

APPENDIX A

Copy of Appendix B of ANCOLD “Guidelines on the Consequence Categories for Dams”

Appendix B

Appendix B: Selection of severity of damage and loss

B1 Total infrastructure costs

Total infrastructure costs are considered for residential and commercial as well as community infrastructure. Costs associated with replacement or repair to the dam are also included.

Type	Minor	Medium	Major	Catastrophic
See Below	< \$10M	\$10M - \$100M	\$100M - \$1B	> \$1B

Explanatory Notes for Infrastructure Costs

Type	Description
Residential	Total number of houses affected, some destroyed and others damaged.
Commercial	Including businesses and agriculture. E.g. retail, manufacturing, resources. Loss of stock and/or produce as a direct result of the flood wave.
Community infrastructure	Such as roads, railways, power, communications, gas, water supply, sewerage, irrigation, drainage, schools, hospitals, community facilities and public buildings.
Dam replacement or repair cost	Repairs to the embankment or wall and appurtenant works which will return the dam to its previous level of service.

Appendix B

B3 Health and social impacts

Type	Minor	Medium	Major	Catastrophic
Human health	<100 people affected	100 to 1000 people affected	>1000 people affected for greater than one month	>10 000 people affected for a year or more
Loss of services to the community	<100 people affected	100 to 1000 people affected	>1000 people affected for greater than one month	>10 000 people affected for a year or more
Cost of emergency management	<1000 person days	1000 to 10 000 person days	>10 000 person days	>100 000 person days
Dislocation of people	<100 person months	100 to 1000 person months	>1000 person months	>10 000 person months
Dislocation of businesses	<200 business months	200 to 2000 business months	>2000 business months and some business failures	Numerous business failures
Employment affected	<100 jobs lost	100 to 1000 jobs lost	>1000 jobs lost	>10 000 jobs lost
Loss of heritage	Local facility	Regional facility	National facility	International facility
Loss of recreational facility	Local facility	Regional facility	National facility	International facility

Explanatory notes for health and social impacts

Type	Description
Human health	Human health could be affected by: <ul style="list-style-type: none"> contamination of drinking water failure or lack of water supplies, sewage treatment works, power. Contamination of services such as food, health, recreation areas and facilities caused by the uncontrolled release of sewage, industrial or toxic waste as a result of a dam break.
Loss of services to the community	Loss of gas/power/communications and transport. Distribution of medical supplies, food, especially perishable food items.
Cost of emergency management	Police, Emergency Services and volunteers will incur a cost both direct and indirect.
Dislocation of people	People whose homes are destroyed or damaged will need to be re-housed or billeted for various times.
Dislocation of businesses	Businesses will be prevented from trading in the short term and may be affected in the long term.
Employment affected	Loss of employment.
Loss of heritage	Historic sites, both pre- and post-European settlement.
Loss of recreational facility	Many communities rely, to various degrees, on bodies of water for boating, fishing and other recreational aspects, including visual relief. Other recreational facilities may be located downstream of the reservoir, e.g. golf course, sports grounds.

Appendix B

B2 Impact on dam owner's business

Type	Minor	Medium	Major	Catastrophic
Importance to the business	Restrictions needed during dry periods	Restrictions needed during peak days and peak hours	Essential to maintain supply	Dissolution of business/entity
Effect on services provided by the owner	Minor difficulties in replacing services	Reduced services are possible with reasonable restrictions	Severe restrictions would be applied for at least one year	Services cannot be replaced or cannot get services from another source
Effect on continuing credibility	Some reaction but short lived	Severe widespread reaction	Extreme discontent	Total loss of confidence and credibility
Community reaction and political implications	Some reaction but short lived	Severe widespread reaction	Extreme discontent	Total loss of confidence and credibility
Impact on financial viability	Able to absorb in one financial year	Significant with considerable impact in the long term	Severe to crippling in the long term	Bankruptcy
Value of water in the storage	Can be absorbed in one financial year	Loss of income for at least 1 year	Loss of income for more than 1 year	Bankruptcy

Explanatory notes for dam owner's business

Type	Description
Importance to the business	Loss of storage is likely to affect the service provided to some degree. It may be appropriate to increase the severity level because of the importance of the reservoir. However a loss of vital water resource may lead to a reduction in the severity of the cost of replacement or repair.
Effect on the services provided by the owner	Water supply, power or recreational facility is no longer available or disrupted to a proportion of the community supplied by the agency.
Effect on continuing credibility	Standing or reputation of the organisation in the community.
Community reaction and political implications	There may be community objection to replacement of the dam. Also, the relationship between the dam owner and local, state and federal legislature.
Impact on financial viability	Economic and legal liability: ability to meet the costs of repairs and damage; ability to meet claims from others.
Value of water in the storage	Loss of income from the loss of the stored water.

Appendix B

B4 Environmental impacts

Type	Minor	Medium	Major	Catastrophic
Area of impact	< 1 km ²	< 5 km ²	< 20 km ²	> 20 km ²
Duration of impact	< 1 year	< 5 years	< 70 years	> 70 years
Stock and fauna	Discharge from dam break would not contaminate water supplies used by stock and fauna.	Discharge from dam break would contaminate water supplies used by stock and fauna. Herd impacts not expected.	Discharge from dam break would contaminate water supplies used by stock and fauna with contaminant uptake.	Discharge from dam break would contaminate water supplies used by stock and fauna with contaminant uptake and measurable health impacts expected.
Ecosystems	Discharge from dam break would have short term impacts on ecosystems. Remediation possible.	Discharge from dam break would have short term impacts on ecosystems with natural recovery expected after one wet season. Remediation possible.	Discharge from dam break would have significant impacts on ecosystems with natural recovery expected after several wet seasons. Remediation possible over many years.	Discharge from dam break would have significant permanent impacts on ecosystems. Remediation involves altered ecosystems.
Rare and endangered species	Species exist but minimal damage expected. Recovery within one year.	Species exist with losses expected to be recovered over a number of years.	Rare and endangered species will be severely impacted. Recovery will take many years.	Endangered species will be lost from the area. Permanent loss of species will occur.

Explanatory notes for environmental impacts

Type	Description
Area of impact	Land damaged by dam failure exclusive of land prone to natural flooding. For tailings dams, the damage will relate to the toxicity of the material in relation to both area of impact and the depth of penetration of the toxic materials.
Duration of impact	Habitats may take a long time to recover (e.g. substantial erosion, deposition of flood borne materials). The duration of the impact will also relate to the toxicity of discharged material (e.g. saline, tailings, sewerage, cold water, desoxygenated water).
Stock and fauna	Stock and fauna may ingest contaminated water/food. Stock may need to be removed from the area or destroyed. Contaminants may cause damage in relation to reproduction cycle. The impact on stock and fauna may not be immediately identified unless testing of food source is carried out.
Ecosystems	Includes organisms and non-living components which interact to form a stable system. Consideration should be given to their environment, habitat, breeding grounds and food chain.
Rare and endangered species	Information can be gained from state and federal government agencies in relation to areas known to contain rare and endangered flora and fauna.

APPENDIX B

Copy of KP memorandum PE801-139 EMEM-KP005

Knight Piésold
CONSULTING

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MEMORANDUM

To:	Cortona Resources Ltd	Date:	12 October 2012
Attn:	James Dornan	Our Ref:	PE801-00139 EJT M12001
		KP File Ref.:	PE801-139 EMEM-KP005
cc:		From:	Tim Rowles

RE: DARGUES REEF GOLD PROJECT – GEOCHEMICAL CHARACTERISATION OF LONDON VICTORIA TAILINGS

1. INTRODUCTION

A sample of a typical tailings product that will be produced at the London Victoria process plant was provided to Knight Piesold for testing. A sub-sample was sent to the Perth laboratory of Genalysis for geochemical analysis. This memorandum summarises the analysis methods employed, the results of the testwork and the implications for design and management of the tailings facility.

2. TESTWORK METHODS

2.1 ACID BASE ACCOUNTING

Acid base accounting (ABA) assesses a sample's potential to form acid from the oxidation of sulphides and the ability to neutralise acid by the dissolution of minerals, especially carbonates, contained in the sample.

Total carbon and total inorganic carbon were determined by LECO induction furnace, with infrared detection. Sulphate sulphur was determined by HCl digest with ICP detection. The test work methods used are based on the ABA methodology defined in the Mine Environment Neutral Drainage (MEND) Acid Rock Drainage Prediction Manual (Ref. 1) and Guidelines for Metal Leaching and Acid Rock Drainage at Mine Sites in British Columbia (Ref. 2).

Acid Neutralising Capacity (ANC) was determined by digestion in a standard solution of HCl, followed by back titration with NaOH to determine the amount of acid consumed. The technique used was based on Sobek et al (Ref. 3).

The results of the ABA test work are used to calculate the Maximum Potential Acidity (MPA) which is a measure of the maximum amount of sulphuric acid which can be produced from the total oxidation of all sulphides within the sample, assuming all sulphide is present as pyrite. The Net Acid Producing Potential (NAPP) is the balance between the Maximum Potential Acidity and the Acid Neutralising Capacity. A negative NAPP indicates that there is an excess neutralising capacity and a positive NAPP indicates there is excess potential acidity.

2.2 STATIC NET ACID GENERATION

Static Net Acid Generation (NAG) test work is a direct measure of the sample's ability to produce acid through sulphide oxidation. The addition of hydrogen peroxide to samples causes rapid oxidation of the contained sulphides to produce sulphuric acid.

The procedure employed is based upon the Static NAG Test (Ref. 4 and 5). The static NAG test involves the addition of 250 mL of 15% hydrogen peroxide to 2.5 g of pulverised sample. The sample is allowed to react overnight prior to heating for a period of three hours. Once the

sample has cooled the pH of the sample is measured prior to titration back to pH 4.5 and 7 to determine the acidity produced by the oxidation reactions.

2.3 ACID FORMING POTENTIAL

The acid formation potential of a sample is calculated based on the acid base accounting, i.e. the balance between a sample's ability to produce acid from the oxidation of sulphide minerals (MPA) and the sample's ability to neutralise acid by the dissolution of alkaline minerals contained within the sample (ANC).

Historically a safety margin was applied to ratio between the ANC and MPA to allow for variability in the rates of acid production and neutralisation processes and the potential for geographic separation of the acid producing and acid neutralising phases. This safety margin was generally set by industry at 2 in North America and 3 in Australia.

With recent advances in the understanding and acceptance of the NAG test there has been a move away from this method of classifying materials based solely on the ANC and MPA as these calculated parameters do not take into consideration the true availability of acid producing and acid neutralising phases.

Knight Piésold prefers to utilise the results of the acid base accounting in combination with the NAG testing results to classify the acid formation potential of materials. Knight Piésold's classification system is summarised in Table 2.1. It is based on the Australian Government's Guidelines on Managing Acidic and Metalliferous Drainage (Ref. 6) and is broadly similar to the classification system contained within the AMIRA ARD Test Handbook (Ref. 7), which is advocated by the Global Acid Rock Drainage Guide (Ref. 8).

Table 2.1: Acid Formation Potential Classification System

Acid Formation Potential Class	NAPP (kg H ₂ SO ₄ /t)	NAG pH
Potentially Acid Forming (PAF)	>10	<4.5
Potentially Acid Forming – Low Capacity (PAF-LC)	0 to 10	<4.5
Non Acid Forming (NAF)	Negative	≥4.5
Acid Consuming (AC)	Less than -100	≥4.5
Uncertain	Positive	≥4.5
	Negative	<4.5

2.4 MULTI-ELEMENT ANALYSIS OF SOLIDS

Multi-element analysis of the sample was conducted to assess element enrichments within the sample. The four acid digestion method used results in near total digestion of the sample to assess the whole rock geochemistry.

Multi-element analysis results were compared to average crustal abundances to calculate the geochemical abundance indices. The Geochemical Abundance Index (GAI) quantifies an assay result for a particular element in terms of average crustal abundance. The GAI is calculated from the following formula:

$$GAI = \text{Log}_2 (C_n / (1.5 \times B_n))$$

Where:

C_n = measured concentration of element in sample

B_n = average crustal abundance (Bowen, (Ref. 9))

The GAI is expressed on a scale of 0 to 6, with 0 indicating the concentration of the element is less than or similar to average crustal abundance. A GAI of 3 corresponds to a 12 fold increase above the average crustal abundance, and so forth up to a GAI of 6 which represents a 96 fold increase or greater. Knight Piésold has assigned an arbitrary scale to the GAI with indices of 0 and 1 being unenriched, indices of 2 being classified as slightly enriched, indices of 3 and 4 being classed as significantly enriched and indices of 5 and 6 being classified as highly enriched.

2.5 SUPERNATANT WATER QUALITY

Characterisation of the tailings supernatant has been conducted to assess the potential for the supernatant to cause environmental impacts to surface water or near surface groundwater. These tests differ from the multi-element tests conducted on the solids in that they only record the readily soluble elements, whereas the multi-element tests give the total element enrichment of the tailings solids.

A sample of the tailings slurry was sent to the laboratory. The pH and conductivity of the slurry were measured and the bottles left to stand for a minimum of 3 hours. The supernatant was siphoned off and filtered through 0.45 µm membrane before preservation of the solution by acid addition prior to analysis. The analysis was undertaken by means of Inductively Coupled Plasma Mass Spectrometry (ICP-MS) or Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES), depending on the element being analysed and the detection limits required.

The results have been compared to a set of reference water quality standards, which are discussed in Section 2.6.

2.6 REFERENCE WATER QUALITY STANDARDS

A set of reference values has been established to allow assessment of the results of the supernatant analysis. These reference values were compiled from internationally accepted guidelines for water quality for release from mining operations (IFC environmental, health and safety guidelines (Ref. 10 and 11) and the ANZECC water quality guideline for livestock drinking water (Ref. 12)). The use of several guidelines is required as no single guideline contains target concentrations for all parameters. Where a target concentration for a specific element is at different levels in various guidelines, the lowest concentration has been adopted. These reference values are provided in Table 2.2. The water quality results of the supernatant analysis have also been compared to Australian drinking water guidelines (Ref. 13) with the Australia drinking water guideline values provided in Table 2.3.

The establishment of these reference water quality values is to allow for evaluation only and it is not implied by production of the reference water quality values that the London Victoria site will be required to meet these reference levels or that these reference levels should be used as the regulatory framework. The regulatory requirements for the project will be determined by the relevant regulatory authorities. These reference levels are to be used for a preliminary assessment of water quality only. More detailed assessment of the impact of any release from the site may be required to assess the impact on receiving environments, such as aquatic systems, where different water quality requirements may be applicable.

Table 2.2: Reference Water Quality Guidelines for Release

Parameter	Unit	ANZECC Livestock	IFC 2004	IFC 2007	Adopted Reference Level
pH	S.U.		6 to 9	6 to 9	6 to 9
TDS	mg/kg	2000			2000
Aluminium	mg/L	5			5
Antimony	mg/L				N/G
Arsenic	mg/L	0.5	0.1	0.1	0.1
Barium	mg/L				N/G
Boron	mg/L	5			5
Cadmium	mg/L	0.01	0.1	0.05	0.01
Calcium	mg/L	1000			1000
Chloride	mg/L				N/G
Chromium	mg/L	1			1
Chromium (Cr ⁺⁶)	mg/L		0.1	0.1	0.1
Cobalt	mg/L	1			1
Copper	mg/L	0.4	0.5	0.3	0.3
Cyanide-Total	mg/L			1	1
Cyanide-WAD	mg/L		0.5	0.5	0.5
Cyanide-Free	mg/L			0.1	0.1
Fluoride	mg/L	2	20		2
Iron	mg/L		3.5	2	2
Lead	mg/L	0.1	0.1	0.2	0.1
Magnesium	mg/L	2000			2000
Manganese	mg/L				N/G
Mercury	mg/L	0.002	0.01	0.002	0.002
Molybdenum	mg/L	0.15			0.15
Nickel	mg/L	1	0.5	0.5	0.5
Phosphorus	mg/L				N/G
Selenium	mg/L	0.02	0.1		0.02
Silver	mg/L		0.5		0.5
Sodium	mg/L				N/G
Sulphate	mg/L	1000			1000
Tin	mg/L				N/G
Uranium	mg/L	0.2			0.2
Vanadium	mg/L				N/G
Zinc	mg/L	20	2	0.5	0.5

N/G – No guideline

Table 2.3: Reference Drinking Water Quality Guidelines

Parameter	Unit	Health	Aesthetic	Adopted Reference Level
pH	S.U.		6.5 to 8.5	6.5 to 8.5
TDS	mg/kg		600	600
Aluminium	mg/L		0.2	0.2
Antimony	mg/L	0.003		0.003
Arsenic	mg/L	0.01		0.01
Barium	mg/L	2.0		2.0
Boron	mg/L	4		4
Cadmium	mg/L	0.002		0.002
Calcium	mg/L			N/G
Chloride	mg/L		250	250
Chromium	mg/L			N/G
Chromium (Cr ⁺⁶)	mg/L	0.05		0.05
Cobalt	mg/L			N/G
Copper	mg/L	2	1	1
Cyanide-Total	mg/L	0.08		0.08
Cyanide-WAD	mg/L			N/G
Cyanide-Free	mg/L			N/G
Fluoride	mg/L	1.5		1.5
Iron	mg/L		0.3	0.3
Lead	mg/L	0.01		0.01
Magnesium	mg/L			N/G
Manganese	mg/L	0.5	0.1	0.1
Mercury	mg/L	0.001		0.001
Molybdenum	mg/L	0.05		0.05
Nickel	mg/L	0.02		0.02
Phosphorus	mg/L			N/G
Selenium	mg/L	0.01		0.01
Silver	mg/L	0.1		0.1
Sodium	mg/L		180	180
Sulphate	mg/L	500	250	250
Tin	mg/L			N/G
Uranium	mg/L	0.017		0.017
Vanadium	mg/L			N/G
Zinc	mg/L		3	3

N/G – No guideline

3. TAILINGS GEOCHEMICAL CHARACTERISTICS

3.1 INTRODUCTION

Laboratory test certificates for all the tailings analytical testing conducted by Genalysis are provided in Appendix A, with the results presented and discussed in the following sections. As part of the quality control and assurance programme conducted by Genalysis, duplicates of all tests were conducted on the tailings and supernatant samples. The results presented in the following sections are the average of the original and duplicate tests.

It should be noted that this assessment of the tailings geochemistry does not include assessment of residual process chemicals which may be present within the tailings slurry, except cyanide. However, should it be foreseeable under normal operating conditions that release of tailings slurry or supernatant into any waterways could occur, a detailed assessment of the residual process chemicals is recommended. This detailed assessment will require input from the process chemical supplier to determine the most appropriate laboratory methods to analyse for the specific process chemicals to be used in ore beneficiation.

3.2 ACID BASE ACCOUNTING

Total sulphur content of the tailings was determined by LECO combustion. In addition the sample was analysed for HCl soluble sulphate. The difference between these two values was assumed to be equal to the sulphide content of the sample. The results of the analysis are given in Table 3.1.

Table 3.1: Sulphur Analysis Results

Sample	Total Sulphur (%)	Sulphate Sulphur (%)	Sulphide Sulphur (%)	Maximum Potential Acidity (kg H ₂ SO ₄ / tonne)
London Victoria	43.6	0.50	43.1	1318

The results of the analysis indicate that the tailings sample had an extremely high total sulphur content and comparatively low sulphate content, indicating that the vast majority of sulphur is likely to be present as sulphide. The maximum potential acidity was calculated from the sulphide content at 1318 kg H₂SO₄ / tonne of tailings, which is extremely high.

The acid neutralising capacity (ANC) of the sample was determined along with the carbonate content. The two results can be used as a check against one another and to identify the contribution of ANC from carbonates and other non-carbonate minerals. The results of the analysis are given in Table 3.2.

Table 3.2: Summarised Carbonate and Acid Neutralising Capacity Results

Sample	Carbonate Carbon (% CaCO ₃)	CO ₃ -ANC ¹ (kg H ₂ SO ₄ /t)	ANC ² (kg H ₂ SO ₄ /t)
London Victoria	0.5	4.9	3.5

¹Calculated ANC from carbonate content, ²Measured Sobek ANC

The results of the analysis indicate that the tailings have a low carbonate content. In addition, the results indicate that the neutralising capacity calculated as being available from carbonate minerals is similar to the measured neutralising capacity of the sample. Therefore, there is not thought to be an additional neutralising capacity available from non-carbonate minerals. The overall acid neutralising capacity is low.

The Net Acid Producing Potential (NAPP) of the sample was calculated from the MPA and the ANC and is given in Table 3.3 along with the ANC/MPA ratio. The net acid producing potential of the sample is extremely high with an ANC/MPA ratio of 0.003, indicating that the sample has significant excess acid generating potential.

Table 3.3: Net Acid Producing Potential Results

Sample	ANC (kg H ₂ SO ₄ /t)	MPA (kg H ₂ SO ₄ /t)	NAPP (kg H ₂ SO ₄ /t)	ANC/MPA
London Victoria	3.5	1318	1315	0.003

3.3 NET ACID GENERATION

The net acid generation (NAG) test aids in interpretation of acid formation potential classifications. It also identifies if the sulphides and neutralising minerals contained in the sample are readily available to produce or consume acid.

The results of the net acid generation test are shown in Table 3.4 and indicate that under extreme oxidising conditions the tailings produced 1038 kg H₂SO₄/t (i.e. 1038 kg of acid for every tonne of tailings) and the pH of the NAG solution became strongly acidic. Comparison of the NAG results with the NAPP indicate that the 250 mL of hydrogen peroxide added in the NAG test may have been insufficient to fully oxidise all of the sulphide minerals contained within the sample. Therefore, the final pH following complete oxidation may be lower than 2.0. Nevertheless, the results of the NAG testing indicate that strongly acidic pH conditions are likely to develop within the tailings pore waters as the sulphide minerals oxidise.

Table 3.4: Net Acid Generation Results

Sample	NAG (7.0) (kg H ₂ SO ₄ /t)	NAG pH
London Victoria	1038	2.0

3.4 ACID FORMATION POTENTIAL

The acid formation potential of the sample is calculated based on the acid base accounting results and the NAG test. The acid base accounting results recorded an extremely high net acid producing potential of 1315 kg H₂SO₄/t, with the NAG test recording 1038 kg H₂SO₄/t. Further, the final NAG pH of the solution was 2.0. Therefore, the tailings sample was classified as Potentially Acid Forming, as shown in Figure 3.1.

3.5 GEOCHEMICAL ENRICHMENTS

Whole rock multi-element analysis of the tailings solids was conducted to assess element enrichments within the solid fraction of the tailings. Multi-element analysis results were compared to the average crustal abundances to calculate the geochemical abundance indices. The Geochemical Abundance Index (GAI) quantifies an assay result for a particular element in terms of average crustal abundance.

The assay results, average crustal abundance (ACA) and corresponding geochemical abundance indices (GAI) are given in Table 3.5. The results of the analysis show that tailings solids have a moderate number of elemental enrichments, with arsenic, bismuth, molybdenum, sulphur and selenium found to be highly enriched and silver, cobalt, copper, iron and mercury found to be significantly enriched. In addition, chromium, nickel, lead and antimony were found to be slightly enriched.

The results of the analysis have also been compared to a set of soil intervention guidelines compiled from the Australian National Environmental Protection (Assessment of Site Contamination) Measure (Ref. 14), Australian Health-based Soil Investigation Levels (Ref. 15), Netherlands National Institute of Public Health and Environment Intervention Values for Soil

(Ref. 16), and ecological threshold concentrations for antimony in water and soil (Ref. 17). The results of the comparison are given in Table 3.6 and indicate that arsenic, chromium, cobalt, copper, mercury, nickel, sulphur and sulphate concentrations exceed the guideline values. Sulphur was found to exceed the guideline values by the highest margin, with a concentration equivalent to over seven hundred times the target concentration. The results of this comparison indicate that a cover system will be required on closure to isolate the tailings from the environment. This is discussed further in Section 3.7.

Table 3.5: Multi-Element Analysis Results and Geochemical Abundance Indices

Element	Unit	Multi-Element Analysis Results	Average Crustal Abundance	Geochemical Abundance Index
Ag	ppm	2	0.07	4
Al	ppm	17982	82000	0
As	ppm	114	1.5	6
B	ppm	110	10	3
Ba	ppm	91	500	0
Be	ppm	0.45	2.6	0
Bi	ppm	178	0.048	6
Ca	ppm	3662	41000	0
Cd	ppm	0.35	0.11	1
Cl	ppm	200	130	0
Co	ppm	338	20	3
Cr	ppm	655	100	2
Cu	ppm	1611	50	4
F	ppm	237	950	0
Fe	ppm	371650	41000	3
Hg	ppm	1.46	0.05	4
K	ppm	5460	21000	0
Mg	ppm	3208	23000	0
Mn	ppm	178	950	0
Mo	ppm	89	1.5	5
Na	ppm	5135	23000	0
Ni	ppm	421	80	2
P	ppm	257	1000	0
Pb	ppm	76	14	2
S	ppm	435600	260	6
Sb	ppm	1.4	0.2	2
Se	ppm	33	0.05	6
Sn	ppm	2.3	2.2	0
Sr	ppm	36	370	0
Th	ppm	16	12	0
U	ppm	3.7	2.4	0
V	ppm	39	160	0
Zn	ppm	22	75	0

Not Enriched
Slightly Enriched
Significantly Enriched
Highly Enriched

Table 3.6: Tailings Solid Multi-Element Results & Site Contamination Guidelines

Element	Ecological Investigation - Interim Urban ¹ (ppm)	Health Investigation Levels - Category A ² (ppm)	Intervention Values for Soil ³ (ppm)	Most Conservative	Multi-Element Analysis Results (ppm)
Antimony ⁴			15	15	1.4
Arsenic	20	100	55	20	114
Barium	300		625	300	91
Beryllium		20	30	20	0.45
Boron		3000		3000	110
Cadmium	3	20	12	3	0.35
Chromium			380	380	655
Cobalt		100	240	100	338
Copper	100	1000	190	100	1611
Lead	600	300	530	300	76
Manganese	500	1500		500	178
Mercury	1	15	10	1	1.46
Molybdenum			200	200	89
Nickel	60	600	210	60	421
Phosphorus	2000			2000	257
Selenium			100	100	33
Silver			15	15	2.0
Sulphur	600			600	435600
Sulphate	2000			2000	4850
Tin			900	900	2.3
Vanadium	50		250	50	39
Zinc	200	7000	720	200	22

1 = National Environmental Protection Council - National Environmental Protection (Assessment of Site Contamination) Measure.

2 = Commonwealth of Australia – Health-based Soil Investigation Levels.

3 = Netherlands National Institute of Public Health and the Environment.

4 = Ecological Threshold Concentrations for Antimony in Water and Soil, Environmental Chemistry.

3.6 SUPERNATANT WATER QUALITY

The supernatant water quality was assessed to examine the solubility of various elements during processing. The results of the testing give an indication of the water quality which is likely within the supernatant pond during operation, but cannot be used to predict long term seepage quality from the facility. This would require leach and/or kinetic testing of the tailings solids which is beyond the scope of this initial geochemical assessment.

The results of the supernatant testing have been compared to the reference water quality standards for release of water from mining operations and livestock drinking water, as detailed in Table 2.2. The results of the supernatant testing compared to the reference water quality standards for release and livestock drinking water are provided in Table 3.7.

The supernatant of the tailings sample meets the guidelines for release from mining operations and for livestock drinking water for the majority of parameters analysed (where a guideline value is available), although the pH (i.e. low), TDS, selenium and sulphate concentrations were found to exceed the guideline values.

The free cyanide concentration was found to be below the laboratory limit of detection of 0.50 mg/L. However, given that the limit of detection exceeds the guideline value of 0.10 mg/L, it is not possible to determine whether the actual free cyanide concentration of the sample exceeds the guideline value. It should be noted that the standard laboratory limit of detection for free cyanide is 0.05 mg/L, however, this is not always achievable.

The results of the supernatant testing have also been compared to drinking water guidelines, as detailed in Table 2.3. The results of the supernatant testing compared to drinking water guidelines are provided in Table 3.8.

The tailings supernatant sample was found to exceed the drinking water guideline values for pH (i.e. low), TDS, cyanide (total), manganese, selenium, sodium, sulphate and uranium. Further, given that these determinants exceed the drinking water guidelines by less than ten times, they are deemed as being low hazard (low toxicity). Therefore, this indicates that a basin liner is required for the TSF or a proven depth of low permeability soil in all areas. This is discussed further in Section 3.7.

Table 3.7: Supernatant Comparison to Release and Livestock Guidelines

Parameter	Reference Value (mg/L)	Assay Results (mg/L)
pH	6 to 9	5.7
TDS	2000	3371
Aluminium	5	0.02
Antimony	N/G	0.001
Arsenic	0.1	0.003
Barium	N/G	0.03
Boron	5	0.25
Cadmium	0.01	0.0001
Calcium	1000	610
Chloride	N/G	213
Chromium (total)	1	0.01
Cobalt	1	0.01
Copper	0.3	0.01
Cyanide-Total	1	0.25
Cyanide-WAD	0.1	0.10
Cyanide-Free	0.5	0.50
Fluoride	2	1.20
Iron	2	0.12
Lead	0.1	0.001
Magnesium	2000	72
Manganese	N/G	0.15
Mercury	0.002	0.0001
Molybdenum	0.15	0.001
Nickel	0.5	0.02
Phosphorus	N/G	0.1
Selenium	0.02	0.025
Silver	0.5	0.00001
Sodium	N/G	209
Sulphate	1000	1911
Tin	N/G	0.0001
Uranium	0.2	0.025
Vanadium	N/G	0.01
Zinc	0.5	0.01

Notes:

N/D = Not determined.

N/G = No guideline.

Table 3.8: Supernatant Comparison to Drinking Water Guideline Values

Parameter	Reference Drinking Water Value (mg/L)	Assay Results (mg/L)
pH	6.5 to 8.5	5.7
TDS	600	3371
Aluminium	0.2	0.02
Antimony	0.003	0.001
Arsenic	0.01	0.003
Barium	2	0.03
Boron	4	0.25
Cadmium	0.002	0.0001
Calcium	N/G	610
Chloride	250	213
Chromium (total)	N/G	0.01
Cobalt	N/G	0.01
Copper	1	0.01
Cyanide-Total	0.08	0.25
Cyanide-WAD	N/G	0.10
Cyanide-Free	N/G	0.50
Fluoride	1.5	1.20
Iron	0.3	0.12
Lead	0.01	0.001
Magnesium	N/G	72
Manganese	0.1	0.15
Mercury	0.001	0.0001
Molybdenum	0.05	0.001
Nickel	0.02	0.02
Phosphorus	N/G	0.1
Selenium	0.01	0.025
Silver	0.1	0.00001
Sodium	180	209
Sulphate	250	1911
Tin	N/G	0.0001
Uranium	0.017	0.025
Vanadium	N/G	0.01
Zinc	3	0.01

Notes:

N/D = Not determined.

N/G = No guideline.

3.7 IMPLICATIONS FOR TAILINGS MANAGEMENT

The tailings sample is classified as Potentially Acid Forming due to an extremely high NAPP of 1315 kg H₂SO₄/t and NAG pH of 2. Therefore, additional testing is recommended to assess the acid generation rates of the tailings, as this will determine whether the tailings will generate acid whilst exposed on the tailings beach. This will enable the deposition management plan to be revised accordingly to reduce acid generation. The results would also be used to assist with liner and closure cover design. The additional testing would comprise kinetic NAG or column leach testing. Should the lag times for acid generation be very short, it may be necessary to either design and operate the TSF as a sub-aqueous facility, or accept that the tailings will acidify and implement appropriate containment measures.

The tailings recorded a moderate number of elemental enrichments, with arsenic, bismuth, molybdenum, sulphur and selenium found to be highly enriched and silver, cobalt, copper, iron and mercury found to be significantly enriched. The concentrations of arsenic, chromium, cobalt, copper, mercury, nickel, sulphur and sulphate were also found to exceed soil intervention values, indicating that a cover system will be required on closure to isolate the tailings from the environment. However, in this case the cover system design will be controlled by the acid generation potential, rather than elevated metals within the tailings solids.

The supernatant was found to be of a reasonable quality, although elevated concentrations of certain metals were recorded. Therefore, a facility liner will be required, but liner design will be controlled by the acid generation potential and pH of the supernatant, rather than due to the elevated levels of particular metals.

The information contained herein forms a part of the design process for the London Victoria tailings storage facility. Please do not hesitate to contact us should have any queries.

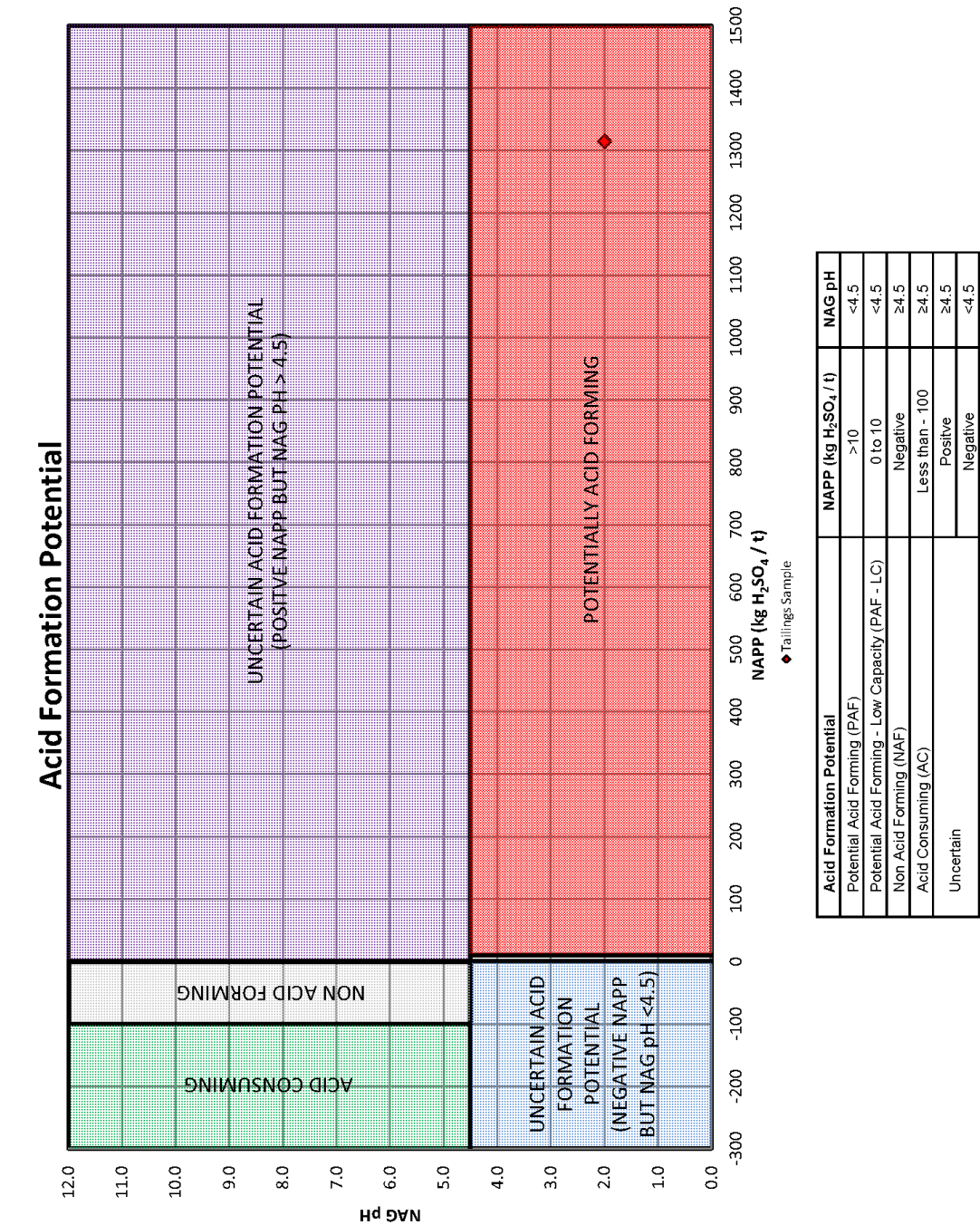
Yours faithfully
KNIGHT PIÉSOLD PTY LTD

TIM ROWLES
Regional Manager, Queensland

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FIGURE



APPENDIX A

Laboratory Test Reports



ANALYTICAL REPORT

KNIGHT PIESOLD PTY LIMITED
 PO Box 6837
 EAST PERTH, W.A. 6892
 AUSTRALIA

JOB INFORMATION

JOB CODE : 752.0/1213383
 No. of SAMPLES : 1
 No. of ELEMENTS : 46
 CLIENT O/N : P10477 (Job 1 of 2)
 SAMPLE SUBMISSION No. : PE801-00139/05
 PROJECT : TAILINGS
 STATE : Solid
 DATE RECEIVED : 26/07/2012
 DATE COMPLETED : 05/09/2012
 DATE PRINTED : 05/10/2012
 PRIMARY LABORATORY : Genalysis Main Laboratory

LEGEND

X = Less than Detection Limit
 N/R = Sample Not Received
 * = Result Checked
 () = Result still to come
 I/S = Insufficient Sample for Analysis
 E6 = Result X 1,000,000
 UA = Unable to Assay
 > = Value beyond Limit of Method
 OV = Value over-range for Package

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SAMPLE DETAILS

DISCLAIMER

Intertek Genalysis wishes to make the following disclaimer pertaining to the accompanying analytical results.

All work is performed in accordance with the Intertek Minerals Standard Terms and Conditions of work <http://www.intertek.com/terms/>

This report relates specifically to the sample(s) that were drawn and/or provided by the client or their nominated third party. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment and only relate to the sample(s) as received and tested. This report was prepared solely for the use of the client named in this report. Intertek accepts no responsibility for any loss, damage or liability suffered by a third party as a result of any reliance upon or use of this report.

SIGNIFICANT FIGURES

It is common practice to report data derived from analytical instrumentation to a maximum of two or three significant figures. Some data reported herein may show more figures than this. The reporting of more than two or three figures in no way implies that the third, fourth and subsequent figures may be real or significant.

Intertek Genalysis accepts no responsibility whatsoever for any interpretation by any party of any data where more than two or three significant figures have been reported.

SAMPLE STORAGE DETAILS

GENERAL CONDITIONS

SAMPLE STORAGE OF SOLIDS

Bulk Residues and Pulps will be stored for 60 DAYS without charge. After this time all Bulk Residues and Pulps will be stored at a rate of \$3.30 per cubic metre per day until your written advice regarding collection or disposal is received. Expenses related to the return or disposal of samples will be charged to you at cost. Current disposal cost is charged at \$100.00 per cubic metre.

SAMPLE STORAGE OF SOLUTIONS

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

NOTES

1. Note: Detection Limit only apply when TDS <100mg/l for MS and TDS<5000mg/l for OES except when indicated in spreadsheet

752.0/1213383 (05/10/2012) CLIENT O/N: P10477

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Part 1/8

ANALYSIS

ELEMENTS	Ag	Al	ANC	As	B	Ba
UNITS	ppm	ppm	kgH ₂ SO ₄ /t	ppm	ppm	ppm
DETECTION LIMIT	0.1	50	1	1	50	0.1
DIGEST	4AB/	4AB/	ANCx/	4AB/	FP1/	4AB/
ANALYTICAL FINISH	MS	OE	VOL	MS	OE	MS
SAMPLE NUMBERS						
0001 Tailing sample	2.0	1.85%	3	111	123	88.1

CHECKS

0001 Tailing sample	2.0	1.74%	4	116	97	92.9
---------------------	-----	-------	---	-----	----	------

STANDARDS

0001 0.5%NaCl						
0002 CaCO ₃						
0003 CCU-1d						
0004 GTS-2a						
0005 OREAS 97.01						
0006 PD-1						
0007 SARM48					X	
0008 STSD-1						

BLANKS

0001 Control Blank	X	X		X	X	X
0002 Control Blank	X	X		X		0.2
0003 Control Blank					X	
0004 Control Blank						
0005 Control Blank						
0006 Control Blank						
0007 Acid Blank	X	X		X		X
0008 Acid Blank					X	
0009 Acid Blank						
0010 Control Blank						

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Part 2/8

ANALYSIS

ELEMENTS	Be	Bi	C	Ca	Cd	Cl
UNITS	ppm	ppm	%	ppm	ppm	%
DETECTION LIMIT	0.1	0.01	0.01	50	0.1	0.02
DIGEST	4AB/	4AB/		4AB/	4AB/	CL1/
ANALYTICAL FINISH	MS	MS	/CSA	OE	MS	COL
SAMPLE NUMBERS						
0001 Tailing sample	0.4	182.29	0.18	3807	0.4	X

CHECKS

0001 Tailing sample	0.5	173.97	0.19	3517	0.3	X
---------------------	-----	--------	------	------	-----	---

STANDARDS

0001 0.5%NaCl						0.32
0002 CaCO3						
0003 CCU-1d			0.07			
0004 GTS-2a						
0005 OREAS 97.01						
0006 PD-1						
0007 SARM48						
0008 STSD-1						

BLANKS

0001 Control Blank	X	X	X	X	X	X
0002 Control Blank	X	X		X	X	
0003 Control Blank						
0004 Control Blank						
0005 Control Blank						
0006 Control Blank						
0007 Acid Blank	X	X		X	X	
0008 Acid Blank						
0009 Acid Blank						
0010 Control Blank						

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Part 3/8

ANALYSIS

ELEMENTS	Co	ColourChange	Cr	Cu	EC	F
UNITS	ppm	NONE	ppm	ppm	mS/cm	ppm
DETECTION LIMIT	0.1	0	5	1	0.01	50
DIGEST	4AB/	ANCx/	4AB/	4AB/	Paste/	FC7/
ANALYTICAL FINISH	MS	QUAL	OE	OE	MTR	SIE
SAMPLE NUMBERS						
0001 Tailing sample	342.1	Yes	682	1647	2.92	227

CHECKS						
0001 Tailing sample	333.3	Yes	627	1574	2.87	247

STANDARDS						
0001 0.5%NaCl						
0002 CaCO3						
0003 CCU-1d						
0004 GTS-2a						
0005 OREAS 97.01						
0006 PD-1						
0007 SARM48						
0008 STSD-1						1050

BLANKS						
0001 Control Blank	X	No	X	X	X	X
0002 Control Blank	X		X	X		
0003 Control Blank						
0004 Control Blank						
0005 Control Blank						
0006 Control Blank						
0007 Acid Blank	X		X	X		
0008 Acid Blank						
0009 Acid Blank						
0010 Control Blank						

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Part 4/8

ANALYSIS

ELEMENTS	Fe	Final-pH	Fizz-Rate	Hg	K	Mg
UNITS	%	NONE	NONE	ppm	ppm	ppm
DETECTION LIMIT	0.01	0.1	0	0.01	20	20
DIGEST	4AB/	ANCx/	ANCx/	HG1/	4AB/	4AB/
ANALYTICAL FINISH	OE	MTR	QUAL	CV	OE	OE
SAMPLE NUMBERS						
0001 Tailing sample	37.89	1.6	0	1.37	5657	3323

CHECKS

0001 Tailing sample	36.44	1.6	0	1.54	5263	3093
---------------------	-------	-----	---	------	------	------

STANDARDS

0001 0.5%NaCl

0002 CaCO₃

0003 CCU-1d

0004 GTS-2a

0.26

0005 OREAS 97.01

0006 PD-1

0007 SARM48

0008 STSD-1

BLANKS

0001 Control Blank	X	1.4	0	X	X	X
0002 Control Blank	X				X	X
0003 Control Blank						
0004 Control Blank				X		
0005 Control Blank						
0006 Control Blank						
0007 Acid Blank	0.01				X	X
0008 Acid Blank						
0009 Acid Blank				X		
0010 Control Blank						

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Part 5/8

ANALYSIS

ELEMENTS	Mn	Mo	Na	NAG	NAGpH	NAG(4.5)
UNITS	ppm	ppm	ppm	kgH ₂ SO ₄ /t	NONE	kgH ₂ SO ₄ /t
DETECTION LIMIT	1	0.1	20	1	0.1	1
DIGEST	4AB/	4AB/	4AB/	NAGx/	NAGx/	NAGx/
ANALYTICAL FINISH	OE	MS	OE	VOL	MTR	VOL
SAMPLE NUMBERS						
0001 Tailing sample	181	90.4	5245	1020	2.0	985

CHECKS

0001 Tailing sample	174	88.0	5024	1055	2.0	1013
---------------------	-----	------	------	------	-----	------

STANDARDS

0001 0.5%NaCl
0002 CaCO₃
0003 CCU-1d
0004 GTS-2a
0005 OREAS 97.01
0006 PD-1
0007 SARM48
0008 STSD-1

BLANKS

0001 Control Blank	1	X	X		5.1	
0002 Control Blank	X	X	X			
0003 Control Blank						
0004 Control Blank						
0005 Control Blank						
0006 Control Blank						
0007 Acid Blank	X	X	X			
0008 Acid Blank						
0009 Acid Blank						
0010 Control Blank						

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Part 6/8

ANALYSIS

ELEMENTS	Ni	P	Pb	pH	pH Drop	S
UNITS	ppm	ppm	ppm	NONE	NONE	%
DETECTION LIMIT	1	50	2	0.1	0.1	0.01
DIGEST	4AB/	4AB/	4AB/	Paste/	ANCx/	
ANALYTICAL FINISH	OE	OE	MS	MTR	MTR	/CSA
SAMPLE NUMBERS						
0001 Tailing sample	430	267	77	6.1	3.0	43.66

CHECKS

0001 Tailing sample	412	247	75	6.1	2.9	43.46
---------------------	-----	-----	----	-----	-----	-------

STANDARDS

0001 0.5%NaCl						
0002 CaCO ₃						
0003 CCU-1d						33.19
0004 GTS-2a						
0005 OREAS 97.01						
0006 PD-1						
0007 SARM48						
0008 STSD-1						

BLANKS

0001 Control Blank	1	X	X	6.7	X	X
0002 Control Blank	1	X	X			
0003 Control Blank						
0004 Control Blank						
0005 Control Blank						
0006 Control Blank						
0007 Acid Blank	X	X	X			
0008 Acid Blank						
0009 Acid Blank						
0010 Control Blank						

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Part 7/8

ANALYSIS

ELEMENTS	S-SO4	Sb	Se	Sn	Sr	Th
UNITS	%	ppm	ppm	ppm	ppm	ppm
DETECTION LIMIT	0.01	0.05	0.01	0.1	0.05	0.01
DIGEST	S71/	4AB/	SE1/	4AB/	4AB/	4AB/
ANALYTICAL FINISH	OE	MS	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailing sample	0.50	1.31	33.77	2.2	35.57	16.13

CHECKS						
0001 Tailing sample	0.47	1.42	31.35	2.3	35.46	16.25

STANDARDS						
0001 0.5%NaCl						
0002 CaCO3						
0003 CCU-1d						
0004 GTS-2a						
0005 OREAS 97.01			0.64			
0006 PD-1	4.48					
0007 SARM48						
0008 STSD-1						

BLANKS						
0001 Control Blank	0.01	X	X	0.2	0.10	X
0002 Control Blank		X		0.2	0.07	X
0003 Control Blank						
0004 Control Blank						
0005 Control Blank			X			
0006 Control Blank	0.01					
0007 Acid Blank		X		X	X	X
0008 Acid Blank						
0009 Acid Blank						
0010 Control Blank			X			

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Part 8/8

ANALYSIS

ELEMENTS	TIC	U	V	Zn
UNITS	%	ppm	ppm	ppm
DETECTION LIMIT	0.01	0.01	2	1
DIGEST	C72/	4AB/	4AB/	4AB/
ANALYTICAL FINISH	CSA	MS	OE	OE
SAMPLE NUMBERS				
0001 Tailing sample	0.07	3.85	39	21

CHECKS				
0001 Tailing sample	0.05	3.56	38	23

STANDARDS				
0001 0.5%NaCl				
0002 CaCO ₃	12.00			
0003 CCU-1d				
0004 GTS-2a				
0005 OREAS 97.01				
0006 PD-1				
0007 SARM48				
0008 STSD-1				

BLANKS				
0001 Control Blank		X	X	2
0002 Control Blank		0.02	X	1
0003 Control Blank				
0004 Control Blank				
0005 Control Blank				
0006 Control Blank				
0007 Acid Blank		X	X	X
0008 Acid Blank				
0009 Acid Blank				
0010 Control Blank				

METHOD CODE DESCRIPTION

/CSA	Genalysis Main Laboratory Induction Furnace Analysed by Infrared Spectrometry
4AB/MS	Genalysis Main Laboratory Multi-acid digest including Hydrofluoric, Nitric, Perchloric and Hydrochloric acids in Teflon Beakers. Analysed by Inductively Coupled Plasma Mass Spectrometry.
4AB/OE	Genalysis Main Laboratory Multi-acid digest including Hydrofluoric, Nitric, Perchloric and Hydrochloric acids in Teflon Beakers. Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.
ANCx/MTR	Genalysis Main Laboratory Acid Neutralizing Capacity Digestion Procedure. Analysed with Electronic Meter Measurement
ANCx/QUAL	Genalysis Main Laboratory Acid Neutralizing Capacity Digestion Procedure. Analysed by Qualitative Inspection
ANCx/VOL	Genalysis Main Laboratory Acid Neutralizing Capacity Digestion Procedure. Analysed by Volumetric Technique.
C72/CSA	Genalysis Main Laboratory Digestion by hot acid(s) Analysed by Infrared Spectrometry
CL1/COL	Genalysis Main Laboratory Carbonate leach specific for Chlorine. Analysed by UV-Visible Spectrometry.
FC7/SIE	Genalysis Main Laboratory Alkaline fusion (Nickel crucible) specific for Fluorine. Analysed by Specific Ion Electrode.
FP1/OE	Genalysis Main Laboratory Sodium peroxide fusion (Zirconia crucibles) and Hydrochloric acid to dissolve the melt. Analysed by Inductively Coupled PI
HG1/CV	Genalysis Main Laboratory Low temperature Perchloric acid digest specific for Mercury. Analysed by Cold Vapour Generation Atomic Absorption Spectrometry.
NAGx/MTR	Genalysis Main Laboratory Net Acid Generation Extraction of samples with H ₂ O ₂ Analysed with Electronic Meter Measurement
NAGx/VOL	Genalysis Main Laboratory Net Acid Generation Extraction of samples with H ₂ O ₂ Analysed by Volumetric Technique.
Paste/MTR	Genalysis Main Laboratory Water Extraction using a specific sample:water ratio. Analysed with Electronic Meter Measurement
S71/OE	Genalysis Main Laboratory Digestion to eliminate sulphides. Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.

METHOD CODE DESCRIPTION

SE1/MS

Genalysis Main Laboratory

Aqua-Regia digest followed by Precipitation and Concentration. Specific for Selenium. Analysed by Inductively Coupled PI



ANALYTICAL REPORT

KNIGHT PIESOLD PTY LIMITED
PO Box 6837
EAST PERTH, W.A. 6892
AUSTRALIA

JOB INFORMATION

JOB CODE : 752.0/1213384
No. of SAMPLES : 1
No. of ELEMENTS : 41
CLIENT O/N : P10477 (Job 2 of 2)
SAMPLE SUBMISSION No. : PE801-00139/05
PROJECT : TAILINGS
STATE : Solutions
DATE RECEIVED : 26/07/2012
DATE COMPLETED : 10/09/2012
DATE PRINTED : 05/10/2012
PRIMARY LABORATORY : Genalysis Main Laboratory

LEGEND

X = Less than Detection Limit
N/R = Sample Not Received
* = Result Checked
() = Result still to come
I/S = Insufficient Sample for Analysis
E6 = Result X 1,000,000
UA = Unable to Assay
> = Value beyond Limit of Method
OV = Value over-range for Package

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TOWNSVILLE LABORATORY

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SAMPLE DETAILS

DISCLAIMER

Intertek Genalysis wishes to make the following disclaimer pertaining to the accompanying analytical results.

All work is performed in accordance with the Intertek Minerals Standard Terms and Conditions of work <http://www.intertek.com/terms/>

This report relates specifically to the sample(s) that were drawn and/or provided by the client or their nominated third party. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment and only relate to the sample(s) as received and tested. This report was prepared solely for the use of the client named in this report. Intertek accepts no responsibility for any loss, damage or liability suffered by a third party as a result of any reliance upon or use of this report.

SIGNIFICANT FIGURES

It is common practice to report data derived from analytical instrumentation to a maximum of two or three significant figures. Some data reported herein may show more figures than this. The reporting of more than two or three figures in no way implies that the third, fourth and subsequent figures may be real or significant.

Intertek Genalysis accepts no responsibility whatsoever for any interpretation by any party of any data where more than two or three significant figures have been reported.

SAMPLE STORAGE DETAILS

GENERAL CONDITIONS

SAMPLE STORAGE OF SOLIDS

Bulk Residues and Pulps will be stored for 60 DAYS without charge. After this time all Bulk Residues and Pulps will be stored at a rate of \$3.30 per cubic metre per day until your written advice regarding collection or disposal is received. Expenses related to the return or disposal of samples will be charged to you at cost. Current disposal cost is charged at \$100.00 per cubic metre.

SAMPLE STORAGE OF SOLUTIONS

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

NOTES

1. Note: Detection Limit only apply when TDS <100mg/l for MS and TDS<5000mg/l for OES except when indicated in spreadsheet

752.0/1213384 (05/10/2012) CLIENT O/N: P10477

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Part 1/5

ANALYSIS

ELEMENTS	Ag	Al	As	B	Ba	Bi	Ca	Cd	Cl	Co
UNITS	ug/l	mg/l	ug/l	mg/l	ug/l	ug/l	mg/l	ug/l	mg/l	ug/l
DETECTION LIMIT	0.01	0.01	0.1	0.01	0.05	0.005	0.01	0.02	5	0.1
DIGEST		Ac/	Ac/	Ac/	Ac/	Ac/	Ac/	Ac/		Ac/
ANALYTICAL FINISH	/MS	OE	MS	OE	MS	MS	OE	MS	/VOL	MS
SAMPLE NUMBERS										
0001 PE801-00139	X	X	2.3	0.25	30.47	X	614.72	0.10	213	14.2

CHECKS

0001 PE801-00139	X	0.02	2.8	0.25	30.32	X	606.13	0.10	213	14.2
------------------	---	------	-----	------	-------	---	--------	------	-----	------

STANDARDS

0001 Alcoa11-OES		2.07		0.99			50.82			
0002 SOLN-001										
0003 Alcoa-High5-MS	18.99		108.5		23.68	19.206		19.60		533.9

BLANKS

0001 Control Blank	X	X	X	X	X	X	0.01	X		X
--------------------	---	---	---	---	---	---	------	---	--	---

752.0/1213384 (05/10/2012) CLIENT O/N: P10477

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Part 2/5

ANALYSIS

ELEMENTS	Cr	Cu	EC	F	Fe-Sol	Hg	K	Mg	Mn	Mo
UNITS	mg/l	mg/l	mS/cm	mg/l	mg/l	ug/l	mg/l	mg/l	mg/l	ug/l
DETECTION LIMIT	0.01	0.01	0.01	0.1	0.01	0.1	0.1	0.01	0.01	0.05
DIGEST	Ac/	Ac/			Ac/	Ac/	Ac/	Ac/	Ac/	Ac/
ANALYTICAL FINISH	OE	OE	/MTR	/SIE	OE	MS	OE	OE	OE	MS
SAMPLE NUMBERS										
0001 PE801-00139	X	X	3.46	1.2	0.12	X	16.4	72.67	0.15	0.60

CHECKS

0001 PE801-00139	0.01	X	3.46	1.2	0.11	X	15.9	71.33	0.14	0.60
------------------	------	---	------	-----	------	---	------	-------	------	------

STANDARDS

0001 Alcoa11-OES	0.51	0.53			2.03		3.8	49.99	0.52	
0002 SOLN-001				0.9						
0003 Alcoa-High5-MS						21.9				23.19

BLANKS

0001 Control Blank	X	X		X	0.01	X	X	X	X	X
--------------------	---	---	--	---	------	---	---	---	---	---

752.0/1213384 (05/10/2012) CLIENT O/N: P10477

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Part 3/5

ANALYSIS

ELEMENTS	CN-Tot	CN-WAD	FreeCN	Na	Ni	P	Pb	pH	S	SO4
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	ug/l	NONE	mg/l	mg/l
DETECTION LIMIT	0.01	0.01	0.5	0.1	0.01	0.1	0.5	0.1	0.1	0.3
DIGEST				Ac/	Ac/	Ac/	Ac/		Ac/	
ANALYTICAL FINISH	/COL	/COL	/COL	OE	OE	OE	MS	/MTR	OE	/CALC
SAMPLE NUMBERS										
0001 PE801-00139	0.25	0.10	X	211.9	0.02	X	X	5.7	645.1	1932.6

CHECKS

0001 PE801-00139	0.25	0.10	X	205.5	0.02	X	X	5.7	630.6	1889.1
------------------	------	------	---	-------	------	---	---	-----	-------	--------

STANDARDS

0001 Alcoa11-OES				244.5	0.54	0.9			17.6	52.7
0002 SOLN-001										
0003 Alcoa-High5-MS							18.8			

BLANKS

0001 Control Blank				X	X	X	X		X	X
--------------------	--	--	--	---	---	---	---	--	---	---

752.0/1213384 (05/10/2012) CLIENT O/N: P10477

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Part 4/5

ANALYSIS

ELEMENTS	Sb	Se	Si	Sn	Sr	TDSEva	Th	Tl	U	V
UNITS	ug/l	ug/l	mg/l	ug/l	ug/l	mg/Kg	ug/l	ug/l	ug/l	mg/l
DETECTION LIMIT	0.01	0.5	0.05	0.1	0.02	20	0.005	0.01	0.005	0.01
DIGEST	Ac/	Ac/	Ac/	Ac/	Ac/		Ac/	Ac/	Ac/	Ac/
ANALYTICAL FINISH	MS	MS	OE	MS	MS	/GR	MS	MS	MS	OE
SAMPLE NUMBERS										
0001 PE801-00139	0.58	24.2	4.88	X	2645.12	3363	0.086	0.10	24.630	X

CHECKS

0001 PE801-00139	0.57	25.5	4.79	X	2631.20	3378	0.043	0.09	24.653	X
------------------	------	------	------	---	---------	------	-------	------	--------	---

STANDARDS

0001 Alcoa11-OES			17.78							0.52
0002 SOLN-001										
0003 Alcoa-High5-MS	21.08	101.2		20.5	531.40		21.531	19.27	20.639	

BLANKS

0001 Control Blank	X	X	X	X	X		X	X	X	X
--------------------	---	---	---	---	---	--	---	---	---	---

752.0/1213384 (05/10/2012) CLIENT O/N: P10477

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Part 5/5

ANALYSIS

ELEMENTS	Zn
UNITS	mg/l
DETECTION LIMIT	0.01
DIGEST	Ac/
ANALYTICAL FINISH	OE

SAMPLE NUMBERS

0001 PE801-00139	X
------------------	---

CHECKS

0001 PE801-00139	0.01
------------------	------

STANDARDS

0001 Alcoa11-OES	0.51
------------------	------

0002 SOLN-001	
---------------	--

0003 Alcoa-High5-MS	
---------------------	--

BLANKS

0001 Control Blank	X
--------------------	---

METHOD CODE DESCRIPTION

/CALC

Genalysis Main Laboratory

No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.

/COL

Genalysis Main Laboratory

No digestion or other pre-treatment undertaken. Analysed by UV-Visible Spectrometry.

/GR

Genalysis Main Laboratory

Analysed by Gravimetric Technique.

/MS

Genalysis Main Laboratory

No digestion or other pre-treatment undertaken. Analysed by Inductively Coupled Plasma Mass Spectrometry.

/MTR

Genalysis Main Laboratory

No digestion or other pre-treatment undertaken. Analysed with Electronic Meter Measurement

/SIE

Genalysis Main Laboratory

No digestion or other pre-treatment undertaken. Analysed by Specific Ion Electrode.

/VOL

Genalysis Main Laboratory

No digestion or other pre-treatment undertaken. Analysed by Volumetric Technique.

Ac/MS

Genalysis Main Laboratory

Acidification of the liquid sample. Analysed by Inductively Coupled Plasma Mass Spectrometry.

Ac/OE

Genalysis Main Laboratory

Acidification of the liquid sample. Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.

APPENDIX C

Copy of KP memorandum PE14-00923

Knight Piésold

CONSULTING

MEMORANDUM

To:	Unity Mining Ltd	Date:	19 th September 2014
Attn:	James Doman	Our Ref:	PE14-00923
		KP File Ref.:	PE801-139/8-A plv M14002
cc:	Tony Davis	From:	Peter Veld

RE: DARGUES GOLD PROJECT – LONDON VICTORIA TAILINGS PHYSICAL TESTING

1. INTRODUCTION

Unity Mining Ltd is currently developing the Dargues Gold Project in New South Wales. Physical testing of a concentrate tailings sample was previously carried out on behalf of Cortona Resources prior to the change in project ownership and prior to the project being put on hold. Consequently the results of this testing were never formally issued. For the conceptual design of the concentrate Tailings Storage Facility (TSF) Unity has advised that the tested sample should be considered to be representative of the proposed concentrate tailings stream. This memorandum provides a detailed summary of the testing methods, findings and implications for design from the physical testing programme.

2. TESTING GENERAL

One 20L bucket of slurry sample labelled 'Cortona – Tailings Sample' was supplied by Metallurgy Pty Ltd to the Knight Piésold (KP) laboratory in July 2012. The sample was defined by Cortona Resources Ltd as the London Victoria tailings, a concentrate stream from the Dargues Gold Project. The sample will be referred to as the London Victoria Tailings for the purposes of this memorandum. No flocculent was added to the sample by KP as part of the test work.

The sample was received by KP at a percent solids of around 45% and settling test work was conducted on the as received condition. The following tests were carried out on the sample:

- Classification tests to determine:
 - Particle size distribution of the tailings;
 - Supernatant liquor density;
 - Liquid and plastic limits of the tailings solids;
 - Tailings solids particle density.
- Undrained and drained sedimentation tests;
- Air drying tests;
- Permeability tests;
- Consolidation tests; and
- Geochemistry of solids and liquor (discussed in a separate memo).

During laboratory testing it is Knight Piésold's standard practice to duplicate each test as a means to verify the consistency of the test results. The results of each individual test are plotted on the corresponding figures. The interpreted mean values are given in the tables and text of the document. A brief description of the method employed in each test is also provided.

PE14-00923

3. PHYSICAL TESTING

This section discusses the physical testing results for the tailings sample. Predicted tailings behaviour is discussed in Section 4; however, it should be noted that field results are also dependent on the processing plant operation, layout and design of the proposed storage facility, and climatic conditions on site.

3.1 CLASSIFICATION TESTING

Classification testing was completed by Trilab in Perth. Where appropriate, classification tests were conducted in accordance with relevant Australian Standards. The results of the classification tests and relevant Australian Standards are summarised in Table 3.1. The Trilab laboratory test reports are presented in Appendix A.

Table 3.1: Classification testing – results and relevant standards

Test	London Victoria Tailings	AS1289
Particle Density	4.21	3.5.1 (1995)
Supernatant Density	1.00	(hydrometer)
Supernatant pH	8.2	(pH meter)
Liquid Limit (%)	25	3.9.2 (1995)
Plastic Limit (%)	18	3.2.1 (1995)
Plasticity Index (%)	7	3.3.2 (1995)
Linear Shrinkage (%)	3.0	3.4.1 (1995)

The particle size analysis was completed in accordance with AS1289 3.6.3 - 2003. The measured particle size distribution is presented in Table 3.2 and the grading curve for the sample is shown in Figure 3.1.

Table 3.2: Particle size distribution

Fraction	London Victoria Tailings	
	Particle Size (µm)	Percent Passing (%)
Sand	600	100
	200	99
Silt	75	92
	20	38
	6	16
Clay	2	7

Using the Unified Soil Classification System (Geotechnical Site Investigations, AS1726-1993) the sample classifies as a low plasticity silt with a universal soil classification of ML-CL. The P_{80} is around 65µm.

3.2 PERCENT SOLIDS TEST

During the preparation of each test, two sub-samples of the tailings sample were subjected to oven drying until no further weight was lost, to determine the percent solids by mass of the sample. In addition to these measurements, the percent solids have been back calculated from other test results for comparison. Table 3.3 presents the results of the percent solids tests.

Table 3.3: Percent solids of tailings samples

Sample	Oven Dry Tests (%)	Percent Solids Range Back-Calculated from Tests (%)	Mean Percent Solids Back-Calculated from Tests (%)
London Victoria Tailings	45.5	46.0 to 51.0	47.4

The results indicate that there is some variance in the percent solids for the individual tests. However, the variation in percent solids between tests is considered to be within reasonable limits.

3.3 SEDIMENTATION TESTS

Drained and undrained sedimentation tests were carried out to determine the settling rate, volume of supernatant and underdrainage, and settled dry density of the tailings.

In the undrained sedimentation test, tailings slurry is allowed to settle in a measuring cylinder. This is equivalent to the deposition of tailings under water (sub aqueous). The results indicate the expected rate and quantity of supernatant release and enable the minimum dry density of the tailings to be determined.

In the drained sedimentation test, tailings slurry is allowed to settle and drain in a cylinder with a fine sand filter drain at the base. In addition, supernatant is progressively removed from the sample as it is released. This simulates the deposition of tailings where both settling and free drainage can occur. The results indicate the relative quantities of supernatant and underdrainage water released by the settling slurry and enables the drained dry density of the tailings to be determined. The underdrainage values represent maximum values, as the drainage layer is free-draining without back pressure and the tailings are deposited directly over the drainage medium. During sub-aerial deposition, the conditions would be part way between the two cases, depending on beach area.

The results of the sedimentation tests are presented in figures 3.2 and 3.3. Table 3.4 presents a summary of the measured sedimentation test data.

Table 3.4: Sedimentation test results

Sample	Test	Initial Solids (%)	Supernatant (% of initial water volume)	Underdrainage (% of initial water volume)	Time to Achieve		Final Dry Density (t/m ³)	Void Ratio	Figure
					90% of total density increase (days)	Final Density (days)			
Tailings	Undrained	48	64	-	<1	2	1.61	1.61	3.2
	Drained	48	49	24	<1	2	1.90	1.22	3.3

The tests indicate that the tailings sample is quick settling. The sample takes less than a day to complete the majority of the settlement and releases the majority of available water in this time.

The sample released approximately 64% of the water in slurry to supernatant for the undrained case, reducing to 49% for the drained case with an additional 24% reporting to underdrainage. There is an approximately 18% increase in the settled density between

the tests when ideal drainage is available. The resulting void ratio for the sedimentation tests ranges from 1.2 – 1.6 which is typical for coarse and quick settling tailings. The resulting dry density is high due to the high particle density of the material.

3.4 AIR DRYING TESTS

Air drying tests were carried out on slurry samples to determine the effect of air drying on the tailings after initial undrained settling and removal of supernatant liquor, thereby simulating conditions expected following sub-aerial deposition. Frequent recording of the weight and volume of each specimen was carried out in order to quantify the relationship between dry density, moisture content, volumetric change and the degree of saturation of the tailings.

A direct relationship exists between dry density and moisture content up to a breakaway point, at which the degree of saturation falls below 100%. At this point, negative pore water pressures are developed, which further consolidates the tailings by desiccation. Drying below a limiting saturation produces no further consolidation, and the density at this point represents the maximum that can be achieved via air drying of the tailings.

The results of air drying tests are presented in figures 3.4 and 3.5, and are summarised in Table 3.5.

Table 3.5: Results of air drying tests

Sample	Initial Solids (%)	Moisture Content at Breakaway Point (% MC)	Dry Density at Breakaway Point (t/m ³)	Limiting Saturation Value (% Sat)	Final Dry Density (t/m ³)	Figures
London Victoria Tailings	47	29	1.97	80	2.30	3.4, 3.5

Air drying of the sample improves the achieved dry density over the initial settlement tests once water is removed from the surface of the sample. The sample takes approximately 24 mm of evaporation to achieve the final density. The sample achieved this over approximately 3 days at an evaporation rate of 7.5 mm/day. The air drying tests increased the final dry density by 45% above the undrained sedimentation test resulting in a void ratio of around 0.8.

3.5 PERMEABILITY TESTS

Falling head permeability tests were completed on saturated tailings samples with drainage through the drained sedimentation sample being measured. In addition, permeability values were derived from the results of the consolidation test. Results are summarised in Table 3.6 and presented in Figure 3.6.

Table 3.6: Permeability test results

Sample	Test Type	Dry Density (t/m ³)	Permeability (m/s)
London Victoria Tailings	Falling Head	1.90	3.0×10^{-7}
	Consolidation Test	1.60	4.0×10^{-6}
		1.80	3.0×10^{-7}

The falling head and consolidation test results represent the vertical permeability of saturated tailings prior to additional consolidation due to additional deposition loading or air-drying. In the range of expected settled densities, the vertical permeability is

approximately 3.0×10^{-7} m/s for the sample indicating medium to high permeability tailings.

3.6 CONSOLIDATION TESTS

The consolidation of the tailings can be quantified in terms of the compression index C_c and the coefficient of consolidation C_v . The compression index relates the void ratio or tailings density to the effective stress of the tailings sample. The larger the value of C_c , the more compressible the tailings. The coefficient of consolidation defines the rate of excess pore water dissipation, and hence the rate of increase in effective stress within the tailings. Higher values of C_v indicate more rapid consolidation of the sample.

The settlement for the low stress consolidation with respect to time and the variation in permeability with density for the test is presented in Figure 3.6 and the results of the consolidation tests are summarised in Table 3.7.

Table 3.7: Consolidation test results

Sample	Dry Density (t/m ³)	Stress Range (kPa)	Coeff. of Consolidation C_v (m ² /y)	Coeff. of Volume Decrease M_v (m ² /kN)	Comp. Index C_c
London Victoria Tailings	1.60 - 1.80	1.93 – 5.29	36.7	0.03	0.63

4. PREDICTED PHYSICAL BEHAVIOUR OF TAILINGS

Based on the physical testing of the sample, the following predicted behaviour is expected for the concentrate tailings. It should be noted that field results are also dependent on the processing plant operation, layout and design of the proposed storage facility, and climatic conditions on site.

4.1 WATER PRODUCTION

The release of water following deposition of the tailings can be estimated from the drained and undrained sedimentation test results. The rate of release will determine the amount of liquor available in the decant pond for collection and return to the process plant. The quantity of underdrainage release in the field would be expected to be lower than the values indicated by the test work, due to the thickness of the deposited tailings, and further consolidation of the tailings.

The rate of supernatant release for the sample was rapid with the majority of total water released over a few hours. It is expected that water release would be of the order of 60% of the water in slurry, not accounting for rainfall and evaporation. Underdrainage would typically average around 5 to 10% depending on the arrangement of the underdrainage collection and basin treatments.

4.2 TAILINGS DENSITY

The settled dry density of tailings deposited into the storage facility can be predicted from laboratory testing. The test results indicated that the tailings achieved medium to high densities from the undrained settling due to the particle density, but based on a void ratio of around 1.6, they would be considered average. There was an improvement due to air drying, reducing the void ratio down to 0.8. It has been observed over a number of years that densities achieved in the field are generally lower than those obtained in the laboratory. In addition, field densities achieved are dependent on the area available for

Knight Piésold
CONSULTING

6

drying and the thickness of deposited layers. A suitable deposition plan and efficient operation of the facility can improve settled density for the project. A typical achievable density range of between 1.7 and 2.1 t/m³ is expected for early and final stages respectively; however water balance modelling should follow to account for rainfall, evaporation and facility rate of rise.

We trust that this memorandum provides sufficient information for your current requirements. Please contact us should you have any queries in relation to the above.

Yours faithfully
KNIGHT PIÉSOLD PTY LTD

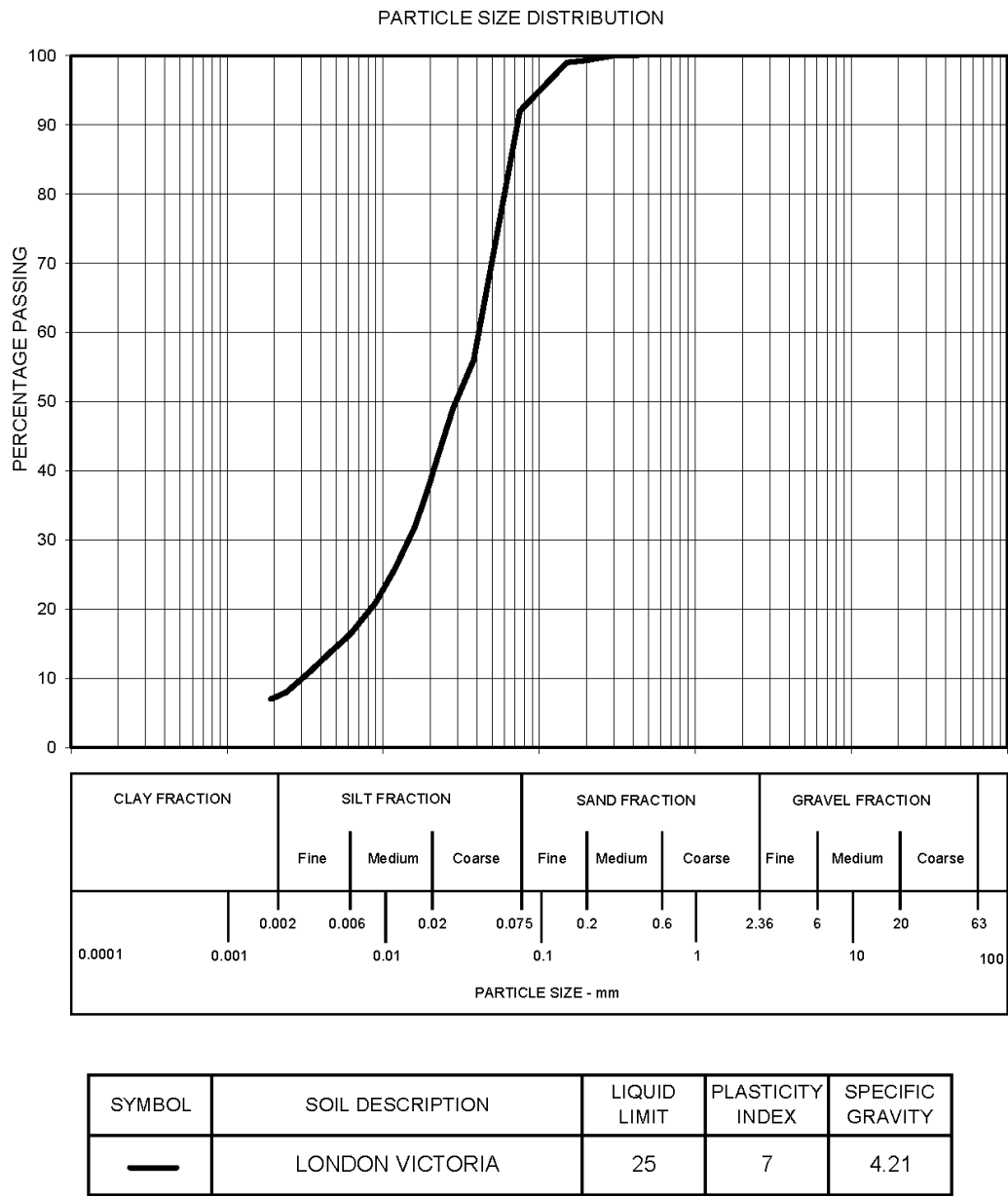
LI LI
Project Engineer


PETER VELD
Technical Consultant

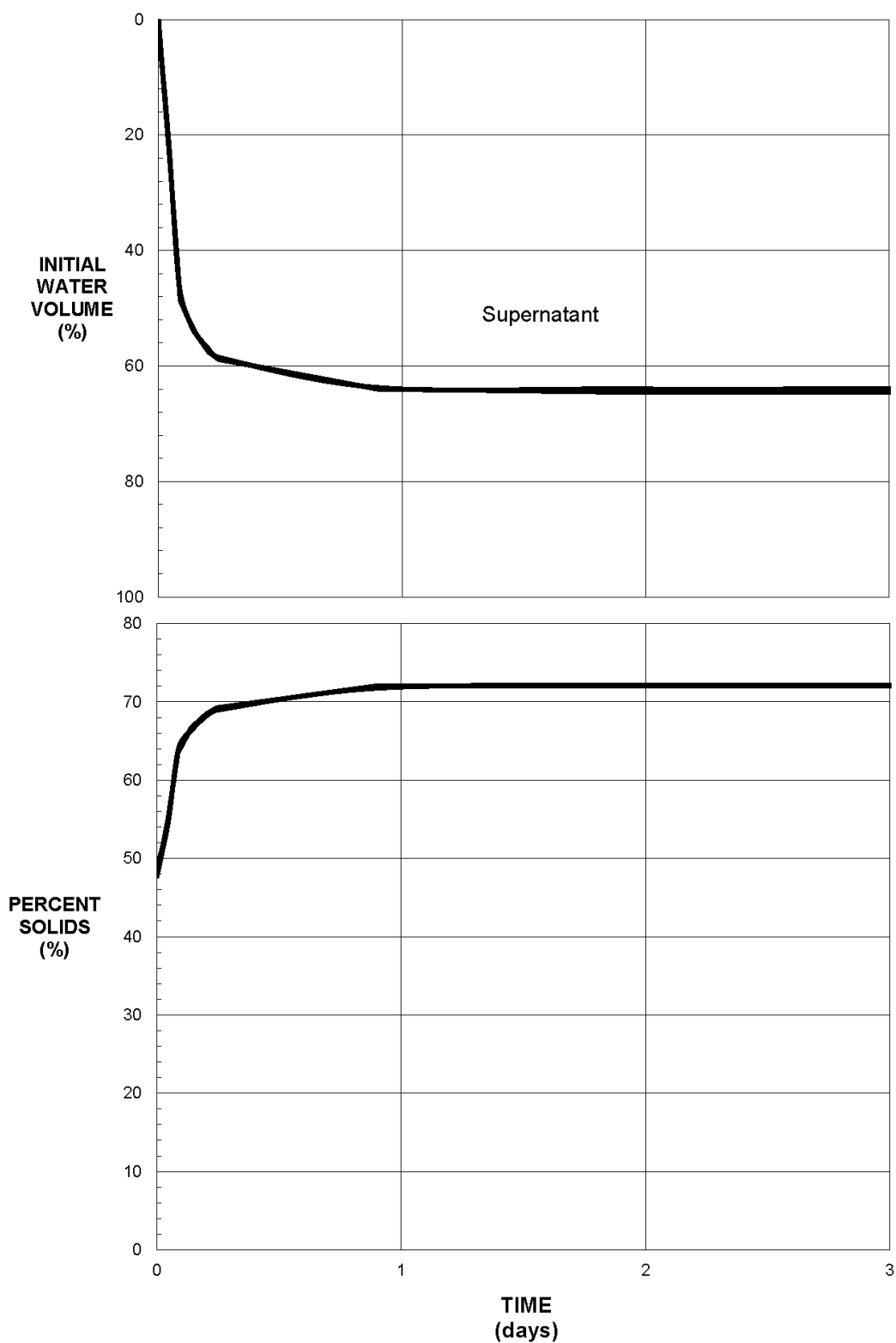
PE14-00923

FIGURES

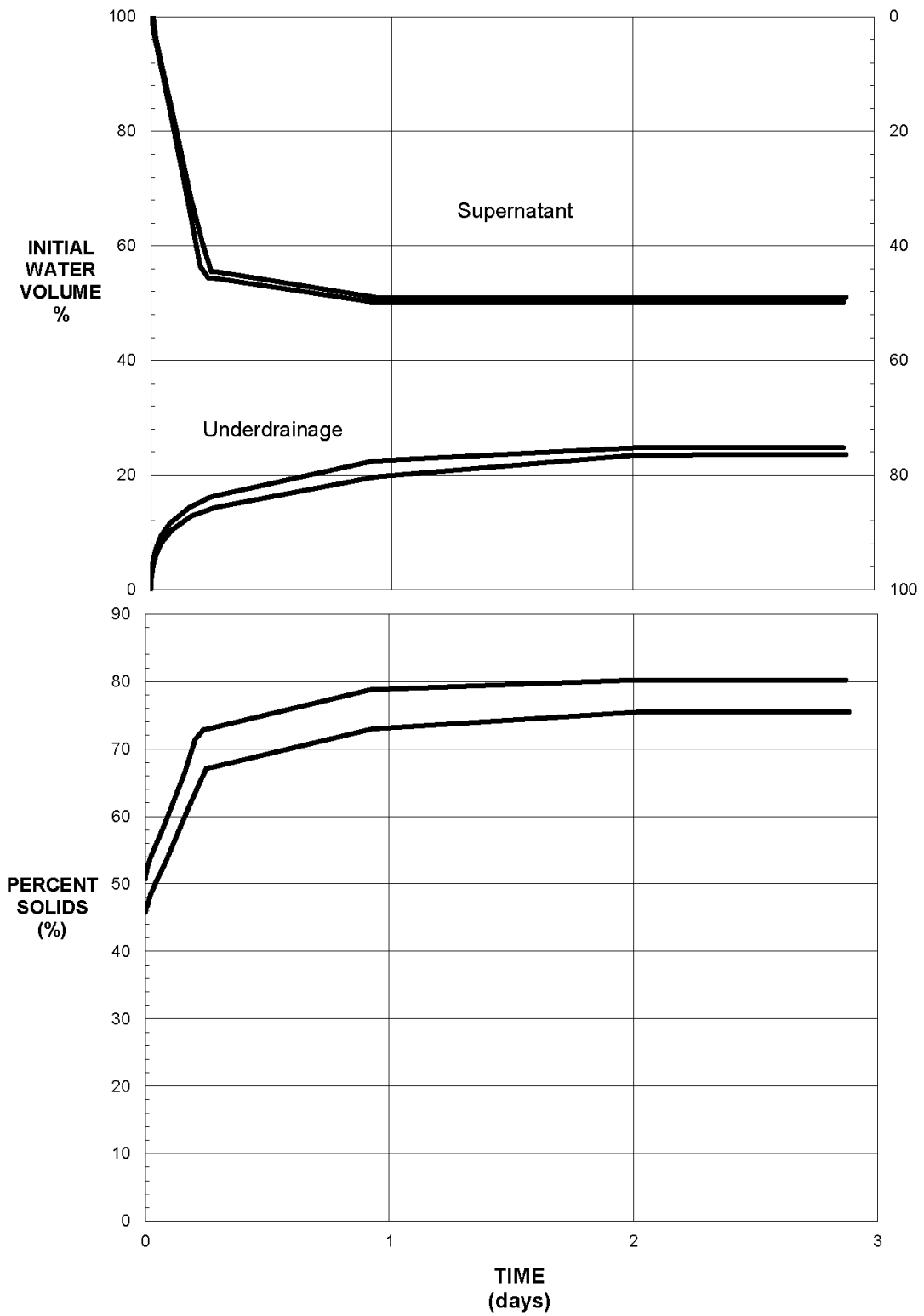
PE801-00139 Dargues - London Victoria Tailings Testing



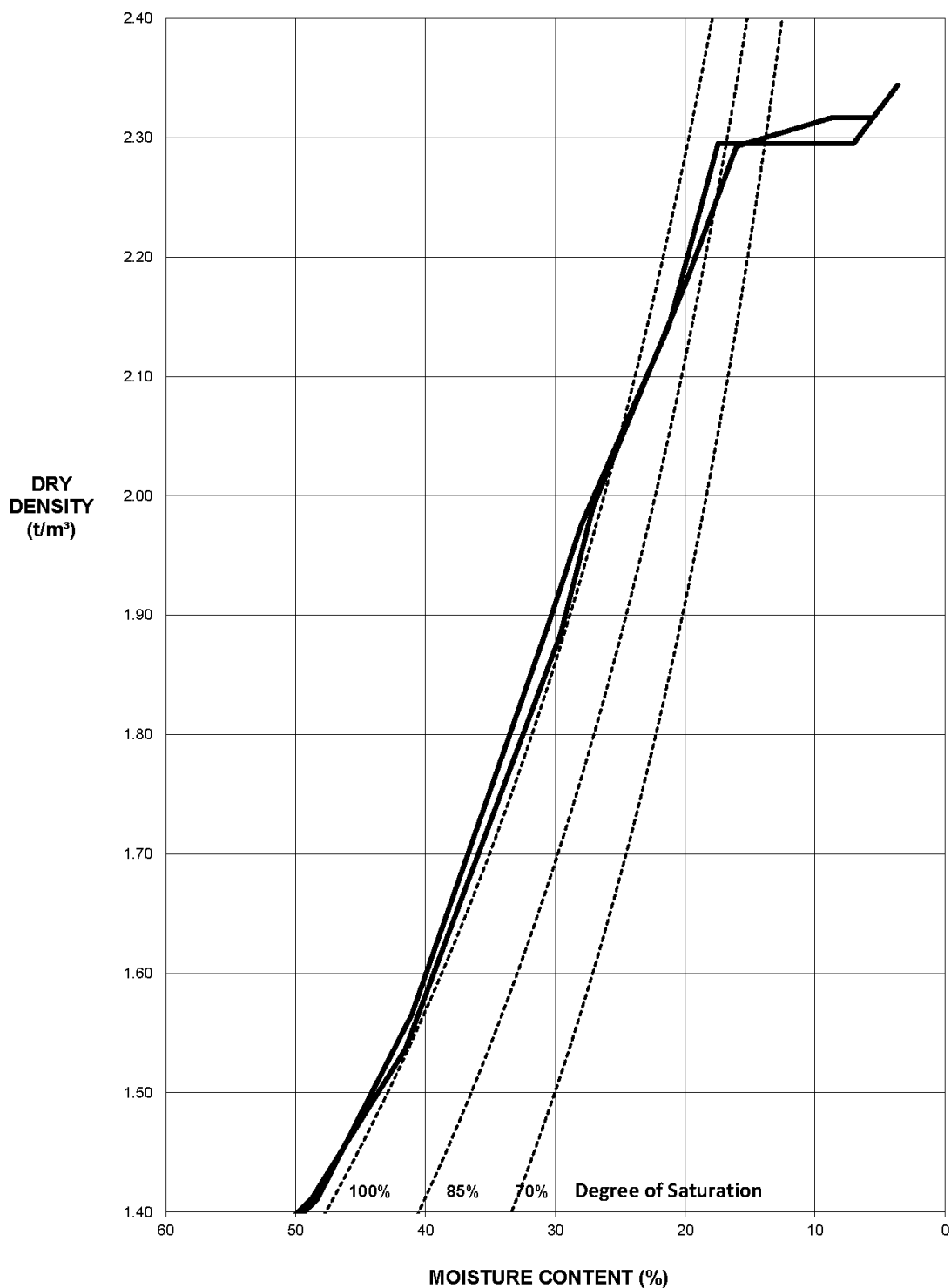
PE801-00139 Dargues - London Victoria Tailings Testing



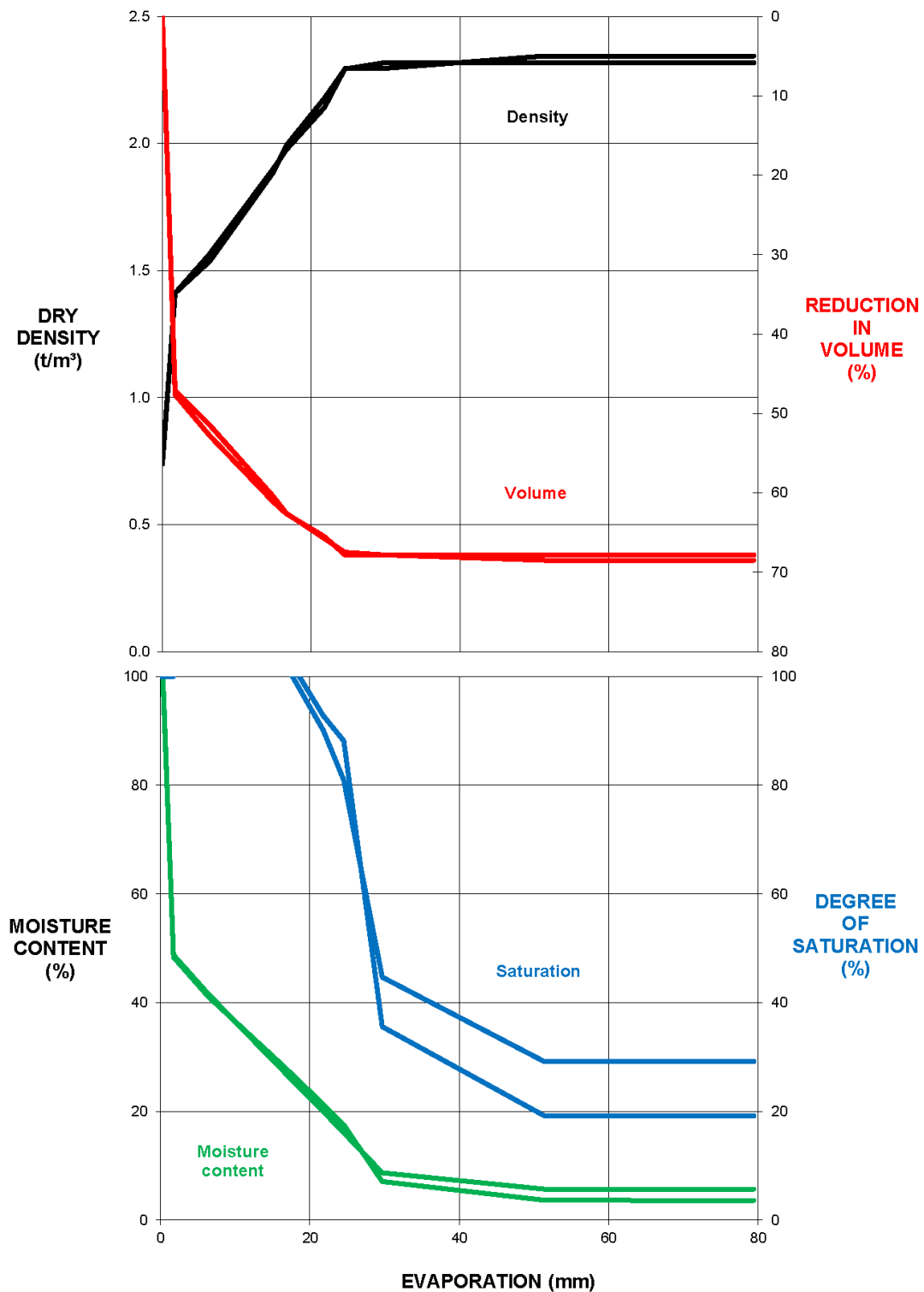
PE801-00139 Dargues - London Victoria Tailings Testing



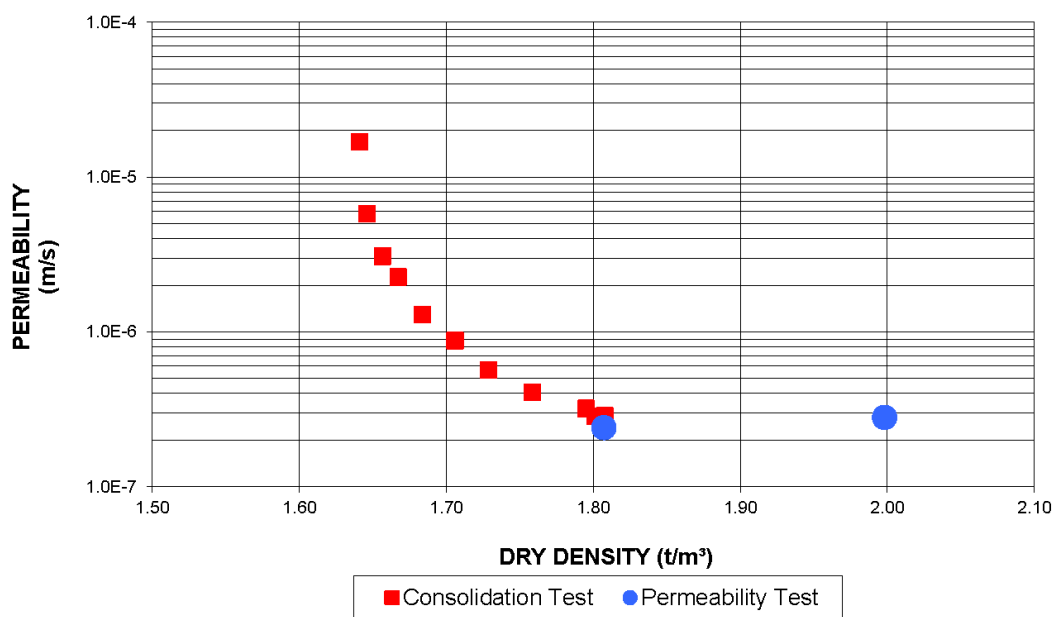
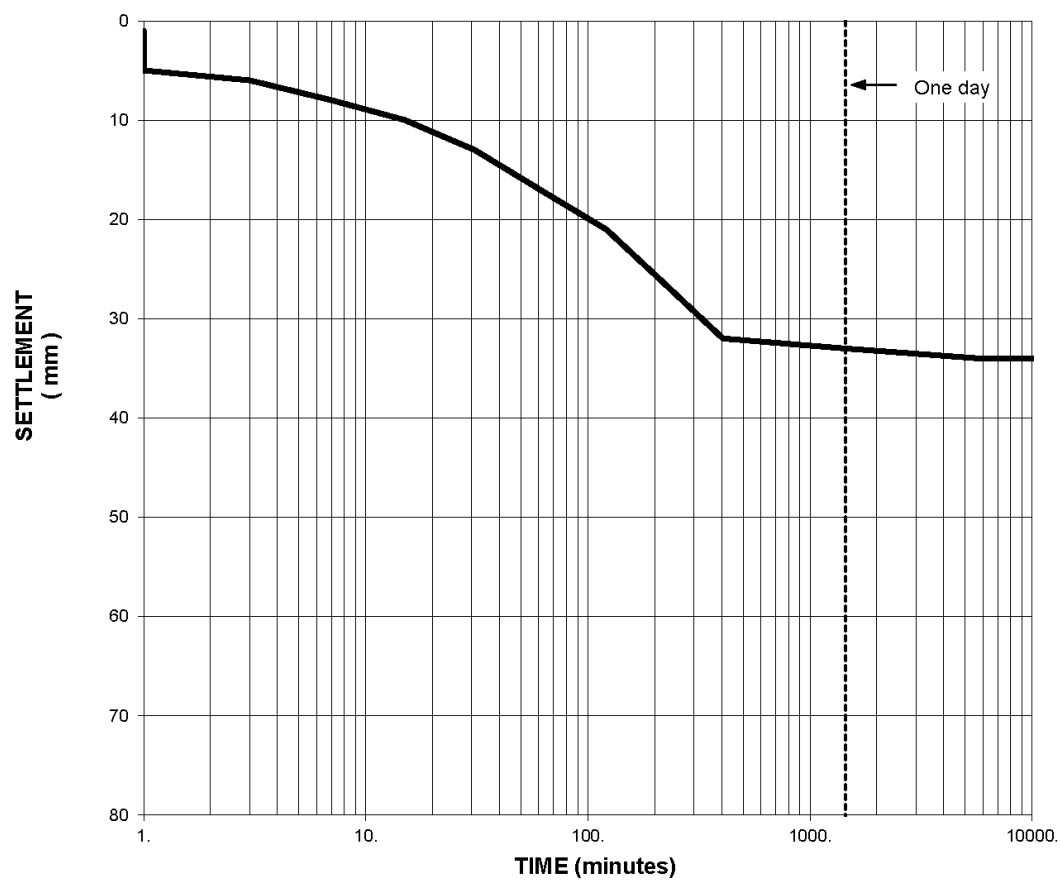
PE801-00139 Dargues - London Victoria Tailings Testing



PE801-00139 Dargues - London Victoria Tailings Testing



PE801-00139 Dargues - London Victoria Tailings Testing



APPENDIX A

Concentrate Tailings Classification Test Reports



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Geebung
QLD 4034
Ph: +61 7 3265 5656

Perth
2 Kimmer Place,
Queens Park
WA 6107
Ph: +61 8 9258 8323

ATTERBERG LIMITS TEST REPORT

Test Method: AS 1289 2.1.1, 3.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

Client	Knight Piesold Pty Ltd	Report No.	P 12100010-AL
Project	Dargues Reef Gold Project	Test Date	15/10/2012
		Report Date	18/10/2012

Sample No.	12100010	12100011	12100012	12100013		
Client ID	London Victoria Sample PE801- 00139/05	Sulphine Float Tails PE701- 00013	CIP Tailings PE701-00013	Crusher Ore PE701-00015		
Depth (m)	-	-	-	-		
Liquid Limit (%)	25	25	34	18		
Plastic Limit (%)	18	19	22	13		
Plasticity Index (%)	7	6	12	5		
Linear Shrinkage (%)	3.0*	2.5	6.0*	2.0		
Field Moisture Content (%)	74.7	105.1	148.9	56.8		

NOTES/REMARKS: The samples were tested oven dried, dry sieved and in a 125-250mm mould.

Sample/s supplied by the client * Crumbling occurred + Curling occurred Page 1 of 1 REP30101

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/National Standards.

Authorised Signatory

C. Channon



Laboratory No. 9926

The results of calibrations and tests performed apply only to the specific instrument or sample at the time of test unless otherwise clearly stated.
Reference should be made to Trilab's "Standard Terms and Conditions of Business" for further details.
Trilab Pty Ltd ABN 25 065 630 506

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



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2 Kimmer Place,
Queens Park
WA 6107
Ph: +61 8 9258 8323

PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3, 3.5.1

Client	Knight Piesold Pty Ltd	Report No.	P 12100010-G
Project	Dargues Reef Gold Project	Test Date	16/10/2012
		Report Date	22/10/2012
Client ID	London Victoria Sample PE801-00139/05	Depth (m)	-

Sieve Size (mm)	Passing %
150.0	
75.0	
53.0	
37.5	
26.5	
19.0	
9.5	
4.75	
2.36	
1.18	
0.600	
0.425	
0.300	100
0.150	99
0.075	92
0.038	56
0.028	49
0.021	40
0.016	32
0.012	26
0.009	21
0.0065	17
0.0047	14
0.0034	11
0.0027	10
0.0024	8
0.0019	7
0.0017	6
0.001	6

NOTES/REMARKS:

Moisture Content 74.7% -2.36mm Soil Particle Density(t/m³) 4.21
Sample/s supplied by the client

Page 1 of 1 REP33901

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Authorised Signatory

C. Channon
C. Channon



Laboratory No. 9926

The results of calibrations and tests performed apply only to the specific instrument or sample at the time of test unless otherwise clearly stated. Reference should be made to Trilab's "Standard Terms and Conditions of Business" for further details.
Trilab Pty Ltd ABN 25 065 630 506

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING

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