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Project No. 42907769

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Subject: Phase 1 Geochemical assessment of Pilot Trial Residue Tailings, FerrAus Pilbara Project, Western Australia

1 Introduction

FerrAus Limited (FerrAus) is planning to construct a single Residue Storage Facility (RSF) at their FerrAus Pilbara Project (FPP) site located in the inter-zone of the Pilbara and Gascoyne bio-geographic regions in Western Australia. The FPP site encompasses two mining areas identified as the Davidson Creek Area (DCA) and the Robertson Range Area (RRA). The proposed RSF will be situated in the DCA abutting waste rock dump DCWD3 to the south. The DCA incorporates five iron ore deposits, namely Mirrin Mirrin, Python, Gwandar, Tiger, Dugite and Taipan. The RRA incorporates two iron ore deposits, namely King Brown and South Zone.

The RSF is currently in feasibility design stage of development, and it is planned to hold residue tailings from the DCA and RRA mining operations. The FPP is currently in approvals stage of development.

The RSF is planed to handle an average tailings production rate of 2.2 million tons per annum (Mtpa) for a planned project life of 15 years. The tailings are expected to have predominantly less than 45 microns material with some [less than 1 millimetre (mm)] spiral reject material. The percent solids, prior to deposition, are expected to be between 40% and 50% solids by weight.

URS Australia Pty Ltd (URS) is currently undertaking the feasibility study for the provision of the design of the RSF. As a component of the design, URS have been asked to undertake an assessment of the residue tailings geochemistry, for the purpose of characterising the chemical properties of the residue tailings as part of the first phase (Phase 1) geochemical assessment.

The objective of the assessment of the residue tailings geochemistry is to provide information to refine the design of the RSF and to assist in the environmental approvals process for the FPP, where possible.

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1.1 Scope of Works

To meet the primary objectives outlined above, the following scope of work was identified:

- Task management and consultation – provision of regular project update reports on the geochemical assessment task, and consultation and meetings with the FerrAus engineering and approvals team.
- Laboratory analytical programme – Management of the sub-contracted laboratory including laboratory program design, and management of reporting of analytical results.
- Data review and analysis – Review of existing information on geochemical testing of materials for the FPP, validation of the laboratory data, and assessment and analysis of results in accordance with standard industry practice.
- Phase 1 Report preparation for refinement of the RSF design and environmental approvals – Preparation of a Memorandum report providing laboratory analytical results, key findings of the data assessment and recommendations for ongoing assessment as part of the FPP approvals process.
- Phase 2 report preparation for Mining Proposal – This task will be completed within a separate scope of work following the submission of the Memorandum report. This scope will include the detailed analytical requirements and reporting to be conducted as part of the Mining Proposal document.

1.2 Background

The requirement for tailings geochemical characterisation is detailed in the Department of Industry and Resources (DoIR) [currently identified as the Department of Mines and Petroleum (DMP)].1999 guideline identified as the *Mining Environmental Management Guidelines - Safe Design and Operating Standards for Tailings Storage* (DoIR, 1999) that provide guidance under the Western Australian legislation governing safety and environmental issues of Tailings Storage Facilities (TSF). For the purposes of clarity, there is no significant difference between a TSF and RSF as they are both designed for the safe, long term storage of fine-grained waste material generated in the production of ore. As such the terms TSF and RSF should be treated as one and the same entity.

For any of the category 1, 2, or 3 TSFs, physical and chemical characterisation of the tailings is required to understand possible environmental issues relating to water quality, dust, revegetation, rehabilitation and closure requirements. The chemical characterisation component includes acid and metalliferous drainage (AMD), but also includes metals, salts and mineralogical characteristics (such as asbestiform fibres) that also need to be considered in the design and operation of the TSF.

The Phase 1 geochemical assessment forms part of a greater geochemical assessment program that is integrated within the life of mine plan (**Figure 1**). The other components of the life of mine plan include approvals documentation, mine plan and impact and/or receptor assessments that are included as part of the greater environmental approvals process for the FPP. The geochemical assessment components and activities that are planned as part of the life of mine plan are described in **Figure 1**.

It is intended that this Phase 1 geochemical assessment be incorporated into the proposed Part IV s38 environmental approvals document. This approvals document is currently anticipated to be assessed as an Assessment on Proponent Information (API) level of assessment. The Phase 2 detailed geochemical assessment will be conducted as part of the ongoing environmental requisite assessments to be included within the FPP Mining Proposal.

The recommendations section of this report outlines the activities that are proposed for the Phase 2 detailed geochemical assessment to be conducted prior to preparation of the FPP Mining Proposal.

2 Existing Information

Geochemical characterisation of the mine-waste materials and low-grade-ore from the King-Brown ore deposit of the DCA was carried out by Graeme Campbell and Associates in December 2010. The report *Geochemical Characterisation of Mine-Waste and Low-Grade-Ore Samples* (GCA, 2010) contains details of the assessment. Key findings have been summarised below.

Sixteen (16) mine-waste samples and seven (7) low-grade-ore samples were selected for geochemical analysis. Acid-base chemistry, salinity and multi-element composition were assessed using the following analytical techniques:

- pH and Electrical-Conductivity (EC) on sample slurries;
- Total-Sulphur (Total-S), and Sulphate-Sulphur (SO4-S);
- Acid-Neutralisation-Capacity (ANC), and CO_3-C;
- pH-buffering properties;
- Net-Acid-Producing-Potential (NAPP);
- Net-Acid-Generation (NAG);
- Geochemical Abundance Index (GAI); and
- Multi-element Analysis.

The mine-waste samples comprised sediments (clay, detrital and surficial materials) that were classified as non-acid forming (NAF), with low total sulfur concentrations. The samples were circum-neutral (pH 6-7) with low contents of soluble-salts as is consistent with typical mine-waste streams produced at iron ore mines in the Pilbara. The multi-element analyses results showed the mine-waste samples had contents of major and minor elements typically below, or close to, those recorded for soils, regoliths, and bedrocks derived from unmineralised terrain. Although variously enriched in As, Sb, Se, Bi, and Mn, the degree of enrichment was not marked.

The low-grade-ores were classified as NAF, and were circum-neutral (pH 6-7) with low contents of soluble-salts. The multi-element analyses showed that the low-grade-ores had contents of major and minor elements typically below, or close to, those recorded for soils, regoliths, and bedrocks derived from unmineralised terrain.

In the management recommendations it was noted that the waste-landform design and rehabilitation should not be constrained by the physicochemical nature of the mine-waste streams. It was recommended that planning for waste-landform decommissioning should integrate industry best-practice concepts for rehabilitation and mine-site closure and the practical know-how gained from the experiences of other Pilbara iron ore mines.

It was noted that only materials from DCA and RRA sites were tested; however, results may be extrapolated to waste from the Mirrin Mirrin ore deposit with a high level of confidence.

The Outback Ecology report *Robertson Range, Davidson Creek and Mirrin Mirrin – Soil and Waste Material* Assessment (Outback Ecology, 2010) indicated that there were unlikely to be any material specific requirements for waste placement within constructed landforms. It was recommended that waste landform designs should aim to minimise the ponding of surface water where applicable.

3 Methodology

FerrAus is undertaking pilot plant process studies to assess the chemical and physical characteristics of the reside waste from the FPP. To date, pilot plant reside samples have been collected for the RRA ore deposits and the Mirrin Mirrin ore deposit. The most recent pilot plant trial represented the Detailed Feasibility Stage Pilot Plant Evaluation. Two tailings residue samples from the RRA ore deposit (RR High grade and RR medium grade) and two samples from the Mirrin Mirrin ore deposit (MM high grade and MM medium grade) were selected for analysis.

This section describes the analysis process undertaken to assess the chemical properties of the samples.

3.1 Classification Criteria

The geochemical assessment and analysis of laboratory analytical results is conducted in accordance with the *Global Acid Rock Drainage (GARD) Guide* (INAP, 2011), and Department of Industry, Tourism and Resources – *Leading Practice Sustainable Development Program for the Mining Industry: Acid and Metalliferous Drainage* (DITR, 2007), that are the current standard industry practice for the analysis and reporting of data relevant to potential acid and metalliferous drainage and/or geochemical assessments.

3.1.1 Acid Base Accounting

A number of procedures have been developed to assess the AMD characteristics of mine waste materials. However, ultimately the overall acid generation assessments for mine materials are mainly carried out using the following static testing methods:

- Acid Base Accounting (ABA); and/or
- Net Acid Generation (NAG).

The testwork carried out for the FPP follows the ABA methodology. It calculates the acid generation capacity of the sample material by determining the maximum potential acidity (MPA) that can be generated from the oxidation of sulfide minerals relative to its acid neutralising capacity (ANC) due mainly to the presence of carbonate minerals and to lesser extent silicate minerals. The difference between the MPA and ANC value is referred to as net acid producing potential (NAPP).

For the purposes of this assessment, total sulfur concentration (%S) has been used to calculate maximum potential acidity (MPA) on the basis that all sulfur present is in the mineral form of pyrite (FeS_2). It is noted that this represents a conservative approach to the estimation of NAPP and is

likely to over-estimate the MPA produced from the residue tailings materials. This is supported by the comment given in the *Geochemical Characterisation of Mine-Waste and Low-Grade-Ore Samples* (GCA, 2010) from the FPP, which stated that it is likely that negligible occurrences of sulphide minerals (e.g. pyrite) would occur at the FPP, as is consistent with the style of iron-ore mineralisation at the FPP and the depths of in-situ weathering observed at the site and around the Pilbara.

The use of a conservative approach enables the assessment to be undertaken as a reasonable worst case scenario. As the objective of this assessment is to test preliminary pilot trial residue tailings samples for the purpose of highlighting any potential gaps in data and identifying any potential impacts from the storage of residue tailings, an assessment based on a reasonable worst case scenario is considered appropriate to enable this objective to be fulfilled.

On the basis of the ABA and NAG results samples may be classified into one of the following categories (AMIRA, 2002):

- **Barren**: where samples have minimal acid neutralising capacity and low total sulfur content (generally <0.1 %S). This category mostly applies to highly weathered materials and criteria may vary between sites.
- **Non-acid Forming (NAF)**: where samples may have significant sulfur content, but acid neutralising capacity is present and is able to neutralise the potential acidity that could be produced by oxidising sulfur. In general NAF materials have negative NAPP and final NAG pH of >4.5.
- **Potentially Acid Forming (PAF)**: where samples have significant sulfur content and the potential to general acidity in exceedence of the available acid neutralising capacity. In general PAF materials have positive NAPP and a final NAG pH <4.5.
- **Uncertain**: where the NAPP and NAG results are not in agreement. Further kinetic testwork or field oxidation trials are usually recommended to determine the acid forming characteristics of these materials.

3.1.2 Multi-element Composition

To assess the potential for elemental enrichment, tailings solid samples were tested for multi-element composition. The results are compared to standard median soil abundance values (Bowen, 1979) to evaluate the extent of elemental enrichment, which is reported as a geochemical abundance index (GAI) value. In general, a GAI of 3 or greater is considered as enrichment to a level that may warrant further examination to assess their environmental significance.

In addition to the GAI, multi-element analyses for the total metals concentration of waste materials have been compared to Department of Environment and Conservation (DEC) Contaminated Sites Management Series Guidelines – *Assessment Levels for Soil, Sediment and Water* (DEC, 2010). The criteria chosen are the interim sediment quality guideline values (ISQG) for both low and high probability of causing biological effects. The trigger values are tabulated in **Table 2-1**.

Table 2-1 DEC Assessment Levels for Soils and Sediment (DEC, 2010)

Element	ISQG – Low[1] (mg/kg)	ISQG – High[2] (mg/kg)
Ag	1.0	3.7
As	20	70
Cd	1.5	10
Cr	80	370
Cu	65	270
Hg	0.15	1.0
Ni	21	52
Pb	50	220
Sb	2.0	25
Zn	200	410

Notes:
[1] ISQG – Low: probable effects concentrations above which biological effects rarely occur.
[2] ISQG – High: probable effects concentrations above which biological effects would possibly occur.

Static leach test methodology for multi-element analysis varies widely. The method used for the two samples subjected to multi-element leach testing involved a singe leach of the solid material with deionised water (utilising the Australian Standard Leaching Procedure). The resulting leachate is generally analysed for major ions and a selected suite of metals. The leachate values have been compared to the Australian and New Zealand Environment and Conservation Council (ANZECC) *Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000). The trigger values have been chosen appropriate to the likely receiving environment, as outlined in the *FerrAus Pilbara Project Mine Water Options Assessment – Receiving Environment Study* (SKM, 2011). This study utilised the ANZECC *Upland Rivers* in Tropical Australia (includes North-West Western Australia) trigger levels for 95% protection of species.

The ANZECC trigger values have been utilised for this Phase 1 assessment as the baseline groundwater quality data for the FPP is currently being collected and analysed for the purpose of future impact assessments. The assessment of potential impact based on these trigger levels is to be used as a guideline only. The Phase 2 detailed geochemistry assessment will utilise the final baseline water quality objectives determined for the FPP.

To aid with the assessment of leachate quality against site specific water quality objective, the draft objectives proposed in the *FerrAus Pilbara Project Mine Water Options Assessment – Receiving Environment Study* (SKM, 2011) have also been utilised for identification of potential impact for the purposes of guiding future work in the Phase 2 detailed geochemistry assessment. These represent draft objectives for waterways that have the potential to be impacted by mine discharges. Some of these waterways may also receive a limited amount of groundwater discharge.

The values for both the ANZECC trigger values and the Draft objectives (SKM, 2011) are tabulated in (**Table 2-2**).

Table 2-2 Assessment Levels for Leachate (ANZECC, 2000; and SKM, 2011)

Element	ANZECC trigger value (mg/L)[1]	Draft Objective (mg/L)[2]
Ag	0.0005	0.005
Al	0.055	0.055
As	0.024	0.024
Bi	No guideline	1
Cd	0.0002	0.0002
Cu	0.0014	0.0014
Fe	0.3	0.3
Mn	1.9	0.5
Pb	0.0034	0.0034
Se	0.011	0.011
Sb	No guideline	0.05
Zn	0.008	0.02

Note:
[1]ANZECC trigger level for Upland Rivers in Tropical Australia (includes North-West WA) 95% Protection level
[2] Draft Objectives for waterways with the potential to be impacted by FPP mine discharges (surface water and groundwater)

4 Quality Assurance and Quality Control

4.1 Data Validation Techniques and Elements

For quality assurance and quality control (QAQC) purposes, validation of analytical data was used to assess whether the data gathered were in compliance with method requirements and project specifications. The primary objectives of this process were to ensure that: (i) data of known quality are reported; and (ii) the data can be used to fulfil the overall project objectives.

The data validation guidelines used are based on guidance documents published by the United States Environmental Protection Agency (US EPA). These include:

- *Contract Laboratory Program for Organic Data Review* (October 1999);
- *Contract Laboratory Program for Inorganic Data Review* (July 2002); and
- *Guidance on Environmental Data Verification and Data Validation* (November 2002).

The validation process, for both the field sampling procedures and the laboratory analytical programmes, involves checking the compliance of analytical procedures and assessing the accuracy and precision of analytical data from a range of quality control measurements.

Tailing samples were produced, by FerrAus, in a pilot process plant and as such validation of field sampling procedures was not required and have not been included in this data assessment.

The data validation protocols employed by URS are compliant with and exceed those specified in the National Environment Protection (assessment of site contamination) Measure (NEPC, 1999),

with additional reference to the quality control specifications detailed in section 5 of the Australian and New Zealand Standard (AS/NZS) 5667.1.1998. *Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples* (AS/NZS, 1998).

Specific elements of the analytical programmes checked and assessed for this project include:

- Sample holding times;
- Use of appropriate analytical procedures;
- Required limits of reporting (LOR);
- Frequency of conducting quality control measurements;
- Laboratory blank results;
- Precision [(Relative Percent Difference (RPD)] of laboratory duplicate results; and
- Matrix spike results.

All quality assurance reports received from the laboratory are included in Appendix A. The contracted laboratory [Australian Laboratory Services (ALS) Environmental Division] is National Association of Testing Authorities (NATA) accredited for all analyses conducted as part of this analytical program.

The X-ray Fluorescence (XRF) testing was conducted by ALS – Minerals Division. This XRF analysis is not covered under the NATA accreditation process.

4.2 Laboratory Analysis Validation

Laboratory data validation consists of four types of QAQC samples:

- Laboratory duplicate - to determine the reproducibility of results (intra-laboratory precision);
- Laboratory control sample - to indicate the potential for bias within the analysis method, or due to analytical equipment;
- Method blank - to assess the potential for cross-contamination during the analytical process; and
- Matrix spike - to indicate the potential bias within the sample results due to the interferences within the sample matrix.

The assessment of these types of QAQC samples allows an overall determination of the quality of laboratory analytical data.

Laboratory data validation also includes the assessment of sample preservation and storage parameters, and compliance with maximum recommended holding times.

Detailed laboratory QAQC data (reported by the laboratory) are presented in the analytical reports in Appendix A. The validation of the laboratory data carried out as part of this assessment is presented in tables in Appendix B.

Based on validation of laboratory QAQC data, the overall quality of the analytical results is considered to be generally acceptable for interpretive use.

Exceptions are discussed below.

4.2.1 Frequency of Laboratory QAQC - Non Compliances

A sufficient frequency of laboratory QAQC was completed to generally confirm the accuracy and precision of laboratory reporting processes, except:

- Laboratory duplicate and laboratory control spikes for physio-chemical parameters (pH).

4.2.2 Sample Handling and Preservation – Non Compliances

- Samples were received by the laboratory at 23.7ºC, above the recommended temperature. However, this will not affect data interpretation as no volatile analytes were included within the analytical suite.
- Sample containers do not comply with preservation standards as tailings samples are usually expected to be delivered as wet samples stored in a plastic bottle with nitric acid preservation. It is not expected that this will influence data interpretation of these samples as no volatile analytes were included in the analytical suite and materials were delivered as dry samples in an unpreserved glass jar.

4.2.3 Holding Time – Exceedences

Holding time exceedence for RRPT01 occurred for pH (6 hour holding time exceeded by 2 days), soluble sulphate (extraction time exceeded by 4 days) and chloride (extraction time exceeded by 4 days).

4.2.4 Laboratory Control Sample

Iron had a recovery (137%) which marginally exceeded the upper control limit (130%).

4.2.5 Matrix Spikes

Manganese (Mn) recovery in RRPT01 was not determined due to background concentrations greater than 4 times the spike level.

4.2.6 Summary of Laboratory QAQC Results

The majority of QAQC issues outlined above are unlikely to have a significant effect on the precision and accuracy of reported results for the following reasons:

- Generally, laboratory QA/QC was reported at an appropriate frequency to indicate that the data has been generated with acceptable accuracy and precision.
- No volatile compounds were analysed, therefore it is unlikely that the excessive sample temperature will affect the reported analyte concentrations.
- The exceedence of holding time for analysis of some parameters (pH, soluble sulfate and chloride) is not considered to affect the interpretation of the results as the parameters are not considered to be of high importance in assessing the overall potential of impact from the residue materials.
- The assessment of Mn recovery was not able to be carried out as concentrations of Mn in the residue samples were higher than the spike concentration. This is not considered to have an affect on the interpretation of any results

The purpose of this Phase 1 geochemical assessment is to highlight a potential for environmental impact, and to establish technically appropriate protocols for ongoing detailed geochemical assessment at the FPP to address identified data gaps. On the basis of the assessment objectives and the laboratory analytical data validation, the overall quality of the analytical results is considered to be acceptable for interpretive use.

5 Results

As part of the most recent pilot plant trial, the Detailed Feasibility Stage Pilot Plant Evaluation, two samples from the RRA ore deposit (RR high grade and RR medium grade) and two samples from the Mirrin Mirrin ore deposit (MM high grade and MM medium grade) were selected for analysis.

The high and medium grade samples were combined in ratios to approximate the conditions under which the residue material will be generated. The combination ratios and sample names selected are:

- RRPT01: RRA ore deposit - 29% high grade and 71% medium grade; and
- MMPT01: Mirrin Mirrin ore deposit - 57% high grade and 43% medium grade.

Laboratory reports and QAQC results are presented in Appendices A and B respectively.

5.1 Acid Forming Characteristics

Acid producing potential of the residue materials have been assessed using total sulfur (%S) content of the residue tailings samples. The predicted MPA generation based on the maximum %S values, and ANC for each residue sample is presented in **Table 1**.

Total sulfur values for both the RRA (RRPT01) and Mirrin Mirrin (MMPT01) samples were below the 0.1 %S, and as such both samples are categorised as Barren. NAPP values for both samples are negative (-40.7 kg H_2SO_4/t for MMPT01 and -1.2 kg H_2SO_4/t for RRPT01) which indicates that the residue tailings are classified as Non-acid Forming (NAF).

In general NAPP values of +/- 20 kg H_2SO_4/tonne (applicable to RRPT01) are considered to be uncertain of generating acid. In the absence of the complete suite of NAPP and NAG testing, the exact acid producing potential of the ore and waste materials cannot be determined. However, given the oxidised nature and the low total sulfur content (<0.1 %S) of the residue material tested from RRA (RRPT01), it is unlikely that acid production potential will be significant and samples are likely to be classified as NAF. In order to confirm the acid producing characteristics of the waste it is recommended that final pilot trial residue materials are tested for the full NAPP and NAG testing suites.

6 Multi-Element Composition of Waste Materials

6.1.1 Geochemical Abundance Index

The results of the GAI analysis, for both the RRA and Mirrin Mirrin residue samples (RRPT01 and MMPT01) are presented in **Table 2**.The results indicate that the elements present in enriched concentrations in both RRA (RRPT01) and Mirrin Mirrin (MMPT01) residue materials are:

- Arsenic (As), iron (Fe) and zinc (Zn) (both RRPT01 and MMPT01); and
- Manganese (Mn) (RRPT01).

Arsenic enrichment is higher in the RRPT01 compare to MMPT01. The only element that has a GAI that equals or exceeds 3 is As in the RRA residue sample (RRPT01).

As the proposed mine is located in the Pilbara region, where Fe and some metals are preferentially enriched in soils and rock, elevated Fe in the Mirrin Mirrin and RRA residue materials is considered to be representative of background conditions. Therefore, it is unlikely to have substantial environmental impact risks.

6.1.2 Multi-element solids

Screening of residue tailings analytical results was undertaken by initially comparing the results with the ISQG low and high values. **Table 3** presents a summary of the RRA and Mirrin Mirrin residue samples (RRPT01 and MMPT01) compared against the adopted DEC guideline criteria.

Both of the residue samples reported metal concentrations below the ISQG criteria for both low and high probability for causing biological effects, with the exception of silver (Ag) concentrations, which were reported above ISQG low trigger value in MMPT01 and RRPT01. All of the metal concentrations were reported above limit of reporting (LOR). The exceptions were boron (B), mercury (Hg), selenium (Se) for both the residue samples (RRPT01 and MMPT01) and cadmium (Cd) for the Mirrin Mirrin residue sample (MMPT01).

6.1.3 Multi-element leachate

While the NAG and NAPP values (and ANC/MPA ratio and ABCC tests) provide an indication of the potential for acid generation from a sample, additional test work is required to predict the potential for metalliferous or saline drainage. . In view of this, metal leachability tests (deionised water extractions) were conducted. The results of the multi-element leachate analysis of the RRA and Mirrin Mirrin residue samples (RRPT01 and MMPT01) are presented in **Table 4**.

The LOR was higher than the criteria values for Ag. This may lead to an inaccurate determination of potential impacts from leachate. The analyses that were below detection limit for this element have not been highlighted; however results have been interpreted with caution.

In general leachate from both RRA and Mirrin Mirrin residue samples (RRPT01 and MMPT01) had low salinity (electrical conductivity measurements of 196 uS/cm and 115 uS/cm respectively) and had neutral pH (pH 7.22 and 7.34 respectively). Most metals were below detection limit with the exception of:

- Aluminium (Al), Barium (Ba), Boron (B), Lithium (Li), Mn, Molybdenum (Mo) and Strontium (Sr) for both RRPT01 and MMPT01; and
- Chromium (Cr) and Tungsten (W) for RRPT01.

Concentrations of some metals exceeded both of the ANZECC and draft objective assessment criteria in the following samples:

- Copper (Cu) and Zn for both RRPT01 and MMPT01;
- Cadmium (Cd) for MMPT01;
- Aluminium (Al) and Fe[1] for RRPT01.

It is noted that the ANZECC and draft objective trigger values are equivalent for Fe, Cd and Al.

7 Summary

Two residue samples from the recent FPP Detailed Feasibility Stage Pilot Plant Evaluation of materials from the RRA and Mirrin Mirrin ore deposits were subjected for ABA and multi-element solids and leachate analysis as part of the Phase 1 geochemical assessment of the residue materials intended to be stored in the RSF at the FPP.

Both the RRA and Mirrin Mirrin residue samples (RRPT01 and MMPT01) were classified as NAF. Both samples had total sulfur vales below 0.1 %S indicating that they may also be classified as Barren.

Based on the review of the analytical results for ABA for the two samples tested, the residue tailings from RRA and Mirrin Mirrin ore deposits is considered tested is unlikely to generate acid or saline drainage; however, they may be problematic with regards to the potential generation of metal (Cu, Zn, Cd, Al and Fe) drainage if not managed appropriately.

It is recommended that the geochemical testing of residue materials from the DCA ore deposit be included in the Phase 2 detailed geochemical assessment and be considered for the detailed design phase of the RSF development.

Both the RRA and Mirrin Mirrin residue samples (RRPT01 and MMPT01) are enriched in some metals (As, Fe and Zn). Residue materials from the RRA ore deposit (RRPT01) are also enriched in Mn. The GAI results found that the only element enriched at a GAI of 3 or above was As, which was enriched in the RRA residue material (RRPT01). The results of the multi-element testing of the RRPT01 sample show that the RRA residue sample did not exceed the DEC ISQG low or ISQG high trigger values for As and that As did not leach from the RRPT01 residue material in elevated concentrations (As concentration of RRPT01 <LOR).

Therefore, although the GAI indicated that As is present in the RRA residue material at concentrations that may require further investigation, it is considered unlikely that release of residue solids (for example from dust generation on the surface of the RSF) or leaching of the RRA residue materials will cause adverse impact to soils or water quality if managed appropriately. It is

[1] Australian Drinking Water Guideline (aesthetic) value for iron has been adopted based on water quality objectives identified for the FPP (SKM, 2011)

recommended that As be included in the analytical suite of any further geochemical assessments and water quality testing at FPP.

The RRA and Mirrin Mirrin residue samples (RRPT01 and MMPT01) did not exceed DEC ISQG low or ISQG high trigger values for soils and sediments for the majority of metals. The only exception was exceedence of the ISQG low trigger value for Ag for both the RRA and Mirrin Mirrin samples. An exceedence of the ISQG low trigger value indicates that there is the potential for biological effects to occur is rare. The leachate testing was carried out using a method that resulted in the LOR of Ag being higher than the ANZECC (2000) trigger value. This means that the results require interpretation with caution. It is recommended that Ag be included within the analytical suite of any further geochemical assessments and water quality testing at FPP, and that the analytical methodology be adjusted to achieve a smaller LOR and enable a more thorough assessment of the potential impacts associated with Ag in the residue samples.

The results of the leachate testing indicated that the RRA and Mirrin Mirrin residue samples (RRPT01 and MMPT01) exceeded the ANZECC and draft water quality objectives for the following parameters:

- Copper (Cu) and Zinc (Zn) (both RRPT01 and MMPT01);
- Cadmium (Cd) (MMPT01); and
- Aluminium (Al) and Iron (Fe) (RRPT01).

This indicates that leachate generated within the RSF due to interaction of the residue material with rainfall or process liquids has the potential to impact groundwater and/or surface water based in the interim screening trigger values (ANZECC and draft water quality objectives). The presence of Fe and Al in the leachate and in the residue materials is likely to limit the mobility of metals such as Cu, Zn and Cd through sorption reactions with iron-hydroxide minerals. It is recommended that kinetic leach testing be carried out on residue materials from the RRA, Mirrin Mirrin and DCA ore deposits to determine the leachable concentrations under conditions that approximate the climatic conditions of the FPP.

As the draft water quality objectives and ANZECC trigger values relate to the protection of ecosystems in surface water bodies that may be affected by mine discharges, it is recommended that, as a precautionary measure, the RSF be designed and managed so that the potential risk of run-off (and seepage) to cause significant water quality impacts is minimised.

It is understood that draft groundwater quality objectives will be proposed as part of the baseline groundwater quality study that is currently in progress for the FPP. It is recommended that the results of the leachate testing be reviewed against the baseline groundwater quality data to assess the potential for seepage from the base of the RSF to cause impact to groundwater quality in the region.

It is also recommended that a closure strategy be developed to minimise the infiltration of rainfall into the RSF at closure of the FPP. This strategy may include the design and installation of a suitable cover system on the RSF.

8 Recommendations

It is understood that as part of the Phase 2 detailed geochemical assessment, the outcomes of this Phase 1 geochemical assessment of residue tailings materials from RRA and Mirrin Mirrin operations will be combined with other existing information on waste, ore and low-grade materials and placed into context within the greater mine plan and infrastructure planned for the Project (as is illustrated in **Figure 1**). It is suggested that a Mine Waste Management Plan (MWMP) be developed specific to the level of risk of acid or metalliferous drainage (AMD) potential that each of the residue tailings and waste rock materials from the RRA, Mirrin Mirrin and DCA ore deposits have.

At this stage it is not expected that any specific requirements are needed for the placement or management of waste materials, for the purposes of prevention of AMD. It is recommended that waste landforms be constructed to minimise the ponding of surface water (Outback Ecology, 2010).

As part of the Phase 2 detailed geochemical assessment detailed geochemical testing is recommended for all new or existing pilot trial residue tailings samples for RRA, Mirrin Mirrin and DCA ore deposits. This testing may include but not be limited to:

- Residue Tailings solids
  - Acid Base Accounting (static testing e.g. NAPP and NAG);
  - Kinetic Leach Testing;
  - Mineralogy (X-ray diffraction)
  - Multi-element solids (total and leachable); and
  - Major ions.
- Residue Tailings liquor
  - pH, electrical conductivity, total dissolved solids;
  - major ions; and
  - multi elements.

Testing will be repeated throughout mine life where residue tailings composition changes due to change in mining or process conditions.

The results of this Phase 1 geochemical assessment indicate that the residue materials are unlikely to be acid forming; therefore, ABA and detailed testing around acid generation mechanisms is considered to be of lower importance compared to the potential for the residue materials to release metals in leachate. Based on this outcome it is recommended that the detailed testing focus on the potential release of metals from residue materials.

The potential for the release of metals in leachate from the residue tailings material from the RRA and Mirrin Mirrin ore deposits, indicate that additional design parameters may need to be included in the detailed design phase of the RSF development. The final recommendations are subject to comparison of the leachate results to the findings baseline groundwater quality studies. It is understood that these results will be available as part of the proposed Part IV s38 environmental approvals document.

It is recommended that the following be considered in the detailed design of the RSF:

- A surface water management plan that minimises the potential for surface water to be released to the environment during rainfall events;
- Installation of a clay liner to minimise seepage from the base of the RSF; and
- The design of a store and release cover system to minimise infiltration of surface water into the residue tailings materials at closure.

9 Close

We trust that this Phase 1 geochemical assessment meets the requirements of the objectives outlined in Section 1. Please contact the undersigned on 08 9326 0100 if there are any queries on the information contained in this letter.

Yours sincerely
URS Australia Pty Ltd

Tracey Hassell
Senior Geochemist

Imran Gillani
Principal Engineer

Attachments:

Tables

Table 1 Acid Base Accounting Results - FerrAus Pilbara Project Tailings Residue

Table 2a XRF Results - FerrAus Pilbara Project Tailings Residue

Table 2b Geochemical Abundance Index Results - FerrAus Pilbara Project Tailings Residue

Table 3 Soil Analytical Results - FerrAus Pilbara Project Tailings Residue

Table 4 Leachate Analytical Results - FerrAus Pilbara Project Tailings Residue

Figure

Figure 1 Geochemical Assessment – Life of Mining Plan

Appendices

Appendix A Laboratory Reports

Appendix B Data Validation

References

AMIRA International (AMIRA), 2002. *ARD Test Handbook – Project P387A Prediction and Kinetic Control of Acid Mine Drainage*. Ian Wark Research Institute and Environmental Geochemistry International Pty Ltd. May 2002

ANZECC, 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Volume 1. Australian and New Zealand Environment and Conservation Council, and Agriculture and Resource Management Council of Australia and New Zealand.

AS/NZS, 1998. *Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.* Australian and New Zealand Standard

DEC, 2010. *Assessment Levels for Soil, Sediment and Water*. Version 4, revision 1. Contaminated Sites Management Series. Department of Environment and Conservation. February 2010.

DITR, 2007. *Managing Acid and Metalliferous Drainage*. Leading Practice Sustainable Development Program for the Mining Industry. Department of Industry Tourism and Resources, Commonwealth of Australia. February 2007.

DoIR, 1999. *Mining Environmental Management Guidelines – Safe Design and Operating Standards for Tailings Storage*. Department of Industry and Resources Environment Division. May 1999.

GCA, 2010. FerrAus *Pilbara Project: Geochemical Characterisation of Mine-Waste and Low-Grade-Ore Samples form King-Brown Pit and Implications for Material Management*. Draft Report Prepares for FerrAus Limited. Graeme Campbell & Associates Pty Ltd. December 2010.

INAP, 2011. *Global Acid Rock Drainage Guide*. The International Network for Acid Prevention. Online. www.gardguide.com. Accessed June 2011.

NEPC, 1999. *National Environment Protection (Assessment of Site Contamination) Measure*. National Environment Protection Council.

Outback Ecology, 2010. *Robertson Range, Davidson Creek and Mirrin Mirrin – Soil and Waste Material Assessment*. Report prepared for FerrAus Limited, February 2011.

SKM, 2011. *FerrAus Pilbara Project Mine Water Options Assessment – Receiving Environment Study*. Revision B. Draft Report prepared for FerrAus Limited. Ref VW05820-FH-RP-00002. May 2010.

Limitations

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of FerrAus Limited and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Variation Request dated 9 June 2011.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between June 2011 and July 2011 is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

Tables

Table 1
Acid Base Accounting Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

Sample ID	Sample Type	pH[1]	Acidity (to pH 8.3)	Alkalinity (to pH 5.5)	EC[1]	Total Sulfur	Sulfate Sulfur	MPA[2]	ANC[2]	NAPP[2]	Sample Classification[3]
			(kg H_2SO_4/t)		(µS/cm)	(%)		(kg H_2SO_4/t)			
MMPT01	Tailings	NA	NA	NA	NA	0.04	NA	1.2	41.9	-40.7	Non-acid forming (Barren)
RRPT01	Tailings	NA	NA	NA	NA	0.03	NA	0.9	2.1	-1.2	Non-acid forming (Barren)

Notes:

1. Natural pH and EC provided for 1:5 sample:water extracts
2. MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential.
3. Samples generally classified as PAF if NAPP is positive and NAF if NAPP is negative (NAF-Barren if Total Sulfur is <0.10%). Refer to text for further details.
4. NA denoted not analysed

Table 2a
XRF Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

Location	Sample ID	Date Sampled	Sample Type	Analyte	Al2O3	As	BaO	CaO	Cl	Co	Cr2O3	Cu	Fe2O3	K2O	MgO	MnO	Mo	Na2O	Ni	P2O5	Pb	SO3	SiO2	TiO	V2O5	Zn
				Units	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
				LOR	0.01	0.001	0.001	0.01	0.001	0.001	0.001	0.0021	0.01	0.001	0.01	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.01	0.001	0.001
Mirrin Mirrin	MMPT01	24/06/2011	Tailing		**7.52**	**0.005**	<0.001	**0.07**	**0.062**	<0.001	<0.001	**0.002**	**72.1**	<0.001	**0.15**	**0.231**	<0.001	**0.082**	**0.002**	**0.233**	<0.001	**0.043**	**9.42**	**0.21**	<0.001	**0.024**
Robertson Range	RRPT01	24/06/2011	Tailing		**7.58**	**0.006**	<0.001	**0.1**	**0.37**	<0.001	<0.001	**0.003**	**68.4**	**0.027**	**0.12**	**0.297**	<0.001	**0.058**	**0.003**	**0.17**	<0.001	**0.076**	**14.25**	**0.33**	<0.001	**0.021**

Table 2b
Geochemical Abundance Index Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

	TOTAL-ELEMENT CONTENT (mg/kg or %)			GEOCHEMICAL ABUNDANCE INDEX (GAI)	
Element	MMPT01	RRPT01	**AVERAGE CRUSTAL ABUNDANCE[1] (mg/kg or %)**	MMPT01	RRPT01
Al2O3%	7.52	7.58	7.10	0	0
As	50	60	6	**2**	**3**
Ba	<LOR	<LOR	500	<LOR	<LOR
CaO%	0.07	0.1	1.50	0	0
Co	<LOR	<LOR	8	<LOR	<LOR
Cr	<LOR	<LOR	70	<LOR	<LOR
Cu	20	30	30	0	0
Fe%	25.21	23.92	4	**2**	**2**
K2O%	<LOR	0.027	1.40	<LOR	0
MgO%	0.15	0.12	0.50	0	0
Mn	1789	2300.27	1000	0	**1**
Na%	0.061	0.043	0.50	0	0
Ni	20	30	50	0	0
P	1016.58	741.71	800	0	0
Pb	<LOR	<LOR	35	<LOR	<LOR
S%	0.0172	0.0304	0.07	0	0
Si%	4.4	6.66	33	0	0
TiO2%	0.21	0.33	0.50	0	0
V	<LOR	<LOR	90	<LOR	<LOR
Zn	240	210	90	**1**	**1**

notes
Total element content values are median concentrations (calculated form Table B-1 - Appendix B)
<LOR - element below analytical limit of reporting, effective GAI is 0
[1] from Enviromental Chemistry of the Elements (Bowen, 1979)

Table 3
Soil Analytical Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

Location	Mirrin Mirrin	Robertson Range
Sample ID	MMPT01	RRPT01
Date Sampled	24/06/2011	24/06/2011
Sample Type	Primary Sample	Primary Sample

Analyte	LOR	Units	ISQG-Low	ISQG-High		
Moisture Content						
Moisture Content	1	%	-	-	**1.1**	<1
Metals (Total)						
Lithium	0.1	mg/kg	-	-	**4.4**	**1.2**
Uranium	0.1	mg/kg	-	-	**9**	**1.2**
Aluminium	50	mg/kg	-	-	**7280**	**4400**
Antimony	0.1	mg/kg	2	25	**0.5**	**0.5**
Arsenic	0.1	mg/kg	20	70	**0.8**	**1.7**
Barium	0.1	mg/kg	-	-	**40.2**	**94.7**
Beryllium	0.1	mg/kg	-	-	**0.4**	**0.3**
Boron	50	mg/kg	-	-	<50	<50
Cadmium	0.1	mg/kg	1.5	10	<0.1	**0.1**
Chromium	0.1	mg/kg	80	370	**19.9**	**28.6**
Cobalt	0.1	mg/kg	-	-	**6.2**	**15.9**
Copper	0.1	mg/kg	65	270	**26.9**	**18.9**
Iron	50	mg/kg	-	-	**198000**	**126000**
Lead	0.1	mg/kg	50	220	**12.4**	**13.7**
Manganese	0.1	mg/kg	-	-	**1550**	**1620**
Mercury	0.1	mg/kg	0.15	1	<0.1	<0.1
Molybdenum	0.1	mg/kg	-	-	**0.6**	**1**
Nickel	0.1	mg/kg	21	52	**15.6**	**10.2**
Selenium	1	mg/kg	-	-	<1	<1
Silver	0.1	mg/kg	1	3.7	**2.7**	**2.4**
Strontium	0.1	mg/kg	-	-	**7.7**	**6.3**
Thallium	0.1	mg/kg	-	-	**0.2**	**0.4**
Vanadium	1	mg/kg	-	-	**12**	**17**
Zinc	0.1	mg/kg	200	410	**114**	**72.7**
Bismuth	0.1	mg/kg	-	-	**0.1**	**0.1**
Thorium	0.1	mg/kg	-	-	**1.7**	**1.8**
Tungsten	0.1	mg/kg	-	-	**0.3**	**0.3**
Yttrium	0.1	mg/kg	-	-	**3**	**1.9**
Major Ions						
Calcium	10	mg/kg	-	-	**60**	**20**
Chloride	10	mg/kg	-	-	**700**	**270**
Magnesium	10	mg/kg	-	-	**20**	<10
Potassium	10	mg/kg	-	-	**30**	**20**
Sodium	10	mg/kg	-	-	**480**	**220**
Sulfur as S	10	mg/kg	-	-	**50**	**30**
Sulfate as SO4 2-	10	mg/kg	-	-	**160**	**80**
Acid Neutralising Capacity						
ANC as CaCO3	0.1	% caco3	-	-	**4.3**	**0.2**
ANC as H2SO4	0.5	kg h2so4 e	-	-	**41.9**	**2.1**
Fizz Rating		fizz unit	-	-	**2**	**1**
Sulfur						
Sulfur - Total as S (LECO)	0.01	%	-	-	**0.04**	**0.03**

Legend:

Exceeds the WA DEC, 2010, ISQG-Low (Trigger value)

Exceeds the WA DEC, 2010, ISQG-High (Trigger Value)

- Not analysed / not calculated

Table 4
Leachate Analytical Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

Location	Mirrin Mirrin	Robertson Range
Sample ID	MMPT01	RRPT01
Date Sampled	24/06/2011	24/06/2011
Sample Type	Primary sample	Primary sample

Analyte	**LOR**	**Units**	**ANZECC trigeer level**		
Physico-Chemical Parameters					
pH	0.01	ph unit	6.0 - 7.5	**7.22**	**7.34**
Total Dissolved Solids	5	mg/L	20 - 250	**111**	**64**
Electrical Conductivity @ 25°C	1	µs/cm	20-250	**196**	**115**
Metals (Leachable)					
Bismuth	0.001	mg/L	-	<0.001	<0.001
Iron	0.05	mg/L	0.3**	<0.05	**1.39**
Lithium	0.001	mg/L	-	**0.002**	**0.003**
Strontium	0.001	mg/L	-	**0.053**	**0.017**
Thallium	0.001	mg/L	-	<0.001	<0.001
Thorium	0.001	mg/L	-	<0.001	<0.001
Uranium	0.001	mg/L	-	<0.001	<0.001
Yttrium	0.001	mg/L	-	<0.001	<0.001
Arsenic	0.001	mg/L	0.024	**0.003**	<0.001
Antimony	0.001	mg/L	-	<0.001	<0.001
Beryllium	0.001	mg/L	-	<0.001	<0.001
Cadmium	0.0001	mg/L	0.0002	**0.0005**	<0.0001
Chromium	0.001	mg/L	-	<0.001	**0.001**
Cobalt	0.001	mg/L	-	<0.001	<0.001
Copper	0.001	mg/L	0.0014	**0.003**	**0.002**
Lead	0.001	mg/L	0.0034	<0.001	<0.001
Mercury	0.0001	mg/L	-	<0.0001	<0.0001
Molybdenum	0.001	mg/L	-	**0.016**	**0.032**
Nickel	0.001	mg/L	-	<0.001	<0.001
Silver	0.001	mg/L	0.0005	<0.001*	<0.001*
Vanadium	0.01	mg/L	-	<0.01	<0.01
Zinc	0.005	mg/L	0.008	**0.096**	**0.085**
Aluminium	0.01	mg/L	0.055	**0.04**	**0.23**
Barium	0.001	mg/L	-	**0.186**	**0.592**
Boron	0.05	mg/L	-	**0.1**	**0.25**
Manganese	0.001	mg/L	1.9	**0.003**	**0.013**
Tungsten	0.001	mg/L	-	<0.001	**0.002**
Selenium	0.01	mg/L	0.011	<0.01	<0.01
Major Ions					
Calcium	1	mg/L	-	**5**	**3**
Chloride	1	mg/L	250	**32**	**14**
Magnesium	1	mg/L	-	**1**	<1
Potassium	1	mg/L	-	**1**	<1
Sodium	1	mg/L	180	**27**	**18**
Total Anions	0.01	meq/l	-	**1.31**	**0.78**
Total Cations	0.01	meq/l	-	**1.53**	**0.93**
Sulfate as SO4 - Turbidimetric	1	mg/L	250	**11**	**5**
Sulfur as S	1	mg/L	-	**3**	**2**
Alkalinity					
Hydroxide Alkalinity as CaCO3	1	mg/L	-	<1	<1
Carbonate Alkalinity as CaCO3	1	mg/L	-	<1	<1
Bicarbonate Alkalinity as CaCO3	1	mg/L	-	**9**	**14**
Total Alkalinity as CaCO3	1	mg/L	-	**9**	**14**

Legend:

Exceeds the ANZECC trigger level for Upland Rivers in Tropical Australia (includes North-West WA) 95% Protection level

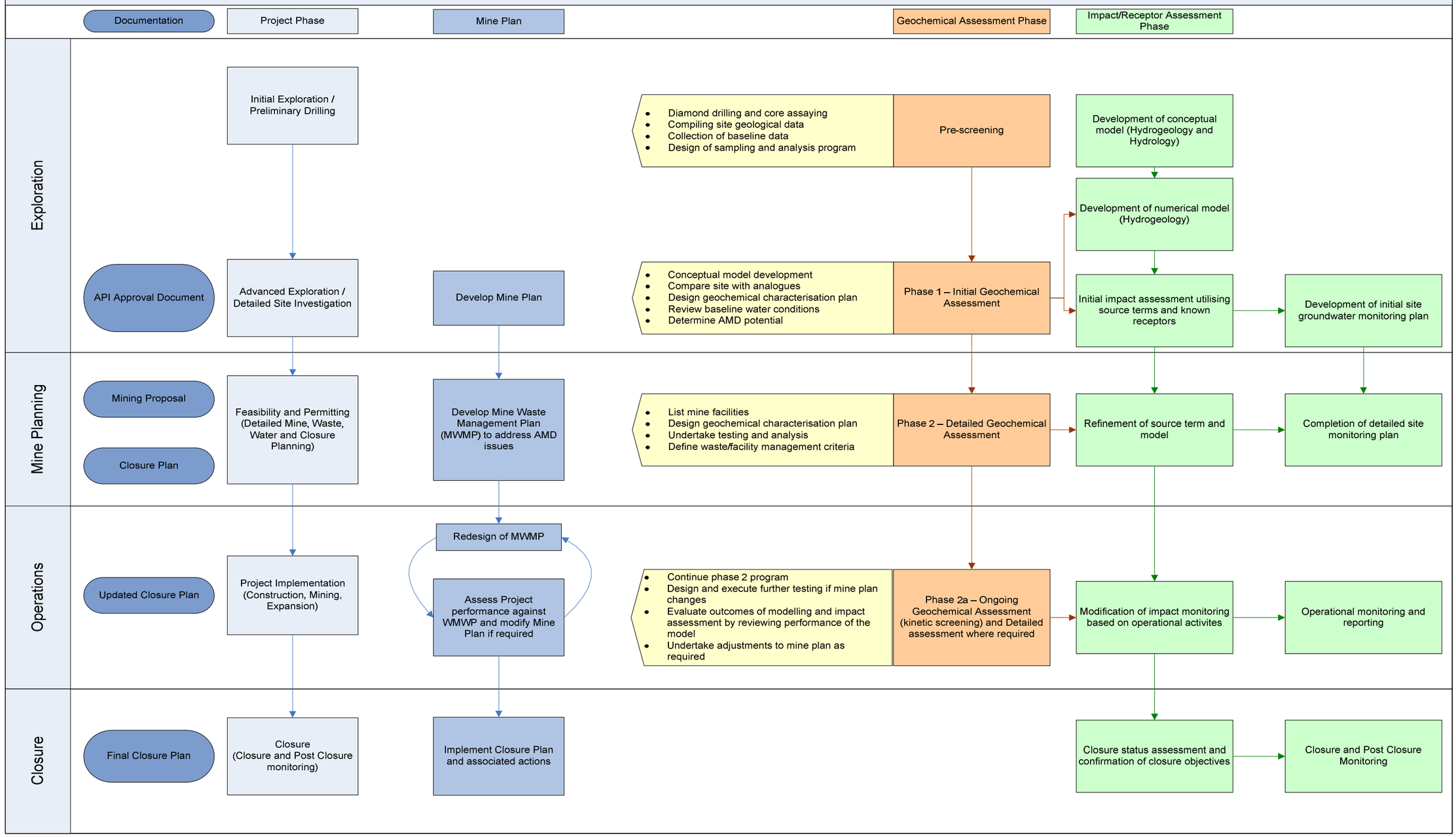
- Not analysed / not calculated

* LOR Exceeds Guideline Trigger Value

** Australian Drinking Water Guidelines - aesthetic value adopted

Figures

Geochemical Assessment – Life of Mining Plan



Notes:
AMD = Acid metalliferous drainge
MWPW = Mine Waste Management Plan

FerrAus Limited

Geochemical Assessment of Pilot Trial Tailings

Life of Mine Plan

URS

FerrAus Pilbara Project

File No: Figure 1.vsd Drawn: TMH Approved: TMH Date: 21-07-2011

Figure: **1** Rev: **A** A3

Appendix A
Laboratory Reports

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney:** 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane:** 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth:** 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston:** 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT: URS AUSTRALIA	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: LEVEL 4, 226 ADELAIDE TERRACE, PERTH WA 6000		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes / No / N/A
PROJECT: 42907769 PROJECT NO.:	ALS QUOTE NO.: EP/361/11	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes / No / N/A
ORDER NUMBER: PER-11-7070E1 PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 23.7 °C
PROJECT MANAGER: Tracy Hassell	CONTACT PH: 9326 0100	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Client	SAMPLER MOBILE:	RELINQUISHED BY:	RECEIVED BY: Josh Rees
COC Emailed to ALS? (YES / NO)	EDD FORMAT (or default):	DATE/TIME:	DATE/TIME: 24/6/11 14:58
Email Reports to (will default to PM if no other addresses are listed): Elena_Chin@urscorp.com & tracey_hassell@urscorp.com		RELINQUISHED BY:	RECEIVED BY:
Email Invoice to (will default to PM if no other addresses are listed):		DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please hold the un-use materials and send back to us when analysis is done. The leachate is to be generated by ASLP phase.

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	Tailings Analysis	Leachate Analysis	XRF Analysis						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	MMPT01	24th June 2011	S		1	x	x	x						Combine Mirrin Mirrin samples with the ratio: 57%High grade and 43%Medium grade.
2	RRPT01	24th June 2011	S		1	x	x	x						Combine Robertson Range samples with the ratio: 29%High grade and 71%Medium grade
3	MMHigh	↓	↓											
4	MMMedium													
5	RRHigh													
6	RRMedium													
				TOTAL										

Environmental Division Perth
Work Order
EP1104006
Telephone : +61-8-9209 7655

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Linda Willis

From: Josh Rees
Sent: Friday, 24 June 2011 2:24 PM
To: Samples Perth
Cc: Lauren Ockwell
Subject: FW: Example COC Form
Attachments: 42907769 COC.pdf

Importance: High

Follow Up Flag: Follow up
Flag Status: Flagged

Hi SR,

Please see attached and below for specific instructions on some incoming URS samples.

It might be best to pre-log these as these may be fast TAT samples.

Can someone please get on this?

Thanks,

How was your customer experience? Please send us your feedback (Click the link)

Joshua Rees
Client Services Officer - Perth

ALS Environmental Division

Address
10 Hod Way, Malaga, WA, 6090

PHONE +61 8 9209 7655
DIRECT +61 8 9209 7617
FAX +61 8 9209 7600

www.alsglobal.com

From: Elena_Chin@URSCorp.com [mailto:Elena_Chin@URSCorp.com]
Sent: Friday, 24 June 2011 12:47 PM
To: Josh Rees
Cc: Lauren Ockwell; Tracey_Hassell@URSCorp.com
Subject: Re: Example COC Form

Hi Josh,

We have sorted out the problem as I discussed with you before about the combination of samples.

I will send 4 samples today into the lab, 2 samples from Mirrin Mirrin (both high and medium grade) and 2 samples from Robertson Range (both high and medium grade). Please combine the high and medium grade samples from each site according the the ratio mentioned on the COC. And please label the combined sample from Mirrin Mirrin as MMPT01 and combined sample from Robertson Range as RRPT01. I have attached the COC for your reference.

Please contact me if you have any questions.

Kind regards,

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EP1104006**

Client	: **URS AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: ELENA CHIN	Contact	: Lauren Ockwell
Address	: LEVEL 4, 226 ADELAIDE TERRACE PERTH WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: elena_chin@urscorp.com	E-mail	: lauren.ockwell@alsenviro.com
Telephone	: +61 08 9326 0100	Telephone	: 08 9209 7606
Facsimile	: +61 08 9326 0296	Facsimile	: 08 9209 7600
Project	: 42907769	Page	: 1 of 3
Order number	: PER-11-7070E1		
C-O-C number	: ----	Quote number	: EP2011URSWA0322 (EP/361/11)
Site	: ----		
Sampler	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 27-JUN-2011	Issue Date	: 27-JUN-2011 15:24
Client Requested Due Date	: 05-JUL-2011	Scheduled Reporting Date	: **05-JUL-2011**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 23.7
No. of coolers/boxes	: 1 medium foam esky	No. of samples received	: 6
Security Seal	: Intact.	No. of samples analysed	: 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- **Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.**
- **Please see attached Spreadsheet "Sample Weights" for weights used in Composites.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of Work Order.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
EG035W : Water Leachable Mercury by FIMS		
MMPT01	- Soil Glass Jar - Unpreserved	- Clear Plastic Bottle - Nitric Acid; Unfiltered
RRPT01	- Soil Glass Jar - Unpreserved	- Clear Plastic Bottle - Nitric Acid; Unfiltered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL - No analysis requested	SOIL - Balance Suite - Balance Suite with DA Chloride	SOIL - EA005P - pH (PC)	SOIL - EA010 - Conductivity	SOIL - EA013 - Acid Neutralising Capacity (ANC)	SOIL - EA015H - Total Dissolved Solids - High Level	SOIL - ED040F - Dissolved Major Anions	SOIL - ED040S - Soluble Major Anions
EP1104006-001	24-JUN-2011 14:58	MMPT01		✓	✓	✓	✓	✓	✓	✓
EP1104006-002	24-JUN-2011 14:58	RRPT01		✓	✓	✓	✓	✓	✓	✓
EP1104006-003	24-JUN-2011 14:58	MM High	✓							
EP1104006-004	24-JUN-2011 14:58	MM Medium	✓							
EP1104006-005	24-JUN-2011 14:58	RR High	✓							
EP1104006-006	24-JUN-2011 14:58	RR Medium	✓							

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - ED042T - Sulfur - Total as S (LECO)	SOIL - ED045G (solids) - Chloride Soluble by Discrete Analyser	SOIL - EG005T (solids) - Total Metals by ICP-AES	SOIL - EG020T (solids) - Total Metals by ICP-MS	SOIL - EG020W - Water Leachable Metals by ICPMS	SOIL - EG035T (solids) - Total Mercury by FIMS	SOIL - EG035W - Water Leachable Mercury by FIMS	SOIL - EN60-DI Suite - Deionised Water Leach
EP1104006-001	24-JUN-2011 14:58	MMPT01	✓	✓	✓	✓	✓	✓	✓	✓
EP1104006-002	24-JUN-2011 14:58	RRPT01	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - MIS-SOL (Subcontracted) Miscellaneous Subcontracted Analysis (Solid)	SOIL - NT-1S Major Cations (Ca, Mg, Na, K)
EP1104006-001	24-JUN-2011 14:58	MMPT01	✓	✓
EP1104006-002	24-JUN-2011 14:58	RRPT01	✓	✓

Requested Deliverables

ELENA CHIN

- *AU Certificate of Analysis - NATA	Email	elena_chin@urscorp.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	elena_chin@urscorp.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA	Email	elena_chin@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	elena_chin@urscorp.com
- Attachment - Report	Email	elena_chin@urscorp.com
- Chain of Custody (CoC)	Email	elena_chin@urscorp.com
- EDI Format - ENMRG	Email	elena_chin@urscorp.com
- EDI Format - ESDAT	Email	elena_chin@urscorp.com
- EDI Format - MRED	Email	elena_chin@urscorp.com
- EDI Format - XTab	Email	elena_chin@urscorp.com

THE ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	Perth_Accounts@urscorp.com

TRACY HASSELL

- *AU Certificate of Analysis - NATA	Email	tracey_hassell@urscorp.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	tracey_hassell@urscorp.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA	Email	tracey_hassell@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	tracey_hassell@urscorp.com
- Attachment - Report	Email	tracey_hassell@urscorp.com
- Chain of Custody (CoC)	Email	tracey_hassell@urscorp.com
- EDI Format - ENMRG	Email	tracey_hassell@urscorp.com
- EDI Format - ESDAT	Email	tracey_hassell@urscorp.com
- EDI Format - MRED	Email	tracey_hassell@urscorp.com
- EDI Format - XTab	Email	tracey_hassell@urscorp.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP1104006**	Page	: 1 of 6
Client	: **URS AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: ELENA CHIN	Contact	: Lauren Ockwell
Address	: LEVEL 4, 226 ADELAIDE TERRACE PERTH WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: elena_chin@urscorp.com	E-mail	: lauren.ockwell@alsenviro.com
Telephone	: +61 08 9326 0100	Telephone	: 08 9209 7606
Facsimile	: +61 08 9326 0296	Facsimile	: 08 9209 7600
Project	: 42907769	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: PER-11-7070E1		
C-O-C number	: ----	Date Samples Received	: 27-JUN-2011
Sampler	: ----	Issue Date	: 06-JUL-2011
Site	: ----		
		No. of samples received	: 6
Quote number	: EP/361/11	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chas Tucker	Inorganic Chemist	Perth Inorganics
Cicelia Bartels	Metals Instrument Chemist	Perth Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Leanne Cooper	Acid Sulfate Soils Supervisor	Perth ASS

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

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Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Analytical Results

Sub-Matrix: **DI WATER LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: MMPT01 Client sampling date / time: 29-JUN-2011 12:00 EP1104006-001	Client sample ID: RRPT01 Client sampling date / time: 29-JUN-2011 12:00 EP1104006-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.22**	**7.34**	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**196**	**115**	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	**111**	**64**	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**9**	**14**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**9**	**14**	----	----	----
ED040F: Dissolved Major Anions								
^ Sulfur as S	63705-05-5	1	mg/L	**3**	**2**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**11**	**5**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**32**	**14**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**5**	**3**	----	----	----
Magnesium	7439-95-4	1	mg/L	**1**	<1	----	----	----
Sodium	7440-23-5	1	mg/L	**27**	**18**	----	----	----
Potassium	7440-09-7	1	mg/L	**1**	<1	----	----	----
EG020T: Total Metals by ICP-MS								
Tungsten	7440-33-7	0.001	mg/L	<0.001	**0.002**	----	----	----
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	**0.23**	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.003**	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.186**	**0.592**	----	----	----
Bismuth	7440-69-9	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	**0.0005**	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.001**	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.003**	**0.002**	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Lithium	7439-93-2	0.001	mg/L	**0.002**	**0.003**	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.003**	**0.013**	----	----	----

Analytical Results

Sub-Matrix: **DI WATER LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: MMPT01	RRPT01	----	----	----
				Client sampling date / time: 29-JUN-2011 12:00	29-JUN-2011 12:00	----	----	----
				EP1104006-001	EP1104006-002	----	----	----
EG020W: Water Leachable Metals by ICP-MS - Continued								
Molybdenum	7439-98-7	0.001	mg/L	**0.016**	**0.032**	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	----	----	----
Strontium	7440-24-6	0.001	mg/L	**0.053**	**0.017**	----	----	----
Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	----	----	----
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.096**	**0.085**	----	----	----
Boron	7440-42-8	0.05	mg/L	**0.10**	**0.25**	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	**1.39**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**1.31**	**0.78**	----	----	----
^ Total Cations	----	0.01	meq/L	**1.53**	**0.93**	----	----	----

Analytical Results

Sub-Matrix: SOIL			Client sample ID	MMPT01	RRPT01	----	----	----
			Client sampling date / time	24-JUN-2011 14:58	24-JUN-2011 14:58	----	----	----
Compound	CAS Number	LOR	Unit	EP1104006-001	EP1104006-002	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	41.9	2.1	----	----	----
^ ANC as CaCO3	----	0.1	% CaCO3	4.3	0.2	----	----	----
Fizz Rating	----	0	Fizz Unit	2	1	----	----	----
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	1.1	<1.0	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	160	80	----	----	----
^ Sulfur as S	63705-05-5	10	mg/kg	50	30	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.04	0.03	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	700	270	----	----	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	60	20	----	----	----
Magnesium	7439-95-4	10	mg/kg	20	<10	----	----	----
Sodium	7440-23-5	10	mg/kg	480	220	----	----	----
Potassium	7440-09-7	10	mg/kg	30	20	----	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	7280	4400	----	----	----
Boron	7440-42-8	50	mg/kg	<50	<50	----	----	----
Iron	7439-89-6	50	mg/kg	198000	126000	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.1	mg/kg	0.8	1.7	----	----	----
Selenium	7782-49-2	1	mg/kg	<1	<1	----	----	----
Silver	7440-22-4	0.1	mg/kg	2.7	2.4	----	----	----
Barium	7440-39-3	0.1	mg/kg	40.2	94.7	----	----	----
Thallium	7440-28-0	0.1	mg/kg	0.2	0.4	----	----	----
Beryllium	7440-41-7	0.1	mg/kg	0.4	0.3	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	0.1	----	----	----
Bismuth	7440-69-9	0.1	mg/kg	0.1	0.1	----	----	----
Cobalt	7440-48-4	0.1	mg/kg	6.2	15.9	----	----	----
Chromium	7440-47-3	0.1	mg/kg	19.9	28.6	----	----	----
Uranium	7440-61-1	0.1	mg/kg	9.0	1.2	----	----	----
Copper	7440-50-8	0.1	mg/kg	26.9	18.9	----	----	----
Thorium	7440-29-1	0.1	mg/kg	1.7	1.8	----	----	----
Manganese	7439-96-5	0.1	mg/kg	1550	1620	----	----	----

Analytical Results

Sub-Matrix: SOIL				Client sample ID	MMPT01	RRPT01	----	----	----
				Client sampling date / time	24-JUN-2011 14:58	24-JUN-2011 14:58	----	----	----
Compound	CAS Number	LOR	Unit		EP1104006-001	EP1104006-002	----	----	----
EG020T: Total Metals by ICP-MS - Continued									
Strontium	7440-24-6	0.1	mg/kg		**7.7**	**6.3**	----	----	----
Tungsten	7440-33-7	0.1	mg/kg		**0.3**	**0.3**	----	----	----
Molybdenum	7439-98-7	0.1	mg/kg		**0.6**	**1.0**	----	----	----
Nickel	7440-02-0	0.1	mg/kg		**15.6**	**10.2**	----	----	----
Lead	7439-92-1	0.1	mg/kg		**12.4**	**13.7**	----	----	----
Antimony	7440-36-0	0.1	mg/kg		**0.5**	**0.5**	----	----	----
Uranium	7440-61-1	0.1	mg/kg		**9.0**	**1.2**	----	----	----
Zinc	7440-66-6	0.1	mg/kg		**114**	**72.7**	----	----	----
Lithium	7439-93-2	0.1	mg/kg		**4.4**	**1.2**	----	----	----
Vanadium	7440-62-2	1	mg/kg		**12**	**17**	----	----	----
Thorium	7440-29-1	0.1	mg/kg		**1.7**	**1.8**	----	----	----
Yttrium	7440-65-5	0.1	mg/kg		**3.0**	**1.9**	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	----	----	----
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EN60: Bottle Leaching Procedure									
Final pH	----	0.1	pH Unit		<0.1	<0.1	----	----	----

Australian Laboratory Services Pty. Ltd.
32 Shand Street
Stafford
Brisbane QLD 4053
Phone: +61 (7) 3243 7222 Fax: +61 (7) 3243 7218
www.alsglobal.com

Finalized Date: 30-JUN-2011
Account: ALSENV

CERTIFICATE PH11116871

Project: EP1104006

P.O. No.: 295856

This report is for 2 Pulp samples submitted to our lab in Perth, WA, Australia on 27-JUN-2011.

The following have access to data associated with this certificate:

SUB RESULTS		

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
LEV-01	Waste Disposal Levy
LOG-24	Pulp Login - Rcd w/o Barcode

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-XRF12	Whole rock XRF	XRF
OA-GRA05t	Multi-temperature LOI	TGA

To: **ALS ENVIRONMENTAL**
ATTN: SUB RESULTS
10 HOD WAY
MALAGA WA 6090

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:
Wayne Abbott, Operations Manager, Western Australia

Australian Laboratory Services Pty. Ltd.
32 Shand Street
Stafford
Brisbane QLD 4053
Phone: +61 (7) 3243 7222 Fax: +61 (7) 3243 7218
www.alsglobal.com

Project: EP1104006

CERTIFICATE OF ANALYSIS PH11116871

Sample Description	Method	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12
	Analyte	Al2O3	As	BaO	CaO	Cl	Co	Cr2O3	Cu	Fe2O3	K2O	MgO	MnO	Mo	Na2O	Ni
	Units	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	LOR	0.01	0.001	0.001	0.01	0.001	0.001	0.001	0.001	0.01	0.001	0.01	0.001	0.001	0.001	0.001
MMPT01		7.52	0.005	<0.001	0.07	0.062	<0.001	<0.001	0.002	72.1	<0.001	0.15	0.231	<0.001	0.082	0.002
RRPT01		7.58	0.006	<0.001	0.10	0.037	<0.001	<0.001	0.003	68.4	0.027	0.12	0.297	<0.001	0.058	0.003

Australian Laboratory Services Pty. Ltd.
32 Shand Street
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Brisbane QLD 4053
Phone: +61 (7) 3243 7222 Fax: +61 (7) 3243 7218
www.alsglobal.com

Project: EP1104006

CERTIFICATE OF ANALYSIS PH11116871

Sample Description	Method / Analyte / Units / LOR	ME-XRF12 P2O5 % 0.001	ME-XRF12 Pb % 0.001	ME-XRF12 SO3 % 0.001	ME-XRF12 SiO2 % 0.01	ME-XRF12 TiO2 % 0.01	ME-XRF12 V2O5 % 0.001	ME-XRF12 Zn % 0.001	OA-GRA05t LOI 1000 % 0.01
MMPT01		0.233	<0.001	0.043	9.42	0.21	<0.001	0.024	9.87
RRPT01		0.170	<0.001	0.076	14.25	0.33	<0.001	0.021	8.48

QUALITY CONTROL REPORT

Work Order	: **EP1104006**	Page	: 1 of 11
Client	: **URS AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: ELENA CHIN	Contact	: Lauren Ockwell
Address	: LEVEL 4, 226 ADELAIDE TERRACE PERTH WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: elena_chin@urscorp.com	E-mail	: lauren.ockwell@alsenviro.com
Telephone	: +61 08 9326 0100	Telephone	: 08 9209 7606
Facsimile	: +61 08 9326 0296	Facsimile	: 08 9209 7600
Project	: 42907769	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 27-JUN-2011
Sampler	: ----	Issue Date	: 06-JUL-2011
Order number	: PER-11-7070E1		
		No. of samples received	: 6
Quote number	: EP/361/11	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chas Tucker	Inorganic Chemist	Perth Inorganics
Cicelia Bartels	Metals Instrument Chemist	Perth Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Leanne Cooper	Acid Sulfate Soils Supervisor	Perth ASS

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Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA013: Acid Neutralising Capacity (QC Lot: 1847759)									
EP1104006-001	MMPT01	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equ	41.9	41.9	0.0	0% - 20%
EA055: Moisture Content (QC Lot: 1858768)									
EP1104006-001	MMPT01	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	1.1	1.1	0.0	No Limit
ED040S: Soluble Major Anions (QC Lot: 1858623)									
EP1104006-001	MMPT01	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	160	160	0.0	0% - 50%
ED042T: Total Sulfur by LECO (QC Lot: 1856956)									
EP1104006-001	MMPT01	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.04	0.04	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 1858625)									
EP1104006-001	MMPT01	ED045G: Chloride	16887-00-6	10	mg/kg	700	690	1.4	0% - 20%
ED093S: Soluble Major Cations (QC Lot: 1858624)									
EP1104006-001	MMPT01	ED093S: Calcium	7440-70-2	10	mg/kg	60	60	0.0	No Limit
		ED093S: Magnesium	7439-95-4	10	mg/kg	20	20	0.0	No Limit
		ED093S: Sodium	7440-23-5	10	mg/kg	480	470	0.0	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	30	30	0.0	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1858539)									
EP1104006-001	MMPT01	EG005T: Aluminium	7429-90-5	50	mg/kg	7280	7220	0.8	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	198000	203000	2.5	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1858541)									
EP1104006-001	MMPT01	EG020X-T: Arsenic	7440-38-2	0.1	mg/kg	0.8	0.8	0.0	No Limit
		EG020X-T: Barium	7440-39-3	0.1	mg/kg	40.2	35.6	12.2	0% - 20%
		EG020X-T: Beryllium	7440-41-7	0.1	mg/kg	0.4	0.4	0.0	No Limit
		EG020X-T: Cobalt	7440-48-4	0.1	mg/kg	6.2	5.8	5.6	0% - 20%
		EG020X-T: Chromium	7440-47-3	0.1	mg/kg	19.9	18.7	6.3	0% - 20%
		EG020X-T: Copper	7440-50-8	0.1	mg/kg	26.9	26.0	3.4	0% - 20%
		EG020X-T: Manganese	7439-96-5	0.1	mg/kg	1550	1520	1.9	0% - 20%
		EG020X-T: Molybdenum	7439-98-7	0.1	mg/kg	0.6	0.6	0.0	No Limit
		EG020X-T: Nickel	7440-02-0	0.1	mg/kg	15.6	15.2	2.5	0% - 20%
		EG020X-T: Lead	7439-92-1	0.1	mg/kg	12.4	11.7	5.8	0% - 20%
		EG020X-T: Antimony	7440-36-0	0.1	mg/kg	0.5	0.5	0.0	No Limit
		EG020X-T: Uranium	7440-61-1	0.1	mg/kg	9.0	8.8	2.3	0% - 20%
		EG020X-T: Zinc	7440-66-6	0.1	mg/kg	114	113	1.0	0% - 20%
		EG020X-T: Lithium	7439-93-2	0.1	mg/kg	4.4	4.7	6.9	0% - 20%
		EG020X-T: Vanadium	7440-62-2	1	mg/kg	12	12	0.0	0% - 50%

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1858542)									
EP1104006-001	MMPT01	EG020Y-T: Thallium	7440-28-0	0.1	mg/kg	0.2	0.2	0.0	No Limit
		EG020Y-T: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020Y-T: Bismuth	7440-69-9	0.1	mg/kg	0.1	0.1	0.0	No Limit
		EG020Y-T: Uranium	7440-61-1	0.1	mg/kg	9.0	8.8	2.3	0% - 20%
		EG020Y-T: Thorium	7440-29-1	0.1	mg/kg	1.7	1.7	0.0	0% - 50%
		EG020Y-T: Strontium	7440-24-6	0.1	mg/kg	7.7	7.2	5.8	0% - 20%
		EG020Y-T: Selenium	7782-49-2	1	mg/kg	<1	<1	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1858544)									
EP1104006-001	MMPT01	EG020Z-T: Silver	7440-22-4	0.1	mg/kg	2.7	2.6	0.0	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1858546)									
EP1104006-001	MMPT01	EG020R-T: Thorium	7440-29-1	0.1	mg/kg	1.7	1.7	0.0	0% - 50%
		EG020R-T: Yttrium	7440-65-5	0.1	mg/kg	3.0	2.9	0.0	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1858540)									
EP1104006-001	MMPT01	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 1854373)									
EP1104127-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.98	7.89	1.1	0% - 20%
EP1104118-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.75	7.77	0.2	0% - 20%
EA010: Conductivity (QC Lot: 1854649)									
EP1104006-001	MMPT01	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	196	196	0.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 1854642)									
EP1104006-001	MMPT01	EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	111	115	3.5	0% - 20%
EP1104080-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	734	715	2.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1854372)									
EP1103773-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	21	23	5.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	21	23	8.4	0% - 20%
EP1104127-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	271	268	1.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	271	268	1.2	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 1854635)									
EP1103773-004	Anonymous	ED040F: Sulfur as S	63705-05-5	1	mg/L	<1	<1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1854638)									
EP1103773-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 1854637)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride Discrete analyser (QC Lot: 1854637) - continued									
EP1103773-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	4	0.0	No Limit
EP1104069-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	331	331	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1854636)									
EP1103773-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	5	6	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	3	4	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EP1104069-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	6	6	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	20	20	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	155	151	2.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1855155)									
EP1104006-001	MMPT01	EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 1855152)									
EP1104006-001	MMPT01	EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	0.0005	0.0001	119	No Limit
		EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Arsenic	7440-38-2	0.001	mg/L	0.003	0.004	0.0	No Limit
		EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Barium	7440-39-3	0.001	mg/L	0.186	0.192	3.4	0% - 20%
		EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.0	No Limit
		EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Lithium	7439-93-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Manganese	7439-96-5	0.001	mg/L	0.003	0.002	0.0	No Limit
		EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	0.016	0.016	0.0	0% - 50%
		EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Zinc	7440-66-6	0.005	mg/L	0.096	0.103	6.7	0% - 20%
		EG020A-W: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.0	No Limit
		EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Boron	7440-42-8	0.05	mg/L	0.10	0.11	0.0	No Limit
		EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 1855153)									
EP1104006-001	MMPT01	EG020B-W: Bismuth	7440-69-9	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Strontium	7440-24-6	0.001	mg/L	0.053	0.054	2.2	0% - 20%
		EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 1855153) - continued									
EP1104006-001	MMPT01	EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 1855154)									
EP1104006-001	MMPT01	EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG035W: Water Leachable Mercury by FIMS (QC Lot: 1855908)									
EP1104006-001	MMPT01	EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA013: Acid Neutralising Capacity (QCLot: 1847759)								
EA013: ANC as H2SO4	----	0.5	kg H2SO4 equ	----	49 kg H2SO4 equ	100	80.4	118
		0.5	kg H2SO4 equiv./t	<0.5	----	----	----	----
EA013: ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
ED040S: Soluble Major Anions (QCLot: 1858623)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	250 mg/kg	102	86	116
ED042T: Total Sulfur by LECO (QCLot: 1856956)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	100 %	100	70	130
ED045G: Chloride Discrete analyser (QCLot: 1858625)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	5000 mg/kg	94.5	82	126
ED093S: Soluble Major Cations (QCLot: 1858624)								
ED093S: Calcium	7440-70-2	10	mg/kg	<10	----	----	----	----
ED093S: Magnesium	7439-95-4	10	mg/kg	<10	----	----	----	----
ED093S: Sodium	7440-23-5	10	mg/kg	<10	----	----	----	----
ED093S: Potassium	7440-09-7	10	mg/kg	<10	----	----	----	----
EG005T: Total Metals by ICP-AES (QCLot: 1858539)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Iron	7439-89-6	50	mg/kg	<50	14257 mg/kg	# 137	79	130
EG020T: Total Metals by ICP-MS (QCLot: 1858541)								
EG020X-T: Arsenic	7440-38-2	0.1	mg/kg	<0.1	13.11 mg/kg	113	74	130
EG020X-T: Barium	7440-39-3	0.1	mg/kg	<0.1	137.41 mg/kg	102	78	130
EG020X-T: Beryllium	7440-41-7	0.1	mg/kg	<0.1	5.51 mg/kg	106	70	130
EG020X-T: Cobalt	7440-48-4	0.1	mg/kg	<0.1	24.49 mg/kg	97.7	75	130
EG020X-T: Chromium	7440-47-3	0.1	mg/kg	<0.1	60.93 mg/kg	101	70	130
EG020X-T: Copper	7440-50-8	0.1	mg/kg	<0.1	54.68 mg/kg	97.1	70	123
EG020X-T: Manganese	7439-96-5	0.1	mg/kg	<0.1	135.60 mg/kg	98.6	70	130
EG020X-T: Molybdenum	7439-98-7	0.1	mg/kg	<0.1	6.86 mg/kg	126	70	130
EG020X-T: Nickel	7440-02-0	0.1	mg/kg	<0.1	55.23 mg/kg	99.0	86	130
EG020X-T: Lead	7439-92-1	0.1	mg/kg	<0.1	54.76 mg/kg	102	79	124
EG020X-T: Antimony	7440-36-0	0.1	mg/kg	<0.1	----	----	----	----
EG020X-T: Uranium	7440-61-1	0.1	mg/kg	<0.1	----	----	----	----
EG020X-T: Zinc	7440-66-6	0.1	mg/kg	<0.1	103.88 mg/kg	101	85	123
EG020X-T: Lithium	7439-93-2	0.1	mg/kg	<0.1	----	----	----	----
EG020X-T: Vanadium	7440-62-2	1	mg/kg	<1	34.03 mg/kg	105	70	130

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 1858542)								
EG020Y-T: Selenium	7782-49-2	1	mg/kg	<1	----	----	----	----
EG020Y-T: Thallium	7440-28-0	0.1	mg/kg	<0.1	----	----	----	----
EG020Y-T: Cadmium	7440-43-9	0.1	mg/kg	<0.1	2.76 mg/kg	99.0	86	123
EG020Y-T: Bismuth	7440-69-9	0.1	mg/kg	<0.1	----	----	----	----
EG020Y-T: Uranium	7440-61-1	0.1	mg/kg	<0.1	----	----	----	----
EG020Y-T: Thorium	7440-29-1	0.1	mg/kg	<0.1	----	----	----	----
EG020Y-T: Strontium	7440-24-6	0.1	mg/kg	<0.1	60.42 mg/kg	105	75	130
EG020T: Total Metals by ICP-MS (QCLot: 1858544)								
EG020Z-T: Silver	7440-22-4	0.1	mg/kg	<0.1	5.60 mg/kg	88.4	79	130
EG020T: Total Metals by ICP-MS (QCLot: 1858545)								
EG020V-T: Tungsten	7440-33-7	0.1	mg/kg	<0.1	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 1858546)								
EG020R-T: Thorium	7440-29-1	0.1	mg/kg	<0.1	----	----	----	----
EG020R-T: Yttrium	7440-65-5	0.1	mg/kg	<0.1	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1858540)								
EG035T: Mercury	7439-97-6	0.10	mg/kg	<0.1	1.34 mg/kg	86.0	73	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 1854373)								
EA005-P: pH Value	----	0.01	pH Unit	----	7.00 pH Unit	100	70	130
EA010: Conductivity (QCLot: 1854649)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	70	130
EA015: Total Dissolved Solids (QCLot: 1854642)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	<5	2000 mg/L	108	79.8	116
ED037P: Alkalinity by PC Titrator (QCLot: 1854372)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	200 mg/L	96.9	79	113
ED040F: Dissolved Major Anions (QCLot: 1854635)								
ED040F: Sulfur as S	63705-05-5	1	mg/L	<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1854638)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.9	85	130
ED045G: Chloride Discrete analyser (QCLot: 1854637)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	94.9	78	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 1854636)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.9	88	112
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.4	88	112
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.0	85	111
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.9	84	114
EG020T: Total Metals by ICP-MS (QCLot: 1855155)								
EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855152)								
EG020A-W: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.500 mg/L	98.5	80	124
EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	0.100 mg/L	99.5	93	126
EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	91.6	80	124
EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	107	90	130
EG020A-W: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	91.8	90	130
EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	100	70	128
EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	100	87	117
EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	98.8	78	121
EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	102	86	116
EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	----	----	----	----
EG020A-W: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	102	72	122
EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.100 mg/L	103	91	130
EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	101	83	126
EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	0.100 mg/L	89.0	75	121
EG020A-W: Thallium	7440-28-0	0.001	mg/L	<0.001	0.100 mg/L	99.8	89	122
EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	92.6	84	115
EG020A-W: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	95.0	75	129
EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	0.500 mg/L	108	75	130
EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	0.500 mg/L	99.0	89	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855153)								
EG020B-W: Bismuth	7440-69-9	0.001	mg/L	<0.001	0.100 mg/L	108	92	116
EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	0.100 mg/L	96.8	70	130
EG020B-W: Strontium	7440-24-6	0.001	mg/L	<0.001	0.500 mg/L	101	87	115
EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855154)								
EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	----	----	----	----
EG035W: Water Leachable Mercury by FIMS (QCLot: 1855908)								
EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	105	84	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 1858625)							
EP1104006-002	RRPT01	ED045G: Chloride	16887-00-6	1250 mg/kg	113	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1858541)							
EP1104006-002	RRPT01	EG020X-T: Arsenic	7440-38-2	10 mg/kg	103	70	130
		EG020X-T: Barium	7440-39-3	50 mg/kg	111	70	130
		EG020X-T: Beryllium	7440-41-7	4 mg/kg	82.3	70	130
		EG020X-T: Cobalt	7440-48-4	50 mg/kg	83.4	70	130
		EG020X-T: Chromium	7440-47-3	50 mg/kg	78.8	70	130
		EG020X-T: Copper	7440-50-8	50 mg/kg	75.2	70	130
		EG020X-T: Manganese	7439-96-5	50 mg/kg	# Not Determined	70	130
		EG020X-T: Nickel	7440-02-0	50 mg/kg	75.0	70	130
		EG020X-T: Lead	7439-92-1	50 mg/kg	81.8	70	130
		EG020X-T: Zinc	7440-66-6	50 mg/kg	80.4	70	130
		EG020X-T: Vanadium	7440-62-2	50 mg/kg	74.0	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1858542)							
EP1104006-002	RRPT01	EG020Y-T: Cadmium	7440-43-9	25 mg/kg	89.4	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1858540)							
EP1104006-002	RRPT01	EG035T: Mercury	7439-97-6	5.0 mg/kg	78.9	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1854638)							
EP1103773-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	116	70	130
ED045G: Chloride Discrete analyser (QCLot: 1854637)							
EP1103773-004	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	112	70	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855152)							
EP1104006-002	RRPT01	EG020A-W: Arsenic	7440-38-2	1.000 mg/L	86.0	70	130
		EG020A-W: Beryllium	7440-41-7	0.100 mg/L	83.1	70	130
		EG020A-W: Barium	7440-39-3	1.000 mg/L	85.4	70	130
		EG020A-W: Cadmium	7440-43-9	0.500 mg/L	80.6	70	130
		EG020A-W: Chromium	7440-47-3	1.000 mg/L	84.6	70	130
		EG020A-W: Cobalt	7440-48-4	1.000 mg/L	86.2	70	130
		EG020A-W: Copper	7440-50-8	1.000 mg/L	85.1	70	130
		EG020A-W: Lead	7439-92-1	1.000 mg/L	87.3	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Spike Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855152) - continued							
EP1104006-002	RRPT01	EG020A-W: Manganese	7439-96-5	1.000 mg/L	83.3	70	130
		EG020A-W: Nickel	7440-02-0	1.000 mg/L	87.4	70	130
		EG020A-W: Vanadium	7440-62-2	1.000 mg/L	82.6	70	130
		EG020A-W: Zinc	7440-66-6	1.000 mg/L	82.1	70	130
EG035W: Water Leachable Mercury by FIMS (QCLot: 1855908)							
EP1104006-002	RRPT01	EG035W: Mercury	7439-97-6	0.010 mg/L	118	70	130

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Finalized Date: 30-JUN-2011
Account: ALSENV

QC CERTIFICATE PH11116871

Project: EP1104006
P.O. No.: 295856
This report is for 2 Pulp samples submitted to our lab in Perth, WA, Australia on 27-JUN-2011.
The following have access to data associated with this certificate:

SUB RESULTS		

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
LEV-01	Waste Disposal Levy
LOG-24	Pulp Login - Rcd w/o Barcode

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-XRF12	Whole rock XRF	XRF
OA-GRA05t	Multi-temperature LOI	TGA

To: **ALS ENVIRONMENTAL**
ATTN: SUB RESULTS
10 HOD WAY
MALAGA WA 6090

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature: W. Abbott
Wayne Abbott, Operations Manager, Western Australia

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Project: EP1104006

QC CERTIFICATE OF ANALYSIS PH11116871

Sample Description	Method	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12
	Analyte	Al2O3	As	BaO	CaO	Cl	Co	Cr2O3	Cu	Fe2O3	K2O	MgO	MnO	Mo	Na2O	Ni
	Units	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	LOR	0.01	0.001	0.001	0.01	0.001	0.001	0.001	0.001	0.01	0.001	0.01	0.001	0.001	0.001	0.001
STANDARDS																
JS1																
JS1																
Target Range - Lower Bound																
Upper Bound																
SARM-39		4.33	<0.001	0.194	9.80	0.052	0.008	0.218	0.006	9.34	1.075	25.5	0.171	<0.001	0.602	0.102
Target Range - Lower Bound		4.07	<0.001	0.180	9.20	0.032	0.007	0.180	0.006	8.82	0.987	24.9	0.161	<0.001	0.588	0.093
Upper Bound		4.51	0.003	0.201	10.20	0.038	0.009	0.201	0.008	9.76	1.095	27.5	0.180	0.002	0.652	0.105
SARM-45		26.4	0.002	0.095	0.77	0.007	0.005	0.036	0.002	12.40	3.12	3.48	0.096	0.003	0.757	0.008
Target Range - Lower Bound		24.9	0.002	0.089	0.73	0.006	0.003	0.034	<0.001	11.95	3.02	3.21	0.094	<0.001	0.797	0.007
Upper Bound		27.5	0.004	0.101	0.83	0.008	0.005	0.040	0.002	13.25	3.34	3.57	0.106	0.002	0.883	0.009
BLANKS																
BLANK		<0.01	<0.001	<0.001	<0.01	<0.001	<0.001	0.003	<0.001	<0.01	<0.001	0.02	<0.001	<0.001	0.141	<0.001
Target Range - Lower Bound		<0.01	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001
Upper Bound		0.02	0.002	0.002	0.02	0.002	0.002	0.002	0.002	0.02	0.002	0.02	0.002	0.002	0.002	0.002
DUPLICATES																
MMPT01																
DUP																
Target Range - Lower Bound																
Upper Bound																
RRPT01		7.58	0.006	<0.001	0.10	0.037	<0.001	<0.001	0.003	68.4	0.027	0.12	0.297	<0.001	0.058	0.003
DUP		7.75	0.006	<0.001	0.10	0.032	<0.001	<0.001	<0.001	68.4	0.032	0.10	0.295	<0.001	0.062	<0.001
Target Range - Lower Bound		7.46	0.005	<0.001	0.09	0.033	<0.001	<0.001	<0.001	66.7	0.028	0.10	0.288	<0.001	0.058	<0.001
Upper Bound		7.87	0.007	0.002	0.11	0.036	0.002	0.002	0.003	70.1	0.031	0.12	0.304	0.002	0.063	0.003

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Project: EP1104006

QC CERTIFICATE OF ANALYSIS PH11116871

Sample Description	Method	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	OA-GRA05t
	Analyte	P2O5	Pb	SO3	SiO2	TiO2	V2O5	Zn	LOI 1000
	Units	%	%	%	%	%	%	%	%
	LOR	0.001	0.001	0.001	0.01	0.01	0.001	0.001	0.01
STANDARDS									
JS1									7.80
JS1									7.84
Target Range - Lower Bound									6.95
Upper Bound									8.51
SARM-39		1.440	<0.001	0.789	34.2	1.66	0.020	0.007	
Target Range - Lower Bound		1.385	0.002	0.719	31.7	1.49	0.017	0.006	
Upper Bound		1.535	0.004	0.797	35.1	1.67	0.021	0.008	
SARM-45		0.077	0.003	0.116	49.5	1.85	0.048	0.009	
Target Range - Lower Bound		0.075	0.002	0.118	47.1	1.72	0.045	0.006	
Upper Bound		0.085	0.004	0.132	52.1	1.92	0.051	0.008	
BLANKS									
BLANK		<0.001	<0.001	<0.001	97.1	<0.01	<0.001	<0.001	
Target Range - Lower Bound		<0.001	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001	
Upper Bound		0.002	0.002	0.002	0.02	0.02	0.002	0.002	
DUPLICATES									
MMPT01									9.87
DUP									9.90
Target Range - Lower Bound									9.38
Upper Bound									10.40
RRPT01		0.170	<0.001	0.076	14.25	0.33	<0.001	0.021	
DUP		0.170	<0.001	0.078	14.10	0.35	<0.001	0.019	
Target Range - Lower Bound		0.165	<0.001	0.074	13.80	0.32	<0.001	0.019	
Upper Bound		0.175	0.002	0.080	14.55	0.36	0.002	0.022	

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EP1104006**	Page	: 1 of 11
Client	: URS AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: ELENA CHIN	Contact	: Lauren Ockwell
Address	: LEVEL 4, 226 ADELAIDE TERRACE PERTH WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: elena_chin@urscorp.com	E-mail	: lauren.ockwell@alsenviro.com
Telephone	: +61 08 9326 0100	Telephone	: 08 9209 7606
Facsimile	: +61 08 9326 0296	Facsimile	: 08 9209 7600
Project	: 42907769	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 27-JUN-2011
Sampler	: ----	Issue Date	: 06-JUL-2011
Order number	: PER-11-7070E1		
		No. of samples received	: 6
Quote number	: EP/361/11	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**---**	29-JUN-2011	----	**01-JUL-2011**	29-JUN-2011	×
EA010: Conductivity								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**----**	----	----	**01-JUL-2011**	27-JUL-2011	✓
EA013: Acid Neutralising Capacity								
Pulp Bag								
MMPT01,	RRPT01	**24-JUN-2011**	**27-JUN-2011**	23-JUN-2012	✓	**04-JUL-2011**	24-DEC-2011	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**----**	----	----	**01-JUL-2011**	06-JUL-2011	✓
EA055: Moisture Content								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**----**	----	----	**05-JUL-2011**	08-JUL-2011	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**---**	13-JUL-2011	----	**01-JUL-2011**	13-JUL-2011	✓
ED040F: Dissolved Major Anions								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**---**	27-JUL-2011	----	**01-JUL-2011**	27-JUL-2011	✓
ED040S : Soluble Sulfate by ICPAES								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	01-JUL-2011	×	**05-JUL-2011**	02-AUG-2011	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**---**	27-JUL-2011	----	**04-JUL-2011**	27-JUL-2011	✓
ED042T: Total Sulfur by LECO								
Pulp Bag								
MMPT01,	RRPT01	**24-JUN-2011**	**04-JUL-2011**	21-DEC-2011	✓	**04-JUL-2011**	21-DEC-2011	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride Discrete analyser								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	---	27-JUL-2011	----	**04-JUL-2011**	27-JUL-2011	✓
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	01-JUL-2011	×	**05-JUL-2011**	02-AUG-2011	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	---	06-JUL-2011	----	**01-JUL-2011**	06-JUL-2011	✓
ED093S: Soluble Major Cations								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	21-DEC-2011	✓	**05-JUL-2011**	21-DEC-2011	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	21-DEC-2011	✓	**05-JUL-2011**	21-DEC-2011	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered								
MMPT01,	RRPT01	**29-JUN-2011**	**04-JUL-2011**	26-DEC-2011	✓	**04-JUL-2011**	26-DEC-2011	✓
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	21-DEC-2011	✓	**05-JUL-2011**	21-DEC-2011	✓
EG020W: Water Leachable Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered								
MMPT01,	RRPT01	**29-JUN-2011**	**04-JUL-2011**	26-DEC-2011	✓	**04-JUL-2011**	26-DEC-2011	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	22-JUL-2011	✓	**05-JUL-2011**	22-JUL-2011	✓
EG035W: Water Leachable Mercury by FIMS								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**----**	----	----	**04-JUL-2011**	22-JUL-2011	✓
EN60: Bottle Leaching Procedure								
LabSplit: Leach for organics and other tests								
MMPT01,	RRPT01	**24-JUN-2011**	---	08-JUL-2011	----	**30-JUN-2011**	08-JUL-2011	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Total Metals by ICP-MS - Suite R	EG020R-T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Acid Neutralising Capacity (ANC)	EA013	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Cations - soluble by ICP-AES	ED093S	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride Soluble By Discrete Analyser	ED045G	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfur - Total as S (LECO)	ED042T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite X	EG020X-T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Y	EG020Y-T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Z	EG020Z-T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Acid Neutralising Capacity (ANC)	EA013	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride Soluble By Discrete Analyser	ED045G	2	2	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfur - Total as S (LECO)	ED042T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite X	EG020X-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Y	EG020Y-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Z	EG020Z-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Total Metals by ICP-MS - Suite R	EG020R-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Acid Neutralising Capacity (ANC)	EA013	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Cations - soluble by ICP-AES	ED093S	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride Soluble By Discrete Analyser	ED045G	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfur - Total as S (LECO)	ED042T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite V	EG020V-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite X	EG020X-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Y	EG020Y-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Z	EG020Z-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride Soluble By Discrete Analyser	ED045G	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Metals by ICP-MS - Suite X	EG020X-T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite Y	EG020Y-T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite Z	EG020Z-T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity	EA010	1	9	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	8	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	16	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.0**	**10.0**	×	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Mercury by FIMS	EG035W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity	EA010	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	16	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Mercury by FIMS	EG035W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity	EA010	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Mercury by FIMS	EG035W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Water Leachable Mercury by FIMS	EG035W	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	SOIL	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity	EA010	SOIL	APHA 21st ed., 2510 B Conductivity is determined by ISE, either manually or automated measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Acid Neutralising Capacity (ANC)	EA013	SOIL	USEPA 600/2-78-054, I. Miller (2000). A fizz test is done to semiquanititatively estimate the likely reactivity. The soil is then reacted with an known excess quanitity of an appropriate acid. Titration determines the acid remaining, and the ANC can be calculated from comparison with a blank titration.
Total Dissolved Solids (High Level)	EA015H	SOIL	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2010 Draft) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Alkalinity by PC Titrator	ED037-P	SOIL	APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Dissolved	ED040F	SOIL	APHA 21st ed., 3120. The 0.45um filtered samples are determined by ICP/AES for Sulfur and/or Silcon content and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Major Anions - Soluble	ED040S	SOIL	In-house. Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	SOIL	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Sulfur - Total as S (LECO)	ED042T	SOIL	In-house. Dried and pulverised sample is combusted in a LECO furnace at 1350C in the presence of strong oxidants / catalysts. The evolved S (as SO2) is measured by infra-red detector
Chloride by Discrete Analyser	ED045G	SOIL	APHA 21st ed., 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	SOIL	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Cations - soluble by ICP-AES	ED093S	SOIL	APHA 21st ed., 3120; USEPA SW 846 - 6010 (ICPAES) Water extracts of the soil are analyzed for major cations by ICPAES. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite R	EG020R-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020) (ICPMS) Metals in solids are determined following an appropriate acid digestion. The ICPMS technique ionizes selected elements. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass / charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (1999) Schedule B(3)
Total Metals by ICP-MS - Suite V	EG020V-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Metals in solids are determined following an appropriate acid digestion. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite X	EG020X-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite Y	EG020Y-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite Z	EG020Z-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Water Leachable Mercury by FIMS	EG035W	SOIL	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the TCLP solution. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and ICPAES	EN055 - PG	SOIL	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by ICPAES. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Miscellaneous Subcontracted Analysis	MIS-SOL	SOIL	Miscellaneous Subcontracted Analysis conducted by Subcontracting Laboratory

Preparation Methods	Method	Matrix	Method Descriptions
Sample Compositing	EN020	SOIL	Equal weights of each original soil are taken, then mixed and homogenised. The combined mixture is labelled as a new sample.
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
Digestion for Total Recoverable Metals in DI Water Leachate	EN25W	SOIL	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Deionised Water Leach	EN60-DIa	SOIL	AS4439.3 Preparation of Leachates
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EG005T: Total Metals by ICP-AES	2190594-003	----	**Iron**	7439-89-6	137 %	79-130%	**Recovery greater than upper control limit**
Matrix Spike (MS) Recoveries							
EG020T: Total Metals by ICP-MS	EP1104006-002	RRPT01	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
MMPT01,	RRPT01	----	----	----	01-JUL-2011	29-JUN-2011	**2**
ED040S : Soluble Sulfate by ICPAES							
Soil Glass Jar - Unpreserved							
MMPT01,	RRPT01	05-JUL-2011	01-JUL-2011	**4**	----	----	----
ED045G: Chloride Discrete analyser							
Soil Glass Jar - Unpreserved							
MMPT01,	RRPT01	05-JUL-2011	01-JUL-2011	**4**	----	----	----

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	1	20	5.0	10.0	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Appendix B
Data Validation

URS DATA VALIDATION SUMMARY REPORT

Site:	FerrAus Tailing, Pilbara	**Validation Conducted by:** (Data Manager)	Elena Chin	**Date:**	8	7 11
Project No.:	42907769	**Signed:**				
Project Manager:	Tracey Hassell					
Matrix:	solid and liquid	**Validation Verified by:**	Wesu Ndilila-Barnes	**Date:**	21	7 2011
No of Primary Samples:	4	(Data Validator)				
Laboratory:	ALS	**Signed:**				
Lab Batch No.:	EP1104006					
		Reviewed by: (Project Manager)	Tracey Hassell	**Date:**	21	7 2011
		Signed:				

Data Quality Objectives

Anomalous Field Data Comparison (Anomalous Results)	Samples were provided by client from laboratory testing. No field work was conducted as part of this scope of work
Frequency of field QA/QC (ie field duplicates/triplicates, rinsate/field/trip blanks, etc)	Field QA/QC was not required in this investigation.
Frequency of laboratory QA/QC (ie laboratory duplicates, matrix spikes, laboratory control samples, method blanks, etc)	Lab duplicates and LCS were reported less than the required frequency for pH (solid tailing samples). Therefore, only a limited assessment of the precision and accuracy of the sample matrix can be performed for this method. However, URS considers this is acceptable as this batch only contained two samples analysed for this analytes.
Number of tests requested/reported	Samples were analysed and reported as requested on the COC.
Limits of Reporting	Limits of reporting were sufficiently low to enable a meaningful comparison with adopted guideline values, with the exception of silver (leacahte analysis), however, this analyte was below the LOR for both samples.

Sample Management

Sample handling/preservation (ie Temp received by laboratory etc.)	Samples were received by the laboratory at 23.7ºC with ice present, above the recommended temperature. However, this will not affect data interpretation as no volatile analytes were required to analyse.
Sample holding times	Analysis holding times failed by 2 days for the following samples: • RRPT01 for pH Extraction holding times failed by 4 days for the following samples: • RRTP01 for soluble sulfate and chloride

Data Precision

Field duplicate RPDs (Primary Laboratory)	Field duplicate was not required as samples were provided by client.
Laboratory duplicate RPDs	All RPDs were within control limits.

Data Accuracy

Laboratory Control Samples	Iron had a recovery (137%) which marginally exceeded the upper control limit (130%).
Data Transcription	A 10% check of the laboratory results identified no anomalies between the electronic data, the laboratory report, and the tables generated by URS.
Matrix Spike Recoveries	Manganese recovery was not determined due to background concentrations greater than 4 times the spike level.
Surrogate Recoveries	Surrogates were within recovery limits.

Data Comparability

Changes in sampling personnel	Samples provided by client
Changes in methodologies	Samples provided by client

Blank Monitoring

Rinsate Blank	N/A
Trip Blank	N/A
Method blank	Concentrations were reported below the LOR.

Chromatograms

Chromatograms	N/A
Other observations	N/A

Data Verification: COPY OF EP1104006_MRED

Site Name	**FerrAus Tailings Geochemical Assessment**
Project No.	**42907769**
Project Manager	**Tracey Hassell**
Matrix	**liquid**
Laboratory	**ALS-BRISBANE**
Batch File Name	**EP1104006**

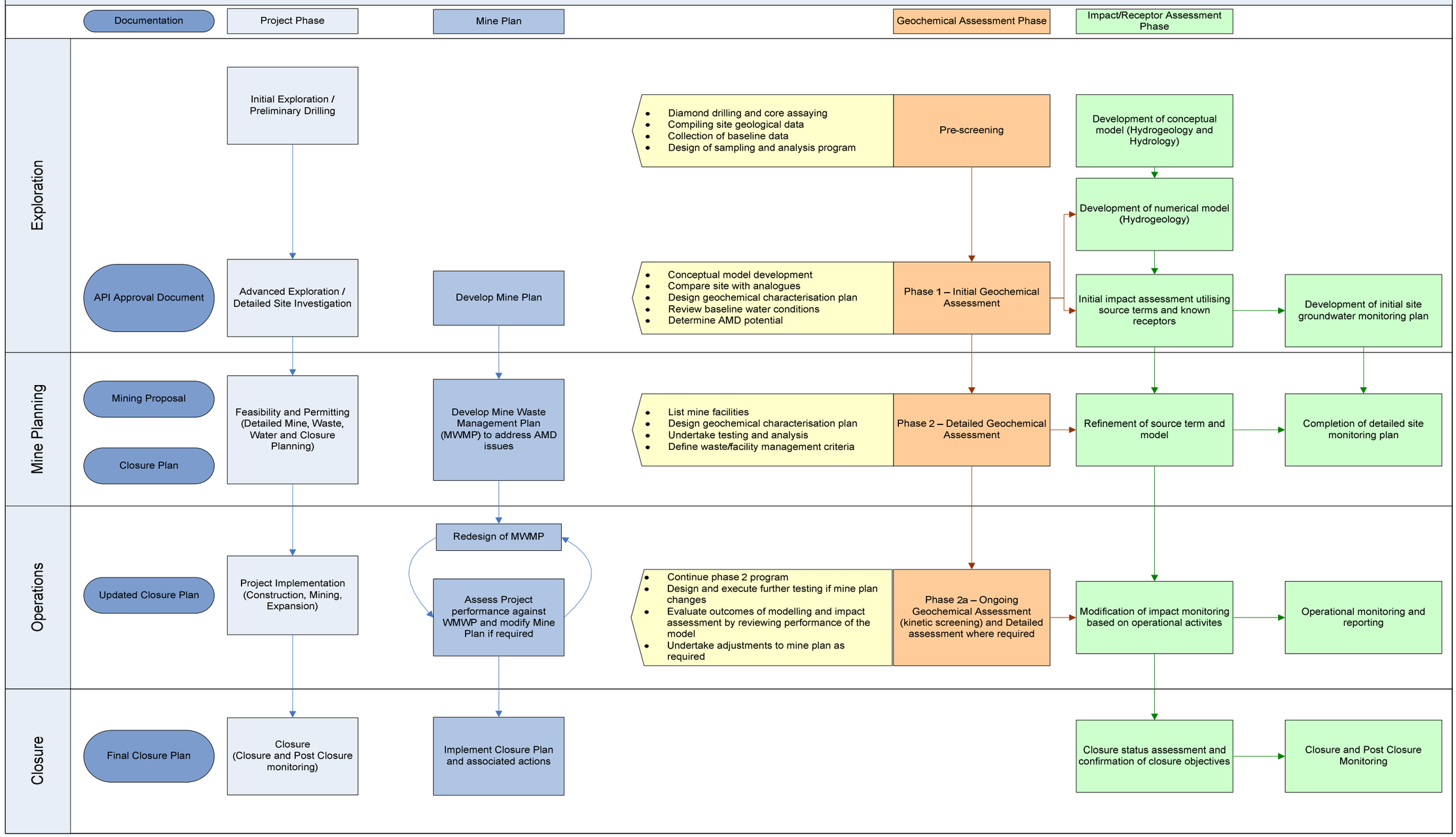
Analytical Parameter	Number of Tests Requested	Number of Tests Reported	Holding Times (a)	Limits of Reporting	LAB_DUPLICATE		LCS		MATRIX_SPIKE		METHOD_BLANK	
					Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported
Acid Neutralising Capacity	2	2	✓	✓	1	1	1	1	0	0	1	1
Sulfur	2	2	✓	✓	1	1	1	1	0	0	1	1
Major Ions	2	2	☒	✓	1	3	1	3	1	1	1	3
Metals (Total)	2	2	✓	✓	1	2	1	5	1	3	1	5
Moisture Content	2	2	✓	✓	1	1	**1**	**0**	0	0	0	0
Physico-Chemical Parameters	2	2	☒	✓	1	1	1	0	0	0	0	0

Leachate

Analytical Parameter	Number of Tests Requested	Number of Tests Reported	Holding Times (a)	Limits of Reporting	LAB_DUPLICATE		LCS		MATRIX_SPIKE		METHOD_BLANK	
					Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported
Alkalinity	2	2	✓	✓	1	2	1	1	0	0	1	1
Major Ions	2	2	☒	✓	1	5	1	4	1	2	1	4
Metals (Leachable)	2	2	✓	✓	1	5	1	4	1	2	1	4
Physico-Chemical Parameters	2	2	☒	✓	1	3	1	3	0	0	1	2

Initial _____ Date ____/____/_____

Geochemical Assessment – Life of Mining Plan



Notes:
AMD = Acid metalliferous drainge
MWPW = Mine Waste Management Plan

FerrAus Limited

Geochemical Assessment of Pilot Trial Tailings

Life of Mine Plan

URS

FerrAus Pilbara Project

File No: Figure 1.vsd Drawn: TMH Approved: TMH Date: 21-07-2011

Figure: **1** Rev: **A** A3

Table 1
Acid Base Accounting Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

Sample ID	Sample Type	pH[1]	Acidity (to pH 8.3)	Alkalinity (to pH 5.5)	EC[1]	Total Sulfur	Sulfate Sulfur	MPA[2]	ANC[2]	NAPP[2]	Sample Classification[3]
			(kg H_2SO_4/t)		(µS/cm)	(%)		(kg H_2SO_4/t)			
MMPT01	Tailings	NA	NA	NA	NA	0.04	NA	1.2	41.9	-40.7	Non-acid forming (Barren)
RRPT01	Tailings	NA	NA	NA	NA	0.03	NA	0.9	2.1	-1.2	Non-acid forming (Barren)

Notes:

1. Natural pH and EC provided for 1:5 sample:water extracts
2. MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential.
3. Samples generally classified as PAF if NAPP is positive and NAF if NAPP is negative (NAF-Barren if Total Sulfur is <0.10%). Refer to text for further details.
4. NA denoted not analysed

Table 2a
XRF Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

Location	Sample ID	Date Sampled	Sample Type	Analyte	Al2O3	As	BaO	CaO	Cl	Co	Cr2O3	Cu	Fe2O3	K2O	MgO	MnO	Mo	Na2O	Ni	P2O5	Pb	SO3	SiO2	TiO	V2O5	Zn
				Units	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
				LOR	0.01	0.001	0.001	0.01	0.001	0.001	0.001	0.0021	0.01	0.001	0.01	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.01	0.001	0.001
Mirrin Mirrin	MMPT01	24/06/2011	Tailing		**7.52**	**0.005**	<0.001	**0.07**	**0.062**	<0.001	<0.001	**0.002**	**72.1**	<0.001	**0.15**	**0.231**	<0.001	**0.082**	**0.002**	**0.233**	<0.001	**0.043**	**9.42**	**0.21**	<0.001	**0.024**
Robertson Range	RRPT01	24/06/2011	Tailing		**7.58**	**0.006**	<0.001	**0.1**	**0.37**	<0.001	<0.001	**0.003**	**68.4**	**0.027**	**0.12**	**0.297**	<0.001	**0.058**	**0.003**	**0.17**	<0.001	**0.076**	**14.25**	**0.33**	<0.001	**0.021**

Table 2b
Geochemical Abundance Index Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

	TOTAL-ELEMENT CONTENT (mg/kg or %)			GEOCHEMICAL ABUNDANCE INDEX (GAI)	
Element	MMPT01	RRPT01	**AVERAGE CRUSTAL ABUNDANCE[1] (mg/kg or %)**	MMPT01	RRPT01
Al2O3%	7.52	7.58	7.10	0	0
As	50	60	6	**2**	**3**
Ba	<LOR	<LOR	500	<LOR	<LOR
CaO%	0.07	0.1	1.50	0	0
Co	<LOR	<LOR	8	<LOR	<LOR
Cr	<LOR	<LOR	70	<LOR	<LOR
Cu	20	30	30	0	0
Fe%	25.21	23.92	4	**2**	**2**
K2O%	<LOR	0.027	1.40	<LOR	0
MgO%	0.15	0.12	0.50	0	0
Mn	1789	2300.27	1000	0	**1**
Na%	0.061	0.043	0.50	0	0
Ni	20	30	50	0	0
P	1016.58	741.71	800	0	0
Pb	<LOR	<LOR	35	<LOR	<LOR
S%	0.0172	0.0304	0.07	0	0
Si%	4.4	6.66	33	0	0
TiO2%	0.21	0.33	0.50	0	0
V	<LOR	<LOR	90	<LOR	<LOR
Zn	240	210	90	**1**	**1**

notes
Total element content values are median concentrations (calculated form Table B-1 - Appendix B)
<LOR - element below analytical limit of reporting, effective GAI is 0
[1] from Enviromental Chemistry of the Elements (Bowen, 1979)

Table 3
Soil Analytical Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

Location	Mirrin Mirrin	Robertson Range
Sample ID	MMPT01	RRPT01
Date Sampled	24/06/2011	24/06/2011
Sample Type	Primary Sample	Primary Sample

Analyte	LOR	Units	ISQG-Low	ISQG-High		
Moisture Content						
Moisture Content	1	%	-	-	**1.1**	<1
Metals (Total)						
Lithium	0.1	mg/kg	-	-	**4.4**	**1.2**
Uranium	0.1	mg/kg	-	-	**9**	**1.2**
Aluminium	50	mg/kg	-	-	**7280**	**4400**
Antimony	0.1	mg/kg	2	25	**0.5**	**0.5**
Arsenic	0.1	mg/kg	20	70	**0.8**	**1.7**
Barium	0.1	mg/kg	-	-	**40.2**	**94.7**
Beryllium	0.1	mg/kg	-	-	**0.4**	**0.3**
Boron	50	mg/kg	-	-	<50	<50
Cadmium	0.1	mg/kg	1.5	10	<0.1	**0.1**
Chromium	0.1	mg/kg	80	370	**19.9**	**28.6**
Cobalt	0.1	mg/kg	-	-	**6.2**	**15.9**
Copper	0.1	mg/kg	65	270	**26.9**	**18.9**
Iron	50	mg/kg	-	-	**198000**	**126000**
Lead	0.1	mg/kg	50	220	**12.4**	**13.7**
Manganese	0.1	mg/kg	-	-	**1550**	**1620**
Mercury	0.1	mg/kg	0.15	1	<0.1	<0.1
Molybdenum	0.1	mg/kg	-	-	**0.6**	**1**
Nickel	0.1	mg/kg	21	52	**15.6**	**10.2**
Selenium	1	mg/kg	-	-	<1	<1
Silver	0.1	mg/kg	1	3.7	**2.7**	**2.4**
Strontium	0.1	mg/kg	-	-	**7.7**	**6.3**
Thallium	0.1	mg/kg	-	-	**0.2**	**0.4**
Vanadium	1	mg/kg	-	-	**12**	**17**
Zinc	0.1	mg/kg	200	410	**114**	**72.7**
Bismuth	0.1	mg/kg	-	-	**0.1**	**0.1**
Thorium	0.1	mg/kg	-	-	**1.7**	**1.8**
Tungsten	0.1	mg/kg	-	-	**0.3**	**0.3**
Yttrium	0.1	mg/kg	-	-	**3**	**1.9**
Major Ions						
Calcium	10	mg/kg	-	-	**60**	**20**
Chloride	10	mg/kg	-	-	**700**	**270**
Magnesium	10	mg/kg	-	-	**20**	<10
Potassium	10	mg/kg	-	-	**30**	**20**
Sodium	10	mg/kg	-	-	**480**	**220**
Sulfur as S	10	mg/kg	-	-	**50**	**30**
Sulfate as SO4 2-	10	mg/kg	-	-	**160**	**80**
Acid Neutralising Capacity						
ANC as CaCO3	0.1	% caco3	-	-	**4.3**	**0.2**
ANC as H2SO4	0.5	kg h2so4 e	-	-	**41.9**	**2.1**
Fizz Rating		fizz unit	-	-	**2**	**1**
Sulfur						
Sulfur - Total as S (LECO)	0.01	%	-	-	**0.04**	**0.03**

Legend:

Exceeds the WA DEC, 2010, ISQG-Low (Trigger value)

Exceeds the WA DEC, 2010, ISQG-High (Trigger Value)

- Not analysed / not calculated

Table 4
Leachate Analytical Results - FerrAus Pilbara Project Tailings Residue
FerrAus Limited

Location	Mirrin Mirrin	Robertson Range
Sample ID	MMPT01	RRPT01
Date Sampled	24/06/2011	24/06/2011
Sample Type	Primary sample	Primary sample

Analyte	**LOR**	**Units**	**ANZECC trigeer level**		
Physico-Chemical Parameters					
pH	0.01	ph unit	6.0 - 7.5	**7.22**	**7.34**
Total Dissolved Solids	5	mg/L	20 - 250	**111**	**64**
Electrical Conductivity @ 25°C	1	µs/cm	20-250	**196**	**115**
Metals (Leachable)					
Bismuth	0.001	mg/L	-	<0.001	<0.001
Iron	0.05	mg/L	0.3**	<0.05	**1.39**
Lithium	0.001	mg/L	-	**0.002**	**0.003**
Strontium	0.001	mg/L	-	**0.053**	**0.017**
Thallium	0.001	mg/L	-	<0.001	<0.001
Thorium	0.001	mg/L	-	<0.001	<0.001
Uranium	0.001	mg/L	-	<0.001	<0.001
Yttrium	0.001	mg/L	-	<0.001	<0.001
Arsenic	0.001	mg/L	0.024	**0.003**	<0.001
Antimony	0.001	mg/L	-	<0.001	<0.001
Beryllium	0.001	mg/L	-	<0.001	<0.001
Cadmium	0.0001	mg/L	0.0002	**0.0005**	<0.0001
Chromium	0.001	mg/L	-	<0.001	**0.001**
Cobalt	0.001	mg/L	-	<0.001	<0.001
Copper	0.001	mg/L	0.0014	**0.003**	**0.002**
Lead	0.001	mg/L	0.0034	<0.001	<0.001
Mercury	0.0001	mg/L	-	<0.0001	<0.0001
Molybdenum	0.001	mg/L	-	**0.016**	**0.032**
Nickel	0.001	mg/L	-	<0.001	<0.001
Silver	0.001	mg/L	0.0005	<0.001*	<0.001*
Vanadium	0.01	mg/L	-	<0.01	<0.01
Zinc	0.005	mg/L	0.008	**0.096**	**0.085**
Aluminium	0.01	mg/L	0.055	**0.04**	**0.23**
Barium	0.001	mg/L	-	**0.186**	**0.592**
Boron	0.05	mg/L	-	**0.1**	**0.25**
Manganese	0.001	mg/L	1.9	**0.003**	**0.013**
Tungsten	0.001	mg/L	-	<0.001	**0.002**
Selenium	0.01	mg/L	0.011	<0.01	<0.01
Major Ions					
Calcium	1	mg/L	-	**5**	**3**
Chloride	1	mg/L	250	**32**	**14**
Magnesium	1	mg/L	-	**1**	<1
Potassium	1	mg/L	-	**1**	<1
Sodium	1	mg/L	180	**27**	**18**
Total Anions	0.01	meq/l	-	**1.31**	**0.78**
Total Cations	0.01	meq/l	-	**1.53**	**0.93**
Sulfate as SO4 - Turbidimetric	1	mg/L	250	**11**	**5**
Sulfur as S	1	mg/L	-	**3**	**2**
Alkalinity					
Hydroxide Alkalinity as CaCO3	1	mg/L	-	<1	<1
Carbonate Alkalinity as CaCO3	1	mg/L	-	<1	<1
Bicarbonate Alkalinity as CaCO3	1	mg/L	-	**9**	**14**
Total Alkalinity as CaCO3	1	mg/L	-	**9**	**14**

Legend:

Exceeds the ANZECC trigger level for Upland Rivers in Tropical Australia (includes North-West WA) 95% Protection level

- Not analysed / not calculated

* LOR Exceeds Guideline Trigger Value

** Australian Drinking Water Guidelines - aesthetic value adopted

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney:** 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane:** 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth:** 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston:** 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT: URS AUSTRALIA	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: LEVEL 4, 226 ADELAIDE TERRACE, PERTH WA 6000		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes / No / N/A
PROJECT: 42907769 PROJECT NO.:	ALS QUOTE NO.: EP/361/11	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes / No / N/A
ORDER NUMBER: PER-11-7070E1 PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 23.7 °C
PROJECT MANAGER: Tracy Hassell	CONTACT PH: 9326 0100	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Client	SAMPLER MOBILE:	RELINQUISHED BY:	RECEIVED BY: Josh Rees
COC Emailed to ALS? (YES / NO)	EDD FORMAT (or default):	DATE/TIME:	DATE/TIME: 24/6/11 14:58
Email Reports to (will default to PM if no other addresses are listed): Elena_Chin@urscorp.com & tracey_hassell@urscorp.com		RELINQUISHED BY:	RECEIVED BY:
Email Invoice to (will default to PM if no other addresses are listed):		DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please hold the un-use materials and send back to us when analysis is done. The leachate is to be generated by ASLP phase.

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	Tailings Analysis	Leachate Analysis	XRF Analysis						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	MMPT01	24th June 2011	S		1	x	x	x						Combine Mirrin Mirrin samples with the ratio: 57%High grade and 43%Medium grade.
2	RRPT01	24th June 2011	S		1	x	x	x						Combine Robertson Range samples with the ratio: 29%High grade and 71%Medium grade
3	MMHigh	↓	↓											
4	MMMedium													
5	RRHigh													
6	RRMedium													
				TOTAL										

Environmental Division Perth
Work Order
EP1104006
Telephone : +61-8-9209 7655

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Linda Willis

From: Josh Rees
Sent: Friday, 24 June 2011 2:24 PM
To: Samples Perth
Cc: Lauren Ockwell
Subject: FW: Example COC Form
Attachments: 42907769 COC.pdf

Importance: High

Follow Up Flag: Follow up
Flag Status: Flagged

Hi SR,

Please see attached and below for specific instructions on some incoming URS samples.

It might be best to pre-log these as these may be fast TAT samples.

Can someone please get on this?

Thanks,

How was your customer experience? Please send us your feedback (Click the link)

Joshua Rees
Client Services Officer - Perth

ALS Environmental Division

Address
10 Hod Way, Malaga, WA, 6090

PHONE +61 8 9209 7655
DIRECT +61 8 9209 7617
FAX +61 8 9209 7600

www.alsglobal.com

From: Elena_Chin@URSCorp.com [mailto:Elena_Chin@URSCorp.com]
Sent: Friday, 24 June 2011 12:47 PM
To: Josh Rees
Cc: Lauren Ockwell; Tracey_Hassell@URSCorp.com
Subject: Re: Example COC Form

Hi Josh,

We have sorted out the problem as I discussed with you before about the combination of samples.

I will send 4 samples today into the lab, 2 samples from Mirrin Mirrin (both high and medium grade) and 2 samples from Robertson Range (both high and medium grade). Please combine the high and medium grade samples from each site according the the ratio mentioned on the COC. And please label the combined sample from Mirrin Mirrin as MMPT01 and combined sample from Robertson Range as RRPT01. I have attached the COC for your reference.

Please contact me if you have any questions.

Kind regards,

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EP1104006**

Client	: **URS AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: ELENA CHIN	Contact	: Lauren Ockwell
Address	: LEVEL 4, 226 ADELAIDE TERRACE PERTH WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: elena_chin@urscorp.com	E-mail	: lauren.ockwell@alsenviro.com
Telephone	: +61 08 9326 0100	Telephone	: 08 9209 7606
Facsimile	: +61 08 9326 0296	Facsimile	: 08 9209 7600
Project	: 42907769	Page	: 1 of 3
Order number	: PER-11-7070E1		
C-O-C number	: ----	Quote number	: EP2011URSWA0322 (EP/361/11)
Site	: ----		
Sampler	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 27-JUN-2011	Issue Date	: 27-JUN-2011 15:24
Client Requested Due Date	: 05-JUL-2011	Scheduled Reporting Date	: **05-JUL-2011**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 23.7
No. of coolers/boxes	: 1 medium foam esky	No. of samples received	: 6
Security Seal	: Intact.	No. of samples analysed	: 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- **Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.**
- **Please see attached Spreadsheet "Sample Weights" for weights used in Composites.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of Work Order.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
EG035W : Water Leachable Mercury by FIMS		
MMPT01	- Soil Glass Jar - Unpreserved	- Clear Plastic Bottle - Nitric Acid; Unfiltered
RRPT01	- Soil Glass Jar - Unpreserved	- Clear Plastic Bottle - Nitric Acid; Unfiltered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL - No analysis requested	SOIL - Balance Suite - Balance Suite with DA Chloride	SOIL - EA005P - pH (PC)	SOIL - EA010 - Conductivity	SOIL - EA013 - Acid Neutralising Capacity (ANC)	SOIL - EA015H - Total Dissolved Solids - High Level	SOIL - ED040F - Dissolved Major Anions	SOIL - ED040S - Soluble Major Anions
EP1104006-001	24-JUN-2011 14:58	MMPT01		✓	✓	✓	✓	✓	✓	✓
EP1104006-002	24-JUN-2011 14:58	RRPT01		✓	✓	✓	✓	✓	✓	✓
EP1104006-003	24-JUN-2011 14:58	MM High	✓							
EP1104006-004	24-JUN-2011 14:58	MM Medium	✓							
EP1104006-005	24-JUN-2011 14:58	RR High	✓							
EP1104006-006	24-JUN-2011 14:58	RR Medium	✓							

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - ED042T - Sulfur - Total as S (LECO)	SOIL - ED045G (solids) - Chloride Soluble by Discrete Analyser	SOIL - EG005T (solids) - Total Metals by ICP-AES	SOIL - EG020T (solids) - Total Metals by ICP-MS	SOIL - EG020W - Water Leachable Metals by ICPMS	SOIL - EG035T (solids) - Total Mercury by FIMS	SOIL - EG035W - Water Leachable Mercury by FIMS	SOIL - EN60-DI Suite - Deionised Water Leach
EP1104006-001	24-JUN-2011 14:58	MMPT01	✓	✓	✓	✓	✓	✓	✓	✓
EP1104006-002	24-JUN-2011 14:58	RRPT01	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - MIS-SOL (Subcontracted) Miscellaneous Subcontracted Analysis (Solid)	SOIL - NT-1S Major Cations (Ca, Mg, Na, K)
EP1104006-001	24-JUN-2011 14:58	MMPT01	✓	✓
EP1104006-002	24-JUN-2011 14:58	RRPT01	✓	✓

Requested Deliverables

ELENA CHIN

- *AU Certificate of Analysis - NATA	Email	elena_chin@urscorp.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	elena_chin@urscorp.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA	Email	elena_chin@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	elena_chin@urscorp.com
- Attachment - Report	Email	elena_chin@urscorp.com
- Chain of Custody (CoC)	Email	elena_chin@urscorp.com
- EDI Format - ENMRG	Email	elena_chin@urscorp.com
- EDI Format - ESDAT	Email	elena_chin@urscorp.com
- EDI Format - MRED	Email	elena_chin@urscorp.com
- EDI Format - XTab	Email	elena_chin@urscorp.com

THE ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	Perth_Accounts@urscorp.com

TRACY HASSELL

- *AU Certificate of Analysis - NATA	Email	tracey_hassell@urscorp.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	tracey_hassell@urscorp.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA	Email	tracey_hassell@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	tracey_hassell@urscorp.com
- Attachment - Report	Email	tracey_hassell@urscorp.com
- Chain of Custody (CoC)	Email	tracey_hassell@urscorp.com
- EDI Format - ENMRG	Email	tracey_hassell@urscorp.com
- EDI Format - ESDAT	Email	tracey_hassell@urscorp.com
- EDI Format - MRED	Email	tracey_hassell@urscorp.com
- EDI Format - XTab	Email	tracey_hassell@urscorp.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP1104006**	Page	: 1 of 6
Client	: **URS AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: ELENA CHIN	Contact	: Lauren Ockwell
Address	: LEVEL 4, 226 ADELAIDE TERRACE PERTH WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: elena_chin@urscorp.com	E-mail	: lauren.ockwell@alsenviro.com
Telephone	: +61 08 9326 0100	Telephone	: 08 9209 7606
Facsimile	: +61 08 9326 0296	Facsimile	: 08 9209 7600
Project	: 42907769	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: PER-11-7070E1		
C-O-C number	: ----	Date Samples Received	: 27-JUN-2011
Sampler	: ----	Issue Date	: 06-JUL-2011
Site	: ----		
		No. of samples received	: 6
Quote number	: EP/361/11	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chas Tucker	Inorganic Chemist	Perth Inorganics
Cicelia Bartels	Metals Instrument Chemist	Perth Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Leanne Cooper	Acid Sulfate Soils Supervisor	Perth ASS

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Analytical Results

Sub-Matrix: **DI WATER LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: MMPT01 Client sampling date / time: 29-JUN-2011 12:00 EP1104006-001	Client sample ID: RRPT01 Client sampling date / time: 29-JUN-2011 12:00 EP1104006-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.22**	**7.34**	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**196**	**115**	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	**111**	**64**	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**9**	**14**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**9**	**14**	----	----	----
ED040F: Dissolved Major Anions								
^ Sulfur as S	63705-05-5	1	mg/L	**3**	**2**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**11**	**5**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**32**	**14**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**5**	**3**	----	----	----
Magnesium	7439-95-4	1	mg/L	**1**	<1	----	----	----
Sodium	7440-23-5	1	mg/L	**27**	**18**	----	----	----
Potassium	7440-09-7	1	mg/L	**1**	<1	----	----	----
EG020T: Total Metals by ICP-MS								
Tungsten	7440-33-7	0.001	mg/L	<0.001	**0.002**	----	----	----
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	**0.23**	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.003**	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.186**	**0.592**	----	----	----
Bismuth	7440-69-9	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	**0.0005**	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.001**	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.003**	**0.002**	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Lithium	7439-93-2	0.001	mg/L	**0.002**	**0.003**	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.003**	**0.013**	----	----	----

Analytical Results

Sub-Matrix: **DI WATER LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: MMPT01	RRPT01	----	----	----
				Client sampling date / time: 29-JUN-2011 12:00	29-JUN-2011 12:00	----	----	----
				EP1104006-001	EP1104006-002	----	----	----
EG020W: Water Leachable Metals by ICP-MS - Continued								
Molybdenum	7439-98-7	0.001	mg/L	**0.016**	**0.032**	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	----	----	----
Strontium	7440-24-6	0.001	mg/L	**0.053**	**0.017**	----	----	----
Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	----	----	----
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.096**	**0.085**	----	----	----
Boron	7440-42-8	0.05	mg/L	**0.10**	**0.25**	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	**1.39**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**1.31**	**0.78**	----	----	----
^ Total Cations	----	0.01	meq/L	**1.53**	**0.93**	----	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MMPT01	RRPT01	----	----	----
				Client sampling date / time: 24-JUN-2011 14:58	24-JUN-2011 14:58	----	----	----
				EP1104006-001	EP1104006-002	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**41.9**	**2.1**	----	----	----
^ ANC as CaCO3	----	0.1	% CaCO3	**4.3**	**0.2**	----	----	----
Fizz Rating	----	0	Fizz Unit	**2**	**1**	----	----	----
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**1.1**	<1.0	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**160**	**80**	----	----	----
^ Sulfur as S	63705-05-5	10	mg/kg	**50**	**30**	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.04**	**0.03**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**700**	**270**	----	----	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	**60**	**20**	----	----	----
Magnesium	7439-95-4	10	mg/kg	**20**	<10	----	----	----
Sodium	7440-23-5	10	mg/kg	**480**	**220**	----	----	----
Potassium	7440-09-7	10	mg/kg	**30**	**20**	----	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**7280**	**4400**	----	----	----
Boron	7440-42-8	50	mg/kg	<50	<50	----	----	----
Iron	7439-89-6	50	mg/kg	**198000**	**126000**	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.1	mg/kg	**0.8**	**1.7**	----	----	----
Selenium	7782-49-2	1	mg/kg	<1	<1	----	----	----
Silver	7440-22-4	0.1	mg/kg	**2.7**	**2.4**	----	----	----
Barium	7440-39-3	0.1	mg/kg	**40.2**	**94.7**	----	----	----
Thallium	7440-28-0	0.1	mg/kg	**0.2**	**0.4**	----	----	----
Beryllium	7440-41-7	0.1	mg/kg	**0.4**	**0.3**	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	**0.1**	----	----	----
Bismuth	7440-69-9	0.1	mg/kg	**0.1**	**0.1**	----	----	----
Cobalt	7440-48-4	0.1	mg/kg	**6.2**	**15.9**	----	----	----
Chromium	7440-47-3	0.1	mg/kg	**19.9**	**28.6**	----	----	----
Uranium	7440-61-1	0.1	mg/kg	**9.0**	**1.2**	----	----	----
Copper	7440-50-8	0.1	mg/kg	**26.9**	**18.9**	----	----	----
Thorium	7440-29-1	0.1	mg/kg	**1.7**	**1.8**	----	----	----
Manganese	7439-96-5	0.1	mg/kg	**1550**	**1620**	----	----	----

Analytical Results

Sub-Matrix: SOIL				Client sample ID	MMPT01	RRPT01	----	----	----
				Client sampling date / time	24-JUN-2011 14:58	24-JUN-2011 14:58	----	----	----
Compound	CAS Number	LOR	Unit		EP1104006-001	EP1104006-002	----	----	----
EG020T: Total Metals by ICP-MS - Continued									
Strontium	7440-24-6	0.1	mg/kg		**7.7**	**6.3**	----	----	----
Tungsten	7440-33-7	0.1	mg/kg		**0.3**	**0.3**	----	----	----
Molybdenum	7439-98-7	0.1	mg/kg		**0.6**	**1.0**	----	----	----
Nickel	7440-02-0	0.1	mg/kg		**15.6**	**10.2**	----	----	----
Lead	7439-92-1	0.1	mg/kg		**12.4**	**13.7**	----	----	----
Antimony	7440-36-0	0.1	mg/kg		**0.5**	**0.5**	----	----	----
Uranium	7440-61-1	0.1	mg/kg		**9.0**	**1.2**	----	----	----
Zinc	7440-66-6	0.1	mg/kg		**114**	**72.7**	----	----	----
Lithium	7439-93-2	0.1	mg/kg		**4.4**	**1.2**	----	----	----
Vanadium	7440-62-2	1	mg/kg		**12**	**17**	----	----	----
Thorium	7440-29-1	0.1	mg/kg		**1.7**	**1.8**	----	----	----
Yttrium	7440-65-5	0.1	mg/kg		**3.0**	**1.9**	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	----	----	----
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EN60: Bottle Leaching Procedure									
Final pH	----	0.1	pH Unit		<0.1	<0.1	----	----	----

Australian Laboratory Services Pty. Ltd.
32 Shand Street
Stafford
Brisbane QLD 4053
Phone: +61 (7) 3243 7222 Fax: +61 (7) 3243 7218
www.alsglobal.com

Finalized Date: 30-JUN-2011
Account: ALSENV

CERTIFICATE PH11116871

Project: EP1104006

P.O. No.: 295856

This report is for 2 Pulp samples submitted to our lab in Perth, WA, Australia on 27-JUN-2011.

The following have access to data associated with this certificate:

SUB RESULTS		

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
LEV-01	Waste Disposal Levy
LOG-24	Pulp Login - Rcd w/o Barcode

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-XRF12	Whole rock XRF	XRF
OA-GRA05t	Multi-temperature LOI	TGA

To: **ALS ENVIRONMENTAL**
ATTN: SUB RESULTS
10 HOD WAY
MALAGA WA 6090

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:
Wayne Abbott, Operations Manager, Western Australia

Australian Laboratory Services Pty. Ltd.
32 Shand Street
Stafford
Brisbane QLD 4053
Phone: +61 (7) 3243 7222 Fax: +61 (7) 3243 7218
www.alsglobal.com

Project: EP1104006

CERTIFICATE OF ANALYSIS PH11116871

Sample Description	Method	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12
	Analyte	Al2O3	As	BaO	CaO	Cl	Co	Cr2O3	Cu	Fe2O3	K2O	MgO	MnO	Mo	Na2O	Ni
	Units	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	LOR	0.01	0.001	0.001	0.01	0.001	0.001	0.001	0.001	0.01	0.001	0.01	0.001	0.001	0.001	0.001
MMPT01		7.52	0.005	<0.001	0.07	0.062	<0.001	<0.001	0.002	72.1	<0.001	0.15	0.231	<0.001	0.082	0.002
RRPT01		7.58	0.006	<0.001	0.10	0.037	<0.001	<0.001	0.003	68.4	0.027	0.12	0.297	<0.001	0.058	0.003

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www.alsglobal.com

Project: EP1104006

CERTIFICATE OF ANALYSIS PH11116871

Sample Description	Method / Analyte / Units / LOR	ME-XRF12 P2O5 % 0.001	ME-XRF12 Pb % 0.001	ME-XRF12 SO3 % 0.001	ME-XRF12 SiO2 % 0.01	ME-XRF12 TiO2 % 0.01	ME-XRF12 V2O5 % 0.001	ME-XRF12 Zn % 0.001	OA-GRA05t LOI 1000 % 0.01
MMPT01		0.233	<0.001	0.043	9.42	0.21	<0.001	0.024	9.87
RRPT01		0.170	<0.001	0.076	14.25	0.33	<0.001	0.021	8.48

QUALITY CONTROL REPORT

Work Order	: **EP1104006**	Page	: 1 of 11
Client	: **URS AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: ELENA CHIN	Contact	: Lauren Ockwell
Address	: LEVEL 4, 226 ADELAIDE TERRACE PERTH WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: elena_chin@urscorp.com	E-mail	: lauren.ockwell@alsenviro.com
Telephone	: +61 08 9326 0100	Telephone	: 08 9209 7606
Facsimile	: +61 08 9326 0296	Facsimile	: 08 9209 7600
Project	: 42907769	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 27-JUN-2011
Sampler	: ----	Issue Date	: 06-JUL-2011
Order number	: PER-11-7070E1		
		No. of samples received	: 6
Quote number	: EP/361/11	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chas Tucker	Inorganic Chemist	Perth Inorganics
Cicelia Bartels	Metals Instrument Chemist	Perth Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Leanne Cooper	Acid Sulfate Soils Supervisor	Perth ASS

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA013: Acid Neutralising Capacity (QC Lot: 1847759)									
EP1104006-001	MMPT01	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equ	41.9	41.9	0.0	0% - 20%
EA055: Moisture Content (QC Lot: 1858768)									
EP1104006-001	MMPT01	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	1.1	1.1	0.0	No Limit
ED040S: Soluble Major Anions (QC Lot: 1858623)									
EP1104006-001	MMPT01	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	160	160	0.0	0% - 50%
ED042T: Total Sulfur by LECO (QC Lot: 1856956)									
EP1104006-001	MMPT01	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.04	0.04	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 1858625)									
EP1104006-001	MMPT01	ED045G: Chloride	16887-00-6	10	mg/kg	700	690	1.4	0% - 20%
ED093S: Soluble Major Cations (QC Lot: 1858624)									
EP1104006-001	MMPT01	ED093S: Calcium	7440-70-2	10	mg/kg	60	60	0.0	No Limit
		ED093S: Magnesium	7439-95-4	10	mg/kg	20	20	0.0	No Limit
		ED093S: Sodium	7440-23-5	10	mg/kg	480	470	0.0	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	30	30	0.0	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1858539)									
EP1104006-001	MMPT01	EG005T: Aluminium	7429-90-5	50	mg/kg	7280	7220	0.8	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	198000	203000	2.5	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1858541)									
EP1104006-001	MMPT01	EG020X-T: Arsenic	7440-38-2	0.1	mg/kg	0.8	0.8	0.0	No Limit
		EG020X-T: Barium	7440-39-3	0.1	mg/kg	40.2	35.6	12.2	0% - 20%
		EG020X-T: Beryllium	7440-41-7	0.1	mg/kg	0.4	0.4	0.0	No Limit
		EG020X-T: Cobalt	7440-48-4	0.1	mg/kg	6.2	5.8	5.6	0% - 20%
		EG020X-T: Chromium	7440-47-3	0.1	mg/kg	19.9	18.7	6.3	0% - 20%
		EG020X-T: Copper	7440-50-8	0.1	mg/kg	26.9	26.0	3.4	0% - 20%
		EG020X-T: Manganese	7439-96-5	0.1	mg/kg	1550	1520	1.9	0% - 20%
		EG020X-T: Molybdenum	7439-98-7	0.1	mg/kg	0.6	0.6	0.0	No Limit
		EG020X-T: Nickel	7440-02-0	0.1	mg/kg	15.6	15.2	2.5	0% - 20%
		EG020X-T: Lead	7439-92-1	0.1	mg/kg	12.4	11.7	5.8	0% - 20%
		EG020X-T: Antimony	7440-36-0	0.1	mg/kg	0.5	0.5	0.0	No Limit
		EG020X-T: Uranium	7440-61-1	0.1	mg/kg	9.0	8.8	2.3	0% - 20%
		EG020X-T: Zinc	7440-66-6	0.1	mg/kg	114	113	1.0	0% - 20%
		EG020X-T: Lithium	7439-93-2	0.1	mg/kg	4.4	4.7	6.9	0% - 20%
		EG020X-T: Vanadium	7440-62-2	1	mg/kg	12	12	0.0	0% - 50%

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1858542)									
EP1104006-001	MMPT01	EG020Y-T: Thallium	7440-28-0	0.1	mg/kg	0.2	0.2	0.0	No Limit
		EG020Y-T: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020Y-T: Bismuth	7440-69-9	0.1	mg/kg	0.1	0.1	0.0	No Limit
		EG020Y-T: Uranium	7440-61-1	0.1	mg/kg	9.0	8.8	2.3	0% - 20%
		EG020Y-T: Thorium	7440-29-1	0.1	mg/kg	1.7	1.7	0.0	0% - 50%
		EG020Y-T: Strontium	7440-24-6	0.1	mg/kg	7.7	7.2	5.8	0% - 20%
		EG020Y-T: Selenium	7782-49-2	1	mg/kg	<1	<1	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1858544)									
EP1104006-001	MMPT01	EG020Z-T: Silver	7440-22-4	0.1	mg/kg	2.7	2.6	0.0	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 1858546)									
EP1104006-001	MMPT01	EG020R-T: Thorium	7440-29-1	0.1	mg/kg	1.7	1.7	0.0	0% - 50%
		EG020R-T: Yttrium	7440-65-5	0.1	mg/kg	3.0	2.9	0.0	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1858540)									
EP1104006-001	MMPT01	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 1854373)									
EP1104127-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.98	7.89	1.1	0% - 20%
EP1104118-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.75	7.77	0.2	0% - 20%
EA010: Conductivity (QC Lot: 1854649)									
EP1104006-001	MMPT01	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	196	196	0.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 1854642)									
EP1104006-001	MMPT01	EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	111	115	3.5	0% - 20%
EP1104080-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	734	715	2.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1854372)									
EP1103773-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	21	23	5.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	21	23	8.4	0% - 20%
EP1104127-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	271	268	1.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	271	268	1.2	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 1854635)									
EP1103773-004	Anonymous	ED040F: Sulfur as S	63705-05-5	1	mg/L	<1	<1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1854638)									
EP1103773-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 1854637)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride Discrete analyser (QC Lot: 1854637) - continued									
EP1103773-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	4	0.0	No Limit
EP1104069-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	331	331	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1854636)									
EP1103773-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	5	6	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	3	4	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EP1104069-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	6	6	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	20	20	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	155	151	2.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1855155)									
EP1104006-001	MMPT01	EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 1855152)									
EP1104006-001	MMPT01	EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	0.0005	0.0001	119	No Limit
		EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Arsenic	7440-38-2	0.001	mg/L	0.003	0.004	0.0	No Limit
		EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Barium	7440-39-3	0.001	mg/L	0.186	0.192	3.4	0% - 20%
		EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.0	No Limit
		EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Lithium	7439-93-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Manganese	7439-96-5	0.001	mg/L	0.003	0.002	0.0	No Limit
		EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	0.016	0.016	0.0	0% - 50%
		EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Zinc	7440-66-6	0.005	mg/L	0.096	0.103	6.7	0% - 20%
		EG020A-W: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.0	No Limit
		EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Boron	7440-42-8	0.05	mg/L	0.10	0.11	0.0	No Limit
		EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 1855153)									
EP1104006-001	MMPT01	EG020B-W: Bismuth	7440-69-9	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Strontium	7440-24-6	0.001	mg/L	0.053	0.054	2.2	0% - 20%
		EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 1855153) - continued									
EP1104006-001	MMPT01	EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 1855154)									
EP1104006-001	MMPT01	EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG035W: Water Leachable Mercury by FIMS (QC Lot: 1855908)									
EP1104006-001	MMPT01	EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA013: Acid Neutralising Capacity (QCLot: 1847759)								
EA013: ANC as H2SO4	----	0.5	kg H2SO4 equ	----	49 kg H2SO4 equ	100	80.4	118
		0.5	kg H2SO4 equiv./t	<0.5	----	----	----	----
EA013: ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
ED040S: Soluble Major Anions (QCLot: 1858623)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	250 mg/kg	102	86	116
ED042T: Total Sulfur by LECO (QCLot: 1856956)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	100 %	100	70	130
ED045G: Chloride Discrete analyser (QCLot: 1858625)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	5000 mg/kg	94.5	82	126
ED093S: Soluble Major Cations (QCLot: 1858624)								
ED093S: Calcium	7440-70-2	10	mg/kg	<10	----	----	----	----
ED093S: Magnesium	7439-95-4	10	mg/kg	<10	----	----	----	----
ED093S: Sodium	7440-23-5	10	mg/kg	<10	----	----	----	----
ED093S: Potassium	7440-09-7	10	mg/kg	<10	----	----	----	----
EG005T: Total Metals by ICP-AES (QCLot: 1858539)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Iron	7439-89-6	50	mg/kg	<50	14257 mg/kg	# 137	79	130
EG020T: Total Metals by ICP-MS (QCLot: 1858541)								
EG020X-T: Arsenic	7440-38-2	0.1	mg/kg	<0.1	13.11 mg/kg	113	74	130
EG020X-T: Barium	7440-39-3	0.1	mg/kg	<0.1	137.41 mg/kg	102	78	130
EG020X-T: Beryllium	7440-41-7	0.1	mg/kg	<0.1	5.51 mg/kg	106	70	130
EG020X-T: Cobalt	7440-48-4	0.1	mg/kg	<0.1	24.49 mg/kg	97.7	75	130
EG020X-T: Chromium	7440-47-3	0.1	mg/kg	<0.1	60.93 mg/kg	101	70	130
EG020X-T: Copper	7440-50-8	0.1	mg/kg	<0.1	54.68 mg/kg	97.1	70	123
EG020X-T: Manganese	7439-96-5	0.1	mg/kg	<0.1	135.60 mg/kg	98.6	70	130
EG020X-T: Molybdenum	7439-98-7	0.1	mg/kg	<0.1	6.86 mg/kg	126	70	130
EG020X-T: Nickel	7440-02-0	0.1	mg/kg	<0.1	55.23 mg/kg	99.0	86	130
EG020X-T: Lead	7439-92-1	0.1	mg/kg	<0.1	54.76 mg/kg	102	79	124
EG020X-T: Antimony	7440-36-0	0.1	mg/kg	<0.1	----	----	----	----
EG020X-T: Uranium	7440-61-1	0.1	mg/kg	<0.1	----	----	----	----
EG020X-T: Zinc	7440-66-6	0.1	mg/kg	<0.1	103.88 mg/kg	101	85	123
EG020X-T: Lithium	7439-93-2	0.1	mg/kg	<0.1	----	----	----	----
EG020X-T: Vanadium	7440-62-2	1	mg/kg	<1	34.03 mg/kg	105	70	130

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 1858542)								
EG020Y-T: Selenium	7782-49-2	1	mg/kg	<1	----	----	----	----
EG020Y-T: Thallium	7440-28-0	0.1	mg/kg	<0.1	----	----	----	----
EG020Y-T: Cadmium	7440-43-9	0.1	mg/kg	<0.1	2.76 mg/kg	99.0	86	123
EG020Y-T: Bismuth	7440-69-9	0.1	mg/kg	<0.1	----	----	----	----
EG020Y-T: Uranium	7440-61-1	0.1	mg/kg	<0.1	----	----	----	----
EG020Y-T: Thorium	7440-29-1	0.1	mg/kg	<0.1	----	----	----	----
EG020Y-T: Strontium	7440-24-6	0.1	mg/kg	<0.1	60.42 mg/kg	105	75	130
EG020T: Total Metals by ICP-MS (QCLot: 1858544)								
EG020Z-T: Silver	7440-22-4	0.1	mg/kg	<0.1	5.60 mg/kg	88.4	79	130
EG020T: Total Metals by ICP-MS (QCLot: 1858545)								
EG020V-T: Tungsten	7440-33-7	0.1	mg/kg	<0.1	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 1858546)								
EG020R-T: Thorium	7440-29-1	0.1	mg/kg	<0.1	----	----	----	----
EG020R-T: Yttrium	7440-65-5	0.1	mg/kg	<0.1	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1858540)								
EG035T: Mercury	7439-97-6	0.10	mg/kg	<0.1	1.34 mg/kg	86.0	73	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EA005P: pH by PC Titrator (QCLot: 1854373)								
EA005-P: pH Value	----	0.01	pH Unit	----	7.00 pH Unit	100	70	130
EA010: Conductivity (QCLot: 1854649)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	70	130
EA015: Total Dissolved Solids (QCLot: 1854642)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	<5	2000 mg/L	108	79.8	116
ED037P: Alkalinity by PC Titrator (QCLot: 1854372)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	200 mg/L	96.9	79	113
ED040F: Dissolved Major Anions (QCLot: 1854635)								
ED040F: Sulfur as S	63705-05-5	1	mg/L	<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1854638)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.9	85	130
ED045G: Chloride Discrete analyser (QCLot: 1854637)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	94.9	78	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 1854636)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.9	88	112
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.4	88	112
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.0	85	111
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.9	84	114
EG020T: Total Metals by ICP-MS (QCLot: 1855155)								
EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855152)								
EG020A-W: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.500 mg/L	98.5	80	124
EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	0.100 mg/L	99.5	93	126
EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	91.6	80	124
EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	107	90	130
EG020A-W: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	91.8	90	130
EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	100	70	128
EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	100	87	117
EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	98.8	78	121
EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	102	86	116
EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	----	----	----	----
EG020A-W: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	102	72	122
EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.100 mg/L	103	91	130
EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	101	83	126
EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	0.100 mg/L	89.0	75	121
EG020A-W: Thallium	7440-28-0	0.001	mg/L	<0.001	0.100 mg/L	99.8	89	122
EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	92.6	84	115
EG020A-W: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	95.0	75	129
EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	0.500 mg/L	108	75	130
EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	0.500 mg/L	99.0	89	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855153)								
EG020B-W: Bismuth	7440-69-9	0.001	mg/L	<0.001	0.100 mg/L	108	92	116
EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	0.100 mg/L	96.8	70	130
EG020B-W: Strontium	7440-24-6	0.001	mg/L	<0.001	0.500 mg/L	101	87	115
EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855154)								
EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	----	----	----	----
EG035W: Water Leachable Mercury by FIMS (QCLot: 1855908)								
EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	105	84	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 1858625)							
EP1104006-002	RRPT01	ED045G: Chloride	16887-00-6	1250 mg/kg	113	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1858541)							
EP1104006-002	RRPT01	EG020X-T: Arsenic	7440-38-2	10 mg/kg	103	70	130
		EG020X-T: Barium	7440-39-3	50 mg/kg	111	70	130
		EG020X-T: Beryllium	7440-41-7	4 mg/kg	82.3	70	130
		EG020X-T: Cobalt	7440-48-4	50 mg/kg	83.4	70	130
		EG020X-T: Chromium	7440-47-3	50 mg/kg	78.8	70	130
		EG020X-T: Copper	7440-50-8	50 mg/kg	75.2	70	130
		EG020X-T: Manganese	7439-96-5	50 mg/kg	# Not Determined	70	130
		EG020X-T: Nickel	7440-02-0	50 mg/kg	75.0	70	130
		EG020X-T: Lead	7439-92-1	50 mg/kg	81.8	70	130
		EG020X-T: Zinc	7440-66-6	50 mg/kg	80.4	70	130
		EG020X-T: Vanadium	7440-62-2	50 mg/kg	74.0	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1858542)							
EP1104006-002	RRPT01	EG020Y-T: Cadmium	7440-43-9	25 mg/kg	89.4	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1858540)							
EP1104006-002	RRPT01	EG035T: Mercury	7439-97-6	5.0 mg/kg	78.9	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1854638)							
EP1103773-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	116	70	130
ED045G: Chloride Discrete analyser (QCLot: 1854637)							
EP1103773-004	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	112	70	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855152)							
EP1104006-002	RRPT01	EG020A-W: Arsenic	7440-38-2	1.000 mg/L	86.0	70	130
		EG020A-W: Beryllium	7440-41-7	0.100 mg/L	83.1	70	130
		EG020A-W: Barium	7440-39-3	1.000 mg/L	85.4	70	130
		EG020A-W: Cadmium	7440-43-9	0.500 mg/L	80.6	70	130
		EG020A-W: Chromium	7440-47-3	1.000 mg/L	84.6	70	130
		EG020A-W: Cobalt	7440-48-4	1.000 mg/L	86.2	70	130
		EG020A-W: Copper	7440-50-8	1.000 mg/L	85.1	70	130
		EG020A-W: Lead	7439-92-1	1.000 mg/L	87.3	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Spike Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 1855152) - continued							
EP1104006-002	RRPT01	EG020A-W: Manganese	7439-96-5	1.000 mg/L	83.3	70	130
		EG020A-W: Nickel	7440-02-0	1.000 mg/L	87.4	70	130
		EG020A-W: Vanadium	7440-62-2	1.000 mg/L	82.6	70	130
		EG020A-W: Zinc	7440-66-6	1.000 mg/L	82.1	70	130
EG035W: Water Leachable Mercury by FIMS (QCLot: 1855908)							
EP1104006-002	RRPT01	EG035W: Mercury	7439-97-6	0.010 mg/L	118	70	130

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Finalized Date: 30-JUN-2011
Account: ALSENV

QC CERTIFICATE PH11116871

Project: EP1104006
P.O. No.: 295856
This report is for 2 Pulp samples submitted to our lab in Perth, WA, Australia on 27-JUN-2011.
The following have access to data associated with this certificate:

SUB RESULTS		

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
LEV-01	Waste Disposal Levy
LOG-24	Pulp Login - Rcd w/o Barcode

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-XRF12	Whole rock XRF	XRF
OA-GRA05t	Multi-temperature LOI	TGA

To: **ALS ENVIRONMENTAL**
ATTN: SUB RESULTS
10 HOD WAY
MALAGA WA 6090

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature: W. Abbott
Wayne Abbott, Operations Manager, Western Australia

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Project: EP1104006

QC CERTIFICATE OF ANALYSIS PH11116871

Sample Description	Method	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12
	Analyte	Al2O3	As	BaO	CaO	Cl	Co	Cr2O3	Cu	Fe2O3	K2O	MgO	MnO	Mo	Na2O	Ni
	Units	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	LOR	0.01	0.001	0.001	0.01	0.001	0.001	0.001	0.001	0.01	0.001	0.01	0.001	0.001	0.001	0.001
STANDARDS																
JS1																
JS1																
Target Range - Lower Bound																
Upper Bound																
SARM-39		4.33	<0.001	0.194	9.80	0.052	0.008	0.218	0.006	9.34	1.075	25.5	0.171	<0.001	0.602	0.102
Target Range - Lower Bound		4.07	<0.001	0.180	9.20	0.032	0.007	0.180	0.006	8.82	0.987	24.9	0.161	<0.001	0.588	0.093
Upper Bound		4.51	0.003	0.201	10.20	0.038	0.009	0.201	0.008	9.76	1.095	27.5	0.180	0.002	0.652	0.105
SARM-45		26.4	0.002	0.095	0.77	0.007	0.005	0.036	0.002	12.40	3.12	3.48	0.096	0.003	0.757	0.008
Target Range - Lower Bound		24.9	0.002	0.089	0.73	0.006	0.003	0.034	<0.001	11.95	3.02	3.21	0.094	<0.001	0.797	0.007
Upper Bound		27.5	0.004	0.101	0.83	0.008	0.005	0.040	0.002	13.25	3.34	3.57	0.106	0.002	0.883	0.009
BLANKS																
BLANK		<0.01	<0.001	<0.001	<0.01	<0.001	<0.001	0.003	<0.001	<0.01	<0.001	0.02	<0.001	<0.001	0.141	<0.001
Target Range - Lower Bound		<0.01	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001
Upper Bound		0.02	0.002	0.002	0.02	0.002	0.002	0.002	0.002	0.02	0.002	0.02	0.002	0.002	0.002	0.002
DUPLICATES																
MMPT01																
DUP																
Target Range - Lower Bound																
Upper Bound																
RRPT01		7.58	0.006	<0.001	0.10	0.037	<0.001	<0.001	0.003	68.4	0.027	0.12	0.297	<0.001	0.058	0.003
DUP		7.75	0.006	<0.001	0.10	0.032	<0.001	<0.001	<0.001	68.4	0.032	0.10	0.295	<0.001	0.062	<0.001
Target Range - Lower Bound		7.46	0.005	<0.001	0.09	0.033	<0.001	<0.001	<0.001	66.7	0.028	0.10	0.288	<0.001	0.058	<0.001
Upper Bound		7.87	0.007	0.002	0.11	0.036	0.002	0.002	0.003	70.1	0.031	0.12	0.304	0.002	0.063	0.003

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Project: EP1104006

QC CERTIFICATE OF ANALYSIS PH11116871

Sample Description	Method	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	ME-XRF12	OA-GRA05t
	Analyte	P2O5	Pb	SO3	SiO2	TiO2	V2O5	Zn	LOI 1000
	Units	%	%	%	%	%	%	%	%
	LOR	0.001	0.001	0.001	0.01	0.01	0.001	0.001	0.01
STANDARDS									
JS1									7.80
JS1									7.84
Target Range - Lower Bound									6.95
Upper Bound									8.51
SARM-39		1.440	<0.001	0.789	34.2	1.66	0.020	0.007	
Target Range - Lower Bound		1.385	0.002	0.719	31.7	1.49	0.017	0.006	
Upper Bound		1.535	0.004	0.797	35.1	1.67	0.021	0.008	
SARM-45		0.077	0.003	0.116	49.5	1.85	0.048	0.009	
Target Range - Lower Bound		0.075	0.002	0.118	47.1	1.72	0.045	0.006	
Upper Bound		0.085	0.004	0.132	52.1	1.92	0.051	0.008	
BLANKS									
BLANK		<0.001	<0.001	<0.001	97.1	<0.01	<0.001	<0.001	
Target Range - Lower Bound		<0.001	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001	
Upper Bound		0.002	0.002	0.002	0.02	0.02	0.002	0.002	
DUPLICATES									
MMPT01									9.87
DUP									9.90
Target Range - Lower Bound									9.38
Upper Bound									10.40
RRPT01		0.170	<0.001	0.076	14.25	0.33	<0.001	0.021	
DUP		0.170	<0.001	0.078	14.10	0.35	<0.001	0.019	
Target Range - Lower Bound		0.165	<0.001	0.074	13.80	0.32	<0.001	0.019	
Upper Bound		0.175	0.002	0.080	14.55	0.36	0.002	0.022	

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EP1104006**	Page	: 1 of 11
Client	: URS AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: ELENA CHIN	Contact	: Lauren Ockwell
Address	: LEVEL 4, 226 ADELAIDE TERRACE PERTH WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: elena_chin@urscorp.com	E-mail	: lauren.ockwell@alsenviro.com
Telephone	: +61 08 9326 0100	Telephone	: 08 9209 7606
Facsimile	: +61 08 9326 0296	Facsimile	: 08 9209 7600
Project	: 42907769	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 27-JUN-2011
Sampler	: ----	Issue Date	: 06-JUL-2011
Order number	: PER-11-7070E1		
		No. of samples received	: 6
Quote number	: EP/361/11	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**---**	29-JUN-2011	----	**01-JUL-2011**	29-JUN-2011	×
EA010: Conductivity								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**----**	----	----	**01-JUL-2011**	27-JUL-2011	✓
EA013: Acid Neutralising Capacity								
Pulp Bag								
MMPT01,	RRPT01	**24-JUN-2011**	**27-JUN-2011**	23-JUN-2012	✓	**04-JUL-2011**	24-DEC-2011	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**----**	----	----	**01-JUL-2011**	06-JUL-2011	✓
EA055: Moisture Content								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**----**	----	----	**05-JUL-2011**	08-JUL-2011	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**---**	13-JUL-2011	----	**01-JUL-2011**	13-JUL-2011	✓
ED040F: Dissolved Major Anions								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**---**	27-JUL-2011	----	**01-JUL-2011**	27-JUL-2011	✓
ED040S : Soluble Sulfate by ICPAES								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	01-JUL-2011	×	**05-JUL-2011**	02-AUG-2011	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	**---**	27-JUL-2011	----	**04-JUL-2011**	27-JUL-2011	✓
ED042T: Total Sulfur by LECO								
Pulp Bag								
MMPT01,	RRPT01	**24-JUN-2011**	**04-JUL-2011**	21-DEC-2011	✓	**04-JUL-2011**	21-DEC-2011	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride Discrete analyser								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	---	27-JUL-2011	----	**04-JUL-2011**	27-JUL-2011	✓
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	01-JUL-2011	×	**05-JUL-2011**	02-AUG-2011	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural								
MMPT01,	RRPT01	**29-JUN-2011**	---	06-JUL-2011	----	**01-JUL-2011**	06-JUL-2011	✓
ED093S: Soluble Major Cations								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	21-DEC-2011	✓	**05-JUL-2011**	21-DEC-2011	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	21-DEC-2011	✓	**05-JUL-2011**	21-DEC-2011	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered								
MMPT01,	RRPT01	**29-JUN-2011**	**04-JUL-2011**	26-DEC-2011	✓	**04-JUL-2011**	26-DEC-2011	✓
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	21-DEC-2011	✓	**05-JUL-2011**	21-DEC-2011	✓
EG020W: Water Leachable Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered								
MMPT01,	RRPT01	**29-JUN-2011**	**04-JUL-2011**	26-DEC-2011	✓	**04-JUL-2011**	26-DEC-2011	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**05-JUL-2011**	22-JUL-2011	✓	**05-JUL-2011**	22-JUL-2011	✓
EG035W: Water Leachable Mercury by FIMS								
Soil Glass Jar - Unpreserved								
MMPT01,	RRPT01	**24-JUN-2011**	**----**	----	----	**04-JUL-2011**	22-JUL-2011	✓
EN60: Bottle Leaching Procedure								
LabSplit: Leach for organics and other tests								
MMPT01,	RRPT01	**24-JUN-2011**	---	08-JUL-2011	----	**30-JUN-2011**	08-JUL-2011	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Total Metals by ICP-MS - Suite R	EG020R-T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Acid Neutralising Capacity (ANC)	EA013	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Cations - soluble by ICP-AES	ED093S	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride Soluble By Discrete Analyser	ED045G	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfur - Total as S (LECO)	ED042T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite X	EG020X-T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Y	EG020Y-T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Z	EG020Z-T	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Acid Neutralising Capacity (ANC)	EA013	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride Soluble By Discrete Analyser	ED045G	2	2	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfur - Total as S (LECO)	ED042T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite X	EG020X-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Y	EG020Y-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Z	EG020Z-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Total Metals by ICP-MS - Suite R	EG020R-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Acid Neutralising Capacity (ANC)	EA013	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Cations - soluble by ICP-AES	ED093S	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride Soluble By Discrete Analyser	ED045G	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Soluble	ED040S	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfur - Total as S (LECO)	ED042T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite V	EG020V-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite X	EG020X-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Y	EG020Y-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite Z	EG020Z-T	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride Soluble By Discrete Analyser	ED045G	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Metals by ICP-MS - Suite X	EG020X-T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite Y	EG020Y-T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite Z	EG020Z-T	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity	EA010	1	9	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	8	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	16	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.0**	**10.0**	×	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Mercury by FIMS	EG035W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity	EA010	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	16	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Mercury by FIMS	EG035W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity	EA010	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Mercury by FIMS	EG035W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Water Leachable Mercury by FIMS	EG035W	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	SOIL	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity	EA010	SOIL	APHA 21st ed., 2510 B Conductivity is determined by ISE, either manually or automated measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Acid Neutralising Capacity (ANC)	EA013	SOIL	USEPA 600/2-78-054, I. Miller (2000). A fizz test is done to semiquanititatively estimate the likely reactivity. The soil is then reacted with an known excess quanitity of an appropriate acid. Titration determines the acid remaining, and the ANC can be calculated from comparison with a blank titration.
Total Dissolved Solids (High Level)	EA015H	SOIL	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2010 Draft) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Alkalinity by PC Titrator	ED037-P	SOIL	APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Dissolved	ED040F	SOIL	APHA 21st ed., 3120. The 0.45um filtered samples are determined by ICP/AES for Sulfur and/or Silcon content and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Major Anions - Soluble	ED040S	SOIL	In-house. Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	SOIL	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Sulfur - Total as S (LECO)	ED042T	SOIL	In-house. Dried and pulverised sample is combusted in a LECO furnace at 1350C in the presence of strong oxidants / catalysts. The evolved S (as SO2) is measured by infra-red detector
Chloride by Discrete Analyser	ED045G	SOIL	APHA 21st ed., 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	SOIL	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Cations - soluble by ICP-AES	ED093S	SOIL	APHA 21st ed., 3120; USEPA SW 846 - 6010 (ICPAES) Water extracts of the soil are analyzed for major cations by ICPAES. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite R	EG020R-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020) (ICPMS) Metals in solids are determined following an appropriate acid digestion. The ICPMS technique ionizes selected elements. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass / charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (1999) Schedule B(3)
Total Metals by ICP-MS - Suite V	EG020V-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Metals in solids are determined following an appropriate acid digestion. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite X	EG020X-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite Y	EG020Y-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite Z	EG020Z-T	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Water Leachable Mercury by FIMS	EG035W	SOIL	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the TCLP solution. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and ICPAES	EN055 - PG	SOIL	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by ICPAES. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Miscellaneous Subcontracted Analysis	MIS-SOL	SOIL	Miscellaneous Subcontracted Analysis conducted by Subcontracting Laboratory

Preparation Methods	Method	Matrix	Method Descriptions
Sample Compositing	EN020	SOIL	Equal weights of each original soil are taken, then mixed and homogenised. The combined mixture is labelled as a new sample.
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
Digestion for Total Recoverable Metals in DI Water Leachate	EN25W	SOIL	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Deionised Water Leach	EN60-DIa	SOIL	AS4439.3 Preparation of Leachates
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EG005T: Total Metals by ICP-AES	2190594-003	----	**Iron**	7439-89-6	137 %	79-130%	**Recovery greater than upper control limit**
Matrix Spike (MS) Recoveries							
EG020T: Total Metals by ICP-MS	EP1104006-002	RRPT01	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
MMPT01,	RRPT01	----	----	----	01-JUL-2011	29-JUN-2011	**2**
ED040S : Soluble Sulfate by ICPAES							
Soil Glass Jar - Unpreserved							
MMPT01,	RRPT01	05-JUL-2011	01-JUL-2011	**4**	----	----	----
ED045G: Chloride Discrete analyser							
Soil Glass Jar - Unpreserved							
MMPT01,	RRPT01	05-JUL-2011	01-JUL-2011	**4**	----	----	----

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	1	20	5.0	10.0	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

URS DATA VALIDATION SUMMARY REPORT

Site:	FerrAus Tailing, Pilbara	**Validation Conducted by:** (Data Manager)	Elena Chin	**Date:**	8	7 11
Project No.:	42907769	**Signed:**				
Project Manager:	Tracey Hassell					
Matrix:	solid and liquid	**Validation Verified by:**	Wesu Ndilila-Barnes	**Date:**	21	7 2011
No of Primary Samples:	4	(Data Validator)				
Laboratory:	ALS	**Signed:**				
Lab Batch No.:	EP1104006					
		Reviewed by: (Project Manager)	Tracey Hassell	**Date:**	21	7 2011
		Signed:				

Data Quality Objectives

Anomalous Field Data Comparison (Anomalous Results)	Samples were provided by client from laboratory testing. No field work was conducted as part of this scope of work
Frequency of field QA/QC (ie field duplicates/triplicates, rinsate/field/trip blanks, etc)	Field QA/QC was not required in this investigation.
Frequency of laboratory QA/QC (ie laboratory duplicates, matrix spikes, laboratory control samples, method blanks, etc)	Lab duplicates and LCS were reported less than the required frequency for pH (solid tailing samples). Therefore, only a limited assessment of the precision and accuracy of the sample matrix can be performed for this method. However, URS considers this is acceptable as this batch only contained two samples analysed for this analytes.
Number of tests requested/reported	Samples were analysed and reported as requested on the COC.
Limits of Reporting	Limits of reporting were sufficiently low to enable a meaningful comparison with adopted guideline values, with the exception of silver (leacahte analysis), however, this analyte was below the LOR for both samples.

Sample Management

Sample handling/preservation (ie Temp received by laboratory etc.)	Samples were received by the laboratory at 23.7ºC with ice present, above the recommended temperature. However, this will not affect data interpretation as no volatile analytes were required to analyse.
Sample holding times	Analysis holding times failed by 2 days for the following samples: • RRPT01 for pH Extraction holding times failed by 4 days for the following samples: • RRTP01 for soluble sulfate and chloride

Data Precision

Field duplicate RPDs (Primary Laboratory)	Field duplicate was not required as samples were provided by client.
Laboratory duplicate RPDs	All RPDs were within control limits.

Data Accuracy

Laboratory Control Samples	Iron had a recovery (137%) which marginally exceeded the upper control limit (130%).
Data Transcription	A 10% check of the laboratory results identified no anomalies between the electronic data, the laboratory report, and the tables generated by URS.
Matrix Spike Recoveries	Manganese recovery was not determined due to background concentrations greater than 4 times the spike level.
Surrogate Recoveries	Surrogates were within recovery limits.

Data Comparability

Changes in sampling personnel	Samples provided by client
Changes in methodologies	Samples provided by client

Blank Monitoring

Rinsate Blank	N/A
Trip Blank	N/A
Method blank	Concentrations were reported below the LOR.

Chromatograms

Chromatograms	N/A
Other observations	N/A

Data Verification: COPY OF EP1104006_MRED

Site Name	**FerrAus Tailings Geochemical Assessment**
Project No.	**42907769**
Project Manager	**Tracey Hassell**
Matrix	**liquid**
Laboratory	**ALS-BRISBANE**
Batch File Name	**EP1104006**

Analytical Parameter	Number of Tests Requested	Number of Tests Reported	Holding Times (a)	Limits of Reporting	LAB_DUPLICATE		LCS		MATRIX_SPIKE		METHOD_BLANK	
					Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported
Acid Neutralising Capacity	2	2	✓	✓	1	1	1	1	0	0	1	1
Sulfur	2	2	✓	✓	1	1	1	1	0	0	1	1
Major Ions	2	2	☒	✓	1	3	1	3	1	1	1	3
Metals (Total)	2	2	✓	✓	1	2	1	5	1	3	1	5
Moisture Content	2	2	✓	✓	1	1	**1**	**0**	0	0	0	0
Physico-Chemical Parameters	2	2	☒	✓	1	1	1	0	0	0	0	0

Leachate

Analytical Parameter	Number of Tests Requested	Number of Tests Reported	Holding Times (a)	Limits of Reporting	LAB_DUPLICATE		LCS		MATRIX_SPIKE		METHOD_BLANK	
					Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported
Alkalinity	2	2	✓	✓	1	2	1	1	0	0	1	1
Major Ions	2	2	☒	✓	1	5	1	4	1	2	1	4
Metals (Leachable)	2	2	✓	✓	1	5	1	4	1	2	1	4
Physico-Chemical Parameters	2	2	☒	✓	1	3	1	3	0	0	1	2

Initial _____ Date ____/____/_____