



2018 ANNUAL WASTE MANAGEMENT REPORT
HYDRO ALUMINIUM KURRI KURRI SMELTER

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2018 SPL Recycling Status

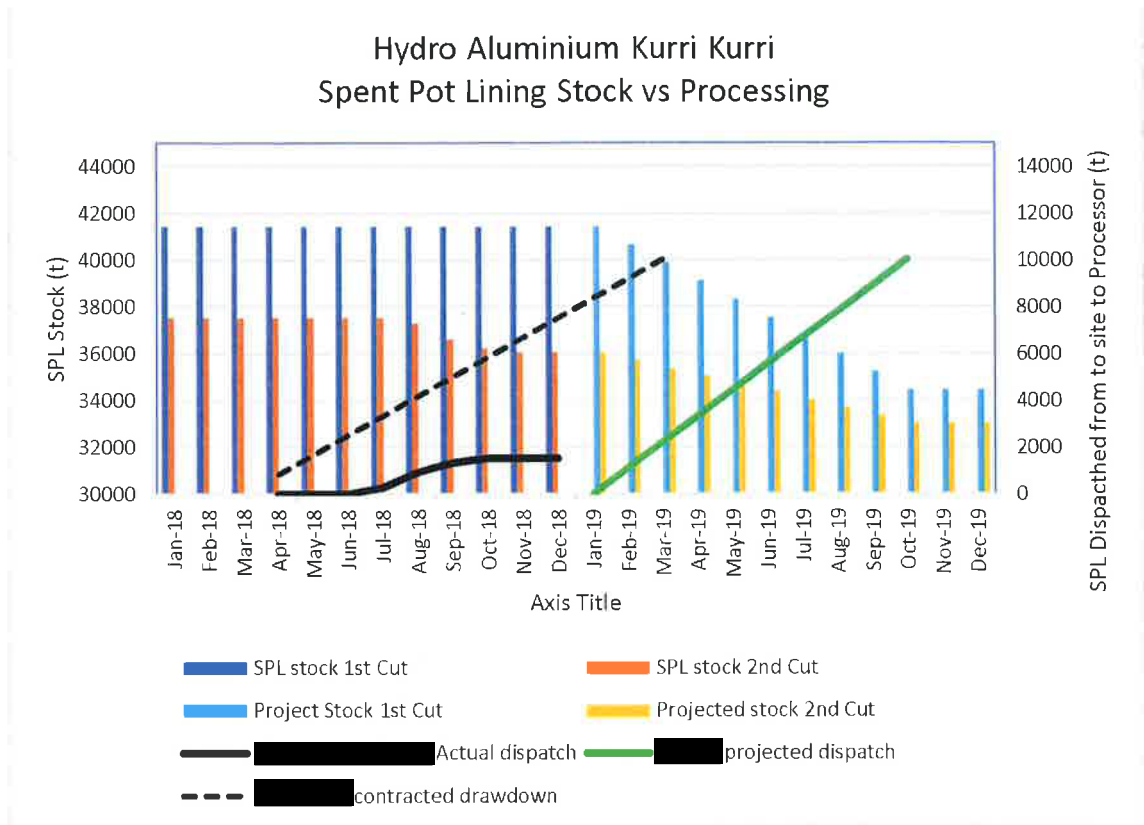


Figure 1: SPL Recycling status

At the beginning of 2018, the SPL stock at Hydro totalled 79000t. During 2018, 1509t have moved off site for processing resulting in a final stock level at the end of 2018 of 77491t.

[REDACTED]

[REDACTED]

[REDACTED]

In April 2018 Hydro entered into an agreement with [REDACTED] to process [REDACTED] spent pot lining. This agreement was for [REDACTED] to process the [REDACTED] SPL into their [REDACTED] product and ensure that this was shipped to a Hydro approved end consumer in China. This end consumer was to use the [REDACTED] in the production of clay based bricks. This brick manufacturing process has been confirmed through laboratory testing to render the SPL inert (non hazardous and non leachable). Based on capability representations from [REDACTED], the agreement was to process a total of 10000t over a period of 12 months. This 10000t allocation was divided into 2 components; 1) 1500t trial amount and, 2) 8500t residual. The concept of the trial amount was agreed following audits of both [REDACTED] and end consumers facilities where a number of deficiencies were identified. These deficiencies ranged from, unsatisfactory housekeeping standards, to a lack of appropriate procedures or permanent permits. It should also be noted that the audit of the Chinese end consumer facility was conducted using an independent, local (Chinese) consultant and assessed in accordance with local Chinese as well as Hydro's corporate standards.

As can be seen in Figure 1, by the end of 2018, 1509t of 2nd cut SPL had been dispatched to [REDACTED] for processing and subsequent export as compared with a contractual expectation that ~7500t should have been dispatched from Hydro in this period. Of this amount, 1217t had been exported to the Chinese end consumer during 2018.

There are a number of explanations for this shortfall:

- [REDACTED] was not sufficiently prepared to transport and process the SPL at their facility which resulted in delayed and slow start to material movement.
- Corrective actions required from the facility audits have not been implemented and thus only the trial allotment of 1500t has been released to [REDACTED].

Hydro has been following up regularly with [REDACTED] regarding the status of actions required to correct the deficiencies identified in the audits. To date there has been no evidence from [REDACTED] that anything has been done. Until there is acceptable progress made, Hydro considers the risk for further processing too great and will not release the remaining 8500t to [REDACTED]. Hydro is awaiting further action from [REDACTED]. It is hoped that the required actions will be completed during 2019 and the 8500t residual of the contract will be processed.

[REDACTED]
[REDACTED]
[REDACTED]

During 2018 Hydro has been negotiating an SPL processing agreement with [REDACTED]. [REDACTED] plans to process a combination of 1st and 2nd cut SPL at a facility located at the [REDACTED] [REDACTED] into their [REDACTED] product. The agreement ensures that the [REDACTED] product is exported to their end consumer, a cement manufacturer located in Thailand, where the SPL derived product is used as a fuel and mineraliser in the cement manufacturing process and all remaining hazardous and leachable properties of the SPL are eliminated. In order to satisfy Hydro's corporate code of conduct and corporate social responsibility requirements, a thorough audit process and independent site inspection was conducted at the [REDACTED] and end consumer. This process produced satisfactory results and on this basis the agreement was finalised in January 2019.

With an expectation to commence material movement in February 2019, the initial 10000t allocation is projected to be consumed within the agreed 9th month term. The impact of this projected material dispatched from Hydro can be seen in Figure 1. Depending on the satisfactory performance of [REDACTED] against the contract requirements and on their success in gaining a modified approval/licence for an increased processing rate at [REDACTED] further allocations may be granted which could result in an increased processing in future SPL allocations.

Other Options

Hydro will continue to investigate a number of other SPL processing options. The implementation of one or several of these options will be determined based on the performance of the existing agreements and/or more favourable commercial terms with equivalent or more environmentally and socially sustainable solutions.

Other Hazardous / Restricted Wastes

During 2018, in addition to the storage and movement of spent pot lining off site for processing (covered in the previous section of this report), the predominant activities on the Hydro Aluminium Kurri Kurri site were associated with the ongoing demolition works.

Demolition activities have produced several wastes streams including wastes which are classified as hazardous or restricted, as well as general solid wastes, recyclable metals and concrete / refractory material suitable for reuse on site.

Non-recyclable general solid waste generated by the demolition is currently being stored on site and is planned to be included with other non-recyclable wastes and contaminated soils in an on-site containment cell which remains subject to DoPE approval as a State Significant Development (No. 6666)

The following sections describe in more detail, the amount and fate of the hazardous and restricted wastes managed during 2018.

The specific waste tracking details are contained in *Appendix A*.

Transformers and associated Waste Transformer Oil

Given the age of the plant and the historical use of PCB containing transformer oil, a number of transformers at the site contained PCBs which exceed to relevant guidelines. Where possible the contaminated oil was removed from the transformer and sent off site for processing.

In total 511,805 litres of waste oil were removed from site in 2018, of which 86,350 L were contaminated with PCB. The PCB containing oil was sent to two different facilities: 9,350L to Southern Oil Refining (EPL No. 11408) and 77,000L to Coopers Environmental Waste Recycling (EPL No. 5938).

Several transformers and oil filled circuit-breakers which were PCB contaminated were also sent off site for cleaning (PCB removal) and recycling (metals). In total 24 units were sent to Coopers Environmental Waste Recycling (EPL No. 5938).

PCB Contaminated Soils

Testing was carried out on all substation soils and rock ballast across the plant to identify any contamination issues associated with the historical use of PCB containing transformer oils.

Those substations which were found to have soils to be above acceptable levels set out in the guidelines had the affected soils excavated under the supervision of a qualified environmental scientist. Soils were stored on site in an undercover, bunded area and then transported off site for processing and disposal. Enviropacific Services were engaged to process the 121.66t of contaminated



soils who transported to material to their SOLVE treatment facility (Licence No. 160972) located in Altona, Victoria.

Asbestos containing material

Hydro owns a number of residential houses within its buffer zone and as part of the current activities, Hydro has been demolishing older, poorer quality dwellings. In 2018 one of these old houses was demolished which contained asbestos containing building materials.

This demolition was carried out by RTC Services (Asbestos removal licence no. 212833) who removed and disposed a total of 980 kg of material at the Summerhill Waste Management facility.

Capped Waste Stockpile

At the time writing this report Hydro is seeking approval, via a State Significant Development application (No. 6666), to excavate the contents of the capped waste stockpile, and place in to a new purpose-built containment cell, along with other non-recyclable process and demolition waste and contaminated soils.

Gas Monitoring

Results in Table 1 show the presence of carbon dioxide, ammonia, methane and hydrogen in a few standpipes, but no detectable levels of carbon monoxide, hydrogen sulphide, hydrogen cyanide, phosphine and arsine generated from the stockpile.

These results support the information supplied in the 1992 Environmental Impact Statement that off gases from the capped waste stockpile do not pose any health or environmental risk.

Ground Water Monitoring

Results in Tables 2 and 3 shows that the near surface contaminated ground water remains similar to previous years, and that deeper ground water remains uncontaminated with natural slightly acidic properties. Further details are contained within the 2018 Groundwater Report prepared by Ramboll.



Appendix A – 2018 Waste Tracking Details



Off-Site Solids Material Tracking

Project No: 310000344
 Client Name: Hydro
 Project Name: Validation of Smelter Site Remediation
 Project Site: Hydro kum kum former Aluminium Smelter
 13-02-19

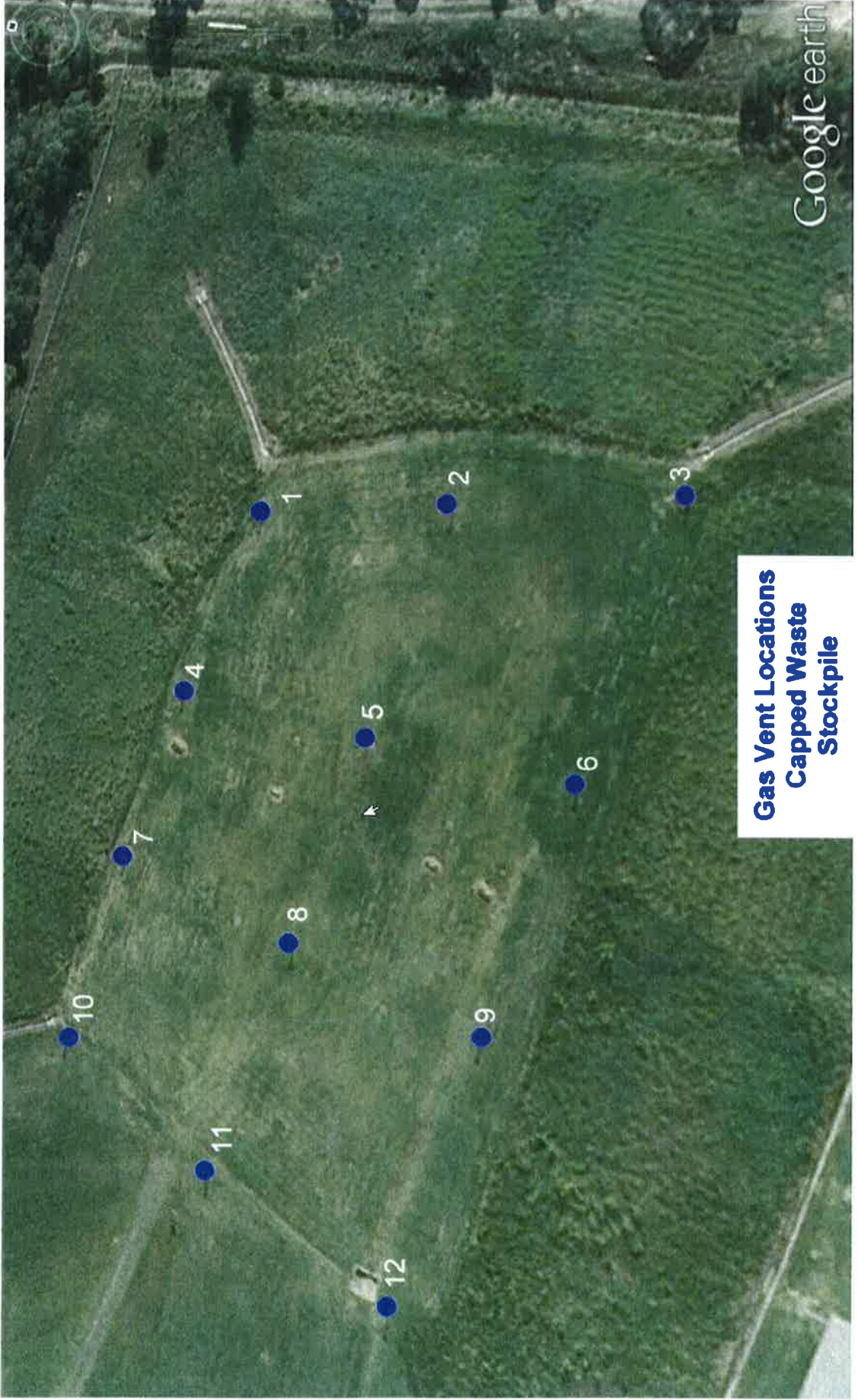
Date	Source Reference	Material Type / Remanagement Option	Net Weight (T)	Stockpile ID	Movement Approved By	Transport Company	Vehicle Registration No.	Time Left Site	Receiving Facility	Weight/Date	Weight/Date Time	Docket ID	TC Number	Comments
16-04-18	Essex Ave	SCR OIL	0.88		MOB LAMBERT (CA)	Essex Environmental Waste Recovery	17-09-18	8:11 AM	Essex Environmental Waste Recovery	18-04-18	11:52 AM		10081384-04	Waste Facility Contact No.
17-04-18	Essex Ave	SCR OIL	1.44		MOB LAMBERT (CA)	Essex Environmental Waste Recovery	17-09-18	8:12 AM	Essex Environmental Waste Recovery	17-09-18	8:11 AM		2159923242	2 x Scrap transformers & oil-filled circuit breakers
17-04-18	Essex Ave	SCR OIL	13.96		MOB LAMBERT (CA)	Essex Environmental Waste Recovery	17-09-18	8:12 AM	Essex Environmental Waste Recovery	17-09-18	8:12 AM		2159923243	2 x Scrap transformers & oil-filled circuit breakers
18-04-18	Essex Ave	SCR OIL	3.44		MOB LAMBERT (CA)	Essex Environmental Waste Recovery	18-09-18	8:13 AM	Essex Environmental Waste Recovery	18-09-18	8:12 AM		2159923244	6 x Scrap transformers & oil-filled circuit breakers
18-04-18	Essex Ave	SCR OIL	7.26		MOB LAMBERT (CA)	Essex Environmental Waste Recovery	18-09-18	8:13 AM	Essex Environmental Waste Recovery	18-09-18	8:13 AM		2159923245	1 x Scrap transformer & oil-filled circuit breakers

Commercial-in-confidence

Off-Site Solids Material Tracking

Project No: 318000344
 Client Name: Hydro
 Project Name: Validation of Smelter Site Remediation
 Project Site: Hydro Kuum Kuum former Aluminium Smelter
 13-02-19

Date	Source Reference	Material Type / Management Option	Net Weight (t)	Stockpile ID	Movement Approved By	Transport Company	Vehicle Registration	Time Left Site	Receiving Facility	Weightbridge Data	Weightbridge Time	Docket ID	TC Number	Comments
16-04-18	Scrap Area	PCB Oil	0.92		Jackie Gordon	ETC Services	DL2VU	6:31 AM	Environmental Waste Mgmt	06-06-18	10:30 AM		10087184-SI	Scrap facility ticket no.
17-09-18	Old Transformer	PCB Oil	11.48		Mark Lawrence (CHA)	Cooper's Environmental Waste Mgmt	0R17RW	6:31 AM	Cooper's Environmental Waste Mgmt	17-09-18	6:31 AM		2709025347	2 x Scrap transformers, 2 oil-filled cables 2
17-09-18	Old Transformer	PCB Oil	13.90		Mark Lawrence (CHA)	Cooper's Environmental Waste Mgmt	0N130W	6:32 AM	Cooper's Environmental Waste Mgmt	17-09-18	6:32 AM		2709025348	1 x Scrap transformer & oil filled cable breaker
18-09-18	Old Transformer	PCB Oil	3.44		Mark Lawrence (CHA)	Cooper's Environmental Waste Mgmt	0N130W	6:37 AM	Cooper's Environmental Waste Mgmt	18-09-18	6:37 AM		2709025349	1 x Scrap transformer & oil-filled output breaker
18-09-18	Old Transformer	PCB Oil	7.26		Mark Lawrence (CHA)	Cooper's Environmental Waste Mgmt	0R17RW	6:35 AM	Cooper's Environmental Waste Mgmt	18-09-18	6:35 AM		2709025350	1 x Scrap transformer & oil-filled output breaker





**Table 1: Hydro Aluminium Kurri Kurri Smelter
Spent Cathode Pile Standpipe Gas Composition.**

(All results expressed as volume percent)

Samples Collected 23/5/18

Standpipe Number	Carbon Dioxide	Carbon Monoxide	Hydrogen	Methane	Ammonia	Phosphine - Arsine	Hydrogen Cyanide	Hydrogen Sulphide
1	0.13	nd	<0.01	0.03	0.010	<0.00001	<0.0001	<0.0001
2	0.18	nd	0.02	0.02	0.006	<0.00001	<0.0001	<0.0001
3	0.18	nd	nd	nd	<0.001	<0.00001	<0.0001	<0.0001
4	0.08	nd	0.06	0.05	0.008	<0.00001	<0.0001	<0.0001
5	0.03	nd	0.99	0.15	0.060	<0.00001	<0.0001	<0.0001
6	0.02	nd	0.26	0.14	0.040	<0.00001	<0.0001	<0.0001
7	0.03	nd	0.32	0.10	0.070	<0.00001	<0.0001	<0.0001
8	0.07	nd	nd	nd	<0.001	<0.00001	<0.0001	<0.0001
9	0.04	nd	nd	nd	<0.001	<0.00001	<0.0001	<0.0001
10	0.09	nd	nd	nd	<0.001	<0.00001	<0.0001	<0.0001
11	0.30	nd	nd	nd	<0.001	<0.00001	<0.0001	<0.0001
12	0.06	nd	nd	nd	<0.001	<0.00001	<0.0001	<0.0001



**Capped Waste Stockpile Standpipe Gas Analysis 2018
Detector tube Tests
Conducted 23/5/18**

Standpipe No.	Ammonia ppm	Phosphine/Arsine ppm	HCN ppm	H2S ppm
1	100	<0.1	<1	<1
2	60	<0.1	<1	<1
3	1	<0.1	<1	<1
4	80	<0.1	<1	<1
5	600	<0.1	<1	<1
6	400	<0.1	<1	<1
7	700	<0.1	<1	<1
8	1	<0.1	<1	<1
9	<1	<0.1	<1	<1
10	<1	<0.1	<1	<1
11	7	<0.1	<1	<1
12	1	<0.1	<1	<1

Results above were obtained using Kitigawa gas detector tubes on the 23/5/18.





Image © 2015 DigitalGlobe

Table 2: Near Surface Ground Water Quality from around the Hydro Aluminium Kurri Kurri Smelter for 2018

Borehole ID	Month	Depth to Water Level (metres)	pH	Fluoride (mg/L)	Total Cyanide (mg/L)	TSS (mg/L)	TDS (mg/L)
E3 20 metres east	MAR	2.6	9.4	950	14	28	4500
	JUN	2.0	9.3	590	7.4	22	5400
	SEP	2.1	9.3	550	15	11	5000
	DEC	2.3	9.3	540	19	4	8000
E4 50 metres east	MAR	2.1	9.6	640	49	240	11000
	JUN	1.7	9.5	310	26	16	9700
	SEP	1.9	9.5	300	31	130	9900
	DEC	2.0	9.5	380	32	80	18000
E5 0 metres east	MAR	Dry	Dry	Dry	Dry	Dry	Dry
	JUN	Dry	Dry	Dry	Dry	Dry	Dry
	SEP	Dry	Dry	Dry	Dry	Dry	Dry
	DEC	Dry	Dry	Dry	Dry	Dry	Dry
E6 0 metres east	MAR	1.8	7.5	1.0	0.03	750	5900
	JUN	1.6	8.2	13.0	0.2	40	6000
	SEP	1.8	8.1	0.7	1.4	16	6400
	DEC	1.4	7.6	0.6	0.01	21	7000
E7 80 metres east	MAR	Dry	Dry	Dry	Dry	Dry	Dry
	JUN	Dry	Dry	Dry	Dry	Dry	Dry
	SEP	Dry	Dry	Dry	Dry	Dry	Dry
	DEC	Dry	Dry	Dry	Dry	Dry	Dry
E8 50 metres east	MAR	Dry	Dry	Dry	Dry	Dry	Dry
	JUN	Dry	Dry	Dry	Dry	Dry	Dry
	SEP	Dry	Dry	Dry	Dry	Dry	Dry
	DEC	Dry	Dry	Dry	Dry	Dry	Dry
E9 40 metres east	MAR	2.6	9.0	210	17.0	280	4300
	JUN	2.1	8.7	190	7.5	42	3600
	SEP	2.3	8.8	120	9.7	220	3300
	DEC	2.3	8.8	160	10	90	4300
E10 130 metres east	MAR	3.9	7.4	2.1	0.36	58	1700
	JUN	4.0	7.5	5.4	0.37	17	1700
	SEP	4.1	8.3	1.6	0.88	39	1700
	DEC	4.1	7.8	1.1	0.37	54	2300
E11 60 metres east	MAR	2.9	8.6	230	3.2	470	5100
	JUN	2.5	8.7	79	2.8	290	6500
	SEP	2.6	8.7	69	3.7	510	7800
	DEC	2.7	8.8	91	5.2	420	8300
F8 220 metres southeast	MAR	1.2	6.5	27	0.008	56	260
	JUN	1.1	6.6	20	0.01	44	380
	SEP	1.0	6.6	12	0.015	40	400
	DEC	1.5	6.5	17	<0.005	77	460
F13 10 metres south	MAR	2.6	6.6	3.3	0.021	150	740
	JUN	0.9	6.7	7.4	0.008	35	160
	SEP	1.5	6.8	4.7	0.008	38	310
	DEC	1.0	6.5	5.3	<0.005	140	290

*TSS (Total Suspended Solids)

*TDS (Total Dissolved Solids)

Table 3: Deep Ground Water Quality near the Hydro Aluminium Kurri Kurri Smelter for 2018

Borehole ID	Month	Depth to Water Level (metres)	pH	Fluoride (mg/L)	Total Cyanide (mg/L)	TSS (mg/L)	TDS (mg/L)
F2 190 metres east	MAR	4.3	3.9	<0.5	0.035	36	7100
	JUN	4.5	3.9	1.7	0.043	32	8800
	SEP	4.4	3.9	0.5	0.034	12	9100
	DEC	4.6	4.1	<0.5	0.015	250	10000
F9 30 metres southeast	MAR	7.0	6.4	0.6	0.006	22	1200
	JUN	7.0	6.6	1.8	0.01	13	1300
	SEP	7.3	6.4	<1.0	0.02	9	1200
	DEC	7.1	6.6	<0.5	<0.005	5	1600
F12 80 metres east	MAR	Dry	Dry	Dry	Dry	Dry	Dry
	JUN	Dry	Dry	Dry	Dry	Dry	Dry
	SEP	Dry	Dry	Dry	Dry	Dry	Dry
	DEC	Dry	Dry	Dry	Dry	Dry	Dry
G1 80 metres east	MAR	6.9	7.2	1.0	0.022	100	3300
	JUN	6.9	7.0	9.9	0.024	54	3000
	SEP	7.0	7.2	0.8	0.097	42	2800
	DEC	7.0	7.2	0.7	0.015	40	3800
G2 90 metres east	MAR	7.5	6.8	1.0	0.013	160	3300
	JUN	7.5	6.8	2.8	0.013	120	3300
	SEP	7.5	6.6	<1	0.063	92	3000
	DEC	7.5	6.5	<0.5	<0.005	50	3200
G5 420 metres east	MAR	3.9	7.4	1.4	0.014	170	970
	JUN	2.6	7.6	2.4	0.011	200	990
	SEP	2.7	7.6	1.0	0.018	270	1100
	DEC	2.9	7.3	1.1	0.009	250	1300
G6 380 metres east	MAR	4.5	3.9	1.1	0.008	140	5200
	JUN	4.3	4.4	2.4	<0.005	200	990
	SEP	4.4	3.5	0.8	0.060	93	5300
	DEC	4.5	3.7	0.6	<0.005	210	6600
G7 320 metres east	MAR	Dry	Dry	Dry	Dry	Dry	Dry
	JUN	Dry	Dry	Dry	Dry	Dry	Dry
	SEP	Dry	Dry	Dry	Dry	Dry	Dry
	DEC	Dry	Dry	Dry	Dry	Dry	Dry
G8 220 metres southeast	MAR	6.0	7.0	17.0	<0.005	28	240
	JUN	6.0	6.8	11.0	<0.005	79	260
	SEP	6.1	7.1	6.8	<0.005	110	280
	DEC	6.1	6.5	3.6	<0.005	30	390
G9 30 metres southeast	MAR	Dry	Dry	Dry	Dry	Dry	Dry
	JUN	Dry	Dry	Dry	Dry	Dry	Dry
	SEP	Dry	Dry	Dry	Dry	Dry	Dry
	DEC	Dry	Dry	Dry	Dry	Dry	Dry
G10 10 metres south	MAR	Dry	Dry	Dry	Dry	Dry	Dry
	JUN	Dry	Dry	Dry	Dry	Dry	Dry
	SEP	Dry	Dry	Dry	Dry	Dry	Dry
	DEC	Dry	Dry	Dry	Dry	Dry	Dry
ANZECC Water Quality Criteria:							
		Irrigation	4.5 - 9.0	1.0			
		Livestock	-	2.0			
		Aquatic Ecosystems	6.5 - 9.0	-			

* TSS (Total Suspended Solids)

* TDS (Total Dissolved Solids)