



2019 ANNUAL WASTE MANAGEMENT REPORT
HYDRO ALUMINIUM KURRI KURRI SMELTER

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2019 SPL Recycling Status

[Note: The purpose of this section of the report is to comply with EPL No. 1548 Condition E2.3]

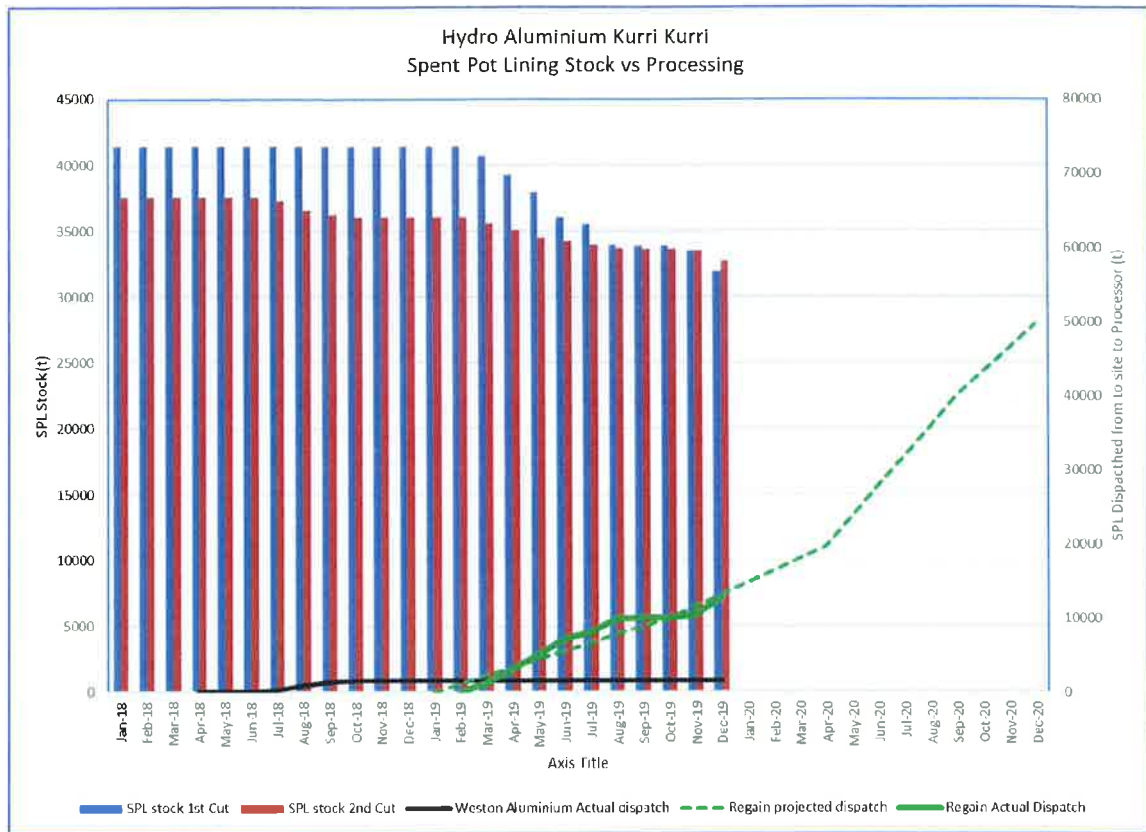


Figure 1: SPL Recycling status

At the beginning of 2019, the SPL stock at Hydro totalled 75982t. During 2019, 12855t have been dispatched off site for processing, resulting in a final stock level at the end of 2019 of 63127t.



Weston Aluminium Pty Ltd

129 Mitchell Avenue, Kurri Kurri
NSW 2327

EPL No. 6423

Background

In April 2018 Hydro entered into an agreement with Weston Aluminium (Weston) to process 2nd cut (refractory) spent pot lining. This agreement was for Weston to process the 2nd cut SPL into their Nepheflux product and ensure that this was shipped to a Hydro approved end consumer in China. This end consumer was to use the Nepheflux 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 Weston, 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 Weston Aluminium 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.

Status

During 2019 Weston Aluminium processed 0t of the Hydro Aluminium spent pot lining.

In December 2019, Hydro was notified by Weston Aluminium that their Chinese customer for the processed spent pot lining *"cannot meet the CSR conditions Hydro requires to move forward with this contract"* and that the *"customer in China is not in a position to accept Nepheflux in future"*. And therefore *"the trial was not successful enough to continue , then the contract is automatically terminated"*. This of course is very disappointing to Hydro, particularly given the assurances and lobbying done by Weston Aluminium to gain the agreement with Hydro in the first place.



Regain Services Pty Ltd

REGAIN SITE, LOCATED WITHIN THE TOMAGO ALUMINIUM SITE
576-638 Tomago Road, TOMAGO, NSW, 2322

EPL No. 13269

Background

During 2018 Hydro negotiated an SPL processing agreement with Regain Services (Regain). Regain planned to process a combination of 1st and 2nd cut SPL at a facility located at the Tomago Aluminium smelter into their HiCal product. The agreement ensures that the HiCal 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 Regain facility and end consumer. This process produced satisfactory results and on this basis the agreement was finalised in January 2019.

Status

Regain completed the dispatch, processing and export of processed spent pot lining for the 1st 10000t allocation in Sept-2019. Based on continued satisfactory performance by Regain, a 2nd allocation of 30000t was granted under the contract. This allocation is required to be completed by Sept-2020, however, the increased rate of processing is contingent on Regain getting the necessary approvals and licenses to increase the capacity of their processing facilities at Tomago. As of the end 2019, Regain had their modification application approved but still required a number of other approvals before the installation and commissioning of the plant expansion. Further allocations will be reliant on continued satisfactory performance by Regain and their end consumer(s).

Other Options

Whilst Regain's performance is currently acceptable, experience (including that exemplified by Weston Aluminium) tells us that relying on one spent pot lining outlet is somewhat risky. On this basis Hydro will continue to assess any other viable option(s) as and when they become available and/or necessary.

Other Hazardous / Restricted Wastes

During 2019, 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 DoPIE 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 2019.

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

Anode Carbon

In 2019, Hydro entered into an agreement with Boral Cement Pty Ltd to recover recyclable anode carbon from the smelter for use in their Berrima Cement Works (EPL No. 1698)

On the 6th May 2019, the EPA advised Hydro that the transport of anode carbon from the Hydro site “satisfies the requirements of Environment Protection Licence 1548 (the Licence) Condition O6.6”. Following this, Boral have removed 8786t of anode carbon from the smelter. It is expected that further anode carbon will be recovered by Boral during 2020.

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 88.88t 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 2019 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 2.3 tonnes 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 2019 Groundwater Report prepared by Ramboll.

Appendix A – 2019 Waste Tracking Details excl SPL & Anode Carbon

Off-Site Solids Material Tracking

Project No: 318000344
 Client Name: Hydro
 Project Name: Validation of Smelter Site Remediation
 Project Site: Hydro Kumi Kumi former Aluminium Smelter
 30/01/2020

Weightbridge Date	Source Reference	Material Type / Management Option	Net Weight (T)	Movement Approved By	Transport Company	Vehicle Registration	Time Left Site	Receiving Facility	TC Number
4/12/2019	77A	PCB Soils	38.80	A Walker	Camsons Haulage	CAM978	8:12 AM	Enviropacific Services SOLVE Altona, Vic	2115594
4/12/2019	77A	PCB Soils	26.78	A Walker	Camsons Haulage	CAM954	8:35 AM	Enviropacific Services SOLVE Altona, Vic	2115594
4/12/2019	77A	PCB Soils	23.30	A Walker	Camsons Haulage	CAM953	9:37 AM	Enviropacific Services SOLVE Altona, Vic	2115594









**Table 1: Hydro Aluminium Kurri Kurri Smelter
Spent Cathode Pile Standpipe Gas Composition**
Analysis (Volume Percent, as received dry basis) Method of Analysis CBM-E041-3 by ALS Global

Sampled : 29/07/2019	Carbon Dioxide	Oxygen	Carbon Monoxide	Methane	Ethane	Ethylene	Propane	Butane	Hydrogen	Balance (by difference mainly N2)	CO:O2 diff:ratio
	SP1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SP2	0.10	15.29	*nd	0.01	*nd	*nd	*nd	*nd	0.0045	84.6	<0.01
SP3	0.19	20.29	*nd	*nd	*nd	*nd	*nd	*nd	*nd	79.5	<0.01
SP4	0.05	19.24	*nd	0.01	*nd	*nd	*nd	*nd	0.008	80.7	<0.01
SP5	0.04	9.46	0.0001	0.07	*nd	*nd	*nd	*nd	0.4365	90.0	<0.01
SP6	0.03	12.82	0.0002	1.04	*nd	*nd	*nd	*nd	0.0775	87.0	<0.01
SP7	0.03	16.14	0.0006	0.03	*nd	*nd	*nd	*nd	0.137	83.7	0.01
SP8	0.10	19.66	*nd	0.01	*nd	*nd	*nd	*nd	0.0005	80.2	<0.01
SP9	0.17	7.61	*nd	0.03	*nd	*nd	*nd	*nd	*nd	92.2	<0.01
SP10	0.14	17.41	*nd	*nd	*nd	*nd	*nd	*nd	*nd	82.4	<0.01
SP11	0.08	19.03	*nd	*nd	*nd	*nd	*nd	*nd	*nd	80.9	<0.01
SP12	0.59	14.72	*nd	*nd	*nd	*nd	*nd	*nd	*nd	84.7	<0.01



**Capped Waste Stockpile Standpipe Gas Analysis 2019
Detector tube Tests
Conducted 29/7/19**

Standpipe No.	Ammonia ppm	Phosphine/Arsine ppm	HCN ppm	H2S ppm
1	200	<0.1	<1	<1
2	90	<0.1	<1	<1
3	<1	<0.1	<1	<1
4	40	<0.1	<1	<1
5	600	<0.1	<1	<1
6	350	<0.1	<1	<1
7	400	<0.1	<1	<1
8	3	<0.1	<1	<1
9	2	<0.1	<1	<1
10	4	<0.1	<1	<1
11	1	<0.1	<1	<1
12	<1	<0.1	<1	<1

Results above were obtained using Kitigawa gas detector tubes on the 29/7/19

Table 2: Near Surface Ground Water Quality from around the Hydro Aluminium Kurri Kurri Smelter for 2019

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	2.4	9.4	440	2.3	8.0	5600
	JUN	2.2	9.4	620	13	26	6100
	SEP	2.4	9.4	540	<0.005	21	6200
	DEC	2.5	9.4	660	37	16	7200
E4 50 metres east	MAR	2.2	9.5	380	3.9	310	13000
	JUN	1.9	9.6	610	62	110	14000
	SEP	2.1	9.6	540	<0.005	280	16000
	DEC	2.3	9.6	550	120	350	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	1.4	8.2	0.7	0.012	3.7	5000
	JUN	1.3	8.2	0.8	0.009	9.7	4700
	SEP	1.3	8.2	0.8	0.0006	11	5200
	DEC	1.5	7.9	0.6	0.012	9.0	5700
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	2.5	8.8	160	0.55	790	3700
	JUN	1.9	8.9	100	4.4	95	3700
	SEP	2.5	8.9	180	9.2	350	3800
	DEC	2.5	8.8	160	13	460	3700
E10 130 metres east	MAR	4.0	7.8	2.2	0.017	2.4	1700
	JUN	4.1	7.9	<0.5	0.33	23	1700
	SEP	4.3	8.4	1.4	0.29	70	1600
	DEC	4.3	8.0	0.8	0.42	17	1600
E11 60 metres east	MAR	2.7	8.9	96	0.57	350	8100
	JUN	2.7	8.8	77	3.3	430	7500
	SEP	2.8	8.5	87	0.93	250	6700
	DEC	2.8	8.9	100	9.6	100	7800
F8 220 metres southeast	MAR	1.9	6.5	14	0.007	160	460
	JUN	1.6	6.5	17	<0.005	120	370
	SEP	1.4	6.6	8	<0.005	87	320
	DEC	1.9	6.6	12	0.012	120	390
F13 10 metres south	MAR	1.8	6.7	5.2	0.006	100	210
	JUN	1.6	7.0	7.2	<0.005	55	170
	SEP	1.0	6.7	3.3	<0.005	64	360
	DEC	1.6	6.8	4.3	<0.005	60	220

*TSS (Total Suspended Solids)

*TDS (Total Dissolved Solids)

Table 3: Deep Ground Water Quality near the Hydro Aluminium Kurri Kurri Smelter for 2019

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	4.6	4.0	<0.5	0.018	270	8700
	JUN	4.7	4.1	<0.5	0.320	80	7300
	SEP	4.9	4.2	<0.5	0.046	60	8300
	DEC	5.0	4.0	<0.05	0.0015	170	8500
F9 30 metres southeast	MAR	7.2	6.4	<0.5	0.55	6.7	1400
	JUN	7.2	6.7	<0.5	<0.005	15	1300
	SEP	7.4	6.6	<0.5	<0.005	11	1300
	DEC	7.3	6.8	<0.5	<0.005	8.8	1300
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	7.1	7.0	0.8	0.008	20	3400
	JUN	7.1	7.3	0.9	0.057	53	2400
	SEP	7.3	7.1	1.2	0.013	63	2700
	DEC	7.2	8.0	1.2	0.058	120	3200
G2 90 metres east	MAR	7.6	6.7	0.5	0.008	180	2600
	JUN	7.5	7.0	0.5	0.013	130	3100
	SEP	7.8	6.7	<0.5	<0.005	70	3200
	DEC	7.7	7.1	<0.5	<0.005	56	2600
G5 420 metres east	MAR	3.0	7.6	1.2	0.008	84	1200
	JUN	3.1	7.7	1.4	<0.005	37	1100
	SEP	3.2	7.7	1.3	<0.005	33	1200
	DEC	3.4	7.6	3.9	0.005	48	1400
G6 380 metres east	MAR	4.7	3.5	<0.5	<0.005	480	4800
	JUN	4.7	3.8	0.6	<0.005	360	5200
	SEP	4.7	3.8	<0.5	<0.005	860	4200
	DEC	5.2	3.7	<0.5	<0.005	1300	4000
G7 320 metres east	MAR	6.5	6.2	0.7	0.006	270	8200
	JUN	6.7	6.5	0.7	<0.005	240	8900
	SEP	6.8	6.3	0.7	<0.005	240	7300
	DEC	6.8	6.8	<0.5	<0.005	190	7900
G8 220 metres southeast	MAR	6.2	6.3	1.7	0.007	270	420
	JUN	6.3	7.0	2.2	<0.005	200	430
	SEP	6.5	6.8	1.4	<0.005	23	440
	DEC	6.5	7.2	<0.5	0.012	120	570
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)