

## CERTIFICATE OF ANALYSIS

**Work Order** : **ES1704401**  
**Client** : **LOW ECOLOGICAL SERVICES**  
**Contact** : **MR JEREMY SNOWDON-JAMES**  
**Address** : **PO BOX 3130**  
**ALICE SPRINGS NT, AUSTRALIA 0871**  
**Telephone** : **+61 08 89 555 222**  
**Project** : **INTERMIN WHITE RANGE**  
**Order number** : **----**  
**C-O-C number** : **----**  
**Sampler** : **JEREMY SNOWDON-JAMES**  
**Site** : **----**  
**Quote number** : **SY/874/14**  
**No. of samples received** : **5**  
**No. of samples analysed** : **5**

**Page** : 1 of 4  
**Laboratory** : Environmental Division Sydney  
**Contact** : Customer Services ES  
**Address** : 277-289 Woodpark Road Smithfield NSW Australia 2164  
**Telephone** : +61-2-8784 8555  
**Date Samples Received** : 24-Feb-2017 13:15  
**Date Analysis Commenced** : 24-Feb-2017  
**Issue Date** : 02-Mar-2017 16:56



Accreditation No. 825  
 Accredited for compliance with  
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW



## 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 insufficient 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 no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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  
ø = ALS is not NATA accredited for these tests.  
~ = Indicates an estimated value.

- EK028SF: It has been noted that Free Cyanide is greater than WAD Cyanide on sample 5, however this difference is within the limits of experimental variation (confirmed by re-analysis).
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	TAILS	SOAK	S01	S02	S03
Client sampling date / time				21-Feb-2017 00:00	21-Feb-2017 00:00	21-Feb-2017 00:00	21-Feb-2017 00:00	21-Feb-2017 00:00	
Compound	CAS Number	LOR	Unit	ES1704401-001	ES1704401-002	ES1704401-003	ES1704401-004	ES1704401-005	
				Result	Result	Result	Result	Result	
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	8.07	8.42	7.20	7.33	7.48	
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	423	1220	980	3560	2990	
<b>EA016: Calculated TDS (from Electrical Conductivity)</b>									
Total Dissolved Solids (Calc.)	----	1	mg/L	275	793	637	2310	1940	
<b>EA065: Total Hardness as CaCO3</b>									
Total Hardness as CaCO3	----	1	mg/L	148	197	438	1120	820	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	21	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	164	437	167	597	721	
Total Alkalinity as CaCO3	----	1	mg/L	164	459	167	597	721	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	26	142	212	965	488	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	8	51	87	266	252	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	41	23	106	276	129	
Magnesium	7439-95-4	1	mg/L	11	34	42	104	121	
Sodium	7440-23-5	1	mg/L	20	223	40	455	417	
Potassium	7440-09-7	1	mg/L	24	10	10	12	14	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Arsenic	7440-38-2	0.001	mg/L	0.004	0.003	0.003	0.002	0.002	
Boron	7440-42-8	0.05	mg/L	0.08	0.18	0.12	0.38	0.38	
Barium	7440-39-3	0.001	mg/L	0.133	0.037	0.068	0.047	0.085	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.006	0.039	0.070	0.076	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.013	0.008	0.028	0.002	0.002	
Manganese	7439-96-5	0.001	mg/L	0.003	0.002	0.723	0.851	0.720	
Nickel	7440-02-0	0.001	mg/L	0.002	0.001	0.008	0.001	0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	



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Compound	CAS Number	LOR	Unit	ES1704401-001	ES1704401-002	ES1704401-003	ES1704401-004	ES1704401-005	
				Result	Result	Result	Result	Result	
<b>EG020F: Dissolved Metals by ICP-MS - Continued</b>									
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<b>0.005</b>	<b>0.022</b>	<0.005	<b>0.005</b>	
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
<b>EK025SF: Free CN by Segmented Flow Analyser</b>									
Free Cyanide	----	0.004	mg/L	<b>0.004</b>	----	<b>0.008</b>	<b>0.009</b>	<b>0.008</b>	
<b>EK026SF: Total CN by Segmented Flow Analyser</b>									
Total Cyanide	57-12-5	0.004	mg/L	<b>0.008</b>	----	<b>0.679</b>	<b>4.01</b>	<b>0.479</b>	
<b>EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser</b>									
Weak Acid Dissociable Cyanide	----	0.004	mg/L	<b>0.005</b>	----	<b>0.008</b>	<b>0.009</b>	<b>0.006</b>	
<b>EK040P: Fluoride by PC Titrator</b>									
Fluoride	16984-48-8	0.1	mg/L	<b>0.4</b>	<b>1.0</b>	<b>0.3</b>	<b>1.6</b>	<b>1.6</b>	
<b>EN055: Ionic Balance</b>									
Total Anions	----	0.01	meq/L	<b>4.04</b>	<b>13.6</b>	<b>10.2</b>	<b>39.5</b>	<b>31.7</b>	
Total Cations	----	0.01	meq/L	<b>4.44</b>	<b>13.9</b>	<b>10.7</b>	<b>42.4</b>	<b>34.9</b>	
Ionic Balance	----	0.01	%	<b>4.61</b>	<b>1.22</b>	<b>2.56</b>	<b>3.55</b>	<b>4.83</b>	