



Jervois Base Metal Project EIS

Baseline Water Quality Assessment Addendum

KGL Resources Pty Ltd

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For and on behalf of WRM Water & Environment Pty Ltd
Level 9, 135 Wickham Tce, Spring Hill
PO Box 10703 Brisbane Adelaide St Qld 4000
Tel 07 3225 0200

A handwritten signature in black ink, appearing to read 'Rhys Cullen', is written over a light blue horizontal line.

Rhys Cullen
Principal Engineer

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1 Introduction

1.1 BACKGROUND

WRM Water & Environment Pty Ltd (WRM) completed the surface water impact assessment for the draft EIS for the Jervois Base Metal Project (WRM, 2018).

The draft EIS for the Jervois Base Metal Project was submitted to Northern Territory Environment Protection Authority (NT EPA) in October 2018. The comments on the draft EIS from various stakeholders were received in December 2018.

Subsequently a supplementary surface water impact assessment was prepared by WRM addressing the comments on the draft EIS (WRM, 2019).

1.2 REQUEST FOR CLARIFICATION

As part of the NT EPA review of the supplementary EIS, it was noted that the water quality data presented in the supplementary EIS reported significantly high metal concentration than that in the draft EIS. The water quality data in the draft EIS was provided as part of the WRM (2018) report, and the supplementary EIS water quality was provided as part of the WRM (2019) report.

The NT EPA provided the following request for clarification regarding the water quality data:

During our assessment of the information provided by KGL in the Jervois Base Metal Project Supplement to the Draft Environmental Impact Statement (EIS), we reviewed the water quality data provided in Table 3.3 (Water quality data for the watercourses across the Project area) of the Surface Water Impact Assessment (Supplement Appendix A-3 pages 52-55).

In comparison to the water quality data presented in the Draft EIS (Tables 2.3 and 3.3 Water quality data for the watercourses across the Project area - Appendix C-5 pages 21-24), some of the metal concentrations are much higher, in particular for Aluminium, Iron and Manganese. This variation between the Draft EIS data and Supplement data is not described or explained in the text and therefore we are requesting clarification on the following:

- *The number of additional samples collected and analysed for the Supplement and the dates of collection*
- *Whether samples included in the Draft EIS have been partially or wholly included in the data analysis for the Supplement*
- *Confirmation that the additional sample data is accurately presented in the correct units and has been carried out by a NATA accredited laboratory in accordance with the QA/QC requirements (provide copies of the Certificates of Analysis).*
- *Potential causes, reasons or explanations for the elevated metals concentrations at levels much higher (sometimes several orders of magnitude) than previously detected following rainfall events (i.e. source contamination, first flush, seasonal variation or other).*

1.3 REASON FOR CHANGE IN WATER QUALITY BETWEEN DRAFT EIS AND SUPPLEMENTARY EIS

The reason for difference between the water quality data presented in the WRM (2018) and WRM (2019) reports is due to three errors in the water quality analysis spreadsheet used in the WRM (2018) report. These errors were corrected during the preparation of the WRM (2019) report.

An additional group of samples taken at 6 of the background monitoring locations after the major rain event at the end of March 2019 were added to the water quality analysis in the WRM (2019) report. These samples were collected after the completion of the WRM (2018) report and hence were not included in the draft EIS. As with previous samples, these were analysed by Intertek (NATA approved).

The additional samples are generally consistent with the water quality data reported in the WRM (2018) report, and there does not appear to have been any significant change in water quality at the Project between the WRM (2018) and WRM (2019) reports.

The errors in the WRM (2018) spreadsheet are outlined below.

1.3.1 Units error for metals analytical methods

Metal concentrations for Manganese, Aluminium and Iron results have been provided based on the Intertek “W205I” analytical method, which gives results in mg/L. In the WRM (2018) report these elements were assigned the incorrect measuring unit µg/L instead of mg/L, and in some cases the “W205I” results were not included in the WRM (2018) summary table at all. As such, concentrations for the “W205I” should have been factored up by 1,000 to convert them from mg/L to µg/L and included in the summary table. This error was then corrected in the WRM (2019) report, which caused reported concentrations of Manganese, Aluminium and Iron to increase by an order of magnitude.

1.3.2 Nitrate and Nitrogen as Nitrate

The results for Nitrate (NO₃) in the WRM (2018) report spreadsheet was incorrectly referencing the Nitrogen as nitrate (NO₃-N) column.

1.3.3 Column error

Water quality from five separate events was available for analysis for the WRM (2018) report. The data was supplied as both .pdf CoA documents, and .csv spreadsheets. The .csv files did not have a consistent column order, and some .csv files had more columns than others. The WRM (2018) water quality analysis spreadsheet did not account correctly for the varying structure of the .csv files, and as a result some values were reported incorrectly in the WRM (2018) report. The errors are as follows:

- Total Aluminium (Al) for samples 45605 (15 April 2016) and 46872 (18 January 2017) was included in the Arsenic analysis instead of the Arsenic results.
- Total Bromium (Br) for samples 45605 (15 April 2016) and 46872 (18 January 2017) was included in the Cadmium analysis instead of the Cadmium results.
- Total Chromium (Cr) for samples 45605 (15 April 2016) and 46872 (18 January 2017) was included in the Copper analysis instead of the Copper results.
- Total Copper (Cu) for samples 45605 (15 April 2016), 46872 (18 January 2017) and 48758 (17 March 2018) was included in the Iron analysis instead of the Iron results, combined with incorrect units / omission of some of the Iron values due to the issue described in Section 1.3.1).
- Total Iodine (I) for samples 45605 (15 April 2016) and 46872 (18 January 2017) was included in the Manganese analysis instead of the Manganese results, combined with incorrect units / omission of some of the Iron values due to the issue already identified.
- Total Iron (Fe) for samples 45605 (15 April 2016), 46872 (18 January 2017) and 48758 (17 March 2018) was included in the Mercury analysis instead of the Mercury results.

1.4 STRUCTURE OF THIS REPORT

This report provides details of the available water quality data that was used in the WRM (2018) and WRM (2019) report and seeks to clarify the error in the WRM (2018) report.

This addendum report will provide the following:

- The total number of samples collected and analysed for each site for both the Draft EIS and the Supplement, the dates of collection and copies of the laboratory certificates of analysis (CoAs);
- Updated water quality data tables (for both the Draft EIS and Supplement) to show the revised concentrations (acknowledging the errors in the WRM (2018) report) along with an evidence based discussion about why the metals are high and what the source could be, including a comparison to data upstream and downstream of site and any historic data and confirmation that samples were representative of insitu surface water conditions; and
- Confirmation that all groundwater sampling parameters, (including Aluminium, Iron and Manganese), reported in WRM (2019), have been reported correctly.

2 Available water quality data

2.1 COLLECTION OF WATER QUALITY DATA

Water quality samples at the Project are collected by a network of remote sampling stations located in the waterways throughout the site. The network collects water quality samples from the watercourses automatically when water levels in the watercourses are sufficient to reach the sampling stations. The sampling network was installed in 2015, and has collected samples from all significant rainfall events since then, including December 2015, February and March 2016, January 2017 and March 2019. Water quality in Jervois Dam was also sampled in March 2018, however there was no rainfall or flow in the site watercourses at this time.

The watercourses at the site are ephemeral and water levels rise and fall quickly only following heavy rainfall, which may only occur once every year, and in some cases every two years. These flow events occur rapidly and mobilise large amounts of sediment from the stream beds every time they occur, and can be considered as being similar to ‘first flush’ type of event, which typically only occurs once every year or two. Rainfall at the site does not typically produce slow moving trickle flow with low levels of suspended solids, as these flows soak quickly into the soil and do not propagate far along the watercourses. This is reflected in the available water quality samples, which typically show very high concentrations of Total Suspended Solids (TSS) and metals.

2.2 WATER QUALITY DATA AVAILABLE FOR WRM (2018) REPORT

Table 2.1 summarises the available water quality data that was analysed and presented in the WRM (2018) report. CoAs for the samples listed in Table 2.1 are provided in Appendix A. Note that the January 1991 sample for Jervois Dam was not undertaken by KGL Resources. Results for this sample were obtained from the NT government water portal for the Jervois Dam gauge. Figure 2.1 shows the locations of the water quality sampling locations.

Table 2.2 presents a summary of the sample results for each location based on the data that was available at the time of preparing the WRM (2018) report. The units and reporting issue described in Section 1.3 has been corrected in this revision of the table.

Metal concentrations for most metalloids (except magnesium) were not measured for filtered samples, therefore the observed metal concentrations are reported as total metals.

Table 2.1 - Water quality samples available for draft EIS surface water impact assessment (WRM, 2018)

Sample Location	Sample analysis dates						Total number samples
	10 Jan 1991	29 Jan 2016	17 Feb 2016	15 April 2016	18 Jan 2017	17 March 2018	
JSW01	N	N	Y	Y	Y	N	3
JSW02	N	N	N	Y	Y	N	2
JSW03	N	N	N	N	N	N	0
JSW04	N	N	N	Y	Y	N	2
JSW05	N	N	N	Y	Y	N	2
JSW06	N	N	N	Y	N	N	1
JSW07	N	N	Y	N	Y	N	2
JSW08	N	N	Y	N	Y	N	2
JSW09	N	Y	Y	Y	Y	N	4
JSW10	N	N	N	Y	N	N	1
Jervois Dam	Y	N	N	N	N	Y	2

N - no sample available for analysis, Y - sample available for analysis

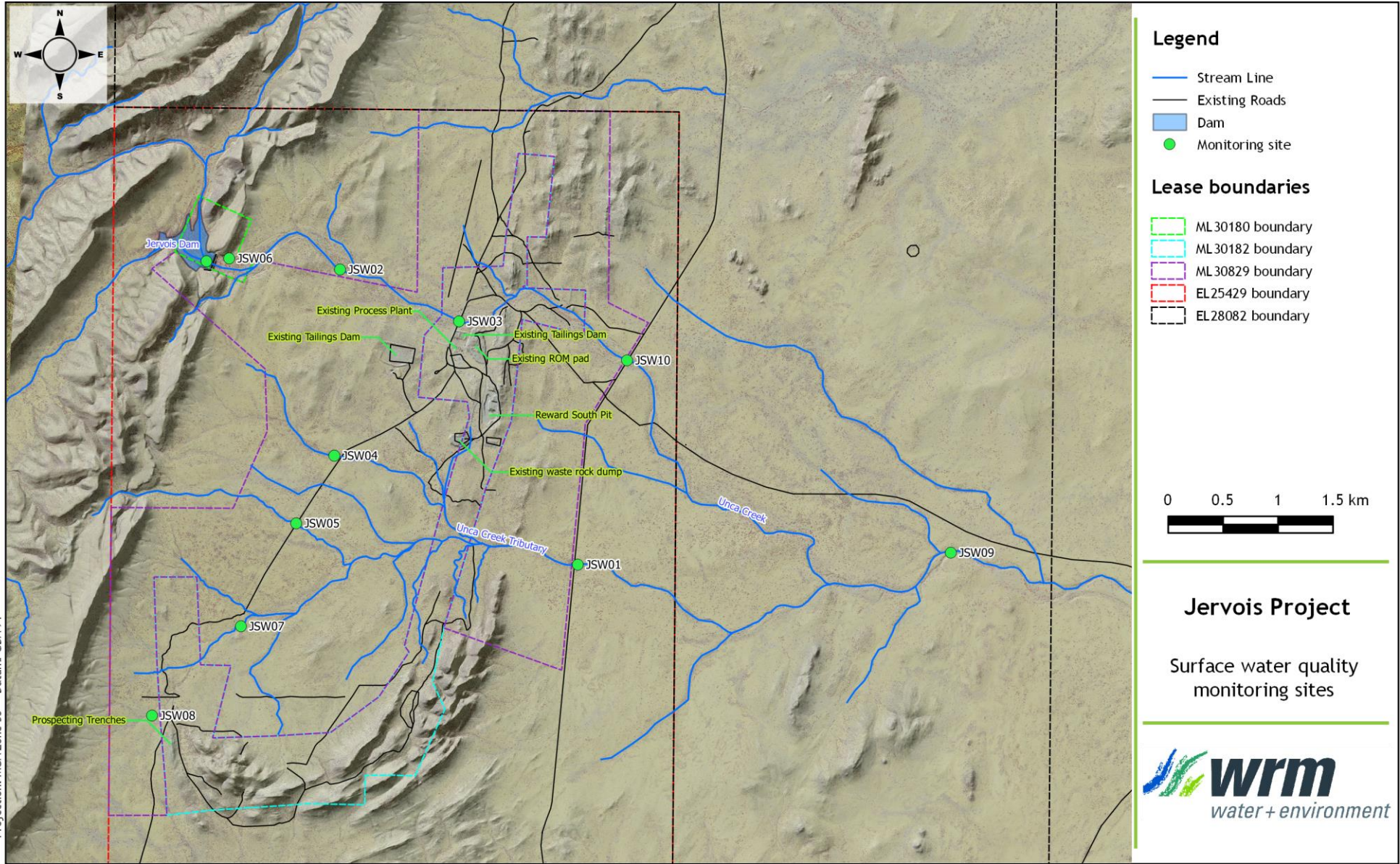


Figure 2.1 - Locations of baseline surface water quality monitoring sites

Table 2.2 - Water quality data for the watercourses across the Project area available for the WRM (2018) report

Monitoring Site No.	Statistic	Non-metallic indicators								Metals and metalloids (total, except Mg)										
		pH	EC (µS/cm)	Total suspended solids (mg/L)	Total dissolved solids (mg/L)	Turbidity (NTU)	Dissolved oxygen (% saturation)	Sulphate (mg/L)	Nitrate (mg/L)	Aluminium (µg/L)	Arsenic (µg/L)	Cadmium (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Magnesium (filtered) (mg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Zinc (µg/L)
JSW01	N	3	3	3	3	3	n/a	3	3	3	3	3	3	3	3	3	3	3	3	3
	Min.	6.5	26	2,520	20	530	n/a	0.4	0.040	38,500	2.0	0.2	120	41,600	32	0.7	680	0.1	32	130
	Max.	7.4	67	6,980	50	1,390	n/a	1.3	0.380	73,400	4.0	0.2	250	88,100	71	1.8	2,730	0.2	72	340
	Mean	6.8	47	4,147	37	1,097	n/a	0.9	0.167	60,067	3.2	0.2	177	66,933	52	1.2	1,877	0.2	53	237
JSW02	N	2	2	2	2	2	n/a	2	2	2	2	2	2	2	2	2	2	2	2	2
	Min.	6.4	39	100	20	100	n/a	1.5	0.02	6,140	1.0	0.2	10	4,620	3	0.6	55	0.2	4	10
	Max.	6.6	39	380	30	250	n/a	2.5	0.04	13,000	1.5	0.2	10	12,300	17	1.1	280	0.2	8	50
	Mean	6.5	39	240	25	175	n/a	2.0	0.03	9,570	1.3	0.2	10	8,460	10	0.9	168	0.2	6	30
JSW03	N									n/a										
	Min.									n/a										
	Max.									n/a										
	Mean									n/a										
JSW04	N	2	2	2	2	2	n/a	2	2	2	2	2	2	2	2	2	2	2	2	2
	Min.	6.2	29	1,540	10	730	n/a	0.7	0.02	40,200	2.5	0.2	40	40,700	25	0.6	840	0.2	28	110
	Max.	6.5	52	4,820	30	760	n/a	0.7	0.14	48,100	2.5	0.2	40	46,900	28	0.9	1,040	0.2	36	140
	Mean	6.4	41	3,180	20	745	n/a	0.7	0.08	44,150	2.5	0.2	40	43,800	27	0.8	940	0.2	32	125
JSW05	N	2	2	2	2	2	n/a	2	2	2	2	2	2	2	2	2	2	2	2	2
	Min.	6.4	30	20	20	61	n/a	1.6	0.02	3,580	0.5	0.2	10	2,660	2	0.6	15	0.2	2	10
	Max.	6.8	47	1,880	30	1,160	n/a	2.0	1.28	50,300	3.5	0.2	40	46,800	44	0.7	1,450	0.2	32	180
	Mean	6.6	39	950	25	611	n/a	1.8	0.65	26,940	2.0	0.2	25	24,730	23	0.7	733	0.2	17	95

Table 2.2 - Water quality data for the watercourses across the Project area available for the WRM (2018) report (continued)

Monitoring Site No.	Statistic	Non-metallic indicators								Metals and metalloids (total, except Mg)										
		pH	EC (µS/cm)	Total suspended solids (mg/L)	Total dissolved solids (mg/L)	Turbidity (NTU)	Dissolved oxygen (% saturation)	Sulphate (mg/L)	Nitrate (mg/L)	Aluminium (µg/L)	Arsenic (µg/L)	Cadmium (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Magnesium (mg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Zinc (µg/L)
JSW06	N	1	1	1	1	1	n/a	1	1	1	1	1	1	1	1	1	1	1	1	1
	Min.	7.1	137	110	110	8	n/a	17.3	0.02	200	0.5	0.2	10	380	1	4.2	435	0.2	2	10
	Max.	7.1	137	110	110	8	n/a	17.3	0.02	200	0.5	0.2	10	380	1	4.2	435	0.2	2	10
	Mean	7.1	137	110	110	8	n/a	17.3	0.02	200	0.5	0.2	10	380	1	4.2	435	0.2	2	10
JSW07	N	2	2	2	2	2	n/a	2	2	2	2	2	2	2	2	2	2	2	2	2
	Min.	6.2	25	2,790	30	800	n/a	0.7	0.78	53,900	2.5	0.2	140	54,200	44	0.7	1,740	0.1	46	200
	Max.	7.1	35	3,490	30	860	n/a	0.8	2.14	56,900	3.0	0.2	460	60,700	44	0.9	1,780	0.2	48	260
	Mean	6.7	30	3,140	30	830	n/a	0.8	1.46	55,400	2.8	0.2	300	57,450	44	0.8	1,760	0.2	47	230
JSW08	N	2	2	2	2	2	n/a	2	2	2	2	2	2	2	2	2	2	2	2	2
	Min.	6.5	10	1,400	10	350	n/a	0.2	0.02	22,800	1.5	0.2	60	23,200	16	0.2	585	0.1	16	60
	Max.	7.1	26	4,090	10	670	n/a	0.9	0.92	35,000	2.5	0.2	80	40,300	24	0.4	865	0.2	26	120
	Mean	6.8	18	2,745	10	510	n/a	0.6	0.47	28,900	2.0	0.2	70	31,750	20	0.3	725	0.2	21	90
JSW09	N	4	4	4	4	4	n/a	4	4	4	4	4	4	4	4	4	4	4	4	4
	Min.	6.4	18	410	10	420	n/a	0.3	0.04	23,400	1.5	0.2	50	25,100	17	0.5	815	0.1	22	100
	Max.	7.0	75	9,090	60	1,730	n/a	1.3	0.94	104,000	4.5	0.4	470	114,000	106	1.8	3,540	0.2	98	360
	Mean	6.8	40	3,788	33	1,113	n/a	0.8	0.31	60,575	3.0	0.3	243	64,700	60	1.0	1,939	0.2	54	225
JSW010	N	1	1	1	1	1	n/a	1	1	1	1	1	1	1	1	1	1	1	1	1
	Min.	6.8	62	2,120	40	1,420	n/a	1.7	0.06	46,800	3.0	0.6	930	54,500	370	1.4	1,640	0.2	44	320
	Max.	6.8	62	2,120	40	1,420	n/a	1.7	0.06	46,800	3.0	0.6	930	54,500	370	1.4	1,640	0.2	44	320
	Mean	6.8	62	2,120	40	1,420	n/a	1.7	0.06	46,800	3.0	0.6	930	54,500	370	1.4	1,640	0.2	44	320

Table 2.2 - Water quality data for the watercourses across the Project area available for the WRM (2018) report (continued)

Monitoring Site No.	Statistic	Non-metallic indicators								Metals and metalloids (total, except Mg)										
		pH	EC (µS/cm)	Total suspended solids (mg/L)	Total dissolved solids (mg/L)	Turbidity (NTU)	Dissolved oxygen (% saturation)	Sulphate (mg/L)	Nitrate (mg/L)	Aluminium (µg/L)	Arsenic (µg/L)	Cadmium (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Magnesium (mg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Zinc (µg/L)
Jervois Dam (03/03/2018) (see note ^a)	N	1	1	1	1	1	n/a	1	1	n/a	1	1	1	1	1	1	1	n/a	1	1
	Min.	6.7	106	80	80	7	n/a	5.4	1.16	n/a	1.0	0.2	10	1,580	1	2.8	180	n/a	2	10
	Max.	6.7	106	80	80	7	n/a	5.4	1.16	n/a	1.0	0.2	10	1,580	1	2.8	180	n/a	2	10
	Mean	6.7	106	80	80	7	n/a	5.4	1.16	n/a	1.0	0.2	10	1,580	1	2.8	180	n/a	2	10
Jervois Dam (10/01/1991) (see note ^b)	N	1	1	1	1	1	n/a	1	1	n/a	n/a	n/a	n/a	1	n/a	1	n/a	n/a	n/a	n/a
	Min.	6.9	170	72	125	26	n/a	7	8 ^c	n/a	n/a	n/a	n/a	4,100	n/a	4.0	n/a	n/a	n/a	n/a
	Max.	6.9	170	72	125	26	n/a	7	8 ^c	n/a	n/a	n/a	n/a	4,100	n/a	4.0	n/a	n/a	n/a	n/a
	Mean	6.9	170	72	125	26	n/a	7	8 ^c	n/a	n/a	n/a	n/a	4,100	n/a	4.0	n/a	n/a	n/a	n/a

^a - Data obtained from surface water sampling undertaken by KGL in March 2018.

^b - Data obtained from the NT government water portal for the Jervois Dam gauge.

^c - Nitrate concentration appears inconsistent compared to data from other monitoring sites.

n/a - No available data

2.3 ADDITIONAL WATER QUALITY DATA AVAILABLE FOR WRM (2019) REPORT

A significant rainfall event occurred at the project site in March 2019, in which the site received 176 mm of rain in 48 hours, resulting in significant flow in the watercourses at the site. Additional water quality samples were collected during this event, and analysed in April 2019 for inclusion in the supplementary report. A total of 6 samples were taken at the background water quality monitoring stations shown in Figure 2.1.

Table 2.3 summarises the water quality data that was obtained from the March 2019 event, and added to the water quality analysis in the WRM (2019) report. CoAs for the March 2019 samples are provided in Appendix B.

Table 2.4 presents the March 2019 sample results for each location that were added to the WRM (2019) water quality analysis.

Metal concentrations for most metalloids (except magnesium) were not measured for filtered samples, therefore the observed metal concentrations are reported as total metals.

Table 2.5 presents a comparison between mean and maximum TSS, total Aluminium, Iron and Manganese concentrations from the WRM (2018) data set with the concentrations from the March 2019 samples. Table 2.5 demonstrates that there is no significant change in TSS, total Aluminium, Iron and Manganese concentrations in the March 2019 dataset.

Table 2.3 - Water quality samples collected from March 2019 rainfall event

Sample Location	15 April 2019
JSW01	Y
JSW02	N
JSW03	Y
JSW04	Y
JSW05	N
JSW06	Y
JSW07	Y
JSW08	N
JSW09	Y
JSW10	N
Jervois Dam	N

N - no sample available for analysis

Y - sample available for analysis

2.4 FINAL REPORTED WATER QUALITY DATASET

Table 2.6 shows the final set of water quality data presented in the WRM (2019) report, which includes the data presented in both Table 2.2 and Table 2.4.

Table 2.4 - Water quality data for the watercourses across the Project area obtained from the March 2019 event

Monitoring Site No.	Non-metallic indicators								Metals and metalloids (total, except Mg)										
	pH	EC (µS/cm)	Total suspended solids (mg/L)	Total dissolved solids (mg/L)	Turbidity (NTU)	Dissolved oxygen (% saturation)	Sulphate (mg/L)	Nitrate (mg/L)	Aluminium (µg/L)	Arsenic (µg/L)	Cadmium (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Magnesium (mg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Zinc (µg/L)
JSW01	6.5	32	1,890	20	850	n/a	0.6	0.760	52,700	2.5	0.2	130	54,800	46	0.5	1,730	n/a	36	170
JSW02	n/a																		
JSW03	6.8	90	33,800	60	3,950	n/a	3.9	1.94	132,000	6.0	1.0	160	158,000	528	2.5	5,770	n/a	106	560
JSW04	6.2	37	1,720	20	1,100	n/a	0.2	3.70	62,100	3.0	0.2	70	63,300	46	0.9	2,000	n/a	46	200
JSW05	n/a																		
JSW06	7.2	516	30	350	5	n/a	185.0	0.02	200	0.5	0.2	10	220	1	11.7	20	n/a	2	10
JSW07	6.4	34	2,340	20	1,220	n/a	0.6	0.82	51,000	2.5	0.2	300	52,900	47	0.6	1,650	n/a	38	210
JSW08	n/a																		
JSW09	7.0	124	9,930	90	4,510	n/a	1.0	0.58	139,000	6.0	1.4	1,030	175,000	550	3.6	7,080	n/a	136	700
JSW10	n/a																		
Jervois Dam	n/a																		

n/a - No available data

Table 2.5 - Comparison of mean TSS, total Aluminium, Iron and Manganese between WRM (2018) dataset and March 2019 event data

Monitoring Site No.	Total suspended solids (mg/L)			Aluminium (µg/L)			Iron (µg/L)			Manganese (µg/L)		
	Mean WRM (2018)	Max WRM (2018)	March 2019	Mean WRM (2018)	Max WRM (2018)	March 2019	Mean WRM (2018)	Max WRM (2018)	March 2019	Mean WRM (2018)	Max WRM (2018)	March 2019
JSW01	4,147	6,980	1,890	60,067	73,400	52,700	66,933	88,100	54,800	1,877	2,730	1,730
JSW02	240	380	n/a	9,570	13,000	n/a	8,460	12,300	n/a	168	280	n/a
JSW03	n/a	n/a	33,800	n/a	n/a	132,000	n/a	n/a	158,000	n/a	n/a	5,770
JSW04	3,180	4,820	1,720	44,150	48,100	62,100	43,800	46,900	63,300	940	1,040	2,000
JSW05	950	1,880	n/a	26,940	50,300	n/a	24,730	46,800	n/a	733	1,450	n/a
JSW06	110	110	30	200	200	200	380	380	220	435	435	20
JSW07	3,140	3,490	2,340	55,400	56,900	51,000	57,450	60,700	52,900	1,760	1,780	1,650
JSW08	2,745	4,090	n/a	28,900	35,000	n/a	31,750	40,300	n/a	725	865	n/a
JSW09	3,788	9,090	9,930	60,575	104,000	139,000	64,700	114,000	175,000	1,939	3,540	7,080
JSW10	2,120	2,120	n/a	46,800	46,800	n/a	54,500	54,500	n/a	1,640	1,640	n/a
Jervois Dam	80	80	n/a	n/a	n/a	n/a	1,580	1,580	n/a	180	180	n/a

n/a - No available data

Table 2.6 - Final reported water quality data in WRM (2019) report

Monitoring Site No.	Statistic	Non-metallic indicators								Metals and metalloids (total, except Mg)										
		pH	EC (µS/cm)	Total suspended solids (mg/L)	Total dissolved solids (mg/L)	Turbidity (NTU)	Dissolved oxygen (% saturation)	Sulphate (mg/L)	Nitrate (mg/L)	Aluminium (µg/L)	Arsenic (µg/L)	Cadmium (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Magnesium (filtered) (mg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Zinc (µg/L)
JSW01	N	4	4	4	4	4	n/a	4	4	4	4	4	4	4	4	4	4	3	4	4
	Min.	6.5	26	1,890	20	530	n/a	0.4	0.04	38,500	2.0	0.2	120	41,600	32	0.5	680	0.1	32	130
	Max.	7.4	67	6,980	50	1,390	n/a	1.3	0.76	73,400	4.0	0.2	250	88,100	71	1.8	2,730	0.2	72	340
	Mean	6.8	43	3,583	33	1,035	n/a	0.9	0.32	58,225	3.0	0.2	165	63,900	51	1.0	1,840	0.2	49	220
JSW02	N	2	2	2	2	2	n/a	2	2	2	2	2	2	2	2	2	2	2	2	2
	Min.	6.4	39	100	20	100	n/a	1.5	0.02	6,140	1.0	0.2	10	4,620	3	0.6	55	0.2	4	10
	Max.	6.6	39	380	30	250	n/a	2.5	0.04	13,000	1.5	0.2	10	12,300	17	1.1	280	0.2	8	50
	Mean	6.5	39	240	25	175	n/a	2.0	0.03	9,570	1.3	0.2	10	8,460	10	0.9	168	0.2	6	30
JSW03	N	1	1	1	1	1	n/a	1	1	1	1	1	1	1	1	1	1	n/a	1	1
	Min.	6.8	90	33,800	60	3,950	n/a	3.9	1.94	132,000	6.0	1.0	160	158,000	528	2.5	5,770	n/a	106	560
	Max.	6.8	90	33,800	60	3,950	n/a	3.9	1.94	132,000	6.0	1.0	160	158,000	528	2.5	5,770	n/a	106	560
	Mean	6.8	90	33,800	60	3,950	n/a	3.9	1.94	132,000	6.0	1.0	160	158,000	528	2.5	5,770	n/a	106	560
JSW04	N	3	3	3	3	3	n/a	3	3	3	3	3	3	3	3	3	3	2	3	3
	Min.	6.2	29	1,540	10	730	n/a	0.2	0.02	40,200	2.5	0.2	40	40,700	25	0.6	840	0.2	28	110
	Max.	6.5	52	4,820	30	1,100	n/a	0.7	3.70	62,100	3.0	0.2	70	63,300	46	0.9	2,000	0.2	46	200
	Mean	6.3	39	2,693	20	863	n/a	0.5	1.29	50,133	2.7	0.2	50	50,300	33	0.8	1,293	0.2	37	150
JSW05	N	2	2	2	2	2	n/a	2	2	2	2	2	2	2	2	2	2	2	2	2
	Min.	6.4	30	20	20	61	n/a	1.6	0.02	3,580	0.5	0.2	10	2,660	2	0.6	15	0.2	2	10
	Max.	6.8	47	1,880	30	1,160	n/a	2.0	1.28	50,300	3.5	0.2	40	46,800	44	0.7	1,450	0.2	32	180
	Mean	6.6	39	950	25	611	n/a	1.8	0.65	26,940	2.0	0.2	25	24,730	23	0.7	733	0.2	17	95

Table 2.6 - Final reported water quality data in WRM (2019) report (continued)

Monitoring Site No.	Statistic	Non-metallic indicators								Metals and metalloids (total, except Mg)										
		pH	EC (µS/cm)	Total suspended solids (mg/L)	Total dissolved solids (mg/L)	Turbidity (NTU)	Dissolved oxygen (% saturation)	Sulphate (mg/L)	Nitrate (mg/L)	Aluminium (µg/L)	Arsenic (µg/L)	Cadmium (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Magnesium (mg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Zinc (µg/L)
JSW06	N	2	2	2	2	2	n/a	2	2	2	2	2	2	2	2	2	2	1	2	2
	Min.	7.1	137	30	110	5	n/a	17.3	0.02	200	0.5	0.2	10	220	1	4.2	20	0.2	2	10
	Max.	7.2	516	110	350	8	n/a	185.0	0.02	200	0.5	0.2	10	380	1	11.7	435	0.2	2	10
	Mean	7.2	327	70	230	7	n/a	101.2	0.02	200	0.5	0.2	10	300	1	8.0	228	0.2	2	10
JSW07	N	3	3	3	3	3	n/a	3	3	3	3	3	3	3	3	3	3	2	3	3
	Min.	6.2	25	2,340	20	800	n/a	0.6	0.78	51,000	2.5	0.2	140	52,900	44	0.6	1,650	0.1	38	200
	Max.	7.1	35	3,490	30	1,220	n/a	0.8	2.14	56,900	3.0	0.2	460	60,700	47	0.9	1,780	0.2	48	260
	Mean	6.6	31	2,873	27	960	n/a	0.7	1.25	53,933	2.7	0.2	300	55,933	45	0.7	1,723	0.2	44	223
JSW08	N	2	2	2	2	2	n/a	2	2	2	2	2	2	2	2	2	2	2	2	2
	Min.	6.5	10	1,400	10	350	n/a	0.2	0.02	22,800	1.5	0.2	60	23,200	16	0.2	585	0.1	16	60
	Max.	7.1	26	4,090	10	670	n/a	0.9	0.92	35,000	2.5	0.2	80	40,300	24	0.4	865	0.2	26	120
	Mean	6.8	18	2,745	10	510	n/a	0.6	0.47	28,900	2.0	0.2	70	31,750	20	0.3	725	0.2	21	90
JSW09	N	5	5	5	5	5	n/a	5	5	5	5	5	5	5	5	5	5	4	5	5
	Min.	6.4	18	410	10	420	n/a	0.3	0.04	23,400	1.5	0.2	50	25,100	17	0.5	815	0.1	22	100
	Max.	7.0	124	9,930	90	4,510	n/a	1.3	0.94	139,000	6.0	1.4	1,030	175,000	550	3.6	7,080	0.2	136	700
	Mean	6.8	57	5,016	44	1,792	n/a	0.9	0.36	76,260	3.6	0.5	400	86,760	158	1.5	2,967	0.2	70	320
JSW010	N	1	1	1	1	1	n/a	1	1	1	1	1	1	1	1	1	1	1	1	1
	Min.	6.8	62	2,120	40	1,420	n/a	1.7	0.06	46,800	3.0	0.6	930	54,500	370	1.4	1,640	0.2	44	320
	Max.	6.8	62	2,120	40	1,420	n/a	1.7	0.06	46,800	3.0	0.6	930	54,500	370	1.4	1,640	0.2	44	320
	Mean	6.8	62	2,120	40	1,420	n/a	1.7	0.06	46,800	3.0	0.6	930	54,500	370	1.4	1,640	0.2	44	320

Table 2.6 - Final reported water quality data in WRM (2019) report (continued)

Monitoring Site No.	Statistic	Non-metallic indicators								Metals and metalloids (total, except Mg)										
		pH	EC (µS/cm)	Total suspended solids (mg/L)	Total dissolved solids (mg/L)	Turbidity (NTU)	Dissolved oxygen (% saturation)	Sulphate (mg/L)	Nitrate (mg/L)	Aluminium (µg/L)	Arsenic (µg/L)	Cadmium (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Magnesium (mg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Zinc (µg/L)
Jervois Dam (03/03/2018) (see note ^a)	N	1	1	1	1	1	n/a	1	1	n/a	1	1	1	1	1	1	1	n/a	1	1
	Min.	6.7	106	80	80	7	n/a	5.4	1.16	n/a	1.0	0.2	10	1,580	1	2.8	180	n/a	2	10
	Max.	6.7	106	80	80	7	n/a	5.4	1.16	n/a	1.0	0.2	10	1,580	1	2.8	180	n/a	2	10
	Mean	6.7	106	80	80	7	n/a	5.4	1.16	n/a	1.0	0.2	10	1,580	1	2.8	180	n/a	2	10
Jervois Dam (10/01/1991) (see note ^b)	N	1	1	1	1	1	n/a	1	1	n/a	n/a	n/a	n/a	1	n/a	1	n/a	n/a	n/a	n/a
	Min.	6.9	170	72	125	26	n/a	7	8 ^c	n/a	n/a	n/a	n/a	4,100	n/a	4.0	n/a	n/a	n/a	n/a
	Max.	6.9	170	72	125	26	n/a	7	8 ^c	n/a	n/a	n/a	n/a	4,100	n/a	4.0	n/a	n/a	n/a	n/a
	Mean	6.9	170	72	125	26	n/a	7	8 ^c	n/a	n/a	n/a	n/a	4,100	n/a	4.0	n/a	n/a	n/a	n/a

^a - Data obtained from surface water sampling undertaken by KGL in March 2018.

^b - Data obtained from the NT government water portal for the Jervois Dam gauge.

^c - Nitrate concentration appears inconsistent compared to data from other monitoring sites.

n/a - No available data

3 Water quality discussion

3.1 AREAS OF EXISTING DISTURBANCE

The existing areas of mining disturbance at the Project site are limited to the eastern parts of the catchments of Unca Creek and the Unca Creek Tributary.

The old tailings dams, processing plant area and ROM pad are located in the catchment of Unca Creek downstream of JSW02 and JSW06 and upstream of JSW03 and JSW10.

The old Reward South waste rock dump is located in the catchment of the Unca Creek tributary, downstream of JSW04, JSW05, JSW07 and JSW08, and upstream of JSW01.

There is no existing mining disturbance in the catchment of Unca Creek upstream of JSW02, JSW06 or Jervois Dam, and no existing mining disturbance in the catchment of the Unca Creek tributary upstream of JSW04, JSW05, JSW07 and JSW08.

3.2 SUMMARY OF WATER QUALITY DATA

Table 2.6 provides a summary of water quality data for the Project site. The data shows that:

- Water sampled in Jervois Dam is slightly acidic but close to neutral (pH of 6.7 to 6.9), with low EC, TSS and turbidity. Metal concentrations (total) are also below the detection limit for most metals, with the exception of total Iron, which is somewhat elevated. Contaminant concentrations in Jervois Dam are generally similar between the two samples taken in 1991 and 2018 respectively.
- Immediately downstream of Jervois Dam (site JSW02), water quality is similar to that observed in Jervois Dam, with pH close to neutral, low EC, TSS and turbidity as well as low concentrations of metals (with the exception of total Aluminium and total Iron). Total Iron concentrations at these monitoring stations are similar to those observed in Jervois Dam. Note that samples from Jervois Dam and JSW02 are downstream of the large undisturbed catchment draining to Jervois Dam, and this runoff does not flow through any areas of previous mining disturbance.
- Water quality results for the two samples at JSW06 are not consistent with the water quality samples at the upstream (Jervois Dam) and downstream (JSW02). The maximum, EC, sulphate and total dissolved solids (TDS) concentrations at JSW06 are significantly higher than those observed at all other sites. Total metal concentrations, TSS and turbidity are significantly lower than observed at other sites. It is possible that there is an issue with the sampling equipment at JSW06.
- In Unca Creek at JSW03 (immediately downstream of where runoff from the old processing plant area and ROM pad would discharge to the creek), the results from the single available sample indicate that pH (6.8) is slightly acidic but close to neutral. However, there is a noticeable increase in TSS and turbidity compared to samples taken from upstream sites (JSW02). Metal concentrations are also significantly higher (compared to samples taken upstream) for all metal indicators.
- In Unca Creek at the eastern boundary of the Project area (at Lucy Creek Road) (site JSW10), the results from the single available sample indicate that pH (6.8) is slightly acidic but close to neutral. The JSW10 sample has lower TSS, TDS and metal concentrations than the sample from the upstream site (JSW03), however the samples were obtained from different events (JSW03 sampled in March 2019, and JSW10 sampled in April 2016). The TSS, TDS and metal concentrations from JSW10, although lower than those from JSW03, are higher than those from JSW02 and JSW06.

- At sites JSW04, JSW05, JSW07 and JSW08, located in the undisturbed catchment of the Unca Creek tributary, pH is generally slightly acidic (ranging from 6.2 to 7.1). EC is low, but TSS is relatively high, particularly in JSW04 (ranging from 20 mg/L to 4,820 mg/L). TSS, turbidity and metal concentrations are high considering the undisturbed nature of the catchments draining to these monitoring stations.
- In the Unca Creek tributary at the eastern boundary of the Project area (at Lucy Creek Road) (JSW01) pH ranges from 6.5 to 7.4, while EC is low. TSS and turbidity are higher compared to all other sites except for JSW09 and JSW03. Metal concentrations observed here are generally slightly elevated when compared to the upstream monitoring stations (JSW04, JSW05, JSW07 and JSW08). There is some existing mining disturbance areas that drain into the Unca Creek tributary between JSW04, JSW05, JSW07 and JSW08 and JSW01.
- East of the Project area and downstream of the confluence of Unca Creek and its tributary (site JSW09), pH is neutral to slightly acidic (ranging from 6.4 to 7.0), while EC is low. TSS and turbidity are higher compared to all other sites except for JSW03. Metal concentrations are also generally higher compared to all other sites.

3.3 REASON FOR ELEVATED METAL CONCENTRATIONS

It should be noted that all reported metal concentration are total values, not filtered, and therefore cannot be compared to ANZECC & ARMCANZ (2000) water quality objectives for aquatic ecosystems. However, the data is suitable for developing an understanding of the typical water quality in the watercourses at the Project site during flow events. It should be noted that the proposed surface water monitoring program for the Jervois Project described in both WRM (2018) and WRM (2019) will test for total and filtered metals.

Elevated metal concentrations (in particular Aluminium, Iron and Manganese) are evident at all monitoring stations with the exception of JSW02 and in Jervois Dam. All three of these monitoring sites are located upstream of any existing or proposed mining disturbance. Metal concentrations at monitoring site JSW02 (located downstream of JSW06 and Jervois Dam) are higher than the upstream monitoring sites, but not as extreme as at the other 8 monitoring sites.

Metal concentrations at other monitoring stations not affected by existing mining disturbance (JSW04, JSW05, JSW07 and JSW08) are similar to metal concentrations at monitoring stations downstream of existing disturbance (JSW01, JSW03 and JSW10). Therefore, the elevated metal concentrations do not appear to be due to existing site disturbance.

There is a strong correlation in the water quality dataset between TSS and the elevated metals (Aluminium, Iron and Manganese). Monitoring sites JSW02 and Jervois Dam have the lowest TSS results of the 11 stations, and the lowest concentrations of total metals. Further, JSW02 and Jervois Dam are not located within or downstream of the flatter, sandy, highly mineralised part of the Project, unlike all of the other monitoring sites.

Therefore, the background water quality at the Project site can be characterised as having high TSS and metals concentrations.

The available water quality data, particularly the concentrations of total suspended solids and total metals are not unexpected considering the highly mineralised, sediment laden catchment area, and the ephemeral nature of the watercourses, which flow infrequently and transport large amounts of sediment during flow events.

3.4 GROUNDWATER QUALITY

The WRM (2019) report included a summary of groundwater quality data associated with the ore bodies in the Reward open cut pit. This groundwater quality data was obtained from the *Jervois Base Metals Mine Groundwater Impact Assessment Supplement* (CloudGMS, 2019). The CloudGMS (2019) report also provided water quality data from other locations at the project site, and the Lucy Creek borefield.

The groundwater quality data presented in the WRM (2019) and CloudGMS (2019) reports has been checked, and is correct. This data was analysed by CloudGMS, and was not subject to the analysis errors described in Section 1.3.

Table 3.1 summarises the groundwater quality data presented in the WRM (2019) report. The total metals values in Table 3.1 are significantly lower than those in the available surface water quality dataset. This is likely due to the groundwater samples being taken from water located within the ore body rocks. These groundwater samples have little to no suspended sediment in them, which results in significantly reduced total metal concentrations.

Table 3.1 - Water quality from test production bores in Reward ore body (source CloudGMS, 2019)

Parameter	Abbreviation	Units	Bore J7	Bore J8
<i>Non-metallic indicators</i>				
pH	pH	pH units	6.96	7.07
Electrical conductivity	EC	µS/cm	1,810	3,290
Total dissolved solids	TDS	mg/L	1,020	2,000
Total suspended solids	TSS	mg/L	NA	NA
Turbidity	Turbidity	NTU	NA	NA
Dissolved oxygen	DO	% saturation	NA	NA
Sulphate	SO ₄	mg/L	259	388
Nitrate	NO ₃	mg/L	NA	NA
<i>Metals and metalloids (filtered, unless otherwise stated)</i>				
Aluminium	Al	µg/L	<10	10
Arsenic	As	µg/L	<1	<1
Cadmium	Cd	µg/L	<0.1	<0.1
Copper	Cu	µg/L	3	3
Iron	Fe	µg/L	410	210
Lead	Pb	µg/L	<1	<1
Magnesium	Mg	mg/L	74	96
Manganese	Mn	µg/L	316	26
Mercury	Hg	µg/L	<0.1	<0.1
Nickel	Ni	µg/L	<1	<1
Zinc	Zn	µg/L	9	<5

4 Summary

As part of their review of the draft and supplementary EIS reports, NT EPA noted a change in reported total metal concentrations in the background water quality dataset between the draft EIS surface water assessment (WRM, 2018) and supplementary EIS (WRM, 2019) reports.


This addendum report has clarified the reason for this error and provided updated water quality datasets for the Project based on the data available for the WRM (2018) report and the additional data collected following a rainfall event in March 2019, which was included in the WRM (2019) report.

All water quality samples collected at the site were analysed at a NATA accredited laboratory.

The reason for difference between the water quality data presented in the WRM (2018) and WRM (2019) reports is due to three errors in the water quality analysis spreadsheet used in the WRM (2018) report. These errors were corrected during the preparation of the WRM (2019) report. The errors are summarised as follows:

- Metal concentrations for Manganese, Aluminium and Iron results have been provided based on the Intertek “W205I” analytical method, which gives results in mg/L. In the WRM (2018) report these elements were assigned the incorrect measuring unit µg/L instead of mg/L, and in some cases the “W205I” results were not included in the WRM (2018) summary table at all. As such, concentrations for the “W205I” should have been factored up by 1,000 to convert them from mg/L to µg/L and included in the summary table. This error was then corrected in the WRM (2019) report, which caused reported concentrations of Manganese, Aluminium and Iron to increase by an order of magnitude.
- The results for Nitrate (NO₃) in the WRM (2018) report spreadsheet was incorrectly referencing the Nitrogen as nitrate (NO₃-N) column.
- Total Aluminium (Al) for samples 45605 (15 April 2016) and 46872 (18 January 2017) was included in the Arsenic analysis instead of the Arsenic results.
- Total Bromium (Br) for samples 45605 (15 April 2016) and 46872 (18 January 2017) was included in the Cadmium analysis instead of the Cadmium results.
- Total Chromium (Cr) for samples 45605 (15 April 2016) and 46872 (18 January 2017) was included in the Copper analysis instead of the Copper results.
- Total Copper (Cu) for samples 45605 (15 April 2016), 46872 (18 January 2017) and 48758 (17 March 2018) was included in the Iron analysis instead of the Iron results, combined with incorrect units / omission of some of the Iron values due to the ‘W205I’ issue).
- Total Iodine (I) for samples 45605 (15 April 2016) and 46872 (18 January 2017) was included in the Manganese analysis instead of the Manganese results, combined with incorrect units / omission of some of the Manganese values due to the ‘W205I’ issue).
- Total Iron (Fe) for samples 45605 (15 April 2016), 46872 (18 January 2017) and 48758 (17 March 2018) was included in the Mercury analysis instead of the Mercury results.

The watercourses at the site are ephemeral and water levels rise and fall quickly only following heavy rainfall, which may only occur once every year, and in some cases every two years. These flow events occur rapidly and mobilise large amounts of sediment from the stream beds every time they occur. Rainfall at the site does not typically produce slow moving trickle flow with low levels of suspended solids, as these flows soak quickly into the soil and do not propagate far along the watercourses. This is reflected in the available



water quality samples, which typically show very high concentrations of Total Suspended Solids (TSS) and metals.

There is a strong correlation in the water quality dataset between TSS and the elevated metals (Aluminium, Iron and Manganese). The background water quality at the Project site can be characterised as having high TSS and metals concentrations.

The available water quality data, particularly the concentrations of total suspended solids and total metals are not unexpected considering the highly mineralised, sediment laden catchment area, and the ephemeral nature of the watercourses, which flow infrequently and transport large amounts of sediment during flow events.

5 References

- ANZECC & ARMCANZ, 2000 Australian and New Zealand Environment Control Council and Agricultural and Resource Management Council of Australia and New Zealand, October 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*,
- CloudGMS, 2019 CloudGMS July 2019, *Jervois Base Metals Mine Groundwater Impact Assessment Supplement*, prepared on behalf of KGL Resources
- WRM, 2018 WRM Water and Environment Pty Ltd, September 2018, *Jervois Base Metal Project EIS Surface Water Impact Assessment*, prepared on behalf of KGL Resources
- WRM, 2019 WRM Water and Environment Pty Ltd, July 2019, *Jervois Base Metal Project EIS Surface Water Impact Assessment Supplement*, prepared on behalf of KGL Resources



Appendix A CoAs for water quality samples available for WRM (2018)



Appendix B CoA for water quality samples from March 2019 event

CHEMICAL ANALYSIS REPORT

CASH SALE

NTEL
ABN 32 008 787 237
PO Box 1382 Berrimah 0828
3407 Export Drive
Berrimah NT 0828
Ph: (08) 8947 0510
Fax: (08) 8947 0520

REPORT CODE: NT45136
Report Date: 24/02/2016
Samples Received: 8/02/2016
Number of Samples: 1

Report Distribution:

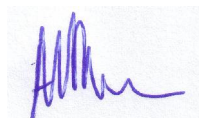
Purchase Order: RUDY LENNARTZ
Project: ADWQG TOTAL PACKAGE DEC 2015 **Tel:**
Cost Code: _____ **Fax:**
E-mail:

Report Details: **NATA ACCREDITATION No: 14610**
Test results only apply to samples received
Samples were analysed between 08/02/16 and 24/02/16
Water samples will be discarded one month from date of report

Comments:

Samples with concentrations greater than the linear working range (>LWR) of the ICPMS were reanalysed by ICPOES.
Br & I may report low off W205M due to possible losses during digestion.
These samples were incorrectly preserved for Mercury analysis. Mercury data is indicative only.
Trace Metals were analysed from the General Chemistry Bottle.

Authorisation:



Andrew McKeon



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ACCREDITATION

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NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45136

Methodology:

Analysis	Analytical Method	Technique	Accuracy/ Precision +/-%	Detection Limit	Data Units
pH	ALK1	EA	10	0.1	units
EC	ALK1	EA	10	1	µS/cm
Alkalinity	ALK1	EA	10	1	mg/L
CO3	ALK1	EA	10	1	mg/L
HCO3	ALK1	EA	10	1	mg/L
OH	ALK1	EA	10	1	mg/L
Turbidity	TURB1	CA	10	1	NTU
True Colour	COLOUR	SA	10	5	units Pt-Co
TSS	TSSTDS	GRAV	10	10	mg/L
TDS	TSSTDS	GRAV	10	10	mg/L
NO2_N	FIAS_4	FIA	10	0.005	mg/L
NO2	FIAS_4	FIA	10	0.02	mg/L
NO3_N	FIAS_4	FIA	10	0.005	mg/L
NO3	FIAS_4	FIA	10	0.02	mg/L
Cl	FIAS_4	FIA	10	0.1	mg/L
PO4_P	FIAS_4	FIA	10	0.005	mg/L
NH3_N	NH3_N	FIA	10	0.005	mg/L
F	FISE1	EA	10	0.1	mg/L
Hardness	TH1	CALC.	10	0.1	mg/L
Ca_F	W108I	ICPOES	10	0.1	mg/L
K_F	W108I	ICPOES	10	0.1	mg/L
Mg_F	W108I	ICPOES	10	0.1	mg/L
Na_F	W108I	ICPOES	10	0.1	mg/L
SiO2	W108I	ICPOES	10	0.2	mg/L
SO4_F	W108I	ICPOES	10	0.1	mg/L
Ag_T	W205M	ICPMS	10	10	µg/L
Al_T	W205M	ICPMS	10	20	µg/L
Al_T	W205I	ICPOES	10	0.02	mg/L
As_T	W205M	ICPMS	10	0.5	µg/L
B_T	W205M	ICPMS	10	20	µg/L
Ba_T	W205M	ICPMS	10	50	µg/L
Be_T	W205M	ICPMS	10	1	µg/L
Br_T	W205M	ICPMS	10	2	µg/L
Cd_T	W205M	ICPMS	10	0.2	µg/L
Cr_T	W205M	ICPMS	10	5	µg/L
Cu_T	W205M	ICPMS	10	10	µg/L
Fe_T	W205M	ICPMS	10	20	µg/L
Fe_T	W205I	ICPOES	10	0.05	mg/L
Hg	W205M	ICPMS	10	0.1	µg/L
I_T	W205M	ICPMS	10	10	µg/L
Mn_T	W205M	ICPMS	10	5	µg/L
Mo_T	W205M	ICPMS	10	5	µg/L
Ni_T	W205M	ICPMS	10	2	µg/L
Pb_T	W205M	ICPMS	10	1	µg/L
Sb_T	W205M	ICPMS	10	0.2	µg/L
Se_T	W205M	ICPMS	10	1	µg/L
Sn_T	W205M	ICPMS	10	10	µg/L
U_T	W205M	ICPMS	10	0.01	µg/L
Zn_T	W205M	ICPMS	10	10	µg/L

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45136

Project: ADWQG TOTAL PACKAGE DEC 2015

Element:	pH	EC	Alkalinity	CO3	HCO3	OH	Turbidity	True Colour	TSS
Method:	ALK1	ALK1	ALK1	ALK1	ALK1	ALK1	TURB1	COLOUR	TSSTDS
Units:	units	µS/cm	mg/L	mg/L	mg/L	mg/L	NTU	units Pt-Co	mg/L
Sample ID									
9_04022016	6.8	18	6	<1	6	<1	420	40	410

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45136

Project: ADWQG TOTAL PACKAGE DEC 2015

Element:	TDS	NO2_N	NO2	NO3_N	NO3	Cl	PO4_P	NH3_N	F
Method:	TSSTDS	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	NH3_N	FISE1
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample ID									
9_04022016	10	<0.005	<0.02	0.010	0.04	0.1	0.015	0.100	<0.1

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45136

Project: ADWQG TOTAL PACKAGE DEC 2015

Element:	Hardness	Ca_F	K_F	Mg_F	Na_F	SiO2	SO4_F	Ag_T	Al_T
Method:	TH1	W108I	W108I	W108I	W108I	W108I	W108I	W205M	W205M
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L
Sample ID									
9_04022016	4.9	1.2	2.5	0.5	0.2	5.0	0.3	<10	>LWR

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45136

Project: ADWQG TOTAL PACKAGE DEC 2015

Element:	Al_T	As_T	B_T	Ba_T	Be_T	Br_T	Cd_T	Cr_T	Cu_T
Method:	W205I	W205M	W205M	W205M	W205M	W205M	W205M	W205M	W205M
Units:	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample ID									
9_04022016	23.4	1.5	<20	150	2	6	<0.2	25	50

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45136

Project: ADWQG TOTAL PACKAGE DEC 2015

Element:	Fe_T	Fe_T	Hg	I_T	Mn_T	Mo_T	Ni_T	Pb_T	Sb_T
Method:	W205M	W205I	W205M	W205M	W205M	W205M	W205M	W205M	W205M
Units:	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample ID									
9_04022016	>LWR	25.1	<0.1	<10	815	<5	22	17	<0.2

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45136

Project: ADWQG TOTAL PACKAGE DEC 2015

Element:	Se_T	Sn_T	U_T	Zn_T
Method:	W205M	W205M	W205M	W205M
Units:	µg/L	µg/L	µg/L	µg/L
Sample ID				
9_04022016	<1	<10	0.64	100



NT ENVIRONMENTAL
LABORATORIES

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

CHEMICAL ANALYSIS REPORT

Kentor Minerals (NT)

**Intertek Testing Services
(Australia) Pty Ltd**
ABN 56 001 722 854
PO Box 1382 Berrimah 0828
55 Export Drive
Berrimah NT 0828
Ph: (08) 8947 0510

REPORT CODE: NT45250
Report Date: 9/03/2016
Samples Received: 25/02/2016
Number of Samples: 4

Report Distribution:
Rudy Lennartz

Purchase Order: ENVIRO_17022016
Project: JERVOIS
Cost Code: _____

Tel:
Fax:
E-mail: rlennartz@kglresources.com.au

Report Details: **NATA ACCREDITATION No: 14610**
Test results only apply to samples received
Samples were analysed between 25/02/16 and 09/03/16
Water samples will be discarded one month from date of report

Comments:

Samples with concentrations greater than the linear working range (>LWR) of the ICPMS were reanalysed by ICPOES.
Br & I may report low off W205M due to possible losses during digestion.
These samples were incorrectly preserved for Mercury analysis. Mercury data is indicative only.

Authorisation:

Andrew McKeon



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NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45250

Methodology:

Analysis	Analytical Method	Technique	Accuracy/ Precision +/-%	Detection Limit	Data Units
pH	ALK1	EA	10	0.1	units
EC	ALK1	EA	10	1	µS/cm
Alkalinity	ALK1	EA	10	1	mg/L
CO3	ALK1	EA	10	1	mg/L
HCO3	ALK1	EA	10	1	mg/L
OH	ALK1	EA	10	1	mg/L
Turbidity	TURB1	CA	10	1	NTU
True Colour	COLOUR	SA	10	5	units Pt-Co
TSS	TSSTDS	GRAV	10	10	mg/L
TDS	TSSTDS	GRAV	10	10	mg/L
NO2_N	FIAS_4	FIA	10	0.005	mg/L
NO2	FIAS_4	FIA	10	0.02	mg/L
NO3_N	FIAS_4	FIA	10	0.005	mg/L
NO3	FIAS_4	FIA	10	0.02	mg/L
Cl	FIAS_4	FIA	10	0.1	mg/L
PO4_P	FIAS_4	FIA	10	0.005	mg/L
NH3_N	NH3_N	FIA	10	0.005	mg/L
F	FISE1	EA	10	0.1	mg/L
Hardness	TH1	CALC.	10	0.1	mg/L
Ca_F	W108I	ICPOES	10	0.1	mg/L
K_F	W108I	ICPOES	10	0.1	mg/L
Mg_F	W108I	ICPOES	10	0.1	mg/L
Na_F	W108I	ICPOES	10	0.1	mg/L
SiO2	W108I	ICPOES	10	0.2	mg/L
SO4_F	W108I	ICPOES	10	0.1	mg/L
Ag_T	W205M	ICPMS	10	10	µg/L
Al_T	W205M	ICPMS	10	20	µg/L
Al_T	W205I	ICPOES	10	0.02	mg/L
As_T	W205M	ICPMS	10	0.5	µg/L
B_T	W205M	ICPMS	10	20	µg/L
Ba_T	W205M	ICPMS	10	50	µg/L
Be_T	W205M	ICPMS	10	1	µg/L
Br_T	W205M	ICPMS	10	2	µg/L
Cd_T	W205M	ICPMS	10	0.2	µg/L
Cr_T	W205M	ICPMS	10	5	µg/L
Cu_T	W205M	ICPMS	10	10	µg/L
Fe_T	W205M	ICPMS	10	20	µg/L
Fe_T	W205I	ICPOES	10	0.05	mg/L
Hg	W205M	ICPMS	10	0.1	µg/L
I_T	W205M	ICPMS	10	10	µg/L
Mn_T	W205M	ICPMS	10	5	µg/L
Mn_T	W205I	ICPOES	10	0.005	mg/L
Mo_T	W205M	ICPMS	10	5	µg/L
Ni_T	W205M	ICPMS	10	2	µg/L
Pb_T	W205M	ICPMS	10	1	µg/L
Sb_T	W205M	ICPMS	10	0.2	µg/L
Se_T	W205M	ICPMS	10	1	µg/L
Sn_T	W205M	ICPMS	10	10	µg/L
U_T	W205M	ICPMS	10	0.01	µg/L
Zn_T	W205M	ICPMS	10	10	µg/L

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45250

Project: JERVOIS

Element:	pH	EC	Alkalinity	CO ₃	HCO ₃	OH	Turbidity	True Colour	TSS
Method:	ALK1	ALK1	ALK1	ALK1	ALK1	ALK1	TURB1	COLOUR	TSSTDS
Units:	units	µS/cm	mg/L	mg/L	mg/L	mg/L	NTU	units Pt-Co	mg/L
Sample ID									
NO. 1	7.4	26	10	<1	10	<1	530	35	2520
NO. 7	7.1	25	7	<1	7	<1	800	70	2790
NO. 8	7.1	10	3	<1	3	<1	350	40	1400
NO. 9	7.0	19	7	<1	7	<1	1070	65	3660

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45250

Project: JERVOIS

Element:	TDS	NO2_N	NO2	NO3_N	NO3	Cl	PO4_P	NH3_N	F
Method:	TSSTDS	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	NH3_N	FISE1
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample ID									
NO. 1	20	0.015	0.04	0.010	0.04	0.2	0.010	0.325	<0.1
NO. 7	30	0.005	0.02	0.485	2.14	0.5	0.025	0.050	<0.1
NO. 8	10	<0.005	<0.02	<0.005	<0.02	0.2	0.015	0.020	<0.1
NO. 9	20	0.025	0.08	0.035	0.16	0.2	0.010	0.040	<0.1

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45250

Project: JERVOIS

Element:	Hardness	Ca_F	K_F	Mg_F	Na_F	SiO2	SO4_F	Ag_T	Al_T
Method:	TH1	W108I	W108I	W108I	W108I	W108I	W108I	W205M	W205M
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L
Sample ID									
NO. 1	8.0	2.1	2.3	0.7	0.1	6.4	0.4	<10	>LWR
NO. 7	7.2	1.8	3.0	0.7	0.5	8.6	0.7	<10	>LWR
NO. 8	2.2	0.5	1.7	0.2	<0.1	2.6	0.2	<10	>LWR
NO. 9	6.4	1.6	2.1	0.6	0.1	5.2	0.5	<10	>LWR

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45250

Project: JERVOIS

Element:	Al_T	As_T	B_T	Ba_T	Be_T	Br_T	Cd_T	Cr_T	Cu_T
Method:	W205I	W205M	W205M	W205M	W205M	W205M	W205M	W205M	W205M
Units:	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample ID									
NO. 1	38.5	2.0	<20	250	3	12	<0.2	40	120
NO. 7	53.9	2.5	20	300	4	14	<0.2	60	140
NO. 8	22.8	1.5	<20	150	2	12	<0.2	25	60
NO. 9	56.2	2.5	20	400	5	20	0.2	60	470

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45250

Project: JERVOIS

Element:	Fe_T	Fe_T	Hg	I_T	Mn_T	Mn_T	Mo_T	Ni_T	Pb_T
Method:	W205M	W205I	W205M	W205M	W205M	W205I	W205M	W205M	W205M
Units:	µg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L
Sample ID									
NO. 1	>LWR	41.6	<0.1	<10	680	N.A.	<5	32	32
NO. 7	>LWR	54.2	0.1	<10	>LWR	1.74	<5	46	44
NO. 8	>LWR	23.2	<0.1	<10	585	N.A.	<5	16	16
NO. 9	>LWR	57.4	0.1	<10	>LWR	1.79	<5	46	48

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45250

Project: JERVOIS

Element:	Sb_T	Se_T	Sn_T	U_T	Zn_T
Method:	W205M	W205M	W205M	W205M	W205M
Units:	µg/L	µg/L	µg/L	µg/L	µg/L
Sample ID					
NO. 1	<0.2	<1	<10	1.30	130
NO. 7	<0.2	<1	<10	1.51	200
NO. 8	<0.2	<1	<10	0.71	60
NO. 9	<0.2	<1	<10	2.22	230

CHEMICAL ANALYSIS REPORT

Kentor Minerals (NT)

**Intertek Testing Services
(Australia) Pty Ltd**
ABN 56 001 722 854
PO Box 1382 Berrimah 0828
55 Export Drive
Berrimah NT 0828
Ph: (08) 8947 0510

REPORT CODE: NT45605
Report Date: 10/05/2016
Samples Received: 20/04/2016
Number of Samples: 7

Report Distribution:
Rudy Lennartz

Purchase Order: Enviro_1804216
Project: ADWQG Total Package April 2016
Cost Code: _____

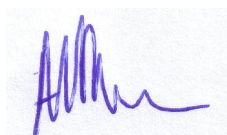
Tel:
Fax:
E-mail: rlennartz@kglresources.com.au

Report Details: **NATA ACCREDITATION No: 14610**
Test results only apply to samples received
Samples were analysed between 20/04/16 and 10/05/16
Water samples will be discarded one month from date of report

Comments:

Due to high levels of dissolved solids some samples have been diluted to reduce matrix effects.
The dilution factors are listed in the report & the detection levels are raised accordingly.
Samples with concentrations greater than the linear working range (>LWR) of the ICPMS were reanalysed by ICPOES.
Br & I may report low off W205M due to possible losses during digestion.
These samples were incorrectly preserved for Mercury analysis. Mercury data is indicative only.

Authorisation:



Andrew McKeon



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NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45605

Methodology:

Analysis	Analytical Method	Technique	Accuracy/ Precision +/-%	Detection Limit	Data Units
pH	ALK1	EA	10	0.1	units
EC	ALK1	EA	10	1	µS/cm
Alkalinity	ALK1	EA	10	1	mg/L
CO3	ALK1	EA	10	1	mg/L
HCO3	ALK1	EA	10	1	mg/L
OH	ALK1	EA	10	1	mg/L
Turbidity	TURB1	CA	10	1	NTU
True Colour	COLOUR	SA	10	5	units Pt-Co
TSS	TSSTDS	GRAV	10	10	mg/L
TDS	TSSTDS	GRAV	10	10	mg/L
NO2_N	FIAS_4	FIA	10	0.005	mg/L
NO2	FIAS_4	FIA	10	0.02	mg/L
NO3_N	FIAS_4	FIA	10	0.005	mg/L
NO3	FIAS_4	FIA	10	0.02	mg/L
Cl	FIAS_4	FIA	10	0.1	mg/L
PO4_P	FIAS_4	FIA	10	0.005	mg/L
NH3_N	NH3_N	FIA	10	0.005	mg/L
F	FISE1	EA	10	0.1	mg/L
Hardness	TH1	CALC.	10	0.1	mg/L
Ca_F	W108I	ICPOES	10	0.1	mg/L
K_F	W108I	ICPOES	10	0.1	mg/L
Mg_F	W108I	ICPOES	10	0.1	mg/L
Na_F	W108I	ICPOES	10	0.1	mg/L
SiO2	W108I	ICPOES	10	0.2	mg/L
SO4_F	W108I	ICPOES	10	0.1	mg/L
DF	W205M	ICPMS	10	1	--
Ag_T	W205M	ICPMS	10	10	µg/L
Al_T	W205M	ICPMS	10	20	µg/L
Al_T	W205I	ICPOES	10	0.02	mg/L
As_T	W205M	ICPMS	10	0.5	µg/L
B_T	W205M	ICPMS	10	20	µg/L
Ba_T	W205M	ICPMS	10	50	µg/L
Be_T	W205M	ICPMS	10	1	µg/L
Br_T	W205M	ICPMS	10	2	µg/L
Cd_T	W205M	ICPMS	10	0.2	µg/L
Cr_T	W205M	ICPMS	10	5	µg/L
Cu_T	W205M	ICPMS	10	10	µg/L
Fe_T	W205M	ICPMS	10	20	µg/L
Fe_T	W205I	ICPOES	10	0.05	mg/L
Hg	W205M	ICPMS	10	0.1	µg/L
I_T	W205M	ICPMS	10	10	µg/L
Mn_T	W205M	ICPMS	10	5	µg/L
Mo_T	W205M	ICPMS	10	5	µg/L
Ni_T	W205M	ICPMS	10	2	µg/L
Pb_T	W205M	ICPMS	10	1	µg/L
Sb_T	W205M	ICPMS	10	0.2	µg/L
Se_T	W205M	ICPMS	10	1	µg/L
Sn_T	W205M	ICPMS	10	10	µg/L
U_T	W205M	ICPMS	10	0.01	µg/L
Zn_T	W205M	ICPMS	10	10	µg/L

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45605

Project: ADWQG Total Package April 2016

Element:	pH	EC	Alkalinity	CO3	HCO3	OH	Turbidity	True Colour	TSS
Method:	ALK1	ALK1	ALK1	ALK1	ALK1	ALK1	TURB1	COLOUR	TSSTDS
Units:	units	µS/cm	mg/L	mg/L	mg/L	mg/L	NTU	units Pt-Co	mg/L
Sample ID									
#1	6.6	67	27	<1	27	<1	1370	60	2940
#2	6.6	39	12	<1	12	<1	250	55	380
#4	6.5	52	17	<1	17	<1	730	65	1540
#5	6.8	47	12	<1	12	<1	1160	45	1880
#6	7.1	137	36	<1	36	<1	8	40	110
#9	6.8	75	30	<1	30	<1	1230	55	1990
#10	6.8	62	25	<1	25	<1	1420	55	2120

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45605

Project: ADWQG Total Package April 2016

Element:	TDS	NO2_N	NO2	NO3_N	NO3	Cl	PO4_P	NH3_N	F
Method:	TSSTDS	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	NH3_N	FISE1
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample ID									
#1	50	0.010	0.04	0.015	0.08	2.2	<0.005	0.675	<0.1
#2	20	0.020	0.06	0.010	0.04	1.5	0.010	0.360	<0.1
#4	30	0.005	0.02	<0.005	<0.02	2.3	<0.005	0.310	<0.1
#5	30	0.015	0.04	0.285	1.28	2.8	0.040	0.270	<0.1
#6	110	0.005	<0.02	<0.005	<0.02	5.3	0.020	0.205	<0.1
#9	60	0.020	0.08	0.020	0.08	2.2	0.005	0.720	<0.1
#10	40	0.010	0.02	0.015	0.06	1.4	<0.005	0.545	<0.1

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45605

Project: ADWQG Total Package April 2016

Element:	Hardness	Ca_F	K_F	Mg_F	Na_F	SiO2	SO4_F	DF	Ag_T
Method:	TH1	W108I	W108I	W108I	W108I	W108I	W108I	W205M	W205M
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	--	µg/L
Sample ID									
#1	28.3	8.3	7.9	1.8	0.3	5.8	1.1	10	<10
#2	7.0	1.8	6.1	0.6	0.3	2.2	1.5	10	<10
#4	11.3	3.0	8.0	0.9	0.2	3.4	0.7	10	<10
#5	8.0	2.1	8.3	0.7	0.3	5.2	2.0	10	<10
#6	48.1	12.4	5.1	4.2	4.1	9.4	17.3	10	<10
#9	21.0	5.4	8.2	1.8	0.6	7.6	1.2	10	<10
#10	16.2	4.1	7.8	1.4	0.5	6.0	1.7	10	<10

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45605

Project: ADWQG Total Package April 2016

Element:	Al_T	Al_T	As_T	B_T	Ba_T	Be_T	Br_T	Cd_T	Cr_T
Method:	W205M	W205I	W205M	W205M	W205M	W205M	W205M	W205M	W205M
Units:	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample ID									
#1	>LWR	68.3	3.5	60	450	5	48	0.2	75
#2	>LWR	13.0	1.5	40	100	<1	36	<0.2	15
#4	>LWR	40.2	2.5	40	300	3	46	<0.2	45
#5	>LWR	50.3	3.5	60	450	2	52	0.2	50
#6	200	N.A.	0.5	60	<50	<1	38	<0.2	<5
#9	>LWR	58.7	3.5	60	400	4	48	0.2	65
#10	>LWR	46.8	3.0	40	350	5	40	0.6	55

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45605

Project: ADWQG Total Package April 2016

Element:	Cu_T	Fe_T	Fe_T	Hg	I_T	Mn_T	Mo_T	Ni_T	Pb_T
Method:	W205M	W205M	W205I	W205M	W205M	W205M	W205M	W205M	W205M
Units:	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample ID									
#1	160	>LWR	71.1	<0.2	<50	2220	<5	54	54
#2	10	>LWR	12.3	<0.2	<50	280	<5	8	17
#4	40	>LWR	40.7	<0.2	<50	840	<5	28	28
#5	40	>LWR	46.8	<0.2	<50	1450	<5	32	44
#6	<10	380	N.A.	<0.2	<50	435	<5	2	<1
#9	170	>LWR	62.3	<0.2	<50	1610	<5	48	68
#10	930	>LWR	54.5	<0.2	<50	1640	<5	44	370

NORTHERN TERRITORY ENVIRONMENTAL LABORATORIES

REPORT CODE: NT45605

Project: ADWQG Total Package April 2016

Element:	Sb_T	Se_T	Sn_T	U_T	Zn_T
Method:	W205M	W205M	W205M	W205M	W205M
Units:	µg/L	µg/L	µg/L	µg/L	µg/L
Sample ID					
#1	<0.5	<2	<10	2.07	240
#2	<0.5	<2	<10	0.41	50
#4	<0.5	<2	<10	1.16	110
#5	<0.5	<2	<10	1.70	180
#6	<0.5	<2	<10	0.06	<10
#9	<0.5	<2	<10	1.79	210
#10	<0.5	<2	<10	2.14	320

CHEMICAL ANALYSIS REPORT

Kentor Minterals (NT)

**Intertek Testing Services
(Australia) Pty Ltd**
ABN 3200 8787 237
PO Box 1382 Berrimah 0828
55 Export Drive
Berrimah NT 0828
Ph: (08) 8947 0510

REPORT CODE: NT46872
Report Date: 14/02/2017
Samples Received: 2/02/2017
Number of Samples: 7

Report Distribution:
Rudy Lennartz

Purchase Order: _____
Project: Jervois Total Package
Cost Code: _____

Tel: _____
Fax: _____
E-mail: rlennartz@kglresources.com.au

Report Details: **NATA ACCREDITATION No: 14610**

1. Test results only apply to samples as received
2. Water samples will be discarded one month from date of report
3. If results are required for compliance, the validity of the results may be affected by ;
 1. non-conforming sample containers
 2. potential holding time breaches
 3. non-conforming preservation technique
 4. laboratory uncertainty of measurement
 5. customer requested sample preparation techniques

Results potentially affected by 1, 2 or 3 will be highlighted in the report.



Accredited for compliance with ISO/IEC
17025

Comments:

Due to high levels of dissolved solids some samples have been diluted to reduce matrix effects.

The dilution factors are listed in the report & the detection levels are raised accordingly.

Samples with concentrations greater than the linear working range (>LWR) of the ICPMS were reanalysed by ICPOES.

Br & I may report low off W205M due to possible losses during digestion.

These samples were incorrectly preserved for Mercury analysis. Mercury data is indicative only.

Authorisation: **Andrew McKeon**

Intertek NTEL Signatory

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REPORT CODE: NT46872

Methodology:

Analysis	Preparation Code	Analytical Method	Technique	Accuracy/ Precision +/-%	Detection Limit	Data Units
pH	ALK1	WWM07	EA	10	0.1	units
EC	ALK1	WWM12	EA	10	1	µS/cm
Alkalinity	ALK1	WWM08	EA	10	1	mg/L
CO3	ALK1	WWM08	EA	10	1	mg/L
HCO3	ALK1	WWM08	EA	10	1	mg/L
OH	ALK1	WWM08	EA	10	1	mg/L
Turbidity	TURB1	WWM15	CA	10	1	NTU
True Colour	COLOUR	WWM16	SA	10	5	PCU
TSS	TSSTDS	WWM14	GRAV	10	10	mg/L
TDS	TSSTDS	WWM14	GRAV	10	10	mg/L
NO2_N	FIAS_4	WWM22	FIA	10	0.005	mg/L
NO2	FIAS_4	WWM22	FIA	10	0.02	mg/L
NO3_N	FIAS_4	WWM22	FIA	10	0.005	mg/L
NO3	FIAS_4	WWM22	FIA	10	0.02	mg/L
Cl	FIAS_4	WWM19	FIA	10	0.1	mg/L
PO4_P	FIAS_4	WWM25	FIA	10	0.005	mg/L
NH3_N	NH3_N	WWM22	FIA	10	0.005	mg/L
F	FISE1	WWM20	EA	10	0.1	mg/L
Hardness	TH1	WWM11	CALC.	10	0.1	mg/L
Ca_F	W108I	W108	ICPOES	10	0.1	mg/L
K_F	W108I	W108	ICPOES	10	0.1	mg/L
Mg_F	W108I	W108	ICPOES	10	0.1	mg/L
Na_F	W108I	W108	ICPOES	10	0.1	mg/L
SiO2	W108I	W108	ICPOES	10	0.2	mg/L
SO4_F	W108I	W108	ICPOES	10	0.1	mg/L
DF	W205M		ICPMS	10	1	--
Ag_T	W205M	W200	ICPMS	10	10	µg/L
Al_T	W205M	W200	ICPMS	10	20	µg/L
Al_T	W204I	W200	ICPOES	10	0.02	mg/L
As_T	W205M	W200	ICPMS	10	0.5	µg/L
B_T	W205M	W200	ICPMS	10	20	µg/L
Ba_T	W205M	W200	ICPMS	10	50	µg/L
Be_T	W205M	W200	ICPMS	10	1	µg/L
Br_T	W205M	W200	ICPMS	10	2	µg/L
Cd_T	W205M	W200	ICPMS	10	0.2	µg/L
Cr_T	W205M	W200	ICPMS	10	5	µg/L
Cu_T	W205M	W200	ICPMS	10	10	µg/L
Fe_T	W205M	W200	ICPMS	10	20	µg/L
Fe_T	W204I	W200	ICPOES	10	0.05	mg/L
Hg	W205M	W200	ICPMS	10	0.1	µg/L
I_T	W205M	W200	ICPMS	10	10	µg/L
Mn_T	W205M	W200	ICPMS	10	5	µg/L
Mo_T	W205M	W200	ICPMS	10	5	µg/L
Ni_T	W205M	W200	ICPMS	10	2	µg/L
Pb_T	W205M	W200	ICPMS	10	1	µg/L
Sb_T	W205M	W200	ICPMS	10	0.2	µg/L
Se_T	W205M	W200	ICPMS	10	1	µg/L
Sn_T	W205M	W200	ICPMS	10	10	µg/L
U_T	W205M	W200	ICPMS	10	0.01	µg/L

REPORT CODE: NT46872

Methodology:

Analysis	Preparation Code	Analytical Method	Technique	Accuracy/ Precision +/-%	Detection Limit	Data Units
Zn_T	W205M	W200	ICPMS	10	10	µg/L



REPORT CODE: NT46872

Project: Jervois Total Package

Element:	pH	EC	Alkalinity	CO3	HCO3	OH	Turbidity	True Colour	TSS
Method:	ALK1	ALK1	ALK1	ALK1	ALK1	ALK1	TURB1	COLOUR	TSSTDS
Units:	units	µS/cm	mg/L	mg/L	mg/L	mg/L	NTU	PCU	mg/L
Analysis Date:	2/02/2017	2/02/2017	2/02/2017	2/02/2017	2/02/2017	2/02/2017	3/02/2017	3/02/2017	9/02/2017
Sample ID									
NO. 1	6.5	47	24	<1	24	<1	1390	35	6980
NO. 2	6.4	39	12	<1	12	<1	100	60	100
NO. 4	6.2	29	12	<1	12	<1	760	30	4820
NO. 5	6.4	30	9	<1	9	<1	61	80	20
NO. 7	6.2	35	13	<1	13	<1	860	35	3490
NO. 8	6.5	26	8	<1	8	<1	670	35	4090
NO. 9	6.4	49	23	<1	23	<1	1730	25	9090



REPORT CODE: NT46872

Project: Jervois Total Package

Element:	TDS	NO2_N	NO2	NO3_N	NO3	Cl	PO4_P	NH3_N	F
Method:	TSSTDS	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	NH3_N	FISE1
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Analysis Date:	9/02/2017	7/02/2017	7/02/2017	7/02/2017	7/02/2017	7/02/2017	7/02/2017	13/02/2017	2/02/2017
Sample ID									
NO. 1	40	0.010	0.02	0.085	0.38	0.6	0.005	0.545	<0.1
NO. 2	30	<0.005	<0.02	<0.005	<0.02	1.8	0.005	0.030	<0.1
NO. 4	10	<0.005	<0.02	0.030	0.14	0.3	0.010	0.160	<0.1
NO. 5	20	0.010	0.04	0.005	0.02	1.0	0.010	0.065	<0.1
NO. 7	30	0.010	0.04	0.175	0.78	0.5	0.015	0.285	<0.1
NO. 8	10	0.005	<0.02	0.210	0.92	1.0	0.045	0.200	<0.1
NO. 9	40	0.005	0.02	0.215	0.94	0.5	0.015	0.185	<0.1



REPORT CODE: NT46872

Project: Jervois Total Package

Element:	Hardness	Ca_F	K_F	Mg_F	Na_F	SiO2	SO4_F	DF	Ag_T
Method:	TH1	W1081	W1081	W1081	W1081	W1081	W1081	W205M	W205M
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	--	µg/L
Analysis Date:	7/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017
Sample ID									
NO. 1	11.3	2.9	4.8	1.0	0.3	8.0	1.3	10	<10
NO. 2	10.4	2.4	3.3	1.1	1.6	11.2	2.5	10	<10
NO. 4	9.3	2.7	2.6	0.6	0.1	4.6	0.7	10	<10
NO. 5	7.9	2.1	3.5	0.6	0.7	12.0	1.6	10	<10
NO. 7	10.7	2.8	2.7	0.9	0.3	4.8	0.8	10	<10
NO. 8	4.0	1.0	4.6	0.4	0.6	5.2	0.9	10	<10
NO. 9	13.7	3.5	5.0	1.2	0.3	13.6	1.3	10	<10



REPORT CODE: NT46872

Project: Jervois Total Package

Element:	Al_T	Al_T	As_T	B_T	Ba_T	Be_T	Br_T	Cd_T	Cr_T
Method:	W205M	W204I	W205M	W205M	W205M	W205M	W205M	W205M	W205M
Units:	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analysis Date:	3/02/2017	9/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017
Sample ID									
NO. 1	>LWR	73.4	4.0	40	550	6	58	<0.2	85
NO. 2	6140	N.A.	1.0	40	<50	<1	54	<0.2	<5
NO. 4	>LWR	48.1	2.5	40	300	3	42	<0.2	50
NO. 5	3580	N.A.	0.5	40	<50	<1	40	<0.2	<5
NO. 7	>LWR	56.9	3.0	40	350	4	56	<0.2	60
NO. 8	>LWR	35.0	2.5	40	250	2	44	<0.2	45
NO. 9	>LWR	104	4.5	40	650	7	58	0.4	125



REPORT CODE: NT46872

Project: Jervois Total Package

Element:	Cu_T	Fe_T	Fe_T	Hg	I_T	Mn_T	Mo_T	Ni_T	Pb_T
Method:	W205M	W205M	W204I	W205M	W205M	W205M	W205M	W205M	W205M
Units:	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analysis Date:	3/02/2017	3/02/2017	9/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017
Sample ID									
NO. 1	250	>LWR	88.1	<0.2	<50	2730	<5	72	71
NO. 2	<10	4620	N.A.	<0.2	<50	55	<5	4	3
NO. 4	40	>LWR	46.9	<0.2	<50	1040	<5	36	25
NO. 5	<10	2660	N.A.	<0.2	<50	15	<5	<2	2
NO. 7	460	>LWR	60.7	<0.2	<50	1780	<5	48	44
NO. 8	80	>LWR	40.3	<0.2	<50	865	<5	26	24
NO. 9	280	>LWR	114	<0.2	<50	3540	<5	98	106



REPORT CODE: NT46872

Project: Jervois Total Package

Element:	Sb_T	Se_T	Sn_T	U_T	Zn_T
Method:	W205M	W205M	W205M	W205M	W205M
Units:	µg/L	µg/L	µg/L	µg/L	µg/L
Analysis Date:	3/02/2017	3/02/2017	3/02/2017	3/02/2017	3/02/2017

Sample ID

NO. 1	<0.5	<1	<10	2.69	340
NO. 2	<0.5	<1	<10	0.13	10
NO. 4	<0.5	<1	<10	1.16	140
NO. 5	<0.5	<1	<10	0.07	<10
NO. 7	<0.5	1	<10	1.78	260
NO. 8	<0.5	1	<10	1.12	120
NO. 9	<0.5	<1	<10	2.88	360

CHEMICAL ANALYSIS REPORT

Kentor Minerals (NT)

Intertek Testing Services
(Australia) Pty Ltd
ABN 3200 8787 237
PO Box 1382 Berrimah 0828
55 Export Drive
Berrimah NT 0828
Ph: (08) 8947 0510

REPORT CODE: NT48758
Report Date: 9/04/2018
Samples Received: 29/03/2018
Number of Samples: 2

Report Distribution:
Rudy Lennartz

Purchase Order: Enviro_25032018 - Jervois
Project: ADWG Package 17/03/2018
Sample Matrix WATER

Tel:
Fax:
E-mail: rlennartz@kglresources.com.au

Report Details: **NATA ACCREDITATION No: 14610**

1. Test results only apply to samples as received
2. Water samples will be discarded one month from date of report
3. If results are required for compliance, the validity of the results may be affected by ;
 1. non-conforming sample containers
 2. potential holding time breaches
 3. non-conforming preservation technique
 4. laboratory uncertainty of measurement
 5. customer requested sample preparation techniques

Results potentially affected by 1, 2 or 3 will be highlighted in the report.



Accredited for compliance with
ISO/IEC 17025 - Testing

Comments:

Trace Metals were analysed from the General Chemistry Bottles supplied.

Authorisation: **Andrew McKeon**

Intertek NTEL Signatory

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REPORT CODE: NT48758

Methodology:

Analysis	Preparation Code	Analytical Method	Technique	Accuracy/ Precision +/- %	Detection Limit	Data Units
pH	ALK1	WWM07	EA	10	0.1	units
EC	ALK1	WWM12	EA	10	1	µS/cm
Alkalinity	ALK1	WWM08	EA	10	1	mg/L
CO3	ALK1	WWM08	EA	10	1	mg/L
HCO3	ALK1	WWM08	EA	10	1	mg/L
OH	ALK1	WWM08	EA	10	1	mg/L
Turbidity	TURB1	WWM15	CA	10	1	NTU
True Colour	COLOUR	WWM16	SA	10	5	PCU
TSS	TSSTDS	WWM14	GRAV	10	10	mg/L
TDS	TSSTDS	WWM14	GRAV	10	10	mg/L
NO2_N	FIAS_4	WWM22	FIA	10	0.005	mg/L
NO2	FIAS_4	WWM22	FIA	10	0.02	mg/L
NO3_N	FIAS_4	WWM22	FIA	10	0.005	mg/L
NO3	FIAS_4	WWM22	FIA	10	0.02	mg/L
Cl	FIAS_4	WWM19	FIA	10	0.1	mg/L
PO4_P	FIAS_4	WWM25	FIA	10	0.005	mg/L
NH3_N	NH3_N	WWM22	FIA	10	0.005	mg/L
F	FISE1	WWM20	EA	10	0.1	mg/L
Hardness	TH1	WWM11	CALC.	10	0.1	mg/L
Ca_F	W108I	W108	ICPOES	10	0.1	mg/L
K_F	W108I	W108	ICPOES	10	0.1	mg/L
Mg_F	W108I	W108	ICPOES	10	0.1	mg/L
Na_F	W108I	W108	ICPOES	10	0.1	mg/L
SiO2	W108I	W108	ICPOES	10	0.2	mg/L
SO4_F	W108I	W108	ICPOES	10	0.1	mg/L
Ag_T	W205M	W200	ICPMS	10	10	µg/L
Al_T	W205M	W200	ICPMS	10	20	µg/L
As_T	W205M	W200	ICPMS	10	0.5	µg/L
B_T	W205M	W200	ICPMS	10	20	µg/L
Ba_T	W205M	W200	ICPMS	10	50	µg/L
Be_T	W205M	W200	ICPMS	10	1	µg/L
Cd_T	W205M	W200	ICPMS	10	0.2	µg/L
Cr_T	W205M	W200	ICPMS	10	5	µg/L
Cu_T	W205M	W200	ICPMS	10	10	µg/L
Fe_T	W205M	W200	ICPMS	10	20	µg/L
Fe_T	W204I	W200	ICPOES	10	0.05	mg/L
Mn_T	W205M	W200	ICPMS	10	5	µg/L
Mo_T	W205M	W200	ICPMS	10	5	µg/L
Ni_T	W205M	W200	ICPMS	10	2	µg/L
Pb_T	W205M	W200	ICPMS	10	1	µg/L
Sb_T	W205M	W200	ICPMS	10	0.2	µg/L
Se_T	W205M	W200	ICPMS	10	1	µg/L
Sn_T	W205M	W200	ICPMS	10	10	µg/L
Sr_T	W205M	W200	ICPMS	10	0.1	µg/L
Sr_T	W204I	W200	ICPOES	10	0.005	mg/L
U_T	W205M	W200	ICPMS	10	0.01	µg/L
Zn_T	W205M	W200	ICPMS	10	10	µg/L
Zn_T	W204I	W200	ICPOES	10	0.005	mg/L



REPORT CODE:

NT48758

Project: ADWG Package 17/03/2018

Element:	pH	EC	Alkalinity	CO3	HCO3	OH	Turbidity	True Colour	TSS
Method:	ALK1	ALK1	ALK1	ALK1	ALK1	ALK1	TURB1	COLOUR	TSSTDS
Units:	units	µS/cm	mg/L	mg/L	mg/L	mg/L	NTU	PCU	mg/L
Analysis Date:	5/04/2018	5/04/2018	5/04/2018	5/04/2018	5/04/2018	5/04/2018	29/03/2018	29/03/2018	29/03/2018
Sample ID									
KJCD234 20M	8.0	2270	545	<1	545	<1	530	<5	370
DAM WATER 17/03/18	6.7	106	23	<1	23	<1	7	140	80



REPORT CODE:

NT48758

Project: ADWG Package 17/03/2018

Element:	TDS	NO2_N	NO2	NO3_N	NO3	Cl	PO4_P	NH3_N	F
Method:	TSSTDS	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	FIAS_4	NH3_N	FISE1
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Analysis Date:	29/03/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	29/03/2018
Sample ID									
KJCD234 20M	1570	0.015	0.06	5.66	25.1	381	<0.005	0.005	1.5
DAM WATER 17/03/18	80	0.035	0.12	0.260	1.16	12.3	0.060	0.210	<0.1



REPORT CODE:

NT48758

Project: ADWG Package 17/03/2018

Element:	Hardness	Ca_F	K_F	Mg_F	Na_F	SiO2	SO4_F	Ag_T	Al_T
Method:	TH1	W108I	W108I	W108I	W108I	W108I	W108I	W205M	W205M
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L
Analysis Date:	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018
Sample ID									
KJCD234 20M	577	63.9	6.6	101	324	20.0	266	<10	3360
DAM WATER 17/03/18	24.7	5.4	5.2	2.8	6.4	11.0	5.4	<10	340



REPORT CODE:

NT48758

Project: ADWG Package 17/03/2018

Element:	As_T	B_T	Ba_T	Be_T	Cd_T	Cr_T	Cu_T	Fe_T	Fe_T
Method:	W205M	W205M	W205M	W205M	W205M	W205M	W205M	W205M	W204I
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
Analysis Date:	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018
Sample ID									
KJCD234 20M	1.5	820	50	1	3.4	35	40	>LWR	43.2
DAM WATER 17/03/18	1.0	100	<50	<1	<0.2	<5	<10	1580	N.A.



REPORT CODE:

NT48758

Project: ADWG Package 17/03/2018

Element:	Mn_T	Mo_T	Ni_T	Pb_T	Sb_T	Se_T	Sn_T	Sr_T	Sr_T
Method:	W205M	W205M	W205M	W205M	W205M	W205M	W205M	W205M	W204I
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
Analysis Date:	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018	3/04/2018
Sample ID									
KJCD234 20M	780	35	40	75	2.0	3	<10	>LWR	1.27
DAM WATER 17/03/18	180	<5	2	<1	<0.2	<1	<10	34.0	N.A.



REPORT CODE:

NT48758

Project: ADWG Package 17/03/2018

Element:	U_T	Zn_T	Zn_T
Method:	W205M	W205M	W204I
Units:	µg/L	µg/L	mg/L
Analysis Date:	3/04/2018	3/04/2018	3/04/2018
Sample ID			
KJCD234 20M	117	>LWR	2.34
DAM WATER 17/03/18	0.11	<10	N.A.



Appendix B CoA for water quality samples from March 2019 event

ANALYTICAL TEST REPORT



KENTOR MINERALS (NT)

Rudy Lennartz
rlennartz@kglresources.com.au
Level 7, 167 Eagle Street
Brisbant QLD 4000

JOB NUMBER	NT50204
PO NUMBER	
PROJECT	Jervois - ADWG Total Package
CHAIN OF CUSTODY	Enviro_15042019
DATE RECEIVED	23/04/19
DATE REPORTED	1/05/19
NO. SAMPLES	7 Water/Solution(s) for Analysis

COMMENTS

- > Results required for compliance may be compromised by:
 1. Use of non-laboratory supplied sample containers
 2. Holding time breaches
 3. Field related preparation or preservation techniques
 4. Laboratory Measurement Uncertainty

Potentially affected results are coloured.
- > Samples will be discarded one month from final report date.
- > Samples with concentrations greater than the linear working range (>LWR) of the ICPMS were re-analysed by ICPOES.

TESTED BY

Intertek NTEL
55 Export Drive
East Arm NT 0822
AUSTRALIA
P: +61 8 8947 0510
E: ntel@intertek.com



RESULTS AUTHORISED BY

NAME **Andrew McKeon**
POSITION Intertek NTEL signatory

Accredited for compliance with ISO/IEC17025 - Testing
Accreditation Number 14610
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REPORT CODE: NT50204
Methodology:



Analysis Code	Description	Method Reference	Analytical Scheme	Technique / Instrument	Detection Limit	Data Units
pH	pH	WWM07	ALK1	ELECTRODE	0.1	units
EC	Electrical Conductivity	WWM12	ALK1	ELECTRODE	1	µS/cm
Alkalinity	Total Alkalinity (as CaCO3)	WWM08	ALK1	ELECTRODE	1	mg/L
CO3	Carbonate Alkalinity (as CaCO3)	WWM08	ALK1	ELECTRODE	1	mg/L
HCO3	BiCarbonate Alkalinity (as CaCO3)	WWM08	ALK1	ELECTRODE	1	mg/L
OH	Hydroxide Alkalinity (as CaCO3)	WWM08	ALK1	ELECTRODE	1	mg/L
Turbidity	Turbidity	WWM15	TURB1	UV/VIS	1	NTU
True Colour	True Colour - filtered	WWM16	COLOUR	UV/VIS	5	PCU
TSS	Total Suspended Solids	WWM14	TSSTDS	GRAV	10	mg/L
TDS	Total Dissolved Solids	WWM14	TSSTDS	GRAV	10	mg/L
NO2_N	Nitrite as Nitrogen	WWM22	FIAS_4	FIA	0.005	mg/L
NO2	Nitrite	WWM22	FIAS_4	FIA	0.02	mg/L
NO3_N	Nitrate as Nitrogen	WWM22	FIAS_4	FIA	0.005	mg/L
NO3	Nitrate	WWM22	FIAS_4	FIA	0.02	mg/L
Cl	Chloride	WWM19	CL	DA	2	mg/L
PO4_P	Reactive/ortho Phosphate as P	WWM25	FIAS_4	FIA	0.005	mg/L
NH3_N	Ammonium as Nitrogen	WWM22	NH3_N	FIA	0.005	mg/L
F	Fluoride	WWM20	FISE1	ELECTRODE	0.1	mg/L
Hardness	Total Hardness (as CaCO3 - calculated)	WWM11	TH1	CALC.	0.1	mg/L
Ca_F	Calcium_Filtered 0.45µm	W108	W108I	ICPOES	0.1	mg/L
K_F	Potassium_Filtered 0.45µm	W108	W108I	ICPOES	0.1	mg/L
Mg_F	Magnesium_Filtered 0.45µm	W108	W108I	ICPOES	0.1	mg/L
Na_F	Sodium_Filtered 0.45µm	W108	W108I	ICPOES	0.1	mg/L
SiO2	Silicon as Silica_Filtered 0.45µm	W108	W108I	ICPOES	0.2	mg/L
SO4_F	Sulfur as Sulfate_Filtered 0.45µm	W108	W108I	ICPOES	0.1	mg/L
Ag_T	Silver_Total Recoverable	W200	W205M	ICPMS	10	µg/L
Al_T	Aluminium_Total Recoverable	W200	W205M	ICPMS	20	µg/L
Al_T	Aluminium_Total Recoverable	W200	W204I	ICPOES	0.02	mg/L
As_T	Arsenic_Total Recoverable	W200	W205M	ICPMS	0.5	µg/L
B_T	Boron_Total Recoverable	W200	W205M	ICPMS	20	µg/L
Ba_T	Barium_Total Recoverable	W200	W205M	ICPMS	50	µg/L
Ba_T	Barium_Total Recoverable	W200	W204I	ICPOES	0.005	mg/L
Be_T	Beryllium_Total Recoverable	W200	W205M	ICPMS	1	µg/L
Cd_T	Cadmium_Total Recoverable	W200	W205M	ICPMS	0.2	µg/L
Cr_T	Chromium_Total Recoverable	W200	W205M	ICPMS	5	µg/L
Cu_T	Copper_Total Recoverable	W200	W205M	ICPMS	10	µg/L
Fe_T	Iron_Total Recoverable	W200	W205M	ICPMS	20	µg/L
Fe_T	Iron_Total Recoverable	W200	W204I	ICPOES	0.05	mg/L
Mn_T	Manganese_Total Recoverable	W200	W205M	ICPMS	5	µg/L
Mn_T	Manganese_Total Recoverable	W200	W204I	ICPOES	0.005	mg/L
Mo_T	Molybdenum_Total Recoverable	W200	W205M	ICPMS	5	µg/L
Ni_T	Nickel_Total Recoverable	W200	W205M	ICPMS	2	µg/L
Pb_T	Lead_Total Recoverable	W200	W205M	ICPMS	1	µg/L
Sb_T	Antimony_Total Recoverable	W200	W205M	ICPMS	0.2	µg/L
Se_T	Selenium_Total Recoverable	W200	W205M	ICPMS	1	µg/L
Sn_T	Tin_Total Recoverable	W200	W205M	ICPMS	10	µg/L
U_T	Uranium_Total Recoverable	W200	W205M	ICPMS	0.01	µg/L
Zn_T	Zinc_Total Recoverable	W200	W205M	ICPMS	10	µg/L



REPORT CODE:

NT50204

COC

Enviro_15042019

Element:	pH	EC	Alkalinity	CO3	HCO3	OH	Turbidity	True Colour	TSS
Units:	units	µS/cm	mg/L	mg/L	mg/L	mg/L	NTU	PCU	mg/L
Method:	ALK1	ALK1	ALK1	ALK1	ALK1	ALK1	TURB1	COLOUR	TSSTDS
Detection Limit:	0.1	1	1	1	1	1	1	5	10
Analysis Date:	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	24/04/19	24/04/19	23/04/19
Sample ID									
JSW01	6.5	32	10	<1	10	<1	850	90	1890
JSW03	6.8	90	33	<1	33	<1	3950	35	33800
JSW04	6.2	37	10	<1	10	<1	1100	40	1720
JSW06	7.2	516	32	<1	32	<1	5	10	30
JSW07	6.4	34	9	<1	9	<1	1220	65	2340
JSW09	7.0	124	55	<1	55	<1	4510	20	9930
M/R CREEKXING	6.2	69	9	<1	9	<1	46	40	50

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COC

Enviro_15042019

Element:	TDS	NO2_N	NO2	NO3_N	NO3	Cl	PO4_P	NH3_N	F
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Method:	TSSTDS	FIAS_4	FIAS_4	FIAS_4	FIAS_4	CL	FIAS_4	NH3_N	FISE1
Detection Limit	10	0.005	0.02	0.005	0.02	2	0.005	0.005	0.1
Analysis Date:	23/04/19	24/04/19	24/04/19	24/04/19	24/04/19	24/04/19	24/04/19	30/04/19	24/04/19
Sample ID									
JSW01	20	0.020	0.06	0.170	0.76	<2	0.010	0.415	<0.1
JSW03	60	0.065	0.22	0.440	1.94	2	0.010	0.165	<0.1
JSW04	20	<0.005	<0.02	0.835	3.70	<2	0.005	0.055	<0.1
JSW06	350	<0.005	<0.02	<0.005	<0.02	16	0.005	0.115	0.1
JSW07	20	0.175	0.58	0.185	0.82	<2	0.015	0.530	<0.1
JSW09	90	0.125	0.42	0.130	0.58	<2	0.005	0.800	<0.1
M/R CREEKXING	50	0.005	0.02	0.435	1.92	8	<0.005	0.230	<0.1

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COC

Enviro_15042019

Element:	Hardness	Ca_F	K_F	Mg_F	Na_F	SiO2	SO4_F	Ag_T	Al_T
Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L
Method:	TH1	W108I	W108I	W108I	W108I	W108I	W108I	W205M	W205M
Detection Limit:	0.1	0.1	0.1	0.1	0.1	0.2	0.1	10	20
Analysis Date:	29/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19
Sample ID									
JSW01	5.7	1.5	2.9	0.5	0.3	3.8	0.6	<10	>LWR
JSW03	30.4	8.0	3.7	2.5	1.5	12.4	3.9	<10	>LWR
JSW04	10.6	2.8	2.5	0.9	0.2	5.4	0.2	<10	>LWR
JSW06	218	68.0	6.2	11.7	11.5	16.6	185	<10	200
JSW07	6.3	1.6	2.6	0.6	0.3	5.0	0.6	<10	>LWR
JSW09	42.2	11.0	5.5	3.6	1.1	13.8	1.0	<10	>LWR
M/R CREEKXING	14.1	3.6	4.1	1.2	3.7	6.4	5.2	<10	1500

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COC

Enviro_15042019

Element:	Al_T	As_T	B_T	Ba_T	Ba_T	Be_T	Cd_T	Cr_T	Cu_T
Units:	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
Method:	W204I	W205M	W205M	W205M	W204I	W205M	W205M	W205M	W205M
Detection Limit:	0.02	0.5	20	50	0.005	1	0.2	5	10
Analysis Date:	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19
Sample ID									
JSW01	52.7	2.5	20	300	N.A.	4	<0.2	50	130
JSW03	132	6.0	60	1050	N.A.	9	1.0	150	160
JSW04	62.1	3.0	20	450	N.A.	4	0.2	65	70
JSW06	N.A.	<0.5	40	<50	N.A.	<1	<0.2	<5	<10
JSW07	51.0	2.5	20	400	N.A.	4	0.2	50	300
JSW09	139	6.0	60	>LWR	1.19	13	1.4	175	1030
M/R CREEKXING	N.A.	<0.5	20	<50	N.A.	<1	<0.2	<5	<10

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NT50204

COC

Enviro_15042019

Element:	Fe_T	Fe_T	Mn_T	Mn_T	Mo_T	Ni_T	Pb_T	Sb_T	Se_T
Units:	µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Method:	W205M	W204I	W205M	W204I	W205M	W205M	W205M	W205M	W205M
Detection Limit	20	0.05	5	0.005	5	2	1	0.2	1
Analysis Date:	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19	23/04/19
Sample ID									
JSW01	>LWR	54.8	>LWR	1.73	<5	36	46	<0.2	<1
JSW03	>LWR	158	>LWR	5.77	<5	106	528	<0.2	<1
JSW04	>LWR	63.3	>LWR	2.00	<5	46	46	<0.2	<1
JSW06	220	N.A.	20	N.A.	<5	<2	<1	<0.2	<1
JSW07	>LWR	52.9	N.A.	1.65	<5	38	47	<0.2	<1
JSW09	>LWR	175	N.A.	7.08	<5	136	550	<0.2	<1
M/R CREEKXING	1340	N.A.	30	N.A.	<5	<2	3	<0.2	<1

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REPORT CODE:

NT50204

COC

Enviro_15042019

Element:	Sn_T	U_T	Zn_T						
Units:	µg/L	µg/L	µg/L						
Method:	W205M	W205M	W205M						
Detection Limit:	10	0.01	10						
Analysis Date:	23/04/19	23/04/19	23/04/19						
Sample ID									
JSW01	<10	1.88	170						
JSW03	<10	5.76	560						
JSW04	<10	2.13	200						
JSW06	<10	0.09	<10						
JSW07	<10	2.02	210						
JSW09	<10	5.75	700						
M/R CREEKXING	<10	0.08	<10						

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