.014	51.06	0.23
	MRRC0094	4	6	BIF	0.028	3.22	0.25	28.53	0.08	0.13	0.005	0.005	0.011	50.23	0.08
	MRRC0094	6	8	BIF	0.017	2.22	0.09	31.54	0.06	0.1	0.005	0.005	0.01	47.36	0.05
	MRRC0094	8	10	BIF	0.008	1.5	0.08	28.74	0.02	0.03	0.005	0.005	0.008	53.24	0.03
	MRRC0094	10	12	BIF	0.007	0.85	0.04	33.77	0.02	0.12	0.005	0.005	0.007	45.56	0.02
	MRRC0094	12	14	BIF	0.009	1.03	0.06	31.85	0.02	0.22	0.005	0.005	0.007	47.48	0.03
	MRRC0094	14	16	BIF	0.01	1.15	0.11	35.08	0.03	0.16	0.005	0.005	0.011	43.77	0.03
	MRRC0094	16	18	BIF	0.011	1.18	0.09	36.45	0.02	0.09	0.005	0.005	0.009	43.54	0.04
	MRRC0094	18	20	BIF	0.027	0.91	0.07	35.7	0.01	0.08	0.005	0.005	0.01	44.39	0.02
	MRRC0094	20	22	BIF	0.056	0.83	0.06	34.69	0.01	0.05	0.005	0.005	0.009	45.13	0.02
	MRRC0094	22	24	BIF	0.088	0.59	0.05	33.08	0.02	0.03	0.005	0.005	0.005	47.85	0.02
	MRRC0094	24	26	BIF	0.019	0.55	0.05	34.05	0.01	0.29	0.005	0.005	0.007	44.34	0.02
	MRRC0094	26	28	BIF	0.015	0.63	0.07	37.5	0.01	0.56	0.005	0.005	0.008	37.93	0.02
	MRRC0094	28	30	BIF	0.018	0.7	0.08	27.47	0.02	0.41	0.005	0.005	0.006	53.34	0.02
	MRRC0094	30	32	BIF	0.01	0.32	0.06	35.69	0.01	0.48	0.005	0.005	0.007	41.75	0.01
	MRRC0094	32	34	BIF	0.0025	0.29	0.06	35.17	0.01	0.48	0.005	0.005	0.007	42.93	0.01
	MRRC0094	34	36	BIF	0.006	0.41	0.07	38.38	0.01	0.51	0.005	0.005	0.008	37.66	0.01
	MRRC0094	36	38	BIF	0.008	0.77	0.08	39.87	0.01	0.54	0.005	0.005	0.007	34.55	0.02
	MRRC0094	38	40	BIF	0.006	0.43	0.08	37.27	0.02	0.6	0.005	0.005	0.007	37.61	0.02
	MRRC0094	40	42	BIF	0.006	0.51	0.06	37.21	0.02	0.31	0.005	0.005	0.007	39.36	0.02
	MRRC0094	42	44	BIF	0.022	0.51	0.06	34.76	0.02	0.34	0.005	0.005	0.008	43.86	0.02
	MRRC0094	44	46	BIF	0.015	0.65	0.06	37.08	0.04	0.38	0.005	0.005	0.011	40.48	0.02
	MRRC0094	46	48	BIF	0.022	0.71	0.06	39.46	0.02	0.22	0.005	0.005	0.017	38.35	0.02
	MRRC0094	48	50	BIF	0.017	0.84	0.06	39.29	0.03	0.21	0.005	0.005	0.025	38.22	0.03
	MRRC0094	50	52	BIF	0.014	0.69	0.07	37.16	0.02	0.43	0.005	0.005	0.011	38.5	0.03
	MRRC0094	52	54	BIF	0.04	0.31	0.04	37.6	0.02	0.18	0.005	0.005	0.007	40.49	0.01
	MRRC0094	54	56	BIF	0.008	0.91	0.04	35.21	0.02	0.1	0.005	0.005	0.042	42.86	0.03
	MRRC0094	56	58	BIF	0.02	1.6	0.08	35.72	0.03	0.36	0.005	0.005	0.021	40.49	0.05
	MRRC0094	58	60	BIF	0.025	3.51	0.09	29.17	0.06	0.19	0.005	0.005	0.047	48.54	0.1
	MRRC0094	60	62	BIF	0.015	4.42	0.09	30.68	0.09	0.13	0.005	0.005	0.028	46.07	0.11
	MRRC0094	62	64	BIF	0.017	2.64	0.04	31.21	0.05	0.005	0.005	0.005	0.011	48.51	0.06
	MRRC0094	64	66	BIF	0.02	2.17	0.06	31.41	0.06	0.11	0.005	0.005	0.012	47.87	0.06
	MRRC0094	66	68	BIF	0.017	4.99	0.05	27.96	0.22	0.07	0.005	0.005	0.013	50.39	0.15
	MRRC0094	68	70	BIF	0.02	4.56	0.05	29.01	0.08	0.09	0.005	0.005	0.011	48.78	0.13
	MRRC0095	0	2	BIF	0.016	1.27	0.66	55.3	0.02	0.04	0.005	0.04	0.012	9.44	0.02
	MRRC0095	2	4	BIF	0.018	2.38	0.33	52.8	0.005	0.03	0.005	0.02	0.014	13.1	0.04
	MRRC0095	4	6	BIF	0.023	1.1	0.05	58.2	0.005	0.02	0.005	0.02	0.01	6.28	0.005
	MRRC0095	6	8	BIF	0.024	2.36	0.16	55.4	0.02	0.04	0.005	0.04	0.009	8.26	0.01
1	MRRC0095	8	10	BIF	0.022	1.2	0.05	58.4	0.01	0.03	0.005	0.04	0.011	5.74	0.04
	MRRC0095	10	12	BIF	0.026	2.56	0.05	56	0.005	0.03	0.005	0.05	0.013	8.72	0.05
	MRRC0095	12	14	BIF	0.023	5.3	0.02	52.1	0.005	0.02	0.005	0.04	0.015	10.2	0.05
	MRRC0095	14	16	BIF	0.023	4	0.005	50.9	0.005	0.01	0.005	0.04	0.016	14	0.03
	MRRC0095	16	18	BIF	0.015	3.15	0.005	54.7	0.005	0.01	0.005	0.04	0.047	9.26	0.06
	MRRC0095	18	20	BIF	0.017	3.19	0.005	55.1	0.005	0.01	0.005	0.04	0.04	9.4	0.06
	MRRC0095	20	22	BIF	0.024	5.01	0.02	51.8	0.01	0.04	0.005	0.05	0.033	11.9	0.09
	MRRC0095	22	24	BIF	0.031	3.34	0.02	54.8	0.005	0.03	0.005	0.05	0.016	9.96	0.07
	MRRC0095	24	26	BIF	0.02	4.43	0.02	52.3	0.005	0.02	0.005	0.06	0.013	12.9	0.1
	MRRC0095	26	28	BIF	0.021	0.95	0.005	60.1	0.005	0.005	0.005	0.02	0.009	3.36	0.005
	MRRC0095	28	30	BIF	0.016	2.49	0.005	58.3	0.005	0.005	0.005	0.02	0.013	5.2	0.02
	MRRC0095	30	32	BIF	0.017	1.4	0.005	59.3	0.005	0.005	0.005	0.02	0.023	3.71	0.02
	MRRC0095	32	34	BIF	0.016	0.55	0.005	60.9	0.005	0.005	0.005	0.02	0.018	2.07	0.005
	MRRC0095	34	36	BIF	0.016	0.61	0.005	61.3	0.005	0.005	0.005	0.01	0.009	1.99	0.005
	MRRC0095	36	38	BIF	0.014	0.64	0.005	60.6	0.005	0.01	0.005	0.01	0.017	2.04	0.005
	MRRC0095	38	40	BIF	0.009	0.47	0.005	61	0.005	0.01	0.005	0.02	0.021	1.52	0.005
	MRRC0095	40	42	BIF	0.008	0.42	0.005	61	0.005	0.005	0.005	0.02	0.014	1.7	0.005
	MRRC0095	42	44	BIF	0.014	0.68	0.005	60.2	0.005	0.01	0.005	0.01	0.029	2.1	0.005
	MRRC0095	44	46	BIF	0.009	0.62	0.005	60	0.005	0.02	0.005	0.01	0.032	2.32	0.005
	MRRC0095	46	48	BIF	0.01	0.51	0.005	60.3	0.005	0.005	0.005	0.005	0.021	2.11	0.005
	MRRC0095	48	50	BIF	0.015	0.84	0.005	60.1	0.005	0.01	0.005	0.02	0.049	2.06	0.005
	MRRC0095	50	52	BIF	0.01	1.1	0.005	59.7	0.005	0.005	0.005	0.01	0.05	3	0.02
	MRRC0095	52	54	BIF	0.01	2.42	0.01	58.4	0.005	0.01	0.005	0.03	0.029	5.25	0.05
	MRRC0095	54	56	BIF	0.015	2.01	0.01	58.2	0.005	0.01	0.005	0.02	0.031	4.32	0.04
	MRRC0095	56	58	BIF	0.029	1.94	0.01	58.9	0.005	0.02	0.005	0.01	0.018	4.1	0.02
	MRRC0095	58	60	BIF	0.015	4.78	0.01	30.6	0.17	0.02	0.005	0.04	0.026	44.7	0.11
	MRRC0095	60	62	BIF	0.013	2.04	0.005	50.6	0.05	0.005	0.005	0.02	0.032	16.3	0.03
	MRRC0095	62	64	BIF	0.016	0.94	0.005	58.8	0.005	0.005	0.005	0.01	0.049	4.12	0.005
	MRRC0095	64	66	BIF	0.009	1.35	0.005	59.5	0.005	0.005	0.005	0.02	0.048	2.45	0.01
	MRRC0095	66	68	BIF	0.015	0.94	0.005	59.8	0.005	0.005	0.005	0.01	0.038	2.5	0.01
	MRRC0095	68	70	BIF	0.01	2.8	0.005	57	0.01	0.005	0.005	0.02	0.07	4.33	0.04
	MRRC0095	70	72	BIF	0.01	1.16	0.005	58.6	0.02	0.005	0.005	0.01	0.076	3.23	0.01
	MRRC0095	72	74	BIF	0.009	0.73	0.005	59.7	0.005	0.005	0.005	0.005	0.089	2.4	0.005
	MRRC0095	74	76	BIF	0.01	0.81	0.005	60.1	0.005	0.005	0.005	0.01	0.071	2	0.005
	MRRC0095	76	78	BIF	0.01	1.16	0.005	59.8	0.005	0.005	0.005	0.01	0.044	2.45	0.01
	MRRC0095	78	80	BIF	0.006	0.68	0.005	60.4	0.005	0.005	0.005	0.01	0.062	1.9	0.005
	MRRC0095	80	82	BIF	0.009	1.66	0.005	58.8	0.005	0.005	0.005	0.005	0.055	2.86	0.02
	MRRC0095	82	84	BIF	0.006	1.58	0.005	58.3	0.03	0.005	0.005	0.005	0.043	3.2	0.01
	MRRC0095	84	86	BIF	0.007	2.09	0.005	57.3	0.02	0.005	0.005	0.01	0.048	4.19	0.02
	MRRC0095	86	88	BIF	0.008	3.69	0.005	55.3	0.01	0.005	0.005	0.005	0.044	5.74	0.05
	MRRC0095	88	90	BIF	0.006	0.9	0.005	59.7	0.005	0.005	0.005	0.005	0.026	2.55	0.005
	MRRC0095	90	92	BIF	0.005	3.95	0.005	37.6	0.38	0.005	0.005	0.03	0.019	34.4	0.1
	MRRC0095	92	94	Sandstone	0.0025	6.79	0.01	4.32	1.37	0.04	0.005	0.1	0.008	83.2	0.22
	MRRC0095	94	96	Sandstone	0.107	7.68	0.01	4.38	1.68	0.46	0.005	0.09	0.008	81.5	0.25

1 = Represents Phase 2 sample source

= Outside pit shell plus 10 m buffer zone

PHASE 1 RESULTS FOR GEOCHEMICAL HOLES - MIRALGA WEST

Phase 2	HoleID	From	To	Lith	S	Al2O3	CaO	Fe	K2O	MgO	MnO	Na2O	P	SiO2	TiO2
	MRRC0097	0	2	BIF	0.014	1.52	2.72	37.67	0.07	0.16	0.005	0.005	0.021	34.65	0.05
	MRRC0097	2	4	BIF	0.01	1.6	2.44	33.73	0.05	0.19	0.005	0.005	0.012	42.2	0.05
	MRRC0097	4	6	BIF	0.007	1.81	0.97	33.12	0.08	0.15	0.005	0.005	0.013	44.63	0.05
	MRRC0097	6	8	BIF	0.005	1.71	0.58	31.32	0.04	0.04	0.005	0.005	0.012	50.38	0.05
	MRRC0097	8	10	BIF	0.013	4.34	0.11	32.48	0.08	0.04	0.005	0.02	0.011	43.94	0.11
	MRRC0097	10	12	BIF	0.018	5.77	0.08	30.5	0.09	0.03	0.005	0.005	0.013	45.04	0.15
1	MRRC0097	12	14	BIF	0.006	2.12	0.06	26.1	0.04	0.005	0.005	0.005	0.017	57.87	0.07
	MRRC0097	14	16	BIF	0.007	2.45	0.07	31.83	0.06	0.005	0.005	0.005	0.017	48.47	0.07
	MRRC0097	16	18	BIF	0.0025	1.19	0.11	33.58	0.03	0.005	0.005	0.005	0.014	47.42	0.04
	MRRC0097	18	20	BIF	0.006	2.34	0.24	38.11	0.04	0.005	0.005	0.005	0.015	39.4	0.07
	MRRC0097	20	22	BIF	0.0025	0.82	0.35	36.06	0.02	0.005	0.005	0.005	0.028	43.8	0.02
	MRRC0097	22	24	BIF	0.0025	0.59	0.05	34.5	0.01	0.005	0.005	0.005	0.024	45.26	0.02
	MRRC0097	24	26	BIF	0.0025	1.07	0.25	30.26	0.005	0.005	0.005	0.005	0.024	50.85	0.04
	MRRC0097	26	28	BIF	0.011	4.89	0.09	29.17	0.01	0.02	0.005	0.005	0.011	48.02	0.13
	MRRC0097	28	30	BIF	0.015	4.8	0.08	29.79	0.02	0.03	0.005	0.005	0.01	47.9	0.13
	MRRC0097	30	32	BIF	0.0025	2.41	0.07	25.18	0.02	0.005	0.005	0.005	0.011	57.59	0.07
	MRRC0097	32	34	BIF	0.007	2.42	0.07	26.29	0.02	0.01	0.005	0.005	0.012	54.99	0.07
	MRRC0097	34	36	BIF	0.021	1.79	0.05	30.46	0.01	0.07	0.005	0.005	0.01	48.74	0.05
	MRRC0097	36	38	BIF	0.012	2.06	0.07	32.97	0.01	0.07	0.005	0.005	0.008	45.4	0.06
	MRRC0097	38	40	BIF	0.022	7.07	0.11	28.8	0.02	0.04	0.005	0.005	0.013	45.7	0.2
	MRRC0097	40	42	BIF	0.01	5.38	0.08	29.93	0.03	0.02	0.005	0.005	0.013	44.92	0.16
	MRRC0097	42	44	BIF	0.008	1.51	0.03	37.5	0.005	0.005	0.005	0.005	0.012	38.13	0.04
	MRRC0097	44	46	BIF	0.005	1.21	0.04	39.67	0.005	0.005	0.005	0.005	0.032	36.59	0.03
	MRRC0097	46	48	BIF	0.005	1.06	0.03	30.11	0.005	0.005	0.005	0.005	0.013	51.41	0.03
	MRRC0097	48	50	BIF	0.009	4.23	0.07	28.82	0.02	0.005	0.005	0.005	0.048	49.57	0.12
	MRRC0097	50	52	BIF	0.006	6.42	0.08	34.17	0.04	0.03	0.005	0.005	0.025	39.16	0.19
	MRRC0097	52	54	BIF	0.006	3.53	0.05	28.72	0.02	0.005	0.005	0.005	0.017	50.75	0.1
	MRRC0097	54	56	BIF	0.0025	1.17	0.05	39.3	0.02	0.005	0.005	0.005	0.018	39.78	0.04
	MRRC0097	56	58	BIF	0.0025	0.44	0.02	50.6	0.005	0.02	0.005	0.005	0.034	19.72	0.01
	MRRC0097	58	60	BIF	0.0025	0.36	0.02	47.04	0.005	0.005	0.005	0.005	0.031	25.23	0.01
	MRRC0097	60	62	BIF	0.0025	1	0.02	43.4	0.02	0.005	0.005	0.005	0.021	30.72	0.04
	MRRC0097	62	64	BIF	0.0025	1.13	0.04	38.12	0.03	0.005	0.005	0.005	0.018	41.79	0.04
	MRRC0097	64	66	BIF	0.0025	0.8	0.02	41.24	0.01	0.005	0.005	0.005	0.023	36.08	0.02
	MRRC0097	66	68	BIF	0.006	0.43	0.02	49.31	0.03	0.005	0.005	0.005	0.035	20.11	0.005
	MRRC0097	68	70	BIF	0.006	0.46	0.01	44.64	0.01	0.005	0.005	0.005	0.02	28.03	0.01
	MRRC0097	70	72	BIF	0.005	0.47	0.005	41.29	0.03	0.005	0.005	0.005	0.016	33.24	0.01
	MRRC0097	72	74	BIF	0.005	0.43	0.01	39.21	0.02	0.005	0.005	0.005	0.023	36.34	0.01
	MRRC0097	74	76	BIF	0.0025	0.68	0.01	41.46	0.01	0.005	0.005	0.005	0.019	33.31	0.02
	MRRC0097	76	78	BIF	0.006	0.57	0.01	42.59	0.005	0.005	0.005	0.005	0.018	32.38	0.02
	MRRC0097	78	80	BIF	0.0025	2	0.02	24.39	0.02	0.005	0.005	0.005	0.013	59.77	0.07
	MRRC0097	80	82	BIF	0.0025	6.49	0.03	12.29	0.04	0.005	0.005	0.005	0.013	70.91	0.19
	MRRC0097	82	84	BIF	0.0025	2.91	0.04	26.3	0.04	0.005	0.005	0.005	0.015	55.54	0.08
	MRRC0097	84	86	BIF	0.009	0.97	0.02	21.27	0.04	0.005	0.005	0.005	0.011	64.37	0.05
	MRRC0097	86	88	BIF	0.012	3.74	0.02	24.6	0.34	0.005	0.005	0.005	0.018	54.29	0.2
	MRRC0097	88	90	BIF	0.005	0.54	0.01	15.77	0.05	0.005	0.005	0.005	0.01	73.9	0.06
	MRRC0097	90	92	BIF	0.008	1.2	0.02	16.31	0.1	0.005	0.005	0.005	0.016	70.95	0.07
	MRRC0097	92	94	BIF	0.008	1.14	0.02	16.03	0.09	0.005	0.005	0.005	0.014	71.88	0.07
	MRRC0097	94	96	BIF	0.005	1.22	0.02	15.82	0.11	0.005	0.005	0.005	0.012	71.52	0.08
	MRRC0097	96	98	BIF	0.0025	0.67	0.02	20.15	0.13	0.005	0.005	0.005	0.011	63.83	0.05
	MRRC0097	98	100	BIF	0.0025	2.04	0.02	15.44	0.1	0.005	0.005	0.005	0.011	70.96	0.06
	MRRC0097	100	102	BIF	0.0025	0.4	0.01	23.99	0.03	0.005	0.005	0.005	0.013	60.18	0.02
	MRRC0097	102	104	BIF	0.005	0.81	0.02	11.5	0.04	0.005	0.005	0.005	0.014	80.06	0.07
	MRRC0097	104	106	BIF	0.0025	0.38	0.02	9.38	0.06	0.005	0.005	0.005	0.01	82.09	0.03
	MRRC0097	106	108	BIF	0.0025	0.38	0.02	15.4	0.04	0.005	0.005	0.005	0.01	74.1	0.04
	MRRC0097	108	110	BIF	0.0025	0.14	0.005	20.64	0.005	0.005	0.005	0.005	0.008	66.64	0.02
	MRRC0097	110	112	BIF	0.0025	0.26	0.005	27.36	0.005	0.005	0.005	0.005	0.011	55.96	0.01
	MRRC0097	112	114	BIF	0.007	3.02	0.02	31.25	0.05	0.005	0.005	0.005	0.024	46.01	0.08
	MRRC0097	114	116	BIF	0.009	1.41	0.01	26.57	0.02	0.005	0.005	0.005	0.015	55.46	0.05
	MRRC0097	116	118	BIF	0.008	1.75	0.01	28.53	0.03	0.005	0.005	0.005	0.025	52.14	0.09
	MRRC0097	118	120	BIF	0.008	0.67	0.005	37.98	0.005	0.005	0.005	0.005	0.026	38.11	0.02
	MRRC0097	120	122	BIF	0.0025	0.57	0.01	16.43	0.01	0.005	0.005	0.005	0.01	72.29	0.03
	MRRC0097	122	124	BIF	0.0025	1.36	0.02	12.95	0.005	0.005	0.005	0.005	0.015	77.75	0.05
	MRRC0097	124	126	BIF	0.0025	0.79	0.005	31.23	0.005	0.005	0.005	0.005	0.027	48.95	0.02
	MRRC0097	126	128	BIF	0.005	0.39	0.005	37.99	0.005	0.005	0.005	0.005	0.037	38.36	0.01
	MRRC0097	128	130	BIF	0.0025	0.4	0.005	31.56	0.005	0.005	0.005	0.005	0.052	48.27	0.01
	MRRC0097	130	132	BIF	0.0025	0.38	0.005	33.39	0.02	0.005	0.005	0.005	0.037	45.01	0.01
	MRRC0097	132	134	BIF	0.0025	0.38	0.005	38.55	0.02	0.005	0.005	0.005	0.031	37.34	0.01
	MRRC0099	0	2	BIF	0.017	2.72	0.02	57.9	0.06	0.01	0.005	0.05	0.014	4.99	0.06
	MRRC0099	2	4	BIF	0.018	2.4	0.01	58.5	0.04	0.02	0.005	0.04	0.01	4.34	0.05
	MRRC0099	4	6	BIF	0.015	2.76	0.005	57.4	0.03	0.02	0.005	0.04	0.01	4.87	0.06
	MRRC0099	6	8	BIF	0.013	2.52	0.1	58.9	0.02	0.03	0.005	0.04	0.014	5.02	0.05
	MRRC0099	8	10	BIF	0.02	2.29	0.08	59.2	0.01	0.03	0.005	0.03	0.008	5.1	0.04
	MRRC0099	10	12	BIF	0.017	3	0.04	59.4	0.02	0.03	0.005	0.04	0.011	5.02	0.04
	MRRC0099	12	14	BIF	0.016	1.85	0.05	60.2	0.02	0.05	0.005	0.04	0.008	3.96	0.03
	MRRC0099	14	16	BIF	0.012	0.94	0.02	60.3	0.005	0.02	0.005	0.02	0.005	2.99	0.005
	MRRC0099	16	18	BIF	0.014	1.2	0.01	58.6	0.005	0.02	0.005	0.04	0.017	5.08	0.02
	MRRC0099	18	20	BIF	0.012	0.68	0.005	53	0.005	0.005	0.005	0.04	0.005	15.3	0.01
	MRRC0099	20	22	BIF	0.01	0.58	0.005	58.9	0.005	0.01	0.005	0.04	0.0025	6.74	0.005
	MRRC0099	22	24	BIF	0.012	0.7	0.005	61.1	0.005	0.02	0.005	0.02	0.005	3.46	0.005
	MRRC0099	24	26	BIF	0.01	0.65	0.01	62	0.005	0.02	0.005	0.03	0.013	3	0.005
	MRRC0099	26	28	BIF	0.01	0.82	0.01	61.5	0.005	0.02	0.005	0.05	0.03	4.32	0.02
	MRRC0099	28	30	BIF	0.007	0.83	0.01	61.7	0.005	0.03	0.005	0.03	0.026	4.87	0.02
	MRRC0099	30	32	BIF	0.012	1.39	0.01	60.6	0.005	0.02	0.005	0.01	0.046	4.29	0.02
	MRRC0099	32	34	BIF	0.009	0.83	0.005	60.1	0.005	0.005	0.005	0.005	0.025	3.23	0.01
	MRRC0099	34	36	BIF	0.012	0.53	0.005	59.8	0.005	0.005	0.005	0.005	0.018	4.35	0.005
	MRRC0099	36	38	BIF	0.01	0.44	0.005	58.8	0.005	0.005	0.005	0.005	0.015	6.59	0.005
	MRRC0099	38	40	BIF	0.0025	0.76	0.01	43.6	0.005	0.005	0.005	0.005	0.033	30.8	0.02
	MRRC0099	40	42	BIF	0.014	3.01	0.01	58.1	0.005	0.02	0.005	0.005	0.037	5.31	0.07
	MRRC0099	42	44	BIF	0.009	4.6	0.02	56	0.01	0.03	0.005	0.01	0.033	7.78	0.11
	MRRC0099	44	46	BIF	0.012	5.65	0.02	54.9	0.02	0.01	0.005	0.02	0.042	7.78	0.11
	MRRC0099	46	48	BIF	0.012	2.36	0.01	51.8	0.02	0.01	0.005	0.005	0.032	15.1	0.04
	MRRC0099	48	50	BIF	0.017	3.64	0.005	56.3	0.02	0.02	0.005	0.005	0.038	6.92	0.08
	MRRC0099	50	52	BIF	0.01	7.25	0.02	51.4	0.05	0.03	0.005	0.02	0.019	11.4	0.16
	MRRC0099	52	54	BIF	0.015	4.48	0.02	54.9	0.02	0.03	0.005	0.01	0.045	8.48	0.09
	MRRC0099	54	56	BIF	0.019	4.88	0.01	53	0.04	0.02	0.005	0.01	0.045	9.04	0.15
	MRRC0099	56	58	BIF	0.014	2.67	0.005	55.4	0.005	0.005	0.005	0.005	0.045	7.29	0.13
	MRRC0099	58	60	BIF	0.014	1.48	0.005	57.8	0.005	0.005	0.005	0.01	0.044	5.5	0.05
	MRRC0099	60	62	BIF	0.01	0.34	0.005	58.7	0.005	0.005	0.005	0.005	0.048	5.01	0.005
	MRRC0099	62	64	BIF	0.007	0.19	0.005	54.2	0.01	0.005	0.005	0.005	0.043	12.6	0.005
	MRRC0099	64	66	BIF	0.008	1	0.005	54.8	0.03	0.01	0.005	0.005	0.049	10.6	0.04
	MRRC0099	66	68	BIF	0.012	2.48	0.01	53.5	0.02	0.005	0.005	0.005	0.045	11.1	0.07
	MRRC0099	68	70	BIF	0.007	2.87	0.02	53.8	0.08	0.01	0.005	0.01	0.037	9.87	0.08
	MRRC0099	70	72	BIF	0.007	0.48	0.005	60.1	0.005	0.005	0.005	0.01	0.032	2.56	0.005
	MRRC0099	72	74	BIF	0.007	0.36	0.005	61	0.005	0.005	0.005	0.01	0.035	1.65	0.005
	MRRC0099	74	76	BIF	0.007	0.81	0.005	60.3	0.005	0.005	0.005	0.005	0.042	1.78	0.01
	MRRC0099	76	78	BIF	0.008	0.7	0.005	60.7	0.005	0.005	0.005	0.005	0.037	1.82	0.005
	MRRC0099	78	80	BIF	0.007	2.86	0.02	56	0.06	0.01	0.005	0.02	0.054	6.14	0.06
	MRRC0099	80	82	BIF	0.005	3.31	0.03	56.8	0.08	0.02	0.005	0.03	0.048	5.8	0.06
	MRRC0099	82	84	BIF	0.005	3.04	0.03	57.6	0.05	0.02	0.005	0.01	0.044	5.13	0.08
	MRRC0099	84	86	BIF	0.007	4.28	0.03	53.2	0.08	0.02	0.005	0.01	0.051	9.22	0.07
	MRRC0099	86	88	BIF	0.005	1.11	0.005	59	0.005	0.005	0.005	0.005	0.038	3.82	0.02
	MRRC0099	88	90	BIF	0.008	0.61	0.005	60.2	0.005	0.005	0.005	0.01	0.04	2.72	0.005
	MRRC0099	90	92	BIF	0.013	0.88	0.005	60	0.005	0.005	0.005	0.02	0.045	2.98	0.01
	MRRC0099	92	94	BIF	0.007	0.86	0.005	57.8	0.03	0.005	0.005	0.03	0.057	5.35	0.01
	MRRC0099	94	96	BIF	0.007	0.75	0.005	59.4	0.03	0.01	0.005	0.005	0.052	2.57	0.01
	MRRC0099	96	98	BIF	0.005	0.51	0.005	59.9	0.02	0.005	0.005	0.005	0.044	2.79	0.005
	MRRC0099	98	100	BIF	0.005	0.65	0.005	60	0.005	0.01	0.005	0.005	0.051	2.47	0.005
	MRRC0099	100	102	BIF	0.009	0.61	0.005	60.3	0.005	0.005	0.005	0.02	0.055	2.48	0.01
	MRRC0099	102	104	BIF	0.005	0.47	0.005	60.8	0.005	0.005	0.005	0.02	0.054	1.66	0.005
	MRRC0099	104	106	BIF	0.006	0.95	0.005	59.9	0.01	0.005	0.005	0.005	0.056	2.07	0.005
	MRRC0099	106	108	BIF	0.007	0.65	0.005	60	0.02	0.005	0.005	0.02	0.053	1.82	0.005
	MRRC0099	108	110	BIF	0.005	0.59	0.005	60.3	0.01	0.005	0.005	0.01	0.05	1.88	0.005
	MRRC0099	110	112	BIF	0.005	1.31	0.005	39.6	0.01	0.005	0.005	0.03	0.04	34.1	0.02
1	MRRC0099	112	114	Chert	0.0025	1.27	0.01	12.5	0.01	0.005	0.005	0.03	0.017	78.2	0.04
	MRRC0099	114	116	Chert	0.0025	1.79	0.02	9.68	0.03	0.005	0.005	0.03	0.016	81.8	0.05
	MRRC0099	116	118	Chert	0.0025	1.27	0.01	3.03	0.01	0.005	0.005	0.04	0.009	93.2	0.04
	MRRC0099	118	120	Chert	0.0025	1.79	0.02	8.08	0.02	0.005	0.005	0.03	0.012	84.1	0.04
	MRRC0099	120	122	BIF	0.0025	1.68	0.005	26	0.01	0.005	0.005	0.02	0.015	56.1	0.05
1	MRRC0099	122	124	BIF	0.0025	1.05	0.01	47.5	0.03	0.005	0.005	0.005	0.012	23.4	0.03
	MRRC0099	124	126	BIF	0.006	1.09	0.01	57.5	0.04	0.005	0.005	0.01	0.015	8.16	0.02
	MRRC0099	126	128	BIF	0.0025	1.86	0.01	48.5	0.09	0.005	0.005	0.01	0.103	18.4	0.05
	MRRC0099	128	130	Chert	0.0025	2.32	0.01	12.3	0.01	0.005	0.005	0.03	0.026	77.5	0.08

1 = Represents Phase 2 sample source

= Outside pit shell plus 10 m buffer zone

PHASE 1 RESULTS FOR GEOCHEMICAL HOLES - MIRALGA WEST

Phase 2	HoleID	From	To	Lith	S	Al2O3	CaO	Fe	K2O	MgO	MnO	Na2O	P	SiO2	TiO2
	MRRC0100	0	2	BIF	0.016	3.07	0.02	57.2	0.04	0.02	0.005	0.005	0.03	4.84	0.08
	MRRC0100	2	4	BIF	0.017	5.54	0.03	54	0.04	0.03	0.005	0.005	0.022	6.28	0.14
	MRRC0100	4	6	BIF	0.023	3.18	0.04	55.1	0.01	0.03	0.005	0.005	0.013	8.14	0.08
	MRRC0100	6	8	BIF	0.023	4.52	0.09	53	0.03	0.08	0.005	0.05	0.012	11.9	0.11
	MRRC0100	8	10	BIF	0.029	4.37	0.09	52.9	0.02	0.06	0.005	0.05	0.021	12.2	0.11
	MRRC0100	10	12	BIF	0.027	2.96	0.08	54.3	0.02	0.05	0.005	0.04	0.022	12.5	0.08
	MRRC0100	12	14	BIF	0.013	4.08	0.09	49	0.03	0.08	0.005	0.06	0.014	21.2	0.1
	MRRC0100	14	16	BIF	0.013	3.18	0.1	49.8	0.03	0.1	0.005	0.07	0.012	21.6	0.08
	MRRC0100	16	18	BIF	0.018	5.38	0.09	44.9	0.03	0.07	0.005	0.05	0.01	23.6	0.14
	MRRC0100	18	20	BIF	0.012	3.5	0.07	43.9	0.03	0.06	0.005	0.05	0.01	28.8	0.1
	MRRC0100	20	22	BIF	0.009	2.86	0.04	40.9	0.005	0.02	0.005	0.03	0.008	33.9	0.07
	MRRC0100	22	24	BIF	0.007	1.72	0.03	43.1	0.005	0.01	0.005	0.03	0.01	33.2	0.04
	MRRC0100	24	26	BIF	0.011	0.97	0.02	45.7	0.005	0.005	0.005	0.02	0.014	27.4	0.02
	MRRC0100	26	28	BIF	0.01	0.51	0.01	53	0.005	0.005	0.005	0.005	0.02	14.9	0.005
	MRRC0100	28	30	BIF	0.012	0.72	0.01	52.6	0.005	0.005	0.005	0.005	0.019	15.7	0.01
	MRRC0100	30	32	BIF	0.01	0.78	0.01	51.2	0.005	0.005	0.005	0.005	0.021	17.8	0.01
	MRRC0100	32	34	BIF	0.012	1.53	0.01	56.17	0.005	0.02	0.005	0.05	0.025	10.94	0.04
	MRRC0100	34	36	BIF	0.008	0.69	0.01	49.8	0.005	0.005	0.005	0.005	0.019	20.5	0.02
	MRRC0100	36	38	BIF	0.009	0.65	0.01	54.2	0.005	0.005	0.005	0.005	0.026	12.6	0.005
	MRRC0100	38	40	BIF	0.007	0.38	0.005	50.2	0.005	0.005	0.005	0.005	0.016	19.1	0.005
	MRRC0100	40	42	BIF	0.01	0.48	0.01	54.4	0.005	0.005	0.005	0.005	0.031	12.7	0.005
	MRRC0100	42	44	BIF	0.01	0.67	0.01	53.7	0.005	0.005	0.005	0.01	0.022	13.5	0.01
	MRRC0100	44	46	BIF	0.013	0.24	0.02	59.7	0.005	0.005	0.005	0.005	0.057	3.31	0.005
	MRRC0100	46	48	BIF	0.011	1.87	0.02	55.7	0.005	0.01	0.005	0.005	0.045	9.2	0.04
	MRRC0100	48	50	BIF	0.011	6.03	0.04	53.1	0.01	0.02	0.005	0.01	0.027	9.24	0.14
	MRRC0100	50	52	BIF	0.016	3.03	0.02	57	0.02	0.005	0.005	0.005	0.048	4.66	0.06
	MRRC0100	52	54	BIF	0.009	4.31	0.03	46.4	0.02	0.005	0.005	0.01	0.031	23.2	0.12
	MRRC0100	54	56	BIF	0.007	4.28	0.04	44	0.03	0.005	0.005	0.01	0.045	26.2	0.11
	MRRC0100	56	58	BIF	0.009	1.63	0.02	52	0.01	0.005	0.005	0.005	0.037	16.5	0.04
	MRRC0100	58	60	BIF	0.0025	1.38	0.02	24.8	0.01	0.005	0.005	0.02	0.018	60	0.03
1	MRRC0100	60	62	BIF	0.0025	0.76	0.01	31.9	0.005	0.005	0.005	0.02	0.019	50	0.02
	MRRC0100	62	64	BIF	0.005	0.43	0.01	36.2	0.04	0.005	0.005	0.005	0.024	41.2	0.005
	MRRC0100	64	66	BIF	0.0025	0.64	0.005	22.2	0.14	0.005	0.005	0.03	0.017	61.5	0.01
	MRRC0100	66	68	BIF	0.005	0.34	0.005	42.8	0.01	0.005	0.005	0.01	0.018	31.5	0.02
	MRRC0100	68	70	BIF	0.006	0.67	0.005	51.7	0.005	0.01	0.005	0.005	0.023	18.1	0.01
	MRRC0100	70	72	BIF	0.013	1.38	0.005	60.3	0.005	0.01	0.005	0.005	0.034	3.47	0.03
	MRRC0100	72	74	BIF	0.011	0.87	0.005	56.3	0.005	0.01	0.005	0.02	0.023	11	0.02
	MRRC0100	74	76	BIF	0.01	0.75	0.005	56.5	0.01	0.01	0.005	0.005	0.019	10.6	0.01
	MRRC0100	76	78	BIF	0.008	0.77	0.005	60.8	0.02	0.01	0.005	0.005	0.026	3.36	0.01
	MRRC0100	78	80	BIF	0.011	0.74	0.005	60.6	0.02	0.01	0.005	0.005	0.046	3.1	0.01
	MRRC0100	80	82	BIF	0.01	1.22	0.005	56.9	0.03	0.02	0.005	0.005	0.029	9.84	0.02
	MRRC0100	82	84	BIF	0.008	0.77	0.005	60.2	0.04	0.01	0.005	0.005	0.044	2.93	0.01
	MRRC0100	84	86	BIF	0.006	0.55	0.005	59.3	0.02	0.01	0.005	0.005	0.052	3.5	0.005
	MRRC0100	86	88	BIF	0.005	0.69	0.005	58.7	0.04	0.01	0.005	0.005	0.043	4.72	0.01
	MRRC0100	88	90	BIF	0.005	1.48	0.005	58.1	0.04	0.02	0.005	0.005	0.046	4.66	0.03
1	MRRC0104	0	2	BIF	0.012	5.71	0.02	39.5	0.14	0.04	0.04	0.005	0.021	28.3	0.56
	MRRC0104	2	4	BIF	0.011	3.63	0.03	50.6	0.03	0.02	0.07	0.005	0.021	14.9	0.11
	MRRC0104	4	6	BIF	0.012	7.28	0.03	47.5	0.03	0.02	0.05	0.005	0.026	15.8	0.19
	MRRC0104	6	8	BIF	0.011	9.68	0.04	39.2	0.1	0.04	0.02	0.005	0.018	24.6	0.62
	MRRC0104	8	10	BIF	0.014	3.85	0.03	46.8	0.01	0.01	0.03	0.005	0.021	21	0.1
	MRRC0104	10	12	BIF	0.007	1.61	0.02	40.6	0.005	0.005	0.03	0.005	0.008	32.8	0.03
	MRRC0104	12	14	BIF	0.006	0.77	0.02	40.2	0.005	0.005	0.04	0.03	0.01	34.6	0.02
	MRRC0104	14	16	BIF	0.01	1	0.02	41.9	0.005	0.02	0.03	0.02	0.009	32.2	0.02
	MRRC0104	16	18	BIF	0.012	1.22	0.02	42.2	0.005	0.02	0.03	0.02	0.007	32.6	0.03
	MRRC0104	18	20	BIF	0.017	1.62	0.02	37.3	0.005	0.03	0.02	0.03	0.009	40.4	0.05
	MRRC0104	20	22	BIF	0.008	1.5	0.02	42.2	0.005	0.03	0.03	0.02	0.015	31.2	0.05
	MRRC0104	22	24	BIF	0.0025	3.53	0.03	14.5	0.02	0.07	0.02	0.05	0.007	71.5	0.27
	MRRC0104	24	26	BIF	0.0025	2.37	0.03	9.99	0.005	0.03	0.01	0.06	0.0025	80.3	0.15
	MRRC0104	26	28	BIF	0.0025	2.19	0.02	24.3	0.005	0.04	0.02	0.03	0.008	57.8	0.14
	MRRC0104	28	30	BIF	0.007	1.47	0.01	42.8	0.005	0.03	0.04	0.02	0.016	29.9	0.06
	MRRC0104	30	32	BIF	0.007	0.89	0.01	52	0.005	0.02	0.14	0.02	0.023	16.3	0.02
	MRRC0104	32	34	BIF	0.007	1.29	0.005	50.1	0.005	0.02	0.12	0.005	0.022	18.1	0.03
	MRRC0104	34	36	BIF	0.009	3.24	0.02	35.3	0.01	0.03	0.1	0.03	0.019	39.9	0.08
	MRRC0104	36	38	BIF	0.007	2.79	0.01	28.2	0.03	0.02	0.38	0.03	0.022	50.9	0.08
	MRRC0104	38	40	BIF	0.01	3.05	0.005	38.1	0.02	0.02	0.18	0.02	0.036	35.6	0.09
	MRRC0104	40	42	BIF	0.012	5.26	0.01	39.3	0.08	0.05	0.93	0.02	0.045	29.1	0.13
	MRRC0104	42	44	BIF	0.01	6.89	0.02	33	0.1	0.05	1.28	0.04	0.033	36.9	0.16
	MRRC0104	44	46	BIF	0.011	7.84	0.03	42.3	0.02	0.04	0.11	0.02	0.055	22.5	0.17
	MRRC0104	46	48	BIF	0.01	1.94	0.005	54.9	0.01	0.02	0.23	0.005	0.035	9.21	0.03
	MRRC0104	48	50	BIF	0.013	2.16	0.005	52.3	0.005	0.02	0.12	0.01	0.038	13.1	0.02
	MRRC0104	50	52	BIF	0.009	1.18	0.005	58.4	0.01	0.01	0.31	0.005	0.04	4.34	0.01
	MRRC0104	52	54	BIF	0.009	0.82	0.005	59.6	0.005	0.01	0.11	0.005	0.05	3.04	0.005
	MRRC0104	54	56	BIF	0.015	0.77	0.005	59.7	0.005	0.01	0.07	0.005	0.043	3.36	0.005
	MRRC0104	56	58	BIF	0.013	0.69	0.005	59.8	0.005	0.01	0.06	0.005	0.045	3.39	0.005
	MRRC0104	58	60	BIF	0.009	0.59	0.005	60	0.01	0.01	0.17	0.005	0.035	3.28	0.005
	MRRC0104	60	62	BIF	0.01	1.06	0.005	59.3	0.005	0.02	0.1	0.005	0.044	3.45	0.01
	MRRC0104	62	64	BIF	0.007	1.34	0.005	59.3	0.02	0.02	0.06	0.005	0.036	3.66	0.01
	MRRC0104	64	66	BIF	0.007	0.8	0.005	60	0.01	0.01	0.22	0.005	0.041	2.59	0.005
	MRRC0104	66	68	BIF	0.011	1.29	0.005	59	0.03	0.02	0.36	0.005	0.06	3.07	0.02
	MRRC0104	68	70	BIF	0.014	0.88	0.005	60	0.01	0.01	0.26	0.005	0.056	2.39	0.01
	MRRC0104	70	72	BIF	0.01	0.66	0.005	60.1	0.01	0.02	0.11	0.005	0.059	2.6	0.005
	MRRC0104	72	74	BIF	0.007	1.07	0.005	53.6	0.005	0.005	0.12	0.005	0.035	12.3	0.02
	MRRC0104	74	76	BIF	0.0025	1.27	0.005	28.1	0.02	0.01	0.11	0.02	0.014	53.2	0.02
	MRRC0104	76	78	BIF	0.0025	1.26	0.005	14.4	0.03	0.005	0.16	0.03	0.011	75	0.02
	MRRC0104	78	80	BIF	0.0025	7.79	0.005	14.4	0.76	0.05	0.15	0.05	0.021	66.4	0.32
	MRRC0104	80	82	BIF	0.0025	19.8	0.02	15.5	2.97	0.19	0.07	0.08	0.021	47.8	0.77
	MRRC0104	82	84	BIF	0.0025	12	0.01	19.3	0.88	0.05	0.07	0.03	0.023	53.1	0.44
	MRRC0104	84	86	BIF	0.0025	6.23	0.005	5.24	1.21	0.07	0.05	0.06	0.01	82.5	0.23
	MRRC0104	86	88	BIF	0.0025	6.44	0.005	4.7	1.28	0.08	0.03	0.05	0.01	83	0.27
	MRRC0104	88	90	BIF	0.0025	7.86	0.01	2.83	1.79	0.1	0.02	0.07	0.008	83.9	0.3

1 = Represents Phase 2 sample source

= Outside pit shell plus 10 m buffer zone

PHASE 1 RESULTS FOR GEOCHEMICAL HOLES - SANDTRAX

Phase 2	HoleID	From	To	Lith	S	Al2O3	CaO	Fe	K2O	MgO	MnO	Na2O	P	SiO2	TiO2
	MRRC0123	0	2	BIF	0.021	4.81	0.06	50.06	0.17	0.07	0.041	0.04	0.036	11.69	0.27
	MRRC0123	2	4	BIF	0.032	3.66	0.02	54.07	0.06	0.04	0.052	0.02	0.021	6.52	0.16
	MRRC0123	4	6	BIF	0.019	2.2	0.02	57.01	0.03	0.04	0.046	0.02	0.01	4.63	0.05
	MRRC0123	6	8	BIF	0.015	1.76	0.01	58.01	0.02	0.03	0.049	0.02	0.011	4.57	0.08
	MRRC0123	8	10	BIF	0.014	2.11	0.005	56	0.02	0.03	0.048	0.02	0.008	7.16	0.05
	MRRC0123	10	12	BIF	0.015	2.3	0.005	55.13	0.01	0.02	0.039	0.005	0.011	7.9	0.05
	MRRC0123	12	14	BIF	0.031	3.05	0.005	51.19	0.02	0.02	0.045	0.005	0.01	13.28	0.06
	MRRC0123	14	16	BIF	0.024	2.61	0.005	55.59	0.005	0.01	0.068	0.005	0.008	6.7	0.04
	MRRC0123	16	18	BIF	0.015	1.8	0.005	55.79	0.005	0.005	0.034	0.005	0.006	7.24	0.03
	MRRC0123	18	20	BIF	0.011	1.55	0.005	54.99	0.01	0.01	0.036	0.005	0.005	8.44	0.02
	MRRC0123	20	22	BIF	0.012	2.97	0.005	54.74	0.02	0.04	0.028	0.01	0.008	8.39	0.05
	MRRC0123	22	24	BIF	0.01	3	0.005	52.81	0.03	0.02	0.026	0.005	0.006	10.86	0.05
	MRRC0123	24	26	BIF	0.007	1.89	0.005	50.54	0.01	0.01	0.039	0.005	0.007	16.1	0.03
	MRRC0123	26	28	BIF	0.009	1.48	0.005	57.55	0.01	0.02	0.116	0.005	0.008	4.69	0.02
	MRRC0123	28	30	BIF	0.009	2.13	0.005	56.54	0.02	0.03	0.132	0.005	0.008	6.67	0.04
	MRRC0123	30	32	BIF	0.01	2.67	0.005	54.96	0.04	0.02	0.139	0.005	0.014	8.53	0.04
	MRRC0123	32	34	BIF	0.01	2.81	0.005	52.51	0.03	0.01	0.08	0.005	0.014	11.63	0.05
	MRRC0123	34	36	BIF	0.01	0.82	0.005	27.35	0.01	0.005	0.072	0.005	0.008	54.53	0.03
	MRRC0123	36	38	BIF	0.0025	0.56	0.005	26.32	0.01	0.005	0.079	0.005	0.006	56.78	0.02
	MRRC0123	38	40	BIF	0.0025	0.29	0.005	24.05	0.005	0.005	0.045	0.005	0.0025	60.55	0.01
	MRRC0124	0	2	BIF	0.021	3.21	0.03	57.91	0.06	0.06	0.107	0.02	0.025	5.17	0.1
	MRRC0124	2	4	BIF	0.014	1.88	0.09	57.68	0.01	0.04	0.09	0.02	0.018	5.53	0.16
	MRRC0124	4	6	BIF	0.015	2.53	0.07	53.54	0.01	0.08	0.043	0.02	0.032	10.67	0.14
	MRRC0124	6	8	BIF	0.028	3.03	0.04	51.63	0.03	0.05	0.031	0.03	0.071	12.02	0.45
	MRRC0124	8	10	BIF	0.026	2.1	0.03	50.73	0.01	0.03	0.036	0.02	0.037	15.05	0.25
	MRRC0124	10	12	BIF	0.021	2.01	0.03	47.88	0.02	0.05	0.028	0.03	0.021	19.04	0.23
	MRRC0124	12	14	BIF	0.025	1.63	0.02	53.5	0.005	0.02	0.046	0.02	0.048	11.55	0.18
	MRRC0124	14	16	BIF	0.02	1.06	0.02	30.74	0.03	0.005	0.555	0.005	0.03	47.08	0.57
	MRRC0124	16	18	BIF	0.009	0.78	0.02	24.04	0.02	0.005	0.475	0.005	0.014	59.45	0.15
	MRRC0124	18	20	BIF	0.007	0.72	0.02	27.13	0.005	0.005	0.028	0.005	0.013	54.59	0.03
	MRRC0124	20	22	BIF	0.016	1.78	0.02	49.64	0.005	0.01	0.035	0.005	0.017	17.68	0.03
	MRRC0124	22	24	BIF	0.01	1.5	0.02	41.58	0.005	0.005	0.062	0.005	0.014	30.05	0.04
	MRRC0124	24	26	CBIF	0.006	1.11	0.03	20.93	0.01	0.005	0.025	0.005	0.008	64.34	0.08
	MRRC0125	0	2	BIF	0.012	2.53	0.04	55.26	0.06	0.04	0.041	0.005	0.041	7.39	0.07
	MRRC0125	2	4	BIF	0.02	1.8	0.04	55.21	0.01	0.03	0.022	0.01	0.03	7.86	0.03
	MRRC0125	4	6	BIF	0.015	1.48	0.04	56.2	0.005	0.04	0.018	0.005	0.028	6.78	0.02
	MRRC0125	6	8	BIF	0.015	1.48	0.04	56.22	0.005	0.04	0.018	0.02	0.028	6.78	0.02
	MRRC0125	8	10	BIF	0.013	1.81	0.22	54.99	0.02	0.07	0.018	0.03	0.027	8.03	0.04
	MRRC0125	10	12	BIF	0.013	0.83	0.05	56.82	0.005	0.01	0.018	0.005	0.014	5.54	0.005
	MRRC0125	12	14	BIF	0.02	1.43	0.06	56.99	0.005	0.04	0.03	0.02	0.024	5.19	0.01
	MRRC0125	14	16	BIF	0.013	0.78	0.04	58.2	0.005	0.02	0.058	0.01	0.018	4.91	0.005
	MRRC0125	16	18	BIF	0.006	0.54	0.1	52.91	0.005	0.03	0.068	0.005	0.019	13.36	0.005
	MRRC0125	18	20	BIF	0.0025	0.22	0.005	44.14	0.005	0.005	0.034	0.005	0.014	27.98	0.005
	MRRC0125	20	22	BIF	0.008	0.58	0.005	52.56	0.005	0.01	0.025	0.005	0.026	15.06	0.005
	MRRC0125	22	24	BIF	0.0025	0.45	0.01	32.15	0.005	0.005	0.012	0.005	0.018	49.01	0.01
	MRRC0125	24	26	BIF	0.007	0.54	0.005	36.6	0.005	0.005	0.052	0.005	0.026	40.42	0.005
	MRRC0125	26	28	BIF	0.0025	0.88	0.02	20.46	0.04	0.005	0.804	0.005	0.017	64.88	0.02
	MRRC0125	28	30	BIF	0.0025	0.59	0.01	21.17	0.02	0.005	0.231	0.005	0.013	65.04	0.02
	MRRC0125	30	32	BIF	0.0025	0.53	0.005	22.72	0.005	0.005	0.035	0.005	0.01	62.67	0.02
	MRRC0125	32	34	BIF	0.0025	2.27	0.02	4.63	0.01	0.005	0.014	0.005	0.01	89.27	0.07
	MRRC0125	34	36	BIF	0.0025	2.24	0.005	39.76	0.005	0.005	0.083	0.005	0.018	32.36	0.04
	MRRC0126	0	2	BIF	0.026	5.09	0.27	51.21	0.14	0.13	0.026	0.05	0.032	11.31	0.33
	MRRC0126	2	4	BIF	0.029	2.83	0.11	53.64	0.03	0.09	0.05	0.04	0.022	12.06	0.18
	MRRC0126	4	6	BIF	0.032	2.48	0.05	53.84	0.02	0.07	0.025	0.03	0.02	10.92	0.1
	MRRC0126	6	8	BIF	0.051	2.33	0.05	52.87	0.01	0.06	0.043	0.01	0.035	11.77	0.13
	MRRC0126	8	10	BIF	0.045	1.98	0.06	49.01	0.02	0.06	0.057	0.01	0.021	18.05	0.1
	MRRC0126	10	12	BIF	0.049	3.18	0.06	37.7	0.02	0.06	0.022	0.005	0.014	34.35	0.24
	MRRC0126	12	14	BIF	0.021	1.45	0.04	18.01	0.01	0.005	0.01	0.005	0.011	69.28	0.27
	MRRC0126	14	16	BIF	0.014	0.92	0.02	22.6	0.005	0.005	0.052	0.005	0.01	63.06	0.07
	MRRC0126	16	18	BIF	0.0025	0.7	0.02	14.8	0.01	0.005	0.035	0.005	0.01	75.41	0.03
	MRRC0126	18	20	BIF	0.007	0.85	0.02	26.83	0.005	0.005	0.015	0.005	0.021	54.49	0.02
	MRRC0126	20	22	BIF	0.0025	0.74	0.02	29.48	0.005	0.005	0.015	0.005	0.021	52.2	0.02
	MRRC0126	22	24	BIF	0.0025	0.5	0.005	36.75	0.005	0.005	0.015	0.005	0.025	39.74	0.01
	MRRC0126	24	26	BIF	0.0025	0.5	0.005	40.64	0.005	0.005	0.018	0.005	0.025	33.28	0.01
	MRRC0126	26	28	BIF	0.0025	0.42	0.01	24.41	0.005	0.005	0.014	0.005	0.019	59.94	0.02
	MRRC0126	28	30	BIF	0.0025	0.46	0.01	7.15	0.01	0.005	0.093	0.005	0.007	87.25	0.04
	MRRC0127	0	2	BIF	0.034	5.56	0.03	50.44	0.11	0.06	0.025	0.01	0.026	14.14	0.33
	MRRC0127	2	4	BIF	0.028	3.41	0.02	55.67	0.04	0.04	0.014	0.03	0.019	7.42	0.21
	MRRC0127	4	6	BIF	0.025	2.3	0.01	59.49	0.005	0.03	0.01	0.02	0.026	3.12	0.03
	MRRC0127	6	8	BIF	0.041	4.21	0.01	56.36	0.02	0.06	0.035	0.03	0.024	5.28	0.15
	MRRC0127	8	10	BIF	0.104	2.48	0.005	59.68	0.005	0.03	0.015	0.01	0.021	4.35	0.05
	MRRC0127	10	12	BIF	0.041	3.13	0.005	57.55	0.005	0.02	0.019	0.02	0.018	5.77	0.1
	MRRC0127	12	14	BIF	0.038	2.97	0.005	56.67	0.02	0.03	0.058	0.01	0.021	4.69	0.11
	MRRC0127	14	16	BIF	0.022	3	0.005	57.33	0.02	0.04	0.062	0.005	0.023	5.18	0.1
	MRRC0127	16	18	BIF	0.037	6.04	0.005	53.66	0.02	0.04	0.058	0.005	0.028	7.03	0.21
	MRRC0127	18	20	BIF	0.021	3.82	0.005	55.84	0.01	0.02	0.034	0.005	0.02	4.85	0.1
	MRRC0127	20	22	BIF	0.018	3.62	0.005	56.7	0.01	0.04	0.027	0.005	0.021	4.49	0.07
	MRRC0127	22	24	BIF	0.013	3.68	0.005	56.08	0.01	0.03	0.04	0.005	0.021	4.06	0.06
	MRRC0127	24	26	BIF	0.012	2.77	0.005	57.21	0.005	0.02	0.036	0.01	0.025	3.07	0.03
	MRRC0127	26	28	BIF	0.008	1.32	0.005	59.64	0.005	0.005	0.022	0.005	0.035	2.02	0.02
	MRRC0127	28	30	BIF	0.009	0.89	0.005	60.11	0.005	0.02	0.023	0.01	0.03	2.16	0.01
	MRRC0127	30	32	BIF	0.0025	1.04	0.005	59.84	0.005	0.01	0.026	0.01	0.072	2.37	0.01
	MRRC0127	32	34	BIF	0.006	1.4	0.005	59.82	0.005	0.02	0.041	0.005	0.06	2.21	0.02
	MRRC0127	34	36	BIF	0.006	1.08	0.005	58.96	0.005	0.005	0.04	0.005	0.071	2.95	0.02
	MRRC0127	36	38	BIF	0.006	1.49	0.005	56.24	0.005	0.06	0.035	0.005	0.044	6	0.03
	MRRC0127	38	40	BIF	0.0025	1.26	0.005	59.51	0.005	0.01	0.039	0.01	0.072	2.47	0.01
	MRRC0127	40	42	BIF	0.0025	1.25	0.005	59.4	0.005	0.02	0.074	0.01	0.044	2.18	0.005
	MRRC0127	42	44	BIF	0.006	1.58	0.005	58.45	0.005	0.02	0.119	0.005	0.041	3.25	0.01
	MRRC0127	44	46	BIF	0.005	1.32	0.005	51.96	0.005	0.005	0.216	0.005	0.031	13.58	0.02
	MRRC0127	46	48	BIF	0.0025	1.23	0.005	29.67	0.01	0.005	0.108	0.005	0.021	49.93	0.02
	MRRC0127	48	50	BIF	0.0025	0.87	0.01	10.35	0.01	0.005	0.028	0.005	0.012	82.35	0.04
	MRRC0127	50	52	BIF	0.0025	0.99	0.005	17.79	0.01	0.005	0.108	0.005	0.014	69.55	0.03
	MRRC0127	52	54	BIF	0.0025	0.85	0.005	23.29	0.01	0.005	0.077	0.005	0.016	60.88	0.02
	MRRC0127	54	56	BIF	0.0025	0.5	0.005	21.41	0.005	0.005	0.063	0.005	0.01	64.73	0.02
	MRRC0127	56	58	BIF	0.0025	0.55	0.005	22.89	0.005	0.005	0.098	0.005	0.009	61.72	0.02
	MRRC0127	58	60	BIF	0.0025	1.26	0.005	25.78	0.01	0.005	0.23	0.005	0.014	56.51	0.03

1 = Represents Phase 2 sample source

= Outside pit shell plus 10 m buffer zone

PHASE 1 RESULTS FOR GEOCHEMICAL HOLES - SANDTRAX

Phase 2	HoleID	From	To	Lith	S	Al2O3	CaO	Fe	K2O	MgO	MnO	Na2O	P	SiO2	TiO2
	MRRC0131	0	2	BIF	0.038	2.58	0.02	57.17	0.03	0.04	0.022	0.01	0.015	8.37	0.05
	MRRC0131	2	4	BIF	0.047	2.13	0.02	58.7	0.02	0.06	0.018	0.02	0.021	5.61	0.04
	MRRC0131	4	6	BIF	0.036	1.06	0.02	61.06	0.005	0.03	0.021	0.02	0.01	4.62	0.01
	MRRC0131	6	8	BIF	0.034	1.06	0.02	61.04	0.005	0.04	0.031	0.02	0.009	3.59	0.01
	MRRC0131	8	10	BIF	0.025	1.89	0.05	58.37	0.03	0.07	0.028	0.03	0.015	7.16	0.07
	MRRC0131	10	12	BIF	0.024	4.09	0.05	49.33	0.07	0.1	0.028	0.02	0.017	16.57	0.19
	MRRC0131	12	14	BIF	0.03	2.63	0.01	57.24	0.03	0.05	0.022	0.01	0.014	6.86	0.06
	MRRC0131	14	16	BIF	0.02	1.43	0.005	58.57	0.005	0.02	0.021	0.02	0.008	7.43	0.03
	MRRC0131	16	18	BIF	0.02	1.31	0.005	59.14	0.005	0.01	0.027	0.02	0.01	6.25	0.02
	MRRC0131	18	20	BIF	0.026	1.38	0.005	59.98	0.005	0.01	0.019	0.01	0.017	3.57	0.02
	MRRC0131	20	22	BIF	0.026	1.61	0.005	60.72	0.005	0.01	0.018	0.01	0.014	2.53	0.01
	MRRC0131	22	24	BIF	0.026	1.46	0.01	61.11	0.005	0.02	0.022	0.01	0.012	3.43	0.02
	MRRC0131	24	26	BIF	0.027	2.27	0.03	58.91	0.005	0.03	0.034	0.02	0.009	4.95	0.02
	MRRC0131	26	28	BIF	0.026	1.44	0.02	59.5	0.005	0.02	0.034	0.02	0.013	3.46	0.01
	MRRC0131	28	30	BIF	0.028	2.06	0.03	58.32	0.005	0.04	0.032	0.02	0.012	5.16	0.02
	MRRC0131	30	32	BIF	0.018	2	0.02	54.27	0.005	0.005	0.045	0.005	0.028	8.62	0.02
	MRRC0131	32	34	BIF	0.016	2.2	0.02	53.96	0.005	0.02	0.032	0.005	0.024	9.3	0.02
	MRRC0131	34	36	BIF	0.024	2.35	0.02	54.17	0.005	0.06	0.028	0.02	0.023	9.19	0.02
	MRRC0131	36	38	BIF	0.014	2.97	0.03	48.11	0.005	0.08	0.028	0.01	0.013	20.36	0.005
	MRRC0131	38	40	BIF	0.012	2.14	0.02	52.18	0.005	0.04	0.054	0.01	0.014	12.64	0.005
	MRRC0131	40	42	BIF	0.011	2.14	0.03	45.57	0.005	0.07	0.046	0.005	0.01	22.52	0.02
	MRRC0131	42	44	BIF	0.007	4.57	0.06	42	0.005	0.21	0.03	0.005	0.012	25.75	0.06
	MRRC0131	44	46	BIF	0.008	2.55	0.02	55.16	0.005	0.09	0.066	0.02	0.023	7.74	0.03
	MRRC0131	46	48	BIF	0.01	2.61	0.02	56.63	0.005	0.08	0.271	0.01	0.025	4.42	0.01
	MRRC0131	48	50	BIF	0.005	2.95	0.03	50.42	0.005	0.08	0.276	0.005	0.014	14.1	0.03
	MRRC0131	50	52	BIF	0.0025	0.57	0.005	34.49	0.005	0.005	0.136	0.005	0.007	46.36	0.005
	MRRC0131	52	54	BIF	0.0025	0.54	0.005	40.99	0.01	0.005	0.182	0.005	0.005	37.09	0.005
	MRRC0130	0	2	BIF	0.025	5.41	0.07	53.1	0.12	0.09	0.039	0.03	0.02	10.53	0.19
	MRRC0130	2	4	BIF	0.044	4.53	0.22	52.58	0.03	0.08	0.049	0.06	0.024	12.19	0.24
	MRRC0130	4	6	BIF	0.044	3.52	0.07	50.26	0.03	0.08	0.041	0.05	0.046	14.8	0.12
	MRRC0130	6	8	BIF	0.029	2.44	0.04	50.79	0.02	0.04	0.062	0.04	0.024	13.85	0.07
	MRRC0130	8	10	BIF	0.026	1.97	0.06	55.52	0.005	0.03	0.048	0.02	0.02	7.09	0.04
	MRRC0130	10	12	BIF	0.027	2.32	0.59	51.83	0.01	0.07	0.03	0.02	0.016	11.32	0.04
	MRRC0130	12	14	BIF	0.023	1.47	0.07	56.76	0.005	0.02	0.023	0.02	0.013	6.42	0.02
	MRRC0130	14	16	BIF	0.012	0.99	0.03	58.55	0.005	0.02	0.017	0.03	0.01	6.94	0.005
	MRRC0130	16	18	BIF	0.015	2.12	0.03	56.43	0.02	0.04	0.018	0.03	0.008	6.92	0.005
	MRRC0130	18	20	BIF	0.019	1.74	0.03	54.29	0.01	0.02	0.018	0.02	0.007	10.93	0.005
	MRRC0130	20	22	BIF	0.016	3.59	0.03	49.11	0.03	0.05	0.026	0.04	0.015	15.59	0.03
	MRRC0130	22	24	BIF	0.012	2.53	0.02	53.79	0.02	0.04	0.026	0.04	0.016	9.86	0.02
	MRRC0130	24	26	BIF	0.009	2.23	0.01	54.65	0.02	0.03	0.158	0.02	0.013	8.33	0.02
	MRRC0130	26	28	BIF	0.005	1.95	0.01	50.16	0.02	0.02	0.323	0.005	0.014	16.28	0.02
	MRRC0130	28	30	BIF	0.005	1.64	0.02	39.92	0.02	0.005	0.492	0.005	0.008	32.11	0.01
	MRRC0130	30	32	BIF	0.006	0.86	0.005	42.06	0.005	0.005	0.05	0.005	0.006	30.58	0.005
	MRRC0130	32	34	BIF	0.0025	0.65	0.005	38.91	0.005	0.005	0.045	0.005	0.005	36.48	0.005
	MRRC0130	34	36	BIF	0.006	3.41	0.03	40.02	0.005	0.04	0.032	0.005	0.007	30.58	0.01
	MRRC0130	36	38	BIF	0.013	1.82	0.005	46.86	0.005	0.005	0.066	0.005	0.007	22.38	0.02
	MRRC0130	38	40	BIF	0.007	1.5	0.005	49.17	0.005	0.02	0.043	0.005	0.007	18.34	0.01
	MRRC0130	40	42	BIF	0.012	1.49	0.01	46.91	0.005	0.01	0.062	0.005	0.01	21.87	0.03
	MRRC0130	42	44	BIF	0.006	0.68	0.005	31.45	0.005	0.005	0.089	0.005	0.008	47.37	0.005
	MRRC0130	44	46	BIF	0.006	1.08	0.005	40.99	0.005	0.005	0.178	0.005	0.01	32.04	0.01
	MRRC0129	0	2	BIF	0.015	1.76	0.05	56.82	0.01	0.02	0.025	0.005	0.009	6.17	0.02
	MRRC0129	2	4	BIF	0.014	2.15	0.02	57.38	0.02	0.03	0.021	0.01	0.011	4.63	0.03
	MRRC0129	4	6	BIF	0.008	1.66	0.02	58.43	0.005	0.04	0.026	0.01	0.009	5.39	0.02
	MRRC0129	6	8	BIF	0.009	1.31	0.03	57.6	0.005	0.02	0.028	0.02	0.01	7.33	0.02
	MRRC0129	8	10	BIF	0.016	1.62	0.01	58.1	0.01	0.02	0.037	0.005	0.011	4.77	0.02
	MRRC0129	10	12	BIF	0.012	1.66	0.01	57.55	0.005	0.01	0.031	0.02	0.01	5.56	0.01
	MRRC0129	12	14	BIF	0.01	1.01	0.02	57.77	0.005	0.005	0.037	0.02	0.008	7.48	0.005
	MRRC0129	14	16	BIF	0.008	0.94	0.02	58.47	0.005	0.005	0.052	0.01	0.021	6.94	0.005
	MRRC0129	16	18	BIF	0.01	0.82	0.005	58.82	0.005	0.01	0.076	0.01	0.025	5.45	0.005
	MRRC0129	18	20	BIF	0.007	0.69	0.01	58.58	0.005	0.005	0.054	0.01	0.042	6.56	0.005
	MRRC0129	20	22	BIF	0.0025	0.64	0.01	59.94	0.005	0.005	0.059	0.02	0.049	4.95	0.01
	MRRC0129	22	24	BIF	0.006	0.8	0.005	59.88	0.005	0.01	0.065	0.01	0.017	3.91	0.005
	MRRC0129	24	26	BIF	0.006	1.32	0.005	57.12	0.005	0.005	0.068	0.005	0.017	6.08	0.005
	MRRC0129	26	28	BIF	0.009	1.47	0.005	56.48	0.005	0.005	0.067	0.02	0.024	6.39	0.03
	MRRC0129	28	30	BIF	0.014	1.25	0.01	57.15	0.005	0.005	0.09	0.01	0.038	5.62	0.05
	MRRC0129	30	32	BIF	0.011	2.86	0.02	53.26	0.005	0.01	0.137	0.04	0.011	10.68	0.05
	MRRC0129	32	34	BIF	0.006	1.39	0.005	56.99	0.005	0.005	0.066	0.02	0.009	6.37	0.02
	MRRC0129	34	36	BIF	0.007	0.79	0.005	59.49	0.005	0.005	0.045	0.005	0.023	4.09	0.02
	MRRC0129	36	38	BIF	0.009	1.64	0.01	55.18	0.005	0.005	0.045	0.005	0.046	7.42	0.02
	MRRC0129	38	40	BIF	0.014	3.94	0.02	49.65	0.005	0.005	0.043	0.005	0.018	13.92	0.04
	MRRC0129	40	42	BIF	0.01	3.19	0.01	54.44	0.005	0.02	0.147	0.02	0.02	7.15	0.02
	MRRC0129	42	44	BIF	0.006	1.92	0.005	57.14	0.005	0.02	0.165	0.01	0.011	4.81	0.01
	MRRC0129	44	46	BIF	0.011	3.82	0.04	50.95	0.02	0.15	0.216	0.01	0.014	11.29	0.04
	MRRC0129	46	48	BIF	0.008	4.03	0.02	51.05	0.005	0.1	0.123	0.005	0.011	11.13	0.03
	MRRC0129	48	50	BIF	0.006	2.97	0.02	37.99	0.005	0.05	0.062	0.005	0.01	34.77	0.03
	MRRC0129	50	52	BIF	0.006	3.4	0.01	31.87	0.005	0.02	0.052	0.005	0.01	44.49	0.05

1 = Represents Phase 2 sample source

= Outside pit shell plus 10 m buffer zone

Appendix B

Phase 2 Results and Lab Reports

PHASE 2 ACID FORMATION POTENTIAL RESULTS

SampleID	BHID	Interval (m)	Lithology	pH (1:2)	EC (1:2) [mS/cm]	Total-S (%)	Total-C (%)	CO3-C (%)	Carb-ANC kg H2SO4/tonne	Bulk-ANC kg H2SO4/tonne	NAG-Ph 4.5 kg H2SO4/tonne	NAG-pH 7.0 kg H2SO4/tonne	NAG-pH	AFP Category
				GCA	GCA	ITK	ITK	ITK	calc	GCA	GCA	GCA	GCA	Prelim
Miralga East Pit 1														
MSC15	MRRC0110	14-18	BIF	6.4	0.09	0.03	0.37	0.08	6.54	1	<1	<1	7.3	NAF
MSC16	MRRC0114	20-24	BIF	6.9	0.29	0.01	0.24	0.07	5.72	1				NAF
MSC17	MRRC0114	48-52	Chert	7.6	0.07	<0.01	0.11	0.03	2.5	<1				NAF
MSC18	MRRC0115	36-40	BIF	6.1	0.07	0.04	0.06	0.02	1.6	2	<1	<1	7.6	NAF
MSC01	MRRC0132	14-18	BIF	8.1	0.36	0.04	0.74	0.05	4.09	1				NAF
MSC02	MRRC0133	0-4	BIF	7.4	0.25	0.02	0.2	0.07	5.7	2				NAF
Miralga East Pit 2														
MSC19	MRRC0119	18-22	BIF	5.8	0.89	0.03	0.1	0.04	3.27	<1				NAF
MSC20	MRRC0119	42-46	BIF	7.3	0.14	<0.01	0.06	<0.01	0.82	<1				NAF
MSC21	MRRC0117	8-12	BIF	7.7	0.11	0.04	0.05	<0.01	0.82	<1				NAF
MSC22	MRRC0117	48-52	BIF	6.7	0.09	0.05	0.06	<0.01	0.82	1	<1	<1	6.8	NAF
MSC23	MRRC0117	64-68	Chert	7.2	0.08	<0.01	0.11	<0.01	0.82	1				NAF
MSC24	MRRC0120	0-4	BIF	8.2	0.36	0.03	0.57	0.48	39.22	34				NAF
Miralga East Pit 3														
MSC03	MRRC0137	4-8	BIF	7.7	0.29	0.01	0.45	0.07	5.72	2				NAF
MSC04	MRRC0138	30-34	BIF	7.9	0.10	<0.01	0.12	0.02	1.63	<1	<1	<1	6.2	NAF
MSC05	MRRC0139	16-20	BIF	8.1	0.42	<0.01	0.22	0.08	6.54	4				NAF
MSC06	MRRC0135	8-12	BIF	8.1	0.37	<0.01	0.58	0.14	11.44	9				NAF
MSC07	MRRC0135	38-42	BIF	7.1	0.11	0.02	0.17	0.07	5.72	<1				NAF
MSC08	MRRC0135	58-62	BIF	7.3	0.10	<0.01	0.13	0.03	2.45	1				NAF
Miralga West														
MWC001	MRRC0091	54-58	Sandstone	5.8	0.11	<0.01	0.04	<0.01	0.82	<1	<1	<1	6.6	NAF
MWC002	MRRC0093	34-38	Shale	8.2	0.34	<0.01	0.11	<0.01	0.82	1	<1	<1	7.9	NAF
MWC003	MRRC0093	92-96	BIF	7.0	0.07	<0.01	0.06	<0.01	0.82	1				NAF
MWC004	MRRC0095	8-12	BIF	8.1	0.12	0.01	0.09	<0.01	0.82	1				NAF
MWC005	MRRC0097	12-16	BIF	8.2	0.15	<0.01	0.08	<0.01	0.82	2				NAF
MWC006	MRRC0099	112-116	Chert	6.8	0.04	<0.01	0.06	<0.01	0.82	<1				NAF
MWC007	MRRC0099	122-126	BIF	6.8	0.02	<0.01	0.06	<0.01	0.82	1				NAF
MWC008	MRRC0100	60-64	BIF	7.3	0.07	<0.01	0.1	0.02	1.63	1				NAF
MWC009	MRRC0104	0-4	BIF	7.3	0.04	<0.01	0.17	0.02	1.63	1				NAF
Sandtrax														
MSC09	MRRC0123	36-40	BIF	7.8	0.07	<0.01	0.06	<0.01	0.82	<1				NAF
MSC10	MRRC0124	22-26	BIF	7.7	0.11	<0.01	0.14	0.02	1.63	1				NAF
MSC11	MRRC0127	2-6	BIF	6.6	0.25	0.02	0.4	0.07	5.72	4				NAF
MSC12	MRRC0127	52-56	BIF	7.1	0.08	<0.01	0.08	0.03	2.45	<1	<1	<1	6.9	NAF
MSC13	MRRC0129	48-52	BIF	6.5	0.07	<0.01	0.14	0.04	3.27	1				NAF
MSC14	MRRC0131	36-40	BIF	7.2	0.16	0.01	0.14	0.02	1.63	1				NAF

PHASE 2 MULTI-ELEMENT RESULTS

SampleID	BHID	Interval (m)	Lithology	S (%)	Ca (%)	Mg (%)	K (%)	Na (%)	Fe (%)	Al (%)	Si (%)	Ti (%)	Hg (ppm)	As (ppm)	Sb (ppm)	Se (ppm)	Mo (ppm)	B (ppm)	F (mg/kg)
				SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	ITK	SGS	SGS	ITK	SGS	SGS	SGS
Miralga East Pit 1																			
MSC15	MRRC0110	14-18	BIF	0.03	0.01	0.01	<0.01	0.01	59.0	1.0	1.2	0.07	0.68	45	8.9	2.15	1.6	<20	<50
MSC16	MRRC0114	20-24	BIF										0.16			1.11			
MSC17	MRRC0114	48-52	Chert	<0.01	0.01	0.02	<0.01	0.01	12.0	0.12	38.0	<0.01	0.30	12	1.4	0.23	1.3	<20	<50
MSC18	MRRC0115	36-40	BIF										0.55			0.1			
MSC01	MRRC0132	14-18	BIF										0.13			0.48			
MSC02	MRRC0133	0-4	BIF	0.02	0.03	0.04	<0.01	0.01	36.0	0.25	21.0	0.01	0.10	6	0.7	0.14	0.9	<20	56
Miralga East Pit 2																			
MSC19	MRRC0119	18-22	BIF	0.03	0.02	0.02	<0.01	0.03	59.0	0.57	3.7	0.01	0.04	24	4.8	0.72	1.5	<20	100
MSC20	MRRC0119	42-46	BIF										0.09			0.38			
MSC21	MRRC0117	8-12	BIF										0.05			0.38			
MSC22	MRRC0117	48-52	BIF	0.05	0.01	0.03	<0.01	0.01	31.0	0.11	25.0	<0.01	0.05	9	2	0.19	1.1	<20	78
MSC23	MRRC0117	64-68	Chert										0.21			0.16			
MSC24	MRRC0120	0-4	BIF										0.32			0.56			
Miralga East Pit 3																			
MSC03	MRRC0137	4-8	BIF										0.18			0.3			
MSC04	MRRC0138	30-34	BIF										0.12			0.41			
MSC05	MRRC0139	16-20	BIF	0.01	0.16	0.04	0.23	0.02	20.0	1.3	32.0	0.03	0.07	22	2.5	1.24	1.5	20	56
MSC06	MRRC0135	8-12	BIF										0.07			0.83			
MSC07	MRRC0135	38-42	BIF										0.04			0.28			
MSC08	MRRC0135	58-62	BIF	0.01	0.01	0.02	<0.01	<0.01	49.0	0.45	9.8	0.01	0.09	32	4	0.53	1.5	<20	62
Miralga West																			
MWC001	MRRC0091	54-58	Sandstone	<0.01	0.01	0.04	2.30	0.08	3.7	6.7	35.0	0.14	0.10	4	0.6	0.06	2.9	<20	97
MWC002	MRRC0093	34-38	Shale	0.01	0.05	0.06	0.20	0.02	37.0	3.0	17.0	0.05	0.07	22	3	1.33	2.8	<20	<50
MWC003	MRRC0093	92-96	BIF										0.19			1.14			
MWC004	MRRC0095	8-12	BIF	0.02	0.05	0.03	<0.01	0.01	59.0	0.89	3.7	0.02	0.10	20	5	0.47	1.3	<20	<50
MWC005	MRRC0097	12-16	BIF										0.06			0.33			
MWC006	MRRC0099	112-116	Chert										0.07			0.63			
MWC007	MRRC0099	122-126	BIF	0.01	0.01	0.01	0.02	0.01	51.0	0.67	8.6	0.01	0.06	12	1.7	0.22	1	<20	<50
MWC008	MRRC0100	60-64	BIF										0.06			0.86			
MWC009	MRRC0104	0-4	BIF										0.15			0.51			
Sandtrax																			
MSC09	MRRC0123	36-40	BIF										0.03			0.37			
MSC10	MRRC0124	22-26	BIF										0.34			0.51			
MSC11	MRRC0127	2-6	BIF	0.03	0.02	0.03	0.02	0.01	58.0	1.5	2.7	0.05	0.21	39	2.6	1.82	2.2	<20	52
MSC12	MRRC0127	52-56	BIF	0.00	0.01	0.02	<0.01	0.01	23.0	0.34	30.0	0.01	0.03	4	0.3	0.39	1	<20	<50
MSC13	MRRC0129	48-52	BIF										0.06			1.24			
MSC14	MRRC0131	36-40	BIF										0.08			1.65			

Average Crustal Abundance

10-100 times

>100 times

NB: Average Crustal Abundance derived from Reimann & Caritat 1998

PHASE 2 MULTI-ELEMENT RESULTS

SampleID	BHID	Interval (m)	Lithology	Ag (ppm)	Ba (ppm)	Bi (ppm)	Cd (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sn (ppm)	Sr (ppm)	Th (ppm)	Tl (ppm)	U (ppm)	V (ppm)	Zn (ppm)
				SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS	SGS
Miralga East Pit 1																					
MSC15	MRRC0110	14-18	BIF	0.16	170	<0.1	<0.1	9.4	120	32	3,400	8	1,000	10	0.8	5.3	1.9	3	0.75	27	56
MSC16	MRRC0114	20-24	BIF																		
MSC17	MRRC0114	48-52	Chert	<0.05	19	<0.1	<0.1	1.1	25	17	120	8	160	<1	0.3	1.8	0.07	<0.1	0.12	<1	11
MSC18	MRRC0115	36-40	BIF																		
MSC01	MRRC0132	14-18	BIF																		
MSC02	MRRC0133	0-4	BIF	0.07	62	<0.1	<0.1	2.9	<10	39	2,500	12	290	3	0.4	8.4	0.28	<0.1	0.15	<1	60
Miralga East Pit 2																					
MSC19	MRRC0119	18-22	BIF	0.1	150	<0.1	<0.1	4.8	20	71	330	23	1,100	7	<0.3	9.1	0.6	<0.1	0.52	<1	83
MSC20	MRRC0119	42-46	BIF																		
MSC21	MRRC0117	8-12	BIF																		
MSC22	MRRC0117	48-52	BIF	<0.05	26	<0.1	<0.1	3.7	<10	14	1,500	18	60	4	0.5	2.7	0.14	<0.1	0.06	<1	49
MSC23	MRRC0117	64-68	Chert																		
MSC24	MRRC0120	0-4	BIF																		
Miralga East Pit 3																					
MSC03	MRRC0137	4-8	BIF																		
MSC04	MRRC0138	30-34	BIF																		
MSC05	MRRC0139	16-20	BIF	<0.05	180	0.4	<0.1	3	40	66	100	22	230	16	3.4	13	1	1.2	0.21	29	120
MSC06	MRRC0135	8-12	BIF																		
MSC07	MRRC0135	38-42	BIF																		
MSC08	MRRC0135	58-62	BIF	0.08	130	<0.1	<0.1	7.2	25	64	1,100	52	720	6	0.6	3.4	0.28	0.1	0.12	<1	79
Miralga West																					
MWC001	MRRC0091	54-58	Sandstone	0.05	450	0.2	<0.1	1.3	30	10	270	23	85	11	1.2	18	8.3	0.8	1.5	31	11
MWC002	MRRC0093	34-38	Shale	0.09	120	<0.1	<0.1	4.1	170	57	1,000	31	120	11	0.9	14	1.7	0.2	0.5	18	64
MWC003	MRRC0093	92-96	BIF																		
MWC004	MRRC0095	8-12	BIF	0.18	26	0.2	<0.1	8.2	15	73	830	21	130	18	1.4	11	0.79	<0.1	0.3	3	82
MWC005	MRRC0097	12-16	BIF																		
MWC006	MRRC0099	112-116	Chert																		
MWC007	MRRC0099	122-126	BIF	0.06	34	<0.1	<0.1	10	20	25	5,100	31	140	7	<0.3	18	0.57	<0.1	0.57	4	110
MWC008	MRRC0100	60-64	BIF																		
MWC009	MRRC0104	0-4	BIF																		
Sandtrax																					
MSC09	MRRC0123	36-40	BIF																		
MSC10	MRRC0124	22-26	BIF																		
MSC11	MRRC0127	2-6	BIF	0.19	11	0.3	<0.1	1.9	120	50	75	25	240	11	1.9	4.7	2.4	<0.1	0.68	53	120
MSC12	MRRC0127	52-56	BIF	<0.05	46	<0.1	<0.1	5.3	100	26	570	35	140	9	<0.3	4.6	2.7	<0.1	1.3	200	41
MSC13	MRRC0129	48-52	BIF																		
MSC14	MRRC0131	36-40	BIF																		

PHASE 2 MINERALOGY RESULTS

SampleID	MWC001	MWC002	MWC007	MSC08	MSC12	MSC17
BHID	MRRC0091	MRRC0093	MRRC0099	MRRC0135	MRRC0127	MRRC0114
Interval (m)	54-58	34-38	122-126	58-62	52-56	48-52
Lithology	Sandstone	Shale	BIF	BIF	BIF	Chert
Dominant (>50%)	Quartz	Quartz	Goethite	Goethite	Goethite	Quartz
Major (50-20%)	Muscovite	Goethite		Quartz	Quartz	
Minor (20-10%)	Kaolin		Quartz			Goethite
Accessory (10-1%)	Hematite Goethite	Muscovite Kaolin Hematite	Kaolin Hematite	Kaolin	Kaolin	
Trace (<1%)		Mn Oxide Xenotime Calcite	Mn Oxide		Hematite	Kaolin Hematite

PHASE 2 WATER EXTRACTION RESULTS

SampleID	BHID	Interval (m)	Lithology	pH	EC (µS/cm)	Alkalinity (mg/L HCO3)	Cl (mg/L)	SO4 (mg/L)	F (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	Fe (mg/L)	Al (mg/L)	Mn (mg/L)	Si (mg/L)	Hg (µg/L)	As (µg/L)	Sb (µg/L)	Se (µg/L)	Mo (µg/L)	B (µg/L)
				SGS	SGS	SGS	SGS	SGS	SGS									SGS	SGS	SGS	SGS	SGS	SGS
Miralga East Pit 1																							
MSC15	MRRC0110	14-18	BIF	6.4	81	6.0	10	7.0	<0.1	2.6	1.5	0.74	8.1	<0.005	<0.005	0.012	8.8	<0.05	<1.0	<1	1.0	<0.5	45
MSC17	MRRC0114	48-52	Chert	6.6	48	4.0	4.0	5.0	0.2	2.0	1.3	0.58	3.3	0.09	<0.005	0.099	9.9	<0.05	<1	<1	<1	<0.5	32
MSC02	MRRC0133	0-4	BIF	7.5	250	59	14	16	0.1	23	4.0	4.3	11	<0.005	<0.005	0.31	5.6	<0.05	<1	<1	2.0	<0.5	51
Miralga East Pit 2																							
MSC19	MRRC0119	18-22	BIF	5.9	840	2.0	210	62	<0.1	25	11	0.21	100	<0.005	<0.005	2.0	8.3	<0.05	<1	<1	3.0	<0.5	35
MSC22	MRRC0117	48-52	BIF	6.1	65	3.0	5.0	8.0	<0.1	3.0	1.3	2.5	3.2	<0.005	<0.005	0.36	4.6	<0.05	<1	<1	<1	<0.5	20
Miralga East Pit 3																							
MSC05	MRRC0139	16-20	BIF	8.2	430	150	25	22	0.5	21	4.6	20	32	0.074	0.058	0.007	14	<0.05	<1	<1	4.0	3.3	86
MSC08	MRRC0135	58-62	BIF	6.7	76	13	2.0	3.0	<0.1	6.7	1.2	3.5	1.5	<0.005	<0.005	0.25	2.3	<0.05	<1	<1	<1	<0.5	13
Miralga West																							
MWC001	MRRC0091	54-58	Sandstone	6.0	90	1.0	13	11	<0.1	0.25	0.091	8.1	9.3	<0.005	<0.005	0.085	4.3	<0.05	<1	<1	<1	<0.5	8.0
MWC002	MRRC0093	34-38	Shale	7.9	320	44	48	32	0.4	7.6	3.0	3.9	43	0.049	0.013	<0.001	5.9	<0.05	<1	<1	2.0	33	67
MWC004	MRRC0095	8-12	BIF	8.0	92	42	4.0	3.0	0.2	8.6	2.6	0.21	5.9	0.075	0.05	0.001	13	<0.05	<1	<1	<1	3.0	35
MWC007	MRRC0099	122-126	BIF	6.5	13	2.0	1.0	<1.0	<0.1	0.35	0.45	0.2	1.1	<0.005	<0.005	0.009	3.4	<0.05	<1	<1	<1	<0.5	20
Sandtrax																							
MSC11	MRRC0127	2-6	BIF	6.8	200	20	19	21	<0.1	4.7	5.0	3.0	22	<0.005	<0.005	0.008	8.1	<0.05	<1	<1	2.0	<0.5	99
MSC12	MRRC0127	52-56	BIF	6.1	35	5.0	2.0	<1.0	<0.1	1.2	0.82	0.89	1.6	<0.005	<0.005	1.3	4.4	<0.05	<1	<1	<1	<0.5	<5

SampleID	BHID	Interval (m)	Lithology	S (mg/L)	Ag (µg/L)	Ba (µg/L)	Bi (µg/L)	Cd (µg/L)	Co (µg/L)	Cr (µg/L)	Cu (µg/L)	Ni (µg/L)	P (µg/L)	Pb (µg/L)	Sn (µg/L)	Sr (µg/L)	Th (µg/L)	Tl (µg/L)	U (µg/L)	V (µg/L)	Zn (µg/L)
Miralga East Pit 1																					
MSC15	MRRC0110	14-18	BIF	2.4	1.0	5.1	<1	<0.1	<1	<1	<1	<1	<50	<1	<1	23	<1	<1	<1	<1	<5
MSC17	MRRC0114	48-52	Chert	1.6	<1	50	<1	<0.1	<1	<1	<1	1.0	<50	<1	<1	20	<1	<1	<1	<1	<5
MSC02	MRRC0133	0-4	BIF	5.7	<1	120	<1	<0.1	<1	<1	<1	<1	<50	<1	<1	170	<1	<1	<1	<1	<5
Miralga East Pit 2																					
MSC19	MRRC0119	18-22	BIF	19	2.0	87	<1	<0.1	<1	<1	<1	5.0	<50	<1	<1	170	<1	<1	<1	<1	<5
MSC22	MRRC0117	48-52	BIF	2.6	<1	48	<1	<0.1	<1	<1	<1	<1	<50	<1	<1	41	<1	<1	<1	<1	<5
Miralga East Pit 3																					
MSC05	MRRC0139	16-20	BIF	7.0	<1	47	<1	<0.1	<1	<1	<1	4.0	<50	<1	<1	93	<1	<1	<1	<1	<5
MSC08	MRRC0135	58-62	BIF	0.83	<1	270	<1	<0.1	<1	<1	<1	<1	<50	<1	<1	51	<1	<1	<1	<1	<5
Miralga West																					
MWC001	MRRC0091	54-58	Sandstone	4.0	<1	1.6	<1	<0.1	<1	<1	<1	<1	<50	<1	<1	2.0	<1	<1	<1	<1	<5
MWC002	MRRC0093	34-38	Shale	10	<1	28	<1	<0.1	<1	3	<1	<1	<50	<1	<1	110	<1	<1	<1	<1	<5
MWC004	MRRC0095	8-12	BIF	0.98	<1	25	<1	<0.1	<1	<1	<1	<1	<50	<1	<1	66	<1	<1	<1	<1	<5
MWC007	MRRC0099	122-126	BIF	<0.1	<1	<0.2	<1	<0.1	<1	<1	<1	<1	<50	<1	<1	4.0	<1	<1	<1	<1	<5
Sandtrax																					
MSC11	MRRC0127	2-6	BIF	7.2	<1	17	<1	<0.1	<1	<1	<1	<1	<50	<1	<1	60	<1	<1	<1	<1	<5
MSC12	MRRC0127	52-56	BIF	0.2	<1	93	<1	<0.1	1.0	<1	<1	25	<50	<1	<1	27	<1	<1	<1	<1	<5

Graeme Campbell & Associates Pty Ltd
Laboratory Report

pH-(1:2) & EC-(1:2) TESTWORK

	SAMPLE_ ID	SAMPLE WEIGHT (g)	pH-(1:2)	EC-(1:2) (µS/cm)
	MSC01	30.0	8.1	355
	MSC02	29.9	7.4	251
	MSC03	30.1	7.7	289
pulp	MSC04	30.0	7.9	101
	MSC05	30.0	8.1	417
	MSC06	29.9	8.1	366
	MSC07	30.1	7.1	113
	MSC08	30.0	7.3	96
	MSC09	30.0	7.8	74
	MSC10	29.9	7.7	113
	MSC10 d	30.0	7.7	105
	MSC11	29.9	6.6	247
	MSC12	29.9	7.1	83
	MSC13	30.0	6.5	73
	MSC14	30.1	7.2	159
	MSC15	29.9	6.4	92
	MSC16	30.0	6.9	290
	MSC17	30.0	7.6	68
	MSC18	29.9	6.1	69
	MSC19	30.0	5.8	890
	MSC20	30.1	7.3	136
	MSC20 d	30.1	7.3	106

Comments:

- For all samples, the supernatants were either clear, or only slightly turbid.
The degree of turbidity did not impact on the EC measurements.

Notes: EC = Electrical-Conductivity
Testwork performed on as-submitted crushed (-5 mm nominal) samples.
pH-(1:2) and EC=(1:2) values correspond to pH and EC values for slurries prepared with deionised-water, and a solid:solution ratio of ***ca.*** **1:2 (w/w)** [i.e. approx. 30 g solids + 60 mL DW).
Test-slurries allowed to 'age' / 'breathe' / equilibrate for *ca.* 2-3 days before pH and EC determinations.
Test-slurries in 100 mL glass-beakers were stirred with a spatula once daily during ageing / equilibration.
Supernatants decanted into a 30mL plastic-vial for measurement of EC, i.e. EC-(1:2) = **'Supernatant-EC'**.
After EC measurement, supernatants returned to glass-beakers, and mixing of slurry, prior to measuring pH-(1:2), i.e. pH-(1:2) = **'Mud-pH'**.
Testwork performed in a CT-room (viz. **20 +/- 2 oC**).

Dr GD Campbell
13th December 2019

pH-(1:2) and EC-(1:2) Testwork

Graeme Campbell & Associates Pty Ltd
Laboratory Report

pH-(1:2) & EC-(1:2) TESTWORK

SAMPLE_ ID	SAMPLE WEIGHT (g)	pH-(1:2)	EC-(1:2) (µS/cm)
MSC21	29.9	7.7	112
MSC22	30.0	6.7	88
MSC23	30.1	7.2	77
MSC24	29.9	8.2	363
MWC001	30.0	5.8	109
MWC002	30.1	8.2	340
MWC003	29.9	7.0	68
MWC004	30.0	8.1	115
MWC005	30.1	8.2	153
MWC006	29.9	6.8	36
MWC007	30.1	6.8	22
MWC007 d	30.1	6.7	32
MWC008	30.0	7.3	67
MWC009	29.9	7.3	37

Comments:

- For all samples, the supernatants were either clear, or only slightly turbid.
The degree of turbidity did not impact on the EC measurements.

Notes: EC = Electrical-Conductivity
Testwork performed on as-submitted crushed (-5 mm nominal) samples.
pH-(1:2) and EC=(1:2) values correspond to pH and EC values for slurries prepared with deionised-water, and a solid:solution ratio of ***ca.* 1:2 (w/w)** [i.e. approx. 30 g solids + 60 mL DW).
Test-slurries allowed to 'age' / 'breathe' / equilibrate for *ca.* 2-3 days before pH and EC determinations.
Test-slurries in 100 mL glass-beakers were stirred with a spatula once daily during ageing / equilibration.
Supernatants decanted into a 30mL plastic-vial for measurement of EC, i.e. EC-(1:2) = **'Supernatant-EC'**.
After EC measurement, supernatants returned to glass-beakers, and mixing of slurry, prior to measuring pH-(1:2), i.e. pH-(1:2) = **'Mud-pH'**.
Testwork performed in a CT-room (viz. **20 +/- 2 oC**).

Dr GD Campbell
13th December 2019

Graeme Campbell & Associates Pty Ltd

ACID-NEUTRALISATION-CAPACITY (ANC) TESTWORK: BASED ON AMIRA (2002) WITH VARIATIONS TO CONSTRAIN DISSOLUTION OF NON-CARBONATE-MINERALS UNRELATED TO CIRCUM-NEUTRAL BUFFERING SAVE FOR VANISHINGLY-SMALL RATES OF PYRITE OXIDATION (e.g. < 0.1 kg H2SO4/tonne/year)

	SAMPLE		HCl		milli	Digest-	NaOH		milli	pH	BULK-	
	ID	WT (g)	Conc. (M)	Pipette Volume (mL)	moles H+ Added	Slurry-Final-pH	Conc. (M)	Titre Volume (mL)	moles OH- Added	after H2O2 Added	ANC (kg H2SO4/ tonne)	
	MSC20	14.99	0.10	10	1.00	3.4	0.05	19.05	0.953	2.8	**< 1**	
	MSC21	14.98	0.10	10	1.00	3.3	0.05	19.25	0.963	2.7	**< 1**	"maghemite" (?)
	MSC22	14.99	0.10	10	1.00	3.4	0.05	16.25	0.813	2.8	**1**	"maghemite" (?)
	MSC23	15.01	0.10	10	1.00	3.3	0.05	16.65	0.833	2.8	**1**	"maghemite" (?)
	MWC001	14.98	0.10	10	1.00	1.2	0.05	18.45	0.923	> 4.0	**< 1**	
	MWC001 d	14.98	0.10	10	1.00	1.1	0.05	17.75	0.888	> 4.0	**< 1**	
	MWC002	14.99	0.10	10	1.00	1.4	0.05	11.15	0.558	> 4.0	**1**	
	MWC003	15.02	0.10	10	1.00	1.1	0.05	15.75	0.788	> 4.0	**1**	
	MWC004	14.97	0.10	10	1.00	1.3	0.05	12.25	0.613	> 4.0	**1**	
	MWC005	15.00	0.10	10	1.00	1.6	0.05	8.25	0.413	> 4.0	**2**	
	MWC006	15.04	0.10	10	1.00	1.1	0.05	17.25	0.863	> 4.0	**< 1**	
	MWC006 d	15.01	0.10	10	1.00	1.1	0.05	17.55	0.878	> 4.0	**< 1**	
	MWC007	14.96	0.10	10	1.00	1.1	0.05	16.65	0.833	> 4.0	**1**	
	MSC09	14.98	0.10	10	1.00	3.4	0.05	18.55	0.928	2.8	**< 1**	"maghemite" (?)
	MSC18	10.03	0.10	10	1.00	1.8	0.05	10.25	0.513	> 4.0	**2**	
pulp	MSC04	10.01	0.10	10	1.00	3.7	0.05	19.35	0.968	2.8	**< 1**	"maghemite" (?)
	MWC008	10.02	0.10	10	1.00	1.1	0.05	17.35	0.868	> 4.0	**1**	
	MWC008 d	9.97	0.10	10	1.00	1.1	0.05	17.05	0.853	> 4.0	**1**	
	ANC Std	4.99	0.10	25	2.50	1.8	0.05	7.65	0.383	> 4.0	21	
	ANC Std d	5.01	0.10	25	2.50	1.8	0.05	7.75	0.388	> 4.0	21	
	HCl	-	0.10	10	1.00		0.05	20.10	1.01		100.5%	
	HCl (d)	-	0.10	10	1.00		0.05	20.15	1.01		100.8%	

Notes:

1. Testing performed on **-2 mm** fraction obtained by dry-sieving the 'as-submitted' crushed samples.
2. ***ca.* 20 mL** of high-purity-deionised-water (HPDW) added to all samples (including HCl-solution 'blanks') initially.
3. HCl solution added manually via volumetric glass pipette (A Class).
4. **HCl** and **NaOH** solutions certified reagents from Merck (viz. Titripur® reagents in hermetically-sealed Titripac® casks).
5. Sample weight, and volume and strength of HCl added, based on corresponding CO3-C value(s).
6. During acid-digestion temperature of waterbath is **80 +/- 5 oC,** and digestion performed for **1.0 hr** with beakers swirled by hand 1-2 times during this reaction period. Digestion performed using 250 mL tall-form beakers covered with watchglasses.
7. After completion of acid-digestion step, the test-slurries are boiled for *ca.* 1 min to expel any dissolved CO2(aq) which is important for the attainment of a stable pH7 end-point in the subsequent back-titration with NaOH solution.
8. Following cooling to room-T, **digest-slurry-final-pH** is measured. HPDW is then added to bring test-slurry volume to *ca.* **125 mL** for titration with NaOH solution.
9. Titration with NaOH performed manually using 50 mL glass burette with slurry stirred using magnetic stirrer-bar. Fast titration with stopcock fully open until slurry-pH rises to approximate range 4.0-4.5 when titration stops for H2O2 addition.
10. Three drops of **30 % H2O2 (v/v)** [adjusted to pH 4.5] added to slurry to oxidise **soluble-Fe(II)** forms ('latent-acidity') and precipitation of Fe(III)/Al-oxyhydroxides, etc. Minimum slurry-pH attained following H2O2 addition recorded.
11. Following completion of H2O2 addition, titration with NaOH continues to a **pH7** end-point. Titration with NaOH undertaken so that slurry-pH at end-point is within range 6.9-7.1 (i.e. pH 7.0 +/- 0.1) for *ca.* 30 seconds. [Related pH-end-point stability criteria for manual titration (cf. autotititration) option applies in ASTM E1915-13, and AS-4969.12-09].
12. ANC Standard is pulped mixture of quartz and AR CaCO3 (CO3-C = 0.27 %; ANC = 22 kg H2SO4/tonne).
13. Samples with "maghemite" (?) noted were characterised by deposits clinging to magnetic-stirrer bar retrieved after completion of titration with NaOH solution. Though magnetic, the deposits did not resemble magnetite.

The main variations to the AMIRA (2002) method are the use of -2 mm fraction (cf. pulp, -75 µm nominal), and the applied HCl loading, as governed by CO3-C value.

Dr GD Campbell
13th December 2019

ANC Testwork: Back-Titrations with NaOH Solution

Graeme Campbell & Associates Pty Ltd

ACID-NEUTRALISATION-CAPACITY (ANC) TESTWORK: BASED ON AMIRA (2002) WITH VARIATIONS TO CONSTRAIN DISSOLUTION OF NON-CARBONATE-MINERALS UNRELATED TO CIRCUM-NEUTRAL BUFFERING SAVE FOR VANISHINGLY-SMALL RATES OF PYRITE OXIDATION (e.g. < 0.1 kg H2SO4/tonne/year)

SAMPLE		HCl		milli	Digest-	NaOH		milli	pH	BULK-	
ID	WT (g)	Conc. (M)	Pipette Volume (mL)	moles H+ Added	Slurry-Final-pH	Conc. (M)	Titre Volume (mL)	moles OH- Added	after H2O2 Added	ANC (kg H2SO4/ tonne)	
MSC09	10.08	0.10	10	1.00	1.2	0.05	16.25	0.813	> 4.0	**1**	
MSC10	10.02	0.10	10	1.00	3.3	0.05	17.25	0.863	2.7	**1**	"maghemite" (?)
MSC14	9.99	0.10	10	1.00	2.2	0.05	16.75	0.838	3.2	**1**	
MSC17	9.98	0.10	10	1.00	3.6	0.05	19.25	0.963	2.7	**< 1**	"maghemite" (?)
MSC08	9.97	0.10	10	1.00	2.5	0.05	16.45	0.823	2.9	**1**	"maghemite" (?)
MSC08 d	9.99	0.10	10	1.00	2.5	0.05	16.85	0.843	2.9	**1**	"maghemite" (?)
MSC12	9.99	0.10	10	1.00	1.8	0.05	18.65	0.933	2.9	**< 1**	"maghemite" (?)
MSC19	10.00	0.10	10	1.00	1.5	0.05	18.15	0.908	3.6	**< 1**	
MSC13	10.01	0.10	10	1.00	2.3	0.05	16.65	0.833	3.5	**1**	"maghemite" (?)
MSC01	7.02	0.10	10	1.00	3.8	0.05	16.85	0.843	2.8	**1**	"maghemite" (?)
MSC16	6.02	0.10	10	1.00	1.8	0.05	16.95	0.848	3.6	**1**	
MSC16 d	6.00	0.10	10	1.00	1.8	0.05	17.05	0.853	3.6	**1**	
MSC02	5.99	0.10	10	1.00	1.8	0.05	15.25	0.763	3.3	**2**	
MSC03	5.99	0.10	10	1.00	2.0	0.05	14.55	0.728	2.9	**2**	
MSC07	5.96	0.10	10	1.00	1.6	0.05	19.15	0.958	2.9	**< 1**	
MSC11	6.00	0.10	10	1.00	1.6	0.05	18.15	0.908	2.8	**4**	
MSC15	6.02	0.10	10	1.00	1.4	0.05	16.95	0.848	> 4.0	**1**	
MSC15 d	5.98	0.10	10	1.00	1.4	0.05	16.25	0.813	> 4.0	**2**	
ANC Std	5.00	0.10	25	2.50	1.8	0.05	7.75	0.388	> 4.0	21	
ANC Std d	5.01	0.10	25	2.50	1.8	0.05	7.60	0.380	> 4.0	21	
HCl	-	0.10	10	1.00		0.05	20.10	1.01		100.5%	
HCl (d)	-	0.10	10	1.00		0.05	20.15	1.01		100.8%	

Notes:

1. Testing performed on **-2 mm** fraction obtained by dry-sieving the 'as-submitted' crushed samples.
2. ***ca.* 20 mL** of high-purity-deionised-water (HPDW) added to all samples (including HCl-solution 'blanks') initially.
3. HCl solution added manually via volumetric glass pipette (A Class).
4. **HCl** and **NaOH** solutions certified reagents from Merck (viz. Titripur® reagents in hermetically-sealed Titripac® casks).
5. Sample weight, and volume and strength of HCl added, based on corresponding CO3-C value(s).
6. During acid-digestion temperature of waterbath is **80 +/- 5 oC,** and digestion performed for **1.0 hr** with beakers swirled by hand 1-2 times during this reaction period. Digestion performed using 250 mL tall-form beakers covered with watchglasses.
7. After completion of acid-digestion step, the test-slurries are boiled for *ca.* 1 min to expel any dissolved CO2(aq) which is important for the attainment of a stable pH7 end-point in the subsequent back-titration with NaOH solution.
8. Following cooling to room-T, **digest-slurry-final-pH** is measured. HPDW is then added to bring test-slurry volume to *ca.* **125 mL** for titration with NaOH solution.
9. Titration with NaOH performed manually using 50 mL glass burette with slurry stirred using magnetic stirrer-bar. Fast titration with stopcock fully open until slurry-pH rises to approximate range 4.0-4.5 when titration stops for H2O2 addition.
10. Three drops of **30 % H2O2 (v/v)** [adjusted to pH 4.5] added to slurry to oxidise **soluble-Fe(II)** forms ('latent-acidity') and precipitation of Fe(III)/Al-oxyhydroxides, etc. Minimum slurry-pH attained following H2O2 addition recorded.
11. Following completion of H2O2 addition, titration with NaOH continues to a **pH7** end-point. Titration with NaOH undertaken so that slurry-pH at end-point is within range 6.9-7.1 (i.e. pH 7.0 +/- 0.1) for *ca.* 30 seconds. [Related pH-end-point stability criteria for manual titration (cf. autotititration) option applies in ASTM E1915-13, and AS-4969.12-09].
12. ANC Standard is pulped mixture of quartz and AR CaCO3 (CO3-C = 0.27 %; ANC = 22 kg H2SO4/tonne).
13. Samples with "maghemite" (?) noted were characterised by deposits clinging to magnetic-stirrer bar retrieved after completion of titration with NaOH solution. Though magnetic, the deposits did not resemble magnetite.

The main variations to the AMIRA (2002) method are the use of -2 mm fraction (cf. pulp, -75 µm nominal), and the applied HCl loading, as governed by CO3-C value.

Dr GD Campbell
13th December 2019

Graeme Campbell & Associates Pty Ltd

ACID-NEUTRALISATION-CAPACITY (ANC) TESTWORK: BASED ON AMIRA (2002) WITH VARIATIONS TO CONSTRAIN DISSOLUTION OF NON-CARBONATE-MINERALS UNRELATED TO CIRCUM-NEUTRAL BUFFERING SAVE FOR VANISHINGLY-SMALL RATES OF PYRITE OXIDATION (e.g. < 0.1 kg H2SO4/tonne/year)

SAMPLE		HCl		milli	Digest-	NaOH		milli	pH	Vigour of	BULK-	
ID	WT (g)	Conc. (M)	Pipette Volume (mL)	moles H+ Added	Slurry- Final- pH	Conc. (M)	Titre Volume (mL)	moles OH- Added	after H2O2 Added	'Fizzing' from HCl Addition ('in-the-cold')	ANC (kg H2SO4/ tonne)	
MSC05	6.03	0.10	10	1.00	3.3	0.05	9.55	0.478	2.8		**4**	"maghemite" (?)
MSC06	4.99	0.10	15	1.50	2.9	0.05	12.20	0.610	2.7	weak-to-moderate	**9**	"maghemite" (?)
MSC24	5.80	0.50	10	5.00	3.3	0.10	9.95	0.995	2.8	strong	**34**	"maghemite" (?)
MSC24 d	5.80	0.50	10	5.00	3.3	0.10	9.70	0.970	2.8		**34**	"maghemite" (?)
ANC Std	2.01	0.50	10	5.00	1.3	0.10	10.35	1.035	> 4.0		97	
ANC Std d	2.00	0.50	10	5.00	1.3	0.10	10.45	1.045	> 4.0		97	
HCl	-	0.50	5	2.50		0.10	25.10	2.51			100.4%	
HCl (d)	-	0.50	5	2.50		0.10	25.05	2.51			100.2%	

Notes:

1. Testing performed on **-2 mm** fraction obtained by dry-sieving the 'as-submitted' crushed samples.
'Fizz' testing employed **pulps (-75 µm nominal)**, and 2-3 M-HCl.
2. ***ca.* 20 mL** of high-purity-deionised-water (HPDW) added to all samples (including HCl-solution 'blanks') initially.
3. HCl solution added manually via volumetric glass pipette (A Class).
4. **HCl** and **NaOH** solutions certified reagents from Merck (viz. Titripur® reagents in hermetically-sealed Titripac® casks).
5. Sample weight, and volume and strength of HCl added, based on corresponding CO3-C value(s).
6. During acid-digestion temperature of waterbath is **80 +/- 5 oC,** and digestion performed for **1.0 hr** with beakers swirled by hand 1-2 times during this reaction period. Digestion performed using 250 mL tall-form beakers covered with watchglasses.
7. After completion of acid-digestion step, the test-slurries are boiled for *ca.* 1 min to expel any dissolved CO2(aq) which is important for the attainment of a stable pH7 end-point in the subsequent back-titration with NaOH solution.
8. Following cooling to room-T, **digest-slurry-final-pH** is measured. HPDW is then added to bring test-slurry volume to *ca.* **125 mL** for titration with NaOH solution.
9. Titration with NaOH performed manually using 50 mL glass burette with slurry stirred using magnetic stirrer-bar. Fast titration with stopcock fully open until slurry-pH rises to approximate range 4.0-4.5 when titration stops for H2O2 addition.
10. Three drops of **30 % H2O2 (v/v)** [adjusted to pH 4.5] added to slurry to oxidise **soluble-Fe(II)** forms ('latent-acidity') and precipitation of Fe(III)/Al-oxyhydroxides, etc. Minimum slurry-pH attained following H2O2 addition recorded.
11. Following completion of H2O2 addition, titration with NaOH continues to a **pH7** end-point. Titration with NaOH undertaken so that slurry-pH at end-point is within range 6.9-7.1 (i.e. pH 7.0 +/- 0.1) for *ca.* 30 seconds. [Related pH-end-point stability criteria for manual titration (cf. autotititration) option applies in ASTM E1915-13, and AS-4969.12-09].
12. ANC Standard is pulped mixture of quartz and AR CaCO3 (CO3-C = 1.21 %; ANC = 99 kg H2SO4/tonne).
13. Samples with "maghemite" (?) noted were characterised by deposits clinging to magnetic-stirrer bar retrieved after completion of titration with NaOH solution. Though magnetic, the deposits did not resemble magnetite.

The main variations to the AMIRA (2002) method are the use of -2 mm fraction (cf. pulp, -75 µm nominal), and the applied HCl loading, as governed by CO3-C value.

Dr GD Campbell
15th December 2019

Graeme Campbell & Associates Pty Ltd

Laboratory Report

NET-ACID-GENERATION (NAG) TESTWORK (SINGLE-ADDITION)

Sample_ ID	Sample Weight (g)	Comments	pH of Test Suspension within approx. 10 mins	pH of Test-Suspension After O'Night Reaction [Before Boiling Steps]	pH of Test-Suspension After 1st-Boiling Step [Before Cu(II) Addition]	Test-Suspension Values After 2nd-Boiling Step [Cu(II) Added Before 2nd-Boiling Step]		Titre (mL) (0.1 M-NaOH)		NAG (kg H2SO4/tonne)		
						NAG-pH	NAG-EC (µS/cm)	To pH 4.5	pH 4.5 to pH 7.0	To pH 4.5	pH 4.5 to pH 7.0	To pH 7.0
MSC04	3.01	no apparent reaction overnight	5.4	5.3	5.4	6.2	22	-	0.30	<1	<1	<1
MSC12	3.00	slight reaction overnight	5.6	5.9	6.7	6.9	7	-	-	<1	<1	<1
MSC15	3.02	boiled within 15 mins	6.5	7.2	7.3	7.3	14	-	-	<1	<1	<1
MSC18	3.01	boiled within 30 mins	6.7	7.1	7.5	7.6	14	-	-	<1	<1	<1
MSC22	3.01	slight reaction overnight	5.7	6.4	7.1	6.8	12	-	-	<1	<1	<1
MWC001	3.00	no apparent reaction overnight	5.7	5.6	5.7	6.6	15	-	0.25	<1	<1	<1
MWC002	2.99	slight reaction overnight	6.1	6.9	8.4	7.9	33	-	-	<1	<1	<1
MWC002 d	3.01	slight reaction overnight	6.1	6.7	8.3	8.1	24	-	-	<1	<1	<1
Blank		no apparent reaction overnight	4.7	4.6	4.9	6.1	3	-	0.05			"<1"

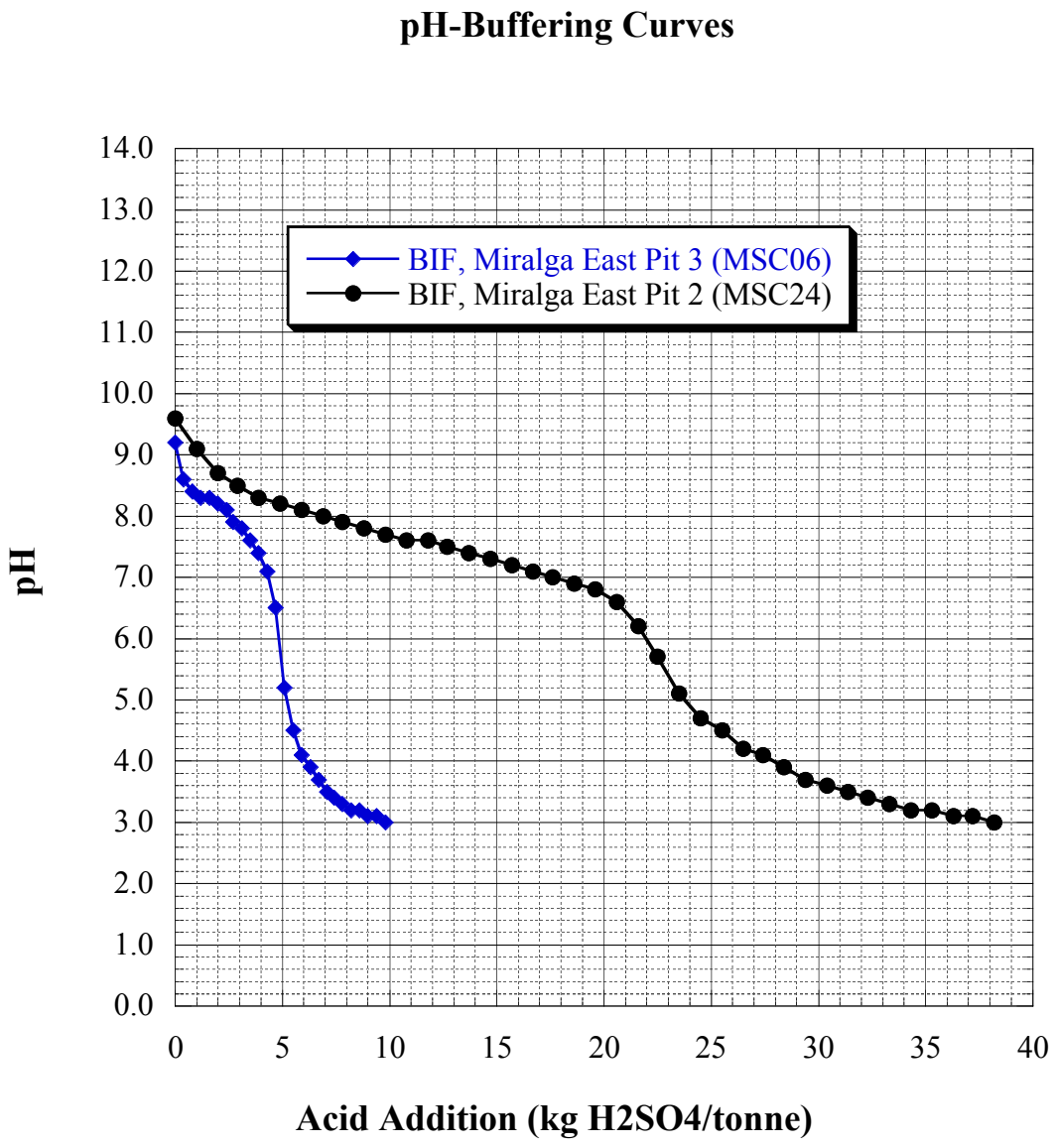
Notes: Chem-Supply® A.R. 30 % H2O2 employed ('apparent-pH' = 4.1). **15 % H2O2** reagent corresponds to 1:1 (v/v) mixing with high-purity deionised-water (HPDW).
250 mL of peroxide solution is added to sample in in 500 mL conical Erlenmeyer beaker that is then covered with a watchglass. pH values of test-suspensions determined at different stages during testing. Following reaction overnight, the occurrence and vigour of reaction is judged according to degree of water condensation on the underside of the watchglass. The suspension-pH is measured, and the test-suspensions then boiled for *ca.* 1 hr. After allowing to cool, *ca.* 1 mL of **0.016 M-CuSO4** is added, and the 2nd-boiling step carried out for *ca.* 1 hr. The added Cu(II) catalyses the decomposition of any residual, unreacted H2O2 (AS 4969.12-2009).
Following determination of supernatant-EC and suspension-pH, the test-suspensions are titrated manually with standardised NaOH solution to respective **pH4.5** and **pH7.0** end-points.
The Blank corresponds to a "NAG-[pH7]" value less than 0.5 kg H2SO4/tonne for a sample weight of 3.00 gm. No CuSO4 was added to Blank. Boiling during 2nd-boiling step continued until it was visually evident that residual-H2O2 in the Blank was negligible.
Testing performed on **pulps** (nominal -75 µm).

Dr GD Campbell
13th December 2019

NAG Testwork: Rapid Reaction of H2O2 with Samples MSC15 and MSC18

Rapid reaction likley reflects H2O2 decomposition catalysed by Mn-oxides (e.g. MnO2).

NAG Testwork: 1st-Boiling Step [without Cu(II) addition] After Overnight Reaction


pH-Buffering Curves
BIF, Miralga East Pit 3 (MSC06)
BIF, Miralga East Pit 2 (MSC24)
pH
14.0
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
5
10
15
20
25
30
35
40
Acid Addition (kg H2SO4/tonne)

Graeme Campbell & Associates Pty Ltd

Laboratory Report

pH-BUFFERING TESTWORK (MSC06)

Cumulative Volume of Acid Added (mL)	Cumulative Acid Addition (kg H2SO4/tonne)	pH
0.00	0.0	9.2
0.40	0.4	8.6
0.80	0.8	8.4
1.20	1.2	8.3
1.60	1.6	8.3
2.00	2.0	8.2
2.40	2.4	8.1
2.80	2.7	7.9
3.20	3.1	7.8
3.60	3.5	7.6
4.00	3.9	7.4
4.40	4.3	7.1
4.80	4.7	6.5
5.20	5.1	5.2
5.60	5.5	4.5
6.00	5.9	4.1
6.40	6.3	3.9
6.80	6.7	3.7
7.20	7.1	3.5
7.60	7.4	3.4
8.00	7.8	3.3
8.40	8.2	3.2
8.80	8.6	3.2
9.20	9.0	3.1
9.60	9.4	3.1
10.00	9.8	3.0

Notes: Titration performed using Metrohm® 736 Titrino auto-titrator, and 0.05 M-H2SO4. Equlibration time between titrant additions is 15 minutes.
5.0 g of pulped (nominal -75 µm) sample initially dispersed in *ca.* 150 mL of deionised-water.
Test-suspension in contact with air in a CT-room @ 20 (+/- 1-2) oC, and continuously stirred.
Calibration of pH-Glass Electrode:
Immediately prior to titration: asymmetry potential = 15 mV (pH=7.00); slope-point = 188 mV (pH=4.00);
97.5 % of Nernstian response.

Dr GD Campbell
10th December 2019

Graeme Campbell & Associates Pty Ltd

Laboratory Report

pH-BUFFERING TESTWORK (MSC24)

Cumulative Volume of Acid Added (mL)	Cumulative Acid Addition (kg H2SO4/tonne)	pH	Cumulative Volume of Acid Added (mL)	Cumulative Acid Addition (kg H2SO4/tonne)	pH
0.00	0.0	9.6	10.40	25.5	4.5
0.40	1.0	9.1	10.80	26.5	4.2
0.80	2.0	8.7	11.20	27.4	4.1
1.20	2.9	8.5	11.60	28.4	3.9
1.60	3.9	8.3	12.00	29.4	3.7
2.00	4.9	8.2	12.40	30.4	3.6
2.40	5.9	8.1	12.80	31.4	3.5
2.80	6.9	8.0	13.20	32.3	3.4
3.20	7.8	7.9	13.60	33.3	3.3
3.60	8.8	7.8	14.00	34.3	3.2
4.00	9.8	7.7	14.40	35.3	3.2
4.40	10.8	7.6	14.80	36.3	3.1
4.80	11.8	7.6	15.20	37.2	3.1
5.20	12.7	7.5	15.60	38.2	3.0
5.60	13.7	7.4			
6.00	14.7	7.3			
6.40	15.7	7.2			
6.80	16.7	7.1			
7.20	17.6	7.0			
7.60	18.6	6.9			
8.00	19.6	6.8			
8.40	20.6	6.6			
8.80	21.6	6.2			
9.20	22.5	5.7			
9.60	23.5	5.1			
10.00	24.5	4.7			

Notes: Titration performed using Metrohm® 736 Titrino auto-titrator, and 0.05 M-H2SO4. Equlibration time between titrant additions is 15 minutes.
2.0 g of pulped (nominal -75 µm) sample initially dispersed in *ca.* 150 mL of deionised-water.
Test-suspension in contact with air in a CT-room @ 20 (+/- 1-2) oC, and continuously stirred.
Calibration of pH-Glass Electrode:
Immediately prior to titration: asymmetry potential = 16 mV (pH=7.00); slope-point = 188 mV (pH=4.00);
97.2 % of Nernstian response.

Dr GD Campbell
10th December 2019

MINERALS
TEST REPORT

CLIENT

GLENDON WESLEY
MINE EARTH PTY LTD
PO Box 404
FREMANTLE, W.A. 6959
AUSTRALIA

JOB INFORMATION

JOB CODE	: 1960.0/1918889
NO. SAMPLES	: 9
NO. ELEMENTS	: 6
CLIENT ORDER NO.	: MIR-1904 (Job 1 of 1)
SAMPLE SUBMISSION NO.	: MIR-1904
PROJECT	: MIRALGA WEST
SAMPLE TYPE	: RC
DATE RECEIVED	: 31/10/2019
DATE TESTED	: 06/11/2019 - 12/11/2019
DATE REPORTED	: 12/11/2019
DATE PRINTED	: 12/11/2019

REPORT NOTES

TESTED BY

Intertek
15 Davison Street, Maddington 6109, Western Australia
PO Box 144, Gosnells 6990, Western Australia
Tel: +61 8 9251 8100
Email: min.aus.per@intertek.com

APPROVED SIGNATURE FOR

Craig RITCHIE
Operations Manager - Perth

SIGNIFICANT FIGURES

It is common practice to report data derived from analytical instrumentation to a maximum of two or three significant figures. Some data reported herein may show more figures than this. The reporting of more than two or three figures in no way implies that figures beyond the least significant digit have significance.

For more information on the uncertainty on individual reported values, please contact the laboratory.

SAMPLE STORAGE

All solid samples (assay pulps, bulk pulps and residues will be stored for 60 days without charge. Following this samples will be stored at a daily rate until clients written advice regarding return, collection or disposal is received. If storage information is not supplied on the submission, or arranged with the laboratory in writing the default will be to store the samples with the applicable charges. Storage is charged at $4.00 per m3 per day, expenses related to the return or disposal of samples will be charged at cost. Current disposal cost is charged at $150.00 per m3.

Samples received as liquids, waters or solutions will be held for 60 days free of charge then disposed of, unless written advice fo return or collection is received.

LEGEND					
	X	= Less than Detection Limit		NA	= Not Analysed
	SNR	= Sample Not Received		UA	= Unable to Assay
	*	= Result Checked		>	= Value beyond Limit of Method
	DTF	= Result still to come		+	= Extra Sample Received Not Listed
	IS	= Insufficient Sample for Analysis			

ELEMENTS	C	C-Acinsol	C-CO3	Hg	S	Se
UNITS	%	%	%	ppb	%	ppm
DETECTION LIMIT	0.01	0.01	0.01	1	0.01	0.01
DIGEST		C71/		AR01/		SE1/
ANALYTICAL FINISH	/CSA	CSA	/CALC	CV	/CSA	MS
SAMPLE NUMBERS						
0001 MWC001	0.04	0.04	X	103	X	0.06
0002 MWC002	0.11	0.11	X	71	X	1.33
0003 MWC003	0.06	0.06	X	189	X	1.14
0004 MWC004	0.09	0.08	X	104	0.01	0.47
0005 MWC005	0.08	0.07	X	64	X	0.33
0006 MWC006	0.06	0.05	X	67	X	0.63
0007 MWC007	0.06	0.06	X	64	X	0.22
0008 MWC008	0.10	0.08	0.02	57	X	0.86
0009 MWC009	0.17	0.15	0.02	150	X	0.51
CHECKS						
0001 MWC001	0.04	0.03	X	112	X	0.05
STANDARDS						
0001 OREAS 24b	0.18				0.20	
0002 OREAS 97.01						0.63
0003 GTS-2a				224		
0004 TOC-1b		1.31				
BLANKS						
0001 Control Blank	X	X		X	X	0.01

METHOD CODE DESCRIPTION

Method Code Date Tested	Analysing Laboratory NATA Laboratory Accreditation	NATA Scope of Accreditation
/CALC **12/11/19 14:26**	Intertek Genalysis Perth **3244 3237** No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.	
/CSA **12/11/19 14:26**	Intertek Genalysis Perth **3244 3237** Induction Furnace Analysed by Infrared Spectrometry	**MPL_W043, CSA : MPL_W043**
/SV10	Intertek Genalysis Perth **3244 3237** QA Screen-Sizing for -75um - INTERNAL	**MPL_W021, SV10 : MPL_W021**
AR01/CV **06/11/19 10:22**	Intertek Genalysis Perth **3244 3237** Aqua-Regia digest. Analysed by Cold Vapour Generation Atomic Absorption Spectrometry.	
C71/CSA **07/11/19 13:58**	Intertek Genalysis Perth **3244 3237** Digestion by hot acid(s) and Induction Furnace Analysed by Infrared Spectrometry	
SE1/MS **06/11/19 12:32**	Intertek Genalysis Perth **3244 3237** Aqua-Regia digest followed by Precipitation and Concentration. Specific for Selenium. Analysed by Inductively Coupled Plasma Mass Spectrometry.	
WT01 **12/11/19 14:26**	Intertek Genalysis Perth **3244 3237** Reporting weights of samples	

MINERALS
TEST REPORT

CLIENT

GLENDON WESLEY
MINE EARTH PTY LTD
PO Box 404
FREMANTLE, W.A. 6959
AUSTRALIA

JOB INFORMATION

JOB CODE	:	1960.0/1918988
NO. SAMPLES	:	10
NO. ELEMENTS	:	6
CLIENT ORDER NO.	:	MIR-1904 (Job 1 of 1)
SAMPLE SUBMISSION NO.	:	MIR-1904
PROJECT	:	MIR EAST AND SANDTRAX
SAMPLE TYPE	:	CoarseReject
DATE RECEIVED	:	01/11/2019
DATE TESTED	:	14/11/2019 - 19/11/2019
DATE REPORTED	:	19/11/2019
DATE PRINTED	:	19/11/2019

REPORT NOTES

TESTED BY

Intertek
15 Davison Street, Maddington 6109, Western Australia
PO Box 144, Gosnells 6990, Western Australia
Tel: +61 8 9251 8100
Email: min.aus.per@intertek.com

APPROVED SIGNATURE FOR

Craig RITCHIE
Operations Manager - Perth

SIGNIFICANT FIGURES

It is common practice to report data derived from analytical instrumentation to a maximum of two or three significant figures. Some data reported herein may show more figures than this. The reporting of more than two or three figures in no way implies that figures beyond the least significant digit have significance.

For more information on the uncertainty on individual reported values, please contact the laboratory.

SAMPLE STORAGE

All solid samples (assay pulps, bulk pulps and residues will be stored for 60 days without charge. Following this samples will be stored at a daily rate until clients written advice regarding return, collection or disposal is received. If storage information is not supplied on the submission, or arranged with the laboratory in writing the default will be to store the samples with the applicable charges. Storage is charged at $4.00 per m3 per day, expenses related to the return or disposal of samples will be charged at cost. Current disposal cost is charged at $150.00 per m3.

Samples received as liquids, waters or solutions will be held for 60 days free of charge then disposed of, unless written advice fo return or collection is received.

LEGEND					
	X	= Less than Detection Limit		NA	= Not Analysed
	SNR	= Sample Not Received		UA	= Unable to Assay
	*	= Result Checked		>	= Value beyond Limit of Method
	DTF	= Result still to come		+	= Extra Sample Received Not Listed
	IS	= Insufficient Sample for Analysis			

ELEMENTS	C	C-Acinsol	C-CO3	Hg	S	Se
UNITS	%	%	%	ppb	%	ppm
DETECTION LIMIT	0.01	0.01	0.01	1	0.01	0.01
DIGEST		C71/		AR01/		SE1/
ANALYTICAL FINISH	/CSA	CSA	/CALC	CV	/CSA	MS
SAMPLE NUMBERS						
0001 MSC15	0.37	0.29	0.08	680	0.03	2.15
0002 MSC16	0.24	0.17	0.07	159	0.01	1.11
0003 MSC17	0.11	0.08	0.03	295	X	0.23
0004 MSC18	0.06	0.04	0.02	552	0.04	0.10
0005 MSC19	0.10	0.06	0.04	38	0.03	0.72
0006 MSC20	0.06	0.05	X	93	X	0.38
0007 MSC21	0.05	0.04	X	50	0.04	0.38
0008 MSC22	0.06	0.05	X	54	0.05	0.19
0009 MSC23	0.11	0.10	X	208	X	0.16
0010 MSC24	0.57	0.09	0.48	320	0.03	0.56
CHECKS						
0001 MSC15	0.36	0.27	0.09	772	0.03	1.78
STANDARDS						
0001 AMIS0092	2.77				0.07	
0002 OREAS 927						0.62
0003 HgSTD-5				738		
0004 OREAS 600	0.49				1.69	
0005 OREAS 45h	0.50				0.03	
0006 TOC-1b		1.39				
0007 AMIS0361						0.57
0008 OREAS 622				5054		
BLANKS						
0001 Control Blank	X	X		X	X	X

METHOD CODE DESCRIPTION

Method Code Date Tested	Analysing Laboratory NATA Laboratory Accreditation	NATA Scope of Accreditation
/CALC **15/11/19 15:33**	Intertek Genalysis Perth **3244 3237** No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.	
/CSA **19/11/19 12:12**	Intertek Genalysis Perth **3244 3237** Induction Furnace Analysed by Infrared Spectrometry	**MPL_W043, CSA : MPL_W043**
AR01/CV **14/11/19 03:17**	Intertek Genalysis Perth **3244 3237** Aqua-Regia digest. Analysed by Cold Vapour Generation Atomic Absorption Spectrometry.	
C71/CSA **11/11/19 10:27**	Intertek Genalysis Perth **3244 3237** Digestion by hot acid(s) and Induction Furnace Analysed by Infrared Spectrometry	
SE1/MS **13/11/19 13:17**	Intertek Genalysis Perth **3244 3237** Aqua-Regia digest followed by Precipitation and Concentration. Specific for Selenium. Analysed by Inductively Coupled Plasma Mass Spectrometry.	
WT01	Intertek Genalysis Perth **3244 3237** Reporting weights of samples	

MINERALS
TEST REPORT

CLIENT

GLENDON WESLEY
MINE EARTH PTY LTD
PO Box 404
FREMANTLE, W.A. 6959
AUSTRALIA

JOB INFORMATION

JOB CODE	:	1960.0/1919143
NO. SAMPLES	:	14
NO. ELEMENTS	:	5
CLIENT ORDER NO.	:	MIR-1904 (Job 1 of 1)
SAMPLE SUBMISSION NO.	:	MIR-1904
PROJECT	:	MIRALGA EAST AND SANDTRAX
SAMPLE TYPE	:	CoarseReject
DATE RECEIVED	:	04/11/2019
DATE TESTED	:	14/11/2019 - 22/11/2019
DATE REPORTED	:	22/11/2019
DATE PRINTED	:	22/11/2019

REPORT NOTES

TESTED BY

Intertek
15 Davison Street, Maddington 6109, Western Australia
PO Box 144, Gosnells 6990, Western Australia
Tel: +61 8 9251 8100
Email: min.aus.per@intertek.com

APPROVED SIGNATURE FOR

Craig RITCHIE
Operations Manager - Perth

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	SNR	= Sample Not Received		UA	= Unable to Assay
	*	= Result Checked		>	= Value beyond Limit of Method
	DTF	= Result still to come		+	= Extra Sample Received Not Listed
	IS	= Insufficient Sample for Analysis			

ELEMENTS	C	C-CO3	Hg	S	Se
UNITS	%	%	ppb	%	ppm
DETECTION LIMIT	0.01	0.01	1	0.01	0.01
DIGEST			AR01/		SE1/
ANALYTICAL FINISH	/CSA	/CALC	CV	/CSA	MS
SAMPLE NUMBERS					
0001 MSC01	0.74	0.05	126	0.04	0.48
0002 MSC02	0.20	0.07	99	0.02	0.14
0003 MSC03	0.45	0.07	180	0.01	0.30
0004 MSC04	0.12	0.02	116	X	0.41
0005 MSC05	0.22	0.08	70	X	1.24
0006 MSC06	0.58	0.14	72	X	0.83
0007 MSC07	0.17	0.07	43	0.02	0.28
0008 MSC08	0.13	0.03	90	X	0.53
0009 MSC09	0.06	X	33	X	0.37
0010 MSC10	0.14	0.02	336	X	0.51
0011 MSC11	0.40	0.07	211	0.02	1.82
0012 MSC12	0.08	0.03	26	X	0.39
0013 MSC13	0.14	0.04	63	X	1.24
0014 MSC14	0.14	0.02	79	0.01	1.65
CHECKS					
0001 MSC07	0.16		50	0.01	0.33
STANDARDS					
0001 MA-3a	2.62			1.04	
0002 HgSTD-5			788		
0003 OREAS 97.01					0.65
0004 OREAS 620	0.33			2.59	
0005 OREAS 45f	0.32			0.03	
0006 OREAS 97.01					0.63
0007 OREAS 622			5631		
BLANKS					
0001 Control Blank	X		X	X	X

METHOD CODE DESCRIPTION

Method Code Date Tested	Analysing Laboratory NATA Laboratory Accreditation	NATA Scope of Accreditation
/CALC **22/11/19 14:06**	Intertek Genalysis Perth **3244 3237** No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.	
/CSA **22/11/19 14:06**	Intertek Genalysis Perth **3244 3237** Induction Furnace Analysed by Infrared Spectrometry	**MPL_W043, CSA : MPL_W043**
AR01/CV **15/11/19 10:51**	Intertek Genalysis Perth **3244 3237** Aqua-Regia digest. Analysed by Cold Vapour Generation Atomic Absorption Spectrometry.	
C71/CSA **11/11/19 10:33**	Intertek Genalysis Perth **3244 3237** Digestion by hot acid(s) and Induction Furnace Analysed by Infrared Spectrometry	
SE1/MS **14/11/19 12:36**	Intertek Genalysis Perth **3244 3237** Aqua-Regia digest followed by Precipitation and Concentration. Specific for Selenium. Analysed by Inductively Coupled Plasma Mass Spectrometry.	
WT01 **22/11/19 14:06**	Intertek Genalysis Perth **3244 3237** Reporting weights of samples	

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Glendon Wesley	Manager	Marjana Siljanoska
Client	MINE EARTH PTY LTD	Laboratory	SGS Perth Environmental
Address	PO BOX 404 FREMANTLE WA 6959	Address	28 Reid Rd Perth Airport WA 6105
Telephone	0407 194 614	Telephone	(08) 9373 3500
Facsimile	(Not specified)	Facsimile	(08) 9373 3556
Email	glendon@mineearth.com.au	Email	au.environmental.perth@sgs.com
Project	**MIR-1904**	SGS Reference	**PE139532 R0**
Order Number	**MIR-1904**	Date Received	22 Nov 2019
Samples	13	Date Reported	11 Dec 2019

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(898/20210).

Total Fluoride in soil: Matrix spike recovery failed acceptance criteria due to matrix interference.
Multi Element Analysis subcontracted to SGS Perth Minerals, 28 Reid Rd Perth Airport WA, NATA Accreditation Number 1936, WM196550

SIGNATORIES

Mary Ann OLA-A
Inorganics Team Leader

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139532.001 Pulp MSC15	PE139532.002 Pulp MSC17	PE139532.003 Pulp MSC02	PE139532.004 Pulp MSC19
Metals in soil by Four Acid digest, ICPMS Method: IMS40Q Tested: 11/12/2019							
Silver, Ag*	ppm	0.05		0.16	<0.05	0.07	0.10
Arsenic, As*	ppm	1		45	12	6	24
Barium, Ba*	ppm	2		170	19	62	150
Bismuth, Bi*	ppm	0.1		<0.1	<0.1	<0.1	<0.1
Cadmium, Cd*	ppm	0.1		<0.1	<0.1	<0.1	<0.1
Cobalt, Co*	ppm	0.1		9.4	1.1	2.9	4.8
Molybdenum, Mo*	ppm	0.1		1.6	1.3	0.9	1.5
Lead, Pb*	ppm	1		10	<1	3	7
Antimony, Sb*	ppm	0.1		8.9	1.4	0.7	4.8
Selenium, Se*	ppm	1		2	<1	<1	<1
Tin, Sn*	ppm	0.3		0.8	0.3	0.4	<0.3
Strontium, Sr*	ppm	0.1		5.3	1.8	8.4	9.1
Thorium, Th*	ppm	0.05		1.9	0.07	0.28	0.60
Thallium, Tl*	ppm	0.1		3.0	<0.1	<0.1	<0.1
Uranium, U*	ppm	0.05		0.75	0.12	0.15	0.52
ICPAES after Four Acid Digest Digest Method: ICP40Q Tested: 10/12/2019							
Aluminium, Al*	ppm	100		10000	1200	2500	5700
Calcium, Ca*	ppm	50		140	120	270	200
Chromium, Cr*	ppm	10		120	25	<10	20
Copper, Cu*	ppm	5		32	17	39	71
Iron, Fe*	ppm	100		590000	120000	360000	590000
Potassium, K*	ppm	100		<100	<100	<100	<100
Magnesium, Mg*	ppm	20		130	160	370	220
Manganese, Mn*	ppm	5		3400	120	2500	330
Sodium, Na*	ppm	50		65	60	70	290
Nickel, Ni*	ppm	5		8	8	12	23
Phosphorus, P*	ppm	20		1000	160	290	1100
Sulphur, S*	ppm	20		300	45	180	290
Titanium, Ti*	ppm	10		740	<10	65	60
Vanadium, V*	ppm	1		27	<1	<1	<1
Zinc, Zn*	ppm	5		56	11	60	83
Metals in Soils from Alkali Fusion ICP AES Method: ICP90Q Tested: 11/12/2019							
Silicon, Si*	%	0.2		1.2	38	21	3.7
Boron, B*	ppm	20		<20	<20	<20	<20
Total Fluoride in Soil Method: AN142 Tested: 28/11/2019							
Total Fluoride	mg/kg	50		<50	<50	56	100

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139532.005 Pulp MSC22	PE139532.006 Pulp MSC05	PE139532.007 Pulp MSC08	PE139532.008 Pulp MSC11
Metals in soil by Four Acid digest, ICPMS Method: IMS40Q Tested: 11/12/2019							
Silver, Ag*	ppm	0.05		<0.05	<0.05	0.08	0.19
Arsenic, As*	ppm	1		9	22	32	39
Barium, Ba*	ppm	2		26	180	130	11
Bismuth, Bi*	ppm	0.1		<0.1	0.4	<0.1	0.3
Cadmium, Cd*	ppm	0.1		<0.1	<0.1	<0.1	<0.1
Cobalt, Co*	ppm	0.1		3.7	3.0	7.2	1.9
Molybdenum, Mo*	ppm	0.1		1.1	1.5	1.5	2.2
Lead, Pb*	ppm	1		4	16	6	11
Antimony, Sb*	ppm	0.1		2.0	2.5	4.0	2.6
Selenium, Se*	ppm	1		<1	<1	<1	2
Tin, Sn*	ppm	0.3		0.5	3.4	0.6	1.9
Strontium, Sr*	ppm	0.1		2.7	13	3.4	4.7
Thorium, Th*	ppm	0.05		0.14	1.0	0.28	2.4
Thallium, Tl*	ppm	0.1		<0.1	1.2	0.1	<0.1
Uranium, U*	ppm	0.05		0.06	0.21	0.12	0.68
ICPAES after Four Acid Digest Digest Method: ICP40Q Tested: 10/12/2019							
Aluminium, Al*	ppm	100		1100	13000	4500	15000
Calcium, Ca*	ppm	50		100	1600	80	190
Chromium, Cr*	ppm	10		<10	40	25	120
Copper, Cu*	ppm	5		14	66	64	50
Iron, Fe*	ppm	100		310000	200000	490000	580000
Potassium, K*	ppm	100		<100	2300	<100	150
Magnesium, Mg*	ppm	20		340	360	150	280
Manganese, Mn*	ppm	5		1500	100	1100	75
Sodium, Na*	ppm	50		75	220	<50	130
Nickel, Ni*	ppm	5		18	22	52	25
Phosphorus, P*	ppm	20		60	230	720	240
Sulphur, S*	ppm	20		510	80	55	250
Titanium, Ti*	ppm	10		20	340	65	490
Vanadium, V*	ppm	1		<1	29	<1	53
Zinc, Zn*	ppm	5		49	120	79	120
Metals in Soils from Alkali Fusion ICP AES Method: ICP90Q Tested: 11/12/2019							
Silicon, Si*	%	0.2		25	32	9.8	2.7
Boron, B*	ppm	20		<20	20	<20	<20
Total Fluoride in Soil Method: AN142 Tested: 28/11/2019							
Total Fluoride	mg/kg	50		78	56	62	52

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139532.009 Pulp MSC12	PE139532.010 Pulp MWC001	PE139532.011 Pulp MWC002	PE139532.012 Pulp MWC004
Metals in soil by Four Acid digest, ICPMS Method: IMS40Q Tested: 11/12/2019							
Silver, Ag*	ppm	0.05		<0.05	0.05	0.09	0.18
Arsenic, As*	ppm	1		4	4	22	20
Barium, Ba*	ppm	2		46	450	120	26
Bismuth, Bi*	ppm	0.1		<0.1	0.2	<0.1	0.2
Cadmium, Cd*	ppm	0.1		<0.1	<0.1	<0.1	<0.1
Cobalt, Co*	ppm	0.1		5.3	1.3	4.1	8.2
Molybdenum, Mo*	ppm	0.1		1.0	2.9	2.8	1.3
Lead, Pb*	ppm	1		9	11	11	18
Antimony, Sb*	ppm	0.1		0.3	0.6	3.0	5.0
Selenium, Se*	ppm	1		<1	<1	<1	<1
Tin, Sn*	ppm	0.3		<0.3	1.2	0.9	1.4
Strontium, Sr*	ppm	0.1		4.6	18	14	11
Thorium, Th*	ppm	0.05		2.7	8.3	1.7	0.79
Thallium, Tl*	ppm	0.1		<0.1	0.8	0.2	<0.1
Uranium, U*	ppm	0.05		1.3	1.5	0.50	0.30
ICPAES after Four Acid Digest Digest Method: ICP40Q Tested: 10/12/2019							
Aluminium, Al*	ppm	100		3400	67000	30000	8900
Calcium, Ca*	ppm	50		60	110	450	490
Chromium, Cr*	ppm	10		100	30	170	15
Copper, Cu*	ppm	5		26	10	57	73
Iron, Fe*	ppm	100		230000	37000	370000	590000
Potassium, K*	ppm	100		<100	23000	2000	<100
Magnesium, Mg*	ppm	20		160	350	600	260
Manganese, Mn*	ppm	5		570	270	1000	830
Sodium, Na*	ppm	50		70	810	190	120
Nickel, Ni*	ppm	5		35	23	31	21
Phosphorus, P*	ppm	20		140	85	120	130
Sulphur, S*	ppm	20		30	45	110	210
Titanium, Ti*	ppm	10		75	1400	470	150
Vanadium, V*	ppm	1		200	31	18	3
Zinc, Zn*	ppm	5		41	11	64	82
Metals in Soils from Alkali Fusion ICP AES Method: ICP90Q Tested: 11/12/2019							
Silicon, Si*	%	0.2		30	35	17	3.7
Boron, B*	ppm	20		<20	<20	<20	<20
Total Fluoride in Soil Method: AN142 Tested: 28/11/2019							
Total Fluoride	mg/kg	50		<50	97	<50	<50

Parameter	Units	LOR	Sample Number: PE139532.013 Sample Matrix: Pulp Sample Name: MWC007
Metals in soil by Four Acid digest, ICPMS Method: IMS40Q Tested: 11/12/2019			
Silver, Ag*	ppm	0.05	**0.06**
Arsenic, As*	ppm	1	**12**
Barium, Ba*	ppm	2	**34**
Bismuth, Bi*	ppm	0.1	<0.1
Cadmium, Cd*	ppm	0.1	<0.1
Cobalt, Co*	ppm	0.1	**10**
Molybdenum, Mo*	ppm	0.1	**1.0**
Lead, Pb*	ppm	1	**7**
Antimony, Sb*	ppm	0.1	**1.7**
Selenium, Se*	ppm	1	<1
Tin, Sn*	ppm	0.3	<0.3
Strontium, Sr*	ppm	0.1	**18**
Thorium, Th*	ppm	0.05	**0.57**
Thallium, Tl*	ppm	0.1	<0.1
Uranium, U*	ppm	0.05	**0.57**
ICPAES after Four Acid Digest Digest Method: ICP40Q Tested: 10/12/2019			
Aluminium, Al*	ppm	100	**6700**
Calcium, Ca*	ppm	50	**90**
Chromium, Cr*	ppm	10	**20**
Copper, Cu*	ppm	5	**25**
Iron, Fe*	ppm	100	**510000**
Potassium, K*	ppm	100	**220**
Magnesium, Mg*	ppm	20	**95**
Manganese, Mn*	ppm	5	**5100**
Sodium, Na*	ppm	50	**80**
Nickel, Ni*	ppm	5	**31**
Phosphorus, P*	ppm	20	**140**
Sulphur, S*	ppm	20	**55**
Titanium, Ti*	ppm	10	**100**
Vanadium, V*	ppm	1	**4**
Zinc, Zn*	ppm	5	**110**
Metals in Soils from Alkali Fusion ICP AES Method: ICP90Q Tested: 11/12/2019			
Silicon, Si*	%	0.2	**8.6**
Boron, B*	ppm	20	<20

Parameter	Units	LOR	Sample Number PE139532.013 Sample Matrix Pulp Sample Name MWC007
Total Fluoride in Soil Method: AN142 Tested: 28/11/2019			
Total Fluoride	mg/kg	50	<50

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Fluoride in Soil **Method: ME-(AU)-[ENV]AN142**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Fluoride	LB166552	mg/kg	50	<50	0%	91%	11%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN142	Fluoride can be measured in soil as water extractable or 'total' by Ion Selective electrode. In this method the solid sample is weighed and then fused with sodium hydroxide at 600°C. The sample is carefully neutralise with hydrochloric acid and the solution of the melt is cooled and made up to volume. The final solution is then compared to synthetic Digestion Matrix standards with analysis by ISE electrode for a total fluoride result after being calculated back to original mass.
ICP40Q	Sample solutions (from Four Acid digest) are analysed by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES) against matched standards.
ICP90Q	Sample solutions (from Alkali Fusion) are analysed by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES) against matched standards.
IMS40Q	Sample solutions (from Four Acid Digest) are analysed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) against matched standards.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
		-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au.pv.sgsvr/en-gb/environment.

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Glendon Wesley
Client	MINE EARTH PTY LTD
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Telephone	0407 194 614
Facsimile	(Not specified)
Email	glendon@mineearth.com.au
Project	**MIR-1904**
Order Number	**MIR-1904**
Samples	15

LABORATORY DETAILS

Manager	Marjana Siljanoska
Laboratory	SGS Perth Environmental
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SGS Reference	**PE139533 R0**
Date Received	22 Nov 2019
Date Reported	10 Dec 2019

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(898/20210).

All analyses performed on 1:2 solid:water extract (150gm of crushing:300gm of HPDW water, bottle-roll 16-18hrs, decant and filter through 0.45um membrane).

Metals: The over range results on ICPMS Method AN318 were reported using ICPOES method AN320.

SIGNATORIES

Hue Thanh LY
Metals Team Leader

Louise HOPE
Laboratory Technician

Mary Ann OLA-A
Inorganics Team Leader

Ohmar DAVID
Metals Chemist

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139533.001 Water MSC15	PE139533.002 Water MSC17	PE139533.003 Water MSC02	PE139533.004 Water MSC19
pH in water Method: AN101 Tested: 28/11/2019							
pH**	pH Units	0.1		6.4	6.6	7.5	5.9
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 28/11/2019							
Conductivity @ 25 C	µS/cm	2		81	48	250	840
Alkalinity Method: AN135 Tested: 28/11/2019							
Total Alkalinity as CaCO3	mg/L	1		6	4	59	2
Chloride by Discrete Analyser in Water Method: AN274 Tested: 2/12/2019							
Chloride, Cl	mg/L	1		10	4	14	210
Sulfate in water Method: AN275 Tested: 2/12/2019							
Sulfate, SO4	mg/L	1		7	5	16	62
Fluoride by Ion Selective Electrode in Water Method: AN141 Tested: 2/12/2019							
Fluoride by ISE	mg/L	0.1		<0.1	0.2	0.1	<0.1

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139533.001 Water MSC15	PE139533.002 Water MSC17	PE139533.003 Water MSC02	PE139533.004 Water MSC19
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 3/12/2019							
Phosphorus, P	µg/L	50		<50	<50	<50	<50
Silicon, Si	µg/L	20		8800	9900	5600	8300
Sulfur, S	µg/L	100		2400	1600	5700	19000
Cations in Water (Dissolved) by ICPOES Method: AN020/AN320 Tested: 3/12/2019							
Calcium, Ca	µg/L	10		2600	2000	23000	25000
Magnesium, Mg	µg/L	10		1500	1300	4000	11000
Potassium, K	µg/L	50		740	580	4300	210
Sodium, Na	µg/L	50		8100	3300	11000	100000
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 29/11/2019							
Aluminium, Al	µg/L	5		<5	<5	<5	<5
Antimony, Sb	µg/L	1		<1	<1	<1	<1
Arsenic, As	µg/L	1		<1	<1	<1	<1
Barium, Ba	µg/L	0.2		5.1	50	120	87
Bismuth, Bi	µg/L	1		<1	<1	<1	<1
Boron, B	µg/L	5		45	32	51	35
Cadmium, Cd	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Chromium, Cr	µg/L	1		<1	<1	<1	<1
Cobalt, Co	µg/L	1		<1	<1	<1	<1
Copper, Cu	µg/L	1		<1	<1	<1	<1
Iron, Fe	µg/L	5		<5	90	<5	<5
Lead, Pb	µg/L	1		<1	<1	<1	<1
Manganese, Mn	µg/L	1		12	99	310	2000
Molybdenum, Mo	µg/L	0.5		<0.5	<0.5	<0.5	<0.5
Nickel, Ni	µg/L	1		<1	1	<1	5
Selenium, Se	µg/L	1		1	<1	2	3
Silver, Ag	µg/L	1		1	<1	<1	2
Strontium, Sr	µg/L	1		23	20	170	170
Thallium, Tl	µg/L	1		<1	<1	<1	<1
Thorium, Th	µg/L	1		<1	<1	<1	<1
Tin, Sn	µg/L	1		<1	<1	<1	<1
Uranium, U	µg/L	1		<1	<1	<1	<1
Vanadium, V	µg/L	1		<1	<1	<1	<1
Zinc, Zn	µg/L	5		<5	<5	<5	<5
Mercury (dissolved) in Water Method: AN311(Perth)/AN312 Tested: 29/11/2019							
Mercury	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Hexavalent Chromium in water by Discrete Analyser Method: AN283 Tested: 10/12/2019							
Hexavalent Chromium, Cr6+	mg/L	0.001		-	-	-	-

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139533.005 Water MSC22	PE139533.006 Water MSC05	PE139533.007 Water MSC08	PE139533.008 Water MSC11
pH in water Method: AN101 Tested: 28/11/2019							
pH**	pH Units	0.1		6.1	8.2	6.7	6.8
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 28/11/2019							
Conductivity @ 25 C	µS/cm	2		65	430	76	200
Alkalinity Method: AN135 Tested: 28/11/2019							
Total Alkalinity as CaCO3	mg/L	1		3	150	13	20
Chloride by Discrete Analyser in Water Method: AN274 Tested: 2/12/2019							
Chloride, Cl	mg/L	1		5	25	2	19
Sulfate in water Method: AN275 Tested: 2/12/2019							
Sulfate, SO4	mg/L	1		8	22	3	21
Fluoride by Ion Selective Electrode in Water Method: AN141 Tested: 2/12/2019							
Fluoride by ISE	mg/L	0.1		<0.1	0.5	<0.1	<0.1

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139533.005 Water MSC22	PE139533.006 Water MSC05	PE139533.007 Water MSC08	PE139533.008 Water MSC11
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 3/12/2019							
Phosphorus, P	µg/L	50		<50	<50	<50	<50
Silicon, Si	µg/L	20		4600	14000	2300	8100
Sulfur, S	µg/L	100		2600	7000	830	7200
Cations in Water (Dissolved) by ICPOES Method: AN020/AN320 Tested: 3/12/2019							
Calcium, Ca	µg/L	10		3000	21000	6700	4700
Magnesium, Mg	µg/L	10		1300	4600	1200	5000
Potassium, K	µg/L	50		2500	20000	3500	3000
Sodium, Na	µg/L	50		3200	32000	1500	22000
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 29/11/2019							
Aluminium, Al	µg/L	5		<5	58	<5	<5
Antimony, Sb	µg/L	1		<1	<1	<1	<1
Arsenic, As	µg/L	1		<1	<1	<1	<1
Barium, Ba	µg/L	0.2		48	47	270	17
Bismuth, Bi	µg/L	1		<1	<1	<1	<1
Boron, B	µg/L	5		20	86	13	99
Cadmium, Cd	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Chromium, Cr	µg/L	1		<1	<1	<1	<1
Cobalt, Co	µg/L	1		<1	<1	<1	<1
Copper, Cu	µg/L	1		<1	<1	<1	<1
Iron, Fe	µg/L	5		<5	74	<5	<5
Lead, Pb	µg/L	1		<1	<1	<1	<1
Manganese, Mn	µg/L	1		360	7	250	8
Molybdenum, Mo	µg/L	0.5		<0.5	3.3	<0.5	<0.5
Nickel, Ni	µg/L	1		<1	4	<1	<1
Selenium, Se	µg/L	1		<1	4	<1	2
Silver, Ag	µg/L	1		<1	<1	<1	<1
Strontium, Sr	µg/L	1		41	93	51	60
Thallium, Tl	µg/L	1		<1	<1	<1	<1
Thorium, Th	µg/L	1		<1	<1	<1	<1
Tin, Sn	µg/L	1		<1	<1	<1	<1
Uranium, U	µg/L	1		<1	<1	<1	<1
Vanadium, V	µg/L	1		<1	<1	<1	<1
Zinc, Zn	µg/L	5		<5	<5	<5	<5
Mercury (dissolved) in Water Method: AN311(Perth)/AN312 Tested: 29/11/2019							
Mercury	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Hexavalent Chromium in water by Discrete Analyser Method: AN283 Tested: 10/12/2019							
Hexavalent Chromium, Cr6+	mg/L	0.001		-	-	-	-

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139533.009 Water MSC12	PE139533.010 Water MWC001	PE139533.011 Water MWC002	PE139533.012 Water MWC004
pH in water Method: AN101 Tested: 28/11/2019							
pH**	pH Units	0.1		6.1	6.0	7.9	8.0
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 28/11/2019							
Conductivity @ 25 C	µS/cm	2		35	90	320	92
Alkalinity Method: AN135 Tested: 28/11/2019							
Total Alkalinity as CaCO3	mg/L	1		5	1	44	42
Chloride by Discrete Analyser in Water Method: AN274 Tested: 2/12/2019							
Chloride, Cl	mg/L	1		2	13	48	4
Sulfate in water Method: AN275 Tested: 2/12/2019							
Sulfate, SO4	mg/L	1		<1	11	32	3
Fluoride by Ion Selective Electrode in Water Method: AN141 Tested: 2/12/2019							
Fluoride by ISE	mg/L	0.1		<0.1	<0.1	0.4	0.2

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139533.009 Water MSC12	PE139533.010 Water MWC001	PE139533.011 Water MWC002	PE139533.012 Water MWC004
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 3/12/2019							
Phosphorus, P	µg/L	50		<50	<50	<50	<50
Silicon, Si	µg/L	20		4400	4300	5900	13000
Sulfur, S	µg/L	100		200	4000	10000	980
Cations in Water (Dissolved) by ICPOES Method: AN020/AN320 Tested: 3/12/2019							
Calcium, Ca	µg/L	10		1200	250	7600	8600
Magnesium, Mg	µg/L	10		820	91	3000	2600
Potassium, K	µg/L	50		890	8100	3900	210
Sodium, Na	µg/L	50		1600	9300	43000	5900
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 29/11/2019							
Aluminium, Al	µg/L	5		<5	<5	13	50
Antimony, Sb	µg/L	1		<1	<1	<1	<1
Arsenic, As	µg/L	1		<1	<1	<1	<1
Barium, Ba	µg/L	0.2		93	1.6	28	25
Bismuth, Bi	µg/L	1		<1	<1	<1	<1
Boron, B	µg/L	5		<5	8	67	35
Cadmium, Cd	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Chromium, Cr	µg/L	1		<1	<1	3	<1
Cobalt, Co	µg/L	1		1	<1	<1	<1
Copper, Cu	µg/L	1		<1	<1	<1	<1
Iron, Fe	µg/L	5		<5	<5	49	75
Lead, Pb	µg/L	1		<1	<1	<1	<1
Manganese, Mn	µg/L	1		1300	85	<1	1
Molybdenum, Mo	µg/L	0.5		<0.5	<0.5	33	3.0
Nickel, Ni	µg/L	1		25	<1	<1	<1
Selenium, Se	µg/L	1		<1	<1	2	<1
Silver, Ag	µg/L	1		<1	<1	<1	<1
Strontium, Sr	µg/L	1		27	2	110	66
Thallium, Tl	µg/L	1		<1	<1	<1	<1
Thorium, Th	µg/L	1		<1	<1	<1	<1
Tin, Sn	µg/L	1		<1	<1	<1	<1
Uranium, U	µg/L	1		<1	<1	<1	<1
Vanadium, V	µg/L	1		<1	<1	<1	<1
Zinc, Zn	µg/L	5		<5	<5	<5	<5
Mercury (dissolved) in Water Method: AN311(Perth)/AN312 Tested: 29/11/2019							
Mercury	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Hexavalent Chromium in water by Discrete Analyser Method: AN283 Tested: 10/12/2019							
Hexavalent Chromium, Cr6+	mg/L	0.001		-	-	0.004	-

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139533.013 Water MWC007	PE139533.014 Water Blank	PE139533.015 Water HPDW
pH in water Method: AN101 Tested: 28/11/2019						
pH**	pH Units	0.1		6.5	5.7	5.6
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 28/11/2019						
Conductivity @ 25 C	µS/cm	2		13	<2	<2
Alkalinity Method: AN135 Tested: 28/11/2019						
Total Alkalinity as CaCO3	mg/L	1		2	<1	<1
Chloride by Discrete Analyser in Water Method: AN274 Tested: 2/12/2019						
Chloride, Cl	mg/L	1		1	<1	<1
Sulfate in water Method: AN275 Tested: 2/12/2019						
Sulfate, SO4	mg/L	1		<1	<1	<1
Fluoride by Ion Selective Electrode in Water Method: AN141 Tested: 2/12/2019						
Fluoride by ISE	mg/L	0.1		<0.1	<0.1	<0.1

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE139533.013 Water MWC007	PE139533.014 Water Blank	PE139533.015 Water HPDW
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 3/12/2019						
Phosphorus, P	µg/L	50		<50	<50	<50
Silicon, Si	µg/L	20		**3400**	<20	<20
Sulfur, S	µg/L	100		<100	<100	<100
Cations in Water (Dissolved) by ICPOES Method: AN020/AN320 Tested: 3/12/2019						
Calcium, Ca	µg/L	10		**350**	<10	<10
Magnesium, Mg	µg/L	10		**450**	<10	<10
Potassium, K	µg/L	50		**200**	<50	<50
Sodium, Na	µg/L	50		**1100**	<50	<50
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 29/11/2019						
Aluminium, Al	µg/L	5		<5	<5	<5
Antimony, Sb	µg/L	1		<1	<1	<1
Arsenic, As	µg/L	1		<1	<1	<1
Barium, Ba	µg/L	0.2		<0.2	<0.2	<0.2
Bismuth, Bi	µg/L	1		<1	<1	<1
Boron, B	µg/L	5		**20**	<5	<5
Cadmium, Cd	µg/L	0.1		<0.1	<0.1	<0.1
Chromium, Cr	µg/L	1		<1	<1	<1
Cobalt, Co	µg/L	1		<1	<1	<1
Copper, Cu	µg/L	1		<1	<1	<1
Iron, Fe	µg/L	5		<5	<5	<5
Lead, Pb	µg/L	1		<1	<1	<1
Manganese, Mn	µg/L	1		**9**	<1	<1
Molybdenum, Mo	µg/L	0.5		<0.5	<0.5	<0.5
Nickel, Ni	µg/L	1		<1	<1	<1
Selenium, Se	µg/L	1		<1	<1	<1
Silver, Ag	µg/L	1		<1	<1	<1
Strontium, Sr	µg/L	1		**4**	<1	<1
Thallium, Tl	µg/L	1		<1	<1	<1
Thorium, Th	µg/L	1		<1	<1	<1
Tin, Sn	µg/L	1		<1	<1	<1
Uranium, U	µg/L	1		<1	<1	<1
Vanadium, V	µg/L	1		<1	<1	<1
Zinc, Zn	µg/L	5		<5	<5	<5
Mercury (dissolved) in Water Method: AN311(Perth)/AN312 Tested: 29/11/2019						
Mercury	µg/L	0.05		<0.05	<0.05	<0.05
Hexavalent Chromium in water by Discrete Analyser Method: AN283 Tested: 10/12/2019						
Hexavalent Chromium, Cr6+	mg/L	0.001		-	-	-

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Alkalinity Method: ME-(AU)-[ENV]AN135

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Alkalinity as CaCO3	LB166694	mg/L	1	<1	0%	108%

Cations in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN020/AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Calcium, Ca	LB166730	µg/L	10	<10	0%	NA
Magnesium, Mg	LB166730	µg/L	10	<10	0%	NA
Potassium, K	LB166730	µg/L	50	<50	0%	NA
Sodium, Na	LB166730	µg/L	50	<50	0%	NA

Chloride by Discrete Analyser in Water Method: ME-(AU)-[ENV]AN274

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Chloride, Cl	LB166678	mg/L	1	<1	0 - 2%	104 - 105%	91 - 109%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB166705	µS/cm	2	<2	0%	99 - 100%

Fluoride by Ion Selective Electrode in Water Method: ME-(AU)-[ENV]AN141

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Fluoride by ISE	LB166679	mg/L	0.1	<0.1	0%	103%	94%

Mercury (dissolved) in Water Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Mercury	LB166637	µg/L	0.05	<0.05	0 - 7%	118%	97%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Phosphorus, P	LB166731	µg/L	50	<50	109%
Silicon, Si	LB166731	µg/L	20	<20	103%
Sulfur, S	LB166731	µg/L	100	<100	107%

pH in water Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH**	LB166705	pH Units	0.1	5.6 - 5.7	0 - 1%	101%

Sulfate in water Method: ME-(AU)-[ENV]AN275

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Sulfate, SO4	LB166678	mg/L	1	<1	1 - 9%	103 - 104%	99 - 106%

Trace Metals (Dissolved) in Water by ICPMS Method: ME-(AU)-[ENV]AN318

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Aluminium, Al	LB166621	µg/L	5	<5	0%	86%	129%
Antimony, Sb	LB166621	µg/L	1	<1	0%	95%	94%
Arsenic, As	LB166621	µg/L	1	<1	0%	111%	110%
Barium, Ba	LB166621	µg/L	0.2	<0.2	0 - 2%	100%	97%
Bismuth, Bi	LB166621	µg/L	1	<1	0%	98%	98%
Boron, B	LB166621	µg/L	5	<5	0%	102%	95%
Cadmium, Cd	LB166621	µg/L	0.1	<0.1	0%	106%	104%
Chromium, Cr	LB166621	µg/L	1	<1	0%	98%	97%
Cobalt, Co	LB166621	µg/L	1	<1	0 - 2%	98%	99%
Copper, Cu	LB166621	µg/L	1	<1	0%	105%	104%
Iron, Fe	LB166621	µg/L	5	<5	0%	96%	97%
Lead, Pb	LB166621	µg/L	1	<1	0%	109%	109%
Manganese, Mn	LB166621	µg/L	1	<1	0%	95%	97%
Molybdenum, Mo	LB166621	µg/L	0.5	<0.5	0%	98%	100%
Nickel, Ni	LB166621	µg/L	1	<1	0%	100%	109%
Selenium, Se	LB166621	µg/L	1	<1	0%	116%	114%
Silver, Ag	LB166621	µg/L	1	<1	0%	98%	107%
Strontium, Sr	LB166621	µg/L	1	<1	0 - 1%	90%	89%
Thallium, Tl	LB166621	µg/L	1	<1	0%	107%	104%
Thorium, Th	LB166621	µg/L	1	<1	0%	113%	118%
Tin, Sn	LB166621	µg/L	1	<1	0%	91%	92%
Uranium, U	LB166621	µg/L	1	<1	0%	95%	92%
Vanadium, V	LB166621	µg/L	1	<1	0%	93%	96%
Zinc, Zn	LB166621	µg/L	5	<5	0%	114%	124%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN020/AN320 LL	Dissolved Cations Low LOR by ICP-OES: Method is as per routine ICP OES method reporting a variation to the method being lower limit of reporting (LOR) for selected cations as validated by the site. Referenced to APHA 3120B.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN140	Acidity by Titration: The water sample is titrated with sodium hydroxide to designated pH end point. In a sample containing only carbon dioxide, bicarbonates and carbonates, titration to pH 8.3 at 25°C corresponds to stoichiometric neutralisation of carbonic acid to bicarbonate. Method reference APHA 2310 B.
AN141	Determination of Fluoride by ISE: A fluoride ion selective electrode and reference electrode combination, in the presence of a pH/complexation buffer, is used to determine the fluoride concentration. The electrode millivolt response is measured logarithmically against fluoride concentration. Reference APHA F- C.
AN274	Chloride by Discrete Analyse: Chloride reacts with mercuric thiocyanate forming a mercuric chloride complex. In the presence of ferric iron, highly coloured ferric thiocyanate is formed which is proportional to the chloride concentration. Reference APHA 4500Cl-
AN275	sulfate by Discrete Analyse: sulfate is precipitated in an acidic medium with barium chloride. The resulting turbidity is measured photometrically at 405nm and compared with standard calibration solutions to determine the sulfate concentration in the sample. Reference APHA 4500-SO42-. Internal reference AN275.
AN283	Hexavalent Chromium via Discrete Analyser: Soluble hexavalent chromium forms a red/violet colour with diphenylcarbazide in acidic solution. This procedure is very sensitive and nearly specific for Cr6+. If total chromium is also measured the trivalent form of chromium Cr3+ can be calculated from the difference (Total Cr - Cr6+). Reference APHA3500CrB.
AN311(Perth)/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components .

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
		-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au.pv.sgsvr/en-gb/environment.

TOWNEND

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Our reference 24432

Mineralogy of six RC cuttings. (PLM/SEM/XRD).

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RESULTS

Polished sections/ XRD/SEM

	Mc1	**Mc2**	**Mc7**	**Mc8**	**Mc12**	**Mv17**
Quartz	Dominant	Dominant	Minor	Major	Major	Dominant
Muscovite	Major	Accessory				
Kaolin	Minor	Accessory	Accessory	Accessory	Accessory	Trace
Hematite 1	Accessory	Accessory	Accessory		Trace	Trace
Goethite	Accessory	Major	Dominant	Dominant	Dominant	Minor
Mn oxides2		Trace	Trace			
Xenotime		Trace				
Calcite		Trace				

Note. 1 No maghemite detected in MSc 8 / 17. Powders have traces of magnetic metal.
2. Mn oxides contain Fe, K and Ba.

.Key Dominant >50%, Major 20-50%, Minor 10-20%, Accessory 1-10%, Trace <1%