

MEMORANDUM

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Cc:

From: Mick Cudby, Tim Porter

Date: 04/02/2025

Subject: Acid consuming properties of Dianne heap leach ore

PURPOSE:

This memo discusses the acid-consuming nature of the ore based on recent test work and considers the potential risks associated with stockpiling spent ore on the waste rock dump.

LEACH COLUMN TESTWORK:

Four 4m high columns with a diameter of 150mm were irrigated with an acidic lixiviant to determine the copper metal recovery. Two columns consisted of straight oxide ore, while the other two columns were a composite of oxide and transitional (PS/SCL) ores. Columns 2 and 4 have leached to completion and the results displayed have been finalised based on the information provided by Brisbane Met Labs (BML). Columns 1 and 3 are still under irrigation, and the results displayed have been generated from the results provided at the time of reporting. The acid consumption results for the four column tests are summarised in **Table 1** below.

Table 1: Acid consumption results from leach column testwork

	Ore Zone Composition	Testwork Status	Sample Mass (kg)	Acid Added (kg)	Gross acid consumption (kg/t Ore)
Column 1	100% Oxide	Under leach	85.89	7.1	82.6
Column 2	100% Oxide	Completed	86.74	7.1	81.7
Column 3	90% Oxide: 10% Transitional	Under leach	89.73	7.4	83.0
Column 4	90% Oxide: 10% Transitional	Completed	86.91	7.8	89.7

The gross acid consumption values demonstrate the ore's ability to neutralise acid through leaching reactions. Values ranging from 81.7 to 89.7 kg/t ore indicates that the Dianne ore has a high capacity for neutralising acid. There is little variability in the acid consumption between the four columns, however, the samples containing 10% of the PS/SCL transitional ore do have a slightly higher acid consumption (which isn't typical of PS/SCL ores). This is likely due to the elevated concentrations of copper, magnesium and iron in the PS/SCL zone which is displayed in **Table 2**.

The elemental analysis of the different zones, as shown in Table 2, further supports the inference that oxide ore is unlikely to be acid-generating due to the absence of sulphur within the oxide zone sampled. The sampled PS/SCL material does contain 16.95% S in the form of pyrite, chalcopryrite, and chalcocite. However, blended with oxide at a 9:1 ratio, the ore still exhibits high acid-consuming properties over the 5–6-month leach observed in these column tests.

Table 2: Elemental analysis of ore zone composites.

Sample Id	Al%	Ca %	Co %	Cr %	Cu %	Fe %	K %	Mg %	Mn %	P %	S %	Si %	Ti %	Zn %
OXIDE HEAD	6.35	0.14	0	0	1.02	3.68	2.27	0.6	0.03	0.04	0.23	31.13	0.33	0.21
PS/SCL HEAD	5.57	0.07	0.03	0.02	4.93	16.51	1.01	1.7	0.02	0.02	16.95	15.8	0.22	0.21

Each of the columns demonstrated high acid consumption right up until they were water washed with 200-300g of acid being consumed in the last week of leaching. This is equivalent to 1.5-1.7kg/t of ore and demonstrates the persistent acid consuming nature of the ore at the end of its leach cycle prior to being washed and relocated.

CONCLUSION:

The test work results confirm that the ore is acid-consuming, with gross acid consumption values ranging from 81.7 kg/t to 89.7 kg/t Ore. This indicates the material is highly unlikely to generate acid when stockpiled with waste rock. Further testing is planned to determine full acid base accounting of the spent ore and consider the management of the metals in the spent ore.

TESTWORK RESULTS:

(See overleaf)

COLUMN 1

Column 1 (Oxide Only) Normal test conditions					Leachate Assays (mg/L)						Feed Assays		Cu leached	Acid Consumed	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	L	ΔL	Cu (mg/L)	FA (g/L)	g	g	kg	kg/t
24-Jun	1	7.81	3.52	0	22.6	19107.1	1493.6	127.6	7.4	7.4		8.0	140.87	59.0	0.5	5.71
25-Jun	2	10.66	3.46	0	19.5	15077.7	1320.5	107.5	10.2	2.8		8.0	42.16	22.4	0.5	5.97
26-Jun	3	13.61	3.57	0	10.9	8980.2	730.2	63.5	13.2	3.1		8.0	27.48	24.5	0.5	6.25
27-Jun	4	16.56	3.54	0	11.5	9344.9	781.0	67.0	16.1	2.9		8.0	26.64	22.8	0.6	6.52
28-Jun	5	19.61	3.55	0	7.5	6503.1	559.5	41.9	19.2	3.1		8.0	20.46	25.2	0.6	6.81
29-Jun	6	22.91	3.49	0	6.4	5544.9	542.7	36.7	22.5	3.3		8.0	18.31	26.4	0.6	7.12
30-Jun	7	25.51	3.42	0	6.3	5492.2	576.0	35.8	25.1	2.5		8.0	13.93	20.3	0.6	7.35
1-Jul	8	28.66	3.48	0	5.5	5062.6	630.8	33.9	28.2	3.1		8.0	15.91	25.1	0.7	7.65
2-Jul	9	3.31	3.56	0	1.6	3284.6	719.6	23.5	3.3	3.3	50	8.0	10.58	26.2	0.7	7.95
3-Jul	10	6.11	3.65	0	1.5	3257.9	793.9	23.0	6.0	2.8	50	8.0	8.88	22.1	0.7	8.21
4-Jul	11	9.01	3.61	0	1.3	3498.2	912.5	22.9	8.9	2.9	50	8.0	9.88	22.9	0.7	8.48
5-Jul	12	11.96	3.52	0	1.3	3171.8	870.6	22.9	11.8	2.9	50	8.0	9.11	23.4	0.8	8.75
6-Jul	13	15.31	3.32	0	1.2	3215.9	880.2	21.3	15.1	3.3	50	8.0	10.49	26.5	0.8	9.06
7-Jul	14	18.26	3.38	0	1.1	3142.7	859.7	21.0	18.1	2.9	50	8.0	9.06	23.4	0.8	9.33
8-Jul	15	21.11	3.28	0	1.0	3153.5	909.0	20.9	20.9	2.8	50	8.0	8.71	22.4	0.8	9.59
15-Jul	22	21.26	3.25	0	0.8	2818.6	572.8	20.3	21.0	21.0	50	8.0	58.27	168.4	1.0	11.55
22-Jul	29	21.31	3.36	0.12	4.8	3018.7	1485.7	53.5	20.9	20.9	50	8.0	62.14	164.9	1.2	13.47
29-Jul	36	21.56	2.425	0.08	5.0	2110.6	1277.1	58.3	21.2	21.2	50	8.0	43.63	167.7	1.3	15.42
5-Aug	43	21.01	2.18	0.12	4.5	1867.6	1339.1	54.2	20.7	20.7	50	8.0	37.58	162.9	1.5	17.32
12-Aug	50	21.21	2.20	0	4.0	1438.6	1519.9	51.5	20.8	20.8	50	8.0	28.95	166.8	1.7	19.26
19-Aug	57	21.06	2.46	0	5.0	1384.4	2368.4	65.1	20.7	20.7	50	8.0	27.58	165.3	1.8	21.19
26-Aug	64	21.21	2.39	0	5.1	1183.8	2235.9	72.8	20.8	20.8	50	8.0	23.55	166.2	2.0	23.12

Column 1 (Oxide Only) Normal test conditions					Leachate Assays (mg/L)						Feed Assays		Cu leached	Acid Consumed	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	L	ΔL	Cu (mg/L)	FA (g/L)	g	g	kg	kg/t
2-Sep	71	21.61	2.38	0	5.1	1137.2	2633.9	76.7	21.1	21.1	50	8.0	22.98	169.1	2.2	25.09
9-Sep	78	21.31	2.40	0.19	5.2	890.9	2933.0	76.8	20.8	20.8	53	8.22	17.44	167.1	2.3	27.04
16-Sep	85	21.61	2.15	0.98	5.6	867.7	3985.7	87.8	21.0	21.0	35	14.91	17.44	291.9	2.6	30.43
23-Sep	92	19.71	1.86	0	5.5	940.6	4737.5	94.6	19.0	19.0	31	15.06	17.28	286.0	2.9	33.76
30-Sep	99	22.06	2.09	0	5.5	800.4	6068.4	103.1	21.2	21.2	37	15.01	16.18	318.1	3.2	37.47
8-Oct	107	24.66	1.99	0.14	5.5	815.6	6822.6	112.4	23.6	23.6	26	15.20	18.62	355.0	3.6	41.60
14-Oct	113	12.31	2.1	0.1	6.3	750	7166	113	11.7	11.7	27	15.06	8.47	175.2	3.7	43.64
21-Oct	120	22.16	2.0	0.0	6.2	671	8279	125	21.0	21.0	28	14.95	13.51	314.4	4.1	47.30
28-Oct	127	22.11	2.0	0.2	5.5	565	8798	130	20.9	20.9	33	15.09	11.13	310.3	4.4	50.91
4-Nov	134	22.21	2.0	0.3	6.8	473	8523	124	21.0	21.0	37	14.92	9.16	306.3	4.7	54.48
11-Nov	141	11.56	1.8	0.1	6	685	12374	179	10.9	10.9	39	14.88	7.01	161.0	4.8	56.35
18-Nov	148	22.01	2.1	0.3	6	499	9891	152	20.7	20.7	38	15.09	9.55	306.8	5.1	59.93
25-Nov	155	24.46	1.7	1.6	5	432	9822	136	23.0	23.0	31	14.33	9.21	292.0	5.4	63.33
2-Dec	162	23.66	1.8	1.6	6	356	10070	156	22.1	22.1	29	14.40	7.23	283.4	5.7	66.63
9-Dec	169	23.91	1.7	1.6	5	308	10416	149	22.3	22.3	29	14.45	6.23	286.7	6.0	69.96
16-Dec	176	23.86	1.7	1.7	5	257	11230	163	22.2	22.2	26	14.82	5.11	291.0	6.3	73.35
23-Dec	183	24.16	1.7	0.0	5	241	11197	164	22.4	22.4	28	14.51	4.77	324.9	6.6	77.13
30-Dec	190	12.36	1.7	0.0	5	225	11656	171	11.4	11.4	53	14.68	1.97	167.8	6.8	79.09
6-Jan	197	22.86	1.8	0.0	5	206	12006	175	21.0	21.0	32	14.49	3.66	304.8	7.1	82.64
											25	15.50	0.00		7.1	82.64

COLUMN 2

Column 2 (Oxide Only) Enhanced Test Conditions					Leachate Assays (mg/L)							Feed Assay		Cu Leached	Acid Consume	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	Cl	L	ΔL	Cu (mg/L)	Acid (g/L)	g	g	kg	kg/t
1-Jul	1	4.00	3.16	0	37.1	34419.8	6391.6	221.7		3.58	3.58		11.0	123.28	39.4	0.6	7.48
2-Jul	2	8.05	3.24	0	25.8	26976.3	5116.4	171.5		7.35	3.77		11.0	101.73	41.5	0.7	7.96
3-Jul	3	12.00	3.35	0	18.3	20674.1	4302.7	125.2		11.19	3.83		11.0	79.26	42.2	0.7	8.45
4-Jul	4	16.10	3.35	0	13.0	18199.0	4101.6	92.5		15.24	4.05		11.0	73.77	44.6	0.8	8.96
5-Jul	5	20.25	3.31	0	9.7	13559.5	3822.0	74.7		19.32	4.08		11.0	55.28	44.8	0.8	9.48
6-Jul	6	25.00	3.23	0	7.6	11846.5	3677.5	62.2		23.94	4.63		11.0	54.81	50.9	0.9	10.06
7-Jul	7	29.30	3.14	0	5.1	9263.6	3875.4	49.6		28.21	4.27		11.0	39.55	47.0	0.9	10.60
8-Jul	8	33.40	2.95	0	5.2	9319.6	3942.0	49.2	747.1	32.16	3.94		11.0	36.74	43.4	1.0	11.10
9-Jul	9	4.45	2.57	0	1.7	5653.0	4684.9	34.0		4.33	4.33	50.0	11.0	24.24	47.6	1.0	11.65
10-Jul	10	8.90	2.39	0	1.6	5384.7	4517.8	33.0		8.65	4.32	50.0	11.0	23.04	47.5	1.1	12.20
11-Jul	11	12.65	2.34	0	1.5	5159.8	4436.3	31.6		12.31	3.67	50.0	11.0	18.74	40.3	1.1	12.67
12-Jul	12	17.40	2.37	0	1.9	6099.0	6238.1	40.3		16.89	4.58	50.0	11.0	27.70	50.4	1.1	13.25
13-Jul	13	21.50	2.41	0	1.5	5419.5	5756.2	34.1		20.88	3.99	50.0	11.0	21.41	43.9	1.2	13.75
14-Jul	14	25.75	2.46	0	1.7	5802.8	6571.2	39.4		25.01	4.13	50.0	11.0	23.77	45.5	1.2	14.28
15-Jul	15	29.40	2.28	0	1.5	5014.5	6022.1	36.5	328.7	28.56	3.55	50.0	11.0	17.63	39.1	1.3	14.73
22-Jul	22	30.65	2.67	0	1.2	2701.6	6387.0	31.0	199.5	29.83	29.83	50.0	11.0	79.10	328.2	1.6	18.51
29-Jul	29	30.95	2.08	0.15	4.5	1728.9	7761.1	74.3	389.6	29.76	29.76	50.0	11.0	49.96	322.9	1.9	22.23
5-Aug	36	29.70	1.9	0	2.6	942.3	4361.7	44.2	321.4	29.03	29.03	50.0	11.0	25.90	319.3	2.2	25.91
12-Aug	43	31.20	1.83	0	2.7	775.6	4728.7	44.4	283.6	30.42	30.42	50.0	11.0	22.07	334.6	2.6	29.77

Column 2 (Oxide Only) Enhanced Test Conditions					Leachate Assays (mg/L)							Feed Assay		Cu Leached	Acid Consume	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	Cl	L	ΔL	Cu (mg/L)	Acid (g/L)	g	g	kg	kg/t
19-Aug	50	30.25	2.05	0	3.4	817.3	7683.1	66.3	353.5	29.22	29.22	50.0	11.0	22.42	321.4	2.9	33.48
26-Aug	57	31.55	1.85	0	3.4	628.6	7195.1	70.3	335.1	30.43	30.43	50.0	11.0	17.61	334.8	3.2	37.34
2-Sep	64	32.05	1.90	0	3.4	578.9	6981.0	74.0	361.2	30.90	30.90	50.0	11.0	16.34	339.9	3.6	41.25
9-Sep	71	31.95	1.91	1.41	3.2	458.8	7517.3	68.8	341.2	30.75	30.75	80	11.42	11.64	307.8	3.9	44.80
16-Sep	78	32.50	1.61	1.96	3.5	432.2	8579.1	82.4	347.7	31.08	31.08	51	14.82	11.85	399.6	4.3	49.41
23-Sep	85	32.15	1.40	0	3.7	411.7	8536.4	87.2	301.7	30.64	30.64	51	15.00	11.06	459.6	4.7	54.71
30-Sep	92	32.65	1.48	3.31	3.5	337.9	9480.9	94.0	369.6	31.02	31.02	57	16.13	8.71	397.7	5.1	59.29
8-Oct	100	39.55	1.39	3.23	3.5	301.6	9690.6	99.9	467.0	37.46	37.46	52	15.82	9.36	471.6	5.6	64.73
14-Oct	106	21.65	1.4	3.4	4	265	9570	95	363	20.46	20.46	55	15.65	4.29	250.0	5.9	67.61
21-Oct	113	23.75	1.5	2.6	4	259	10642	111	379	22.38	22.38	54	15.26	4.59	283.4	6.1	70.88
28-Oct	120	31.60	1.4	3.5	3	188	11025	110	362	29.70	29.70	60	15.30	3.81	351.7	6.5	74.93
4-Nov	127	11.40	1.5	4.2	5	210	11471	116	506	10.73	10.73	51	15.26	1.70	118.6	6.6	76.30
11-Nov	134	28.95	1.4	4.6	2	236	13222	135	440	27.15	27.15	66	15.25	4.62	289.9	6.9	79.65
14-Nov	137	13.50	1.6	4.3	4	207	14430	144	===	12.64	12.64	51	15.02	1.98	135.2	7.0	81.20
15-Nov	138	4.25	1.6	5.0	3	226	13867	138	===	3.98	3.98	64	15.39	0.65	41.3	7.1	81.68
16-Nov	139	4.40	1.5	===	3	151	11028	119	===	4.14	4.14			0.63		7.1	81.68
17-Nov	140	8.65	1.8	===	1	83	4916	57	===	8.42	8.42			0.69		7.1	81.68
18-Nov	141	1.40	2.0	===	1	49	1231	18	===	1.39	1.39			0.07		7.1	81.68
19-Nov	142	3.95	2.1	===	0	30	968	15	===	3.93	3.93			0.12		7.1	81.68
20-Nov	143	4.15	2.3	===	0	17	433	8	===	4.14	4.14			0.07		7.1	81.68

Column 2 (Oxide Only) Enhanced Test Conditions					Leachate Assays (mg/L)							Feed Assay		Cu Leached	Acid Consume	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	Cl	L	ΔL	Cu (mg/L)	Acid (g/L)	g	g	kg	kg/t
21-Nov	144	4.10	2.3	===	0	11	185	4	===	4.10	4.10			0.05		7.1	81.68
22-Nov	145	4.25	2.4	===	0	8	82	3	===	4.25	4.25			0.03		7.1	81.68
23-Nov	146	3.15	2.5	===	0	6	43	2	===	3.15	3.15			0.02		7.1	81.68
24-Nov	147	8.10	2.4	===	0	4	21	1	===	8.11	8.11			0.04		7.1	81.68
25-Nov	148	1.40	2.5	===	0	4	13	1	===	1.40	1.40			0.01		7.1	81.68
26-Nov	149	4.10	2.5	===	0	4	12	1	===	4.11	4.11			0.02		7.1	81.68
27-Nov	150	4.20	2.3	===	0	3	9	1	===	4.21	4.21			0.01		7.1	81.68
28-Nov	151	4.00	2.6	===	0	3	7	0	===	4.01	4.01			0.01		7.1	81.68
29-Nov	152	4.35	2.5	===	0	5	22	0	===	4.36	4.36			0.02		7.1	81.68

COLUMN 3

Column 3 (Oxide + SCL) Normal test conditions					Leachate Assays (mg/L)						Feed Assays		Cu leached	Acid Consumed	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	L	ΔL	Cu (mg/L)	Acid (g/L)	g	g	kg	kg/t
24-Jun	1	3.78	3.42	0	35.7	31888.7	2766.7	182.0	3.44	3.44		8	109.7	27.5	0.5	5.11
25-Jun	2	6.63	3.31	0	31.4	24497.1	2325.9	161.2	6.14	2.70		8	66.2	21.6	0.5	5.35
26-Jun	3	9.43	3.42	0	24.0	18073.7	1694.1	123.9	8.93	2.79		8	50.4	22.3	0.5	5.60
27-Jun	4	12.23	3.45	0	17.0	15707.7	1159.8	92.8	11.69	2.76		8	43.3	22.0	0.5	5.84
28-Jun	5	15.13	3.46	0	12.3	10585.1	782.1	61.9	14.65	2.96		8	31.4	23.7	0.5	6.11
29-Jun	6	18.28	3.47	0	8.6	7617.9	521.1	42.9	17.88	3.23		8	24.6	25.8	0.6	6.40
30-Jun	7	20.83	3.41	0	8.2	7485.4	529.1	41.9	20.36	2.48		8	18.6	19.8	0.6	6.62
1-Jul	8	23.83	3.47	0	8.4	7719.0	570.7	44.2	23.28	2.92	50	8	22.4	23.4	0.6	6.88
2-Jul	9	3.03	3.61	0	2.0	4175.5	427.0	21.4	2.99	2.99	50	8	12.3	23.9	0.6	7.15
3-Jul	10	5.78	3.78	0	1.8	3917.0	472.8	20.1	5.71	2.72	50	8	10.5	21.7	0.7	7.39
4-Jul	11	8.53	3.57	0	1.6	4287.8	597.9	20.0	8.43	2.72	50	8	11.5	21.8	0.7	7.63
5-Jul	12	11.28	3.52	0	1.5	3929.4	582.6	19.7	11.15	2.71	50	8	10.5	21.7	0.7	7.87
6-Jul	13	14.53	3.47	0	1.4	3830.3	617.7	19.4	14.36	3.21	50	8	12.1	25.7	0.7	8.16
7-Jul	14	17.38	3.47	0	1.2	3652.8	621.9	18.2	17.19	2.83	50	8	10.2	22.6	0.8	8.41
8-Jul	15	20.13	3.46	0	1.2	3734.2	668.6	18.4	19.90	2.71	50	8	10.0	21.7	0.8	8.65
15-Jul	22	20.58	3.16	0.704	0.7	2834.6	672.5	15.3	20.26	20.26	50	8	56.4	147.8	0.9	10.30
22-Jul	29	21.08	3.55	0	4.8	3793.2	1888.3	48.5	20.67	20.67	50	8	77.4	165.4	1.1	12.14
29-Jul	36	21.18	2.69	0.06	5.1	2810.8	1301.8	54.8	20.78	20.78	50	8	57.4	165.0	1.3	13.98
5-Aug	43	21.03	2.39	0.13	3.9	2914.1	341.3	43.5	20.55	20.55	50	8	58.9	161.8	1.4	15.78
12-Aug	50	21.33	2.43	0	3.9	2726.4	871.5	46.7	20.97	20.97	50	8	56.1	167.8	1.6	17.65
19-Aug	57	20.88	2.58	0	5.3	2004.2	2322.9	63.3	20.45	20.45	50	8	40.0	163.6	1.7	19.48

Column 3 (Oxide + SCL) Normal test conditions					Leachate Assays (mg/L)						Feed Assays		Cu leached	Acid Consumed	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	L	ΔL	Cu (mg/L)	Acid (g/L)	g	g	kg	kg/t
26-Aug	64	21.18	2.39	0	5.2	2219.7	789.6	65.2	20.78	20.78	50	8	45.1	166.2	1.9	21.33
2-Sep	71	12.08	2.46	0	5.7	2868.8	558.0	72.1	11.85	11.85	50	8	33.4	94.8	2.0	22.39
9-Sep	78	20.93	2.49	0.32	5.7	2288.6	829.5	72.9	20.50	20.50	125	7.60	44.4	149.2	2.2	24.05
16-Sep	85	18.68	2.16	0.98	6.2	2258.6	1519.0	80.2	18.20	18.20	95	15.31	39.4	260.7	2.4	26.95
23-Sep	92	21.13	1.85	0	6.2	2239.0	2622.8	87.8	20.44	20.44	70	15.47	44.3	316.2	2.7	30.48
30-Sep	99	24.25	2.03	0	6.3	1890.7	3400.1	95.5	23.39	23.39	66	15.15	42.7	354.4	3.1	34.43
8-Oct	107	26.95	1.93	0	6.2	1973.1	4287.8	99.9	25.92	25.92	82	15.27	49.0	395.9	3.5	38.84
14-Oct	113	18.43	1.9	0	7	1806	5340	101	17.63	17.63	117	15.13	29.8	266.7	3.8	41.81
21-Oct	120	21.73	2.0	0	7	1788	5995	113	20.70	20.70	111	14.93	34.7	309.1	4.1	45.26
28-Oct	127	21.73	1.9	0	7	1699	6569	121	20.60	20.60	110	15.09	32.7	310.8	4.4	48.72
4-Nov	134	21.93	1.9	0	9	1486	7624	129	20.74	20.74	115	14.98	28.4	310.7	4.7	52.18
11-Nov	141	22.98	1.7	2.2	8	1780	10412	170	21.62	21.62	99	14.95	36.4	276.4	5.0	55.26
18-Nov	148	23.53	2.0	0	8	1075	8903	145	22.07	22.07	92	15.25	21.7	336.6	5.3	59.02
25-Nov	155	19.28	1.8	0	8	990	9646	141	18.04	18.04	57	14.70	16.8	265.2	5.6	61.97
2-Dec	162	23.28	1.8	0	8	860	9509	150	21.72	21.72	53	15.40	17.5	334.6	5.9	65.70
9-Dec	169	22.83	1.6	0.2	8	742	10111	151	21.22	21.22	54	14.67	14.6	306.4	6.2	69.11
16-Dec	176	22.83	1.6	0	8	565	10839	159	21.15	21.15	50	14.67	10.9	310.3	6.5	72.57
23-Dec	183	23.03	1.6	0	8	449	10960	161	21.27	21.27	53	14.93	8.4	317.5	6.8	76.11
30-Dec	190	21.48	1.6	0	8	405	11543	169	19.76	19.76	49	15.15	7.0	299.4	7.1	79.45
6-Jan	197	22.98	1.6	0	8	318	12290	173	21.04	21.04	48	15.10	5.7	317.6	7.4	82.99
											45	16.00	0.0	0.0	7.4	82.99

COLUMN 4

Column 4 (Oxide + SCL) Enhanced test conditions					Leachate Assays (mg/L)						Feed Assays		Cu leached	Acid Consumed	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	L	ΔL	Cu (mg/L)	Acid (g/L)	g	g	kg	kg/t
1-Jul	1	10.05	3.19	0	23.8	23626.8	4357.8	134.2	9.30	9.30		11.0	219.8	102.4	0.7	8.23
2-Jul	2	14.15	3.19	0	17.3	19534.9	4057.2	111.7	13.25	3.95		11.0	77.1	43.4	0.8	8.73
3-Jul	3	18.00	3.28	0	13.6	16514.6	3998.1	92.7	17.00	3.75		11.0	61.9	41.2	0.8	9.21
4-Jul	4	22.00	3.19	0	11.2	16081.4	4172.0	76.5	20.91	3.91		11.0	62.9	43.0	0.8	9.70
5-Jul	5	26.05	3.20	0	8.5	12556.4	3863.5	63.4	24.90	3.99		11.0	50.1	43.9	0.9	10.21
6-Jul	6	30.75	3.15	0	7.5	11656.6	4157.5	58.9	29.46	4.55		11.0	53.1	50.1	0.9	10.78
7-Jul	7	34.90	3.17	0	4.9	8885.5	4152.1	44.3	33.61	4.15		11.0	36.9	45.7	1.0	11.31
8-Jul	8	38.65	3.12	0	5.2	9407.2	4200.2	46.5	37.18	3.57		11.0	33.6	39.3	1.0	11.76
9-Jul	9	4.35	3.14	0	1.5	5509.5	4959.9	30.3	4.22	4.22	50.0	11.0	23.1	46.4	1.1	12.29
10-Jul	10	8.65	2.94	0	1.4	5542.5	4772.8	29.4	8.39	4.17	50.0	11.0	22.9	45.9	1.1	12.82
11-Jul	11	12.30	2.84	0	1.2	5244.5	4528.2	27.5	11.95	3.56	50.0	11.0	18.5	39.1	1.2	13.27
12-Jul	12	16.80	2.89	0	1.6	6551.6	6274.7	33.2	16.30	4.35	50.0	11.0	28.3	47.8	1.2	13.82
13-Jul	13	20.90	2.87	0	1.5	6266.0	6034.7	32.4	20.28	3.98	50.0	11.0	24.7	43.8	1.2	14.33
14-Jul	14	24.95	2.96	0	2.3	8258.2	8318.9	46.3	24.22	3.94	50.0	11.0	32.3	43.3	1.3	14.82
15-Jul	15	28.60	2.81	0	1.7	6876.3	7113.8	37.1	27.79	3.57	50.0	11.0	24.4	39.3	1.3	15.28
22-Jul	22	29.70	2.95	0	1.0	4163.0	5442.9	25.9	28.91	28.91	50.0	11.0	118.9	318.0	1.6	18.94
29-Jul	29	30.05	2.29	0	1.0	3206.8	5369.9	27.2	29.23	29.23	50.0	11.0	92.3	321.5	2.0	22.64
5-Aug	36	29.95	2.05	0	1.3	2453.2	6043.2	34.0	29.07	29.07	50.0	11.0	69.9	319.7	2.3	26.31
12-Aug	43	30.50	2.05	0	2.3	1693.0	6763.0	45.5	29.51	29.51	50.0	11.0	48.5	324.6	2.6	30.05
19-Aug	50	22.65	2.3	0	3.6	1619.6	7020.4	57.6	21.92	21.92	50.0	11.0	34.4	241.1	2.9	32.82
26-Aug	57	30.45	2.14	0	3.3	1302.0	6749.1	58.8	29.43	29.43	50.0	11.0	36.8	323.7	3.2	36.55

Column 4 (Oxide + SCL) Enhanced test conditions					Leachate Assays (mg/L)						Feed Assays		Cu leached	Acid Consumed	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	L	ΔL	Cu (mg/L)	Acid (g/L)	g	g	kg	kg/t
2-Sep	64	31.05	2.17	0	3.3	1162.5	6406.0	62.3	30.03	30.03	50.0	11.0	33.4	330.3	3.5	40.35
9-Sep	71	30.55	2.18	0	3.3	860.2	6663.2	59.9	29.51	29.51	121	11.67	21.8	344.4	3.9	44.31
16-Sep	78	31.25	1.85	0	3.5	880.3	7985.9	68.2	29.96	29.96	87	14.89	23.8	446.2	4.3	49.44
23-Sep	85	30.80	1.54	0	3.7	860.0	8054.4	71.8	29.47	29.47	75	14.91	23.1	439.5	4.7	54.50
30-Sep	92	31.5	1.66	0.36	3.7	701.0	8638.5	78.8	30.05	30.05	74	15.55	18.8	456.4	5.2	59.75
8-Oct	100	38.25	1.45	1.18	3.7	621.8	9005.4	82.3	36.39	36.39	65	15.57	20.3	523.7	5.7	65.78
14-Oct	106	26.85	1.3	2.1	4	459	8961	80	25.48	25.48	69	15.39	9.9	339.7	6.1	69.69
21-Oct	113	28.05	1.5	2.0	5	438	9715	91	26.54	26.54	74	15.26	9.7	353.3	6.4	73.75
28-Oct	120	30.75	1.3	0.0	4	336	10410	93	29.01	29.01	77	15.17	7.5	440.1	6.8	78.82
4-Nov	127	30.55	1.5	2.8	6	267	10598	99	28.82	28.82	74	15.34	5.6	361.7	7.2	82.98
11-Nov	134	31.5	1.3	2.6	4	279	13152	122	29.63	29.63	82	15.57	5.8	385.2	7.6	87.41
14-Nov	137	13.90	1.6	3.5	4	195	10414	101	13.05	13.05	62	15.10	1.7	151.3	7.7	89.15
15-Nov	138	4.30	1.6	4.0	5	251	13035	123	4.03	4.03	60	15.17	0.8	45.0	7.8	89.67
16-Nov	139	4.50	1.5	===	4	168	10464	104	4.24	4.24	===	===	0.7	===	===	===
17-Nov	140	8.90	1.8	===	2	92	4292	49	8.67	8.67	===	===	0.8	===	===	===
18-Nov	141	1.40	1.9	===	1	41	1680	23	1.39	1.39	===	===	0.1	===	===	===
19-Nov	142	3.70	2.0	===	1	40	715	13	3.68	3.68	===	===	0.1	===	===	===
20-Nov	143	4.55	2.2	===	0	25	291	7	4.54	4.54	===	===	0.1	===	===	===
21-Nov	144	4.25	2.1	===	0	16	130	4	4.25	4.25	===	===	0.1	===	===	===
22-Nov	145	4.40	2.3	===	0	12	53	3	4.40	4.40	===	===	0.1	===	===	===
23-Nov	146	3.20	2.3	===	0	10	34	2	3.20	3.20	===	===	0.0	===	===	===
24-Nov	147	8.20	2.3	===	0	8	22	1	8.21	8.21	===	===	0.1	===	===	===
25-Nov	148	1.45	2.4	===	0	7	17	1	1.45	1.45	===	===	0.0	===	===	===

Column 4 (Oxide + SCL) Enhanced test conditions					Leachate Assays (mg/L)						Feed Assays		Cu leached	Acid Consumed	Cumulative	Gross
Date	Day	PLS (kg)	pH	Free Acid	Co	Cu	Fe	Mn	L	ΔL	Cu (mg/L)	Acid (g/L)	g	g	kg	kg/t
26-Nov	149	4.20	2.4	===	0	7	17	1	4.21	4.21	===	===	0.0	===	===	===
27-Nov	150	4.30	2.2	===	0	7	13	1	4.31	4.31	===	===	0.0	===	===	===
28-Nov	151	4.10	2.5	===	0	7	11	0	4.11	4.11	===	===	0.0	===	===	===
29-Nov	152	2.40	2.2	===	0	15	20	1	2.41	2.41	===	===	0.0	===	===	===