SCOTTS HILL AND MT VULCAN PROJECT
TASMANIA
EL2/2017

ANNUAL REPORT
15TH AUGUST 2020 TO 14TH AUGUST 2021

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Tasmania Energy Metals Pty Ltd

Note: All figures and grids are according to the GDA94 datum and MGA94 grid system.

ABSTRACT/EXECUTIVE SUMMARY

The main focus of Tasmania Energy Metals Pty Ltd ("TEM" or "the Company") at the Scotts Hill and Mt Vulcan Project is lateritic nickel-cobalt mineralisation. TEM aims to develop an open pit mining operation at Scotts Hill and Mt Vulcan with production of nickel (Ni) and cobalt (Co) products undertaken off-site in Tasmania.

Work completed in the reporting year 2020-2021 included a replication of the primary and secondary leaching and the additional of a third stage of neutralisation leaching. The in-pit neutraliser was screened from saprock ore, and successfully split a high grade (HG) saprock for Ni production leaching from a low grade (LG) ore that had elevated magnesium (Mg) and was effective in lowering the acidity in leach solutions.

Following this a detailed program of geochemical and mineralogical assessment was undertaken. This included QXRD, QEMSCAN and Electron Probe Micro Analyzer (EPMA) assessment. That work was undertaken by the CSIRO minerals processing laboratory in Waterford, Western Australia. This examined the mineralogical composition of the ores and their liberation features. Following this, CSIRO implemented pre-concentration beneficiation including screening, scrubbing and Low Intensity Magnetic Separation (LIMS). LIMS on scrubbed ores was very successful and produced a Fe concentrate with low impurities that is likely to be suitable for sale.

Work planned for the coming year will include completion of the current program and release of a scoping study. Further metallurgical analysis, including iron ore beneficiation with Wet High Intensity Separation (WHIMS), will also be undertaken. The focus will then shift to the identification of final testwork required for a Pre-Feasibility Study.
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TABLE OF CONTENTS

Digital files submitted with this report:

Filename	**File format**
EL022017_202108_01_Report.doc	*doc*

1 INTRODUCTION

The Scotts Hill and Mt Vulcan Project (EL2/2017) is located in northern Tasmania. The exploration licence contains a JORC 2012 inferred resource of 7.7Mt at 0.67% Ni and 0.047% Co (on a 0.5% Ni cut-off grade). The resource is made up of two interconnected resources known as the Mt Vulcan and Scott's Hill deposits (see Figure 1).

The Scotts Hill and Mt Vulcan Hill Project is located 5km west of the township of Beaconsfield near the Tamar River in northern Tasmania. The Scotts Hill and Mt Vulcan resource can be directly accessed using Tattersall's Road, just west of Beaconsfield.

The exploration licence covers an area of 13km^2 and was granted on 15th August 2017 for a period of five years. It is owned 100% by Tasmania Energy Metals Pty Ltd (TEM), having been transferred from previous holder Monclar Pty Ltd. It is not subject to any current agreements with other companies. The exploration target is lateritic nickel-cobalt mineralisation that can act as feed for the proposed development of the adjacent Barnes Hill mine (on Lease 1872P/M) also held by TEM.

The land tenure plan shows EL2/2017 is covered by both Crown and Private Land. The Crown Land is variously classified. The private land only minorly impacts the Scotts Hill Ni-Co mineralisation to the east of the Tattersalls Road. Exploration and mining are permitted on Private Land but must be preceded by negotiation of an access and compensation agreement with the landowner and its lodgement with Mineral Resources Tasmania (MRT). No exploration is currently proposed for private land.

Most of the Crown Land is classified either as Future Potential Production Forest (FPPF), Regional Reserve, and finally Conservation Area associated with the Dans Hill Conservation Area. The Scotts Hill mineralisation sits on FPPF, while Mt Vulcan sits on FPPF west of the Tattersalls Road and the Dans Hill Conservation Area east of the Tattersalls Road.

Recent advances in leaching techniques and the availability in northeast Tasmania of grid power, roads, water, port facilities and a workforce make the Scotts Hill and Mt Vulcan Project attractive. The development focus is metallurgical testing and preliminary engineering works to establish the most viable flowsheet. It is considered that the joint development of the Scotts Hill and Mt Vulcan deposits with the nearby Barnes Hill deposits will give the project improved scale and greater commercial viability.

Exploration completed during the reporting period has included a tertiary stage of leaching testwork and the production of an iron (Fe) concentrate through the magnetic separation of contained magnetite. These steps followed detailed mineralogical assessment and the application of screening and scrubbing to produce differentiated fractions of the Scotts Hill and Mt Vulcan ore.

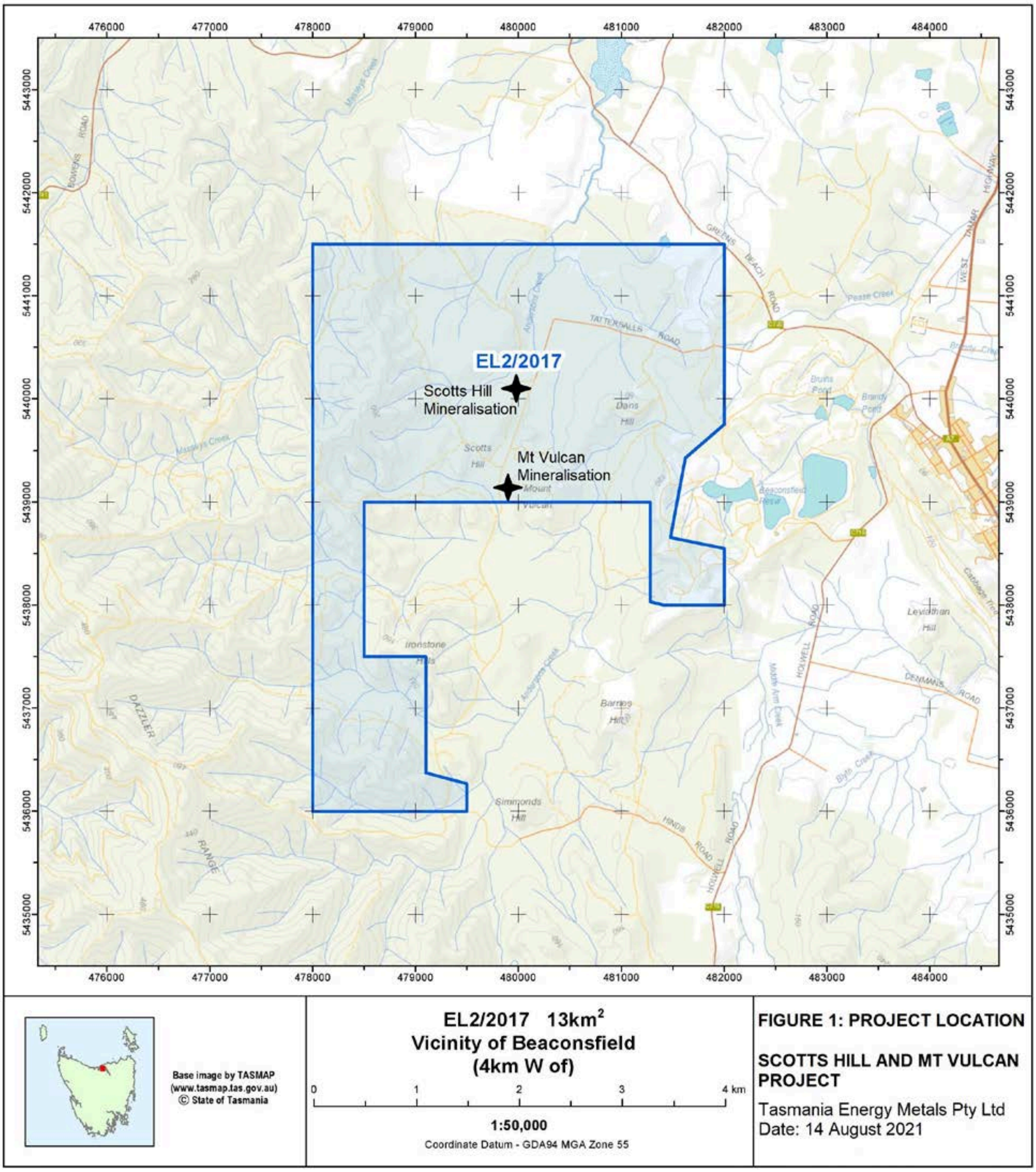

FIGURE 1 SUMMARY ACTIVITY MAP FOR SCOTTS HILL AND MT VULCAN

2 REVIEW OF PREVIOUS WORK AND GEOLOGICAL SETTING

Substantial exploration has been carried out over the last 50 years. A summary table below (Table 1) has been compiled by assessing old reports and specifically compilations made by Lindsay Newham (1997) and Dan Hampton (2012). King Island Scheelite (KIS), Allegiance Mining, Jervois Mining and Proto Resources & Investments Ltd. Former holding Monclar Pty Ltd completed the most recent work on Scotts Hill and Mt Vulcan.

Company	Start	Finish	Focus	Work Completed	Results	Conclusion	Report/EL
Monclar Pty Ltd	2017	2020	Ni, Co	Air core drilling of 20 holes at Scotts Hill and Mt Vulcan. Expanded mineral resource estimate for Scotts Hill and Mt Vulcan. Collection of metallurgical samples for leaching and filtration testwork.	New resource of 7.7Mt at 0.67% Ni and 0.047% Co (Scotts Hill and Mt Vulcan only)	Updated resource and metallurgical results suggest improved economic viability.	EL2/2017
Proto Resources and Investmen ts Ltd	2008	2013	Ni, Co	Satellite imagery including ASTER and Quick-bird, air core drilling of Barnes hill part of license, metallurgical testwork, regional soil sampling, flora & fauna studies, and Aboriginal and European heritage surveys	Mining reserve issued over Barnes Hill part of EL then included in ML1872P/M	Financial pressure meant license was let to lapse in favour of neighbouring ML	EL17/2006
Jervois Mining	2001	2004	Ni, Co	Re-assaying, campsite sampling for met work	12.5 Mt at 1.07% NiEq (combined Ni,Co) (Scotts Hill, Mt Vulcan and Barnes Hill)	Budget pressure meant area dropped to focus on other projects	ETA 504
Allegiance	1996	2000	Ni, Co	Historical data compilation, Shallow drilling, Resource calculation environmental studies, metallurgical studies, 116 air core and 8 diamond holes		Low Ni prices and restricted tenement meant re focus on other projects	97_4013
CRA Exploratio n	1994	1995	NiS	Rock Chip surveys and IP survey	Rock chip sample 1.7% Ni in Serpentinite	not considered economic.	EL35/92
Placeco Australia	1988	1988	PGM, Au	Rock Chips composite sand samples	Failed to detect economic quantities of target minerals	No sampling of Laterite	EL 18/87
Northern Chromite	1969	1981	Cr	Cr production on western flank of Barnes Hill, drilling at Rifle Range south	660,000t at 12% Cr defined at Rifle Range and Barnes Hill	Mined Cr no Ni production	
Departme nt of Mines	1979	1980	Cr	16 percussion holes, serpentinite clays intersected but not tested		Reconnaissance Cr drilling	
Allstate Exploratio n	1971	1972	Asb	15 Core holes and trenching	Top weathered section (Laterite not sampled)	No Ni Focus	
King Island Scheelite	1968	1969	Ni, Co, Cr	37 Holes, metallurgy test work resource calculation, environmental studies	6.014 long tonnes @1.04%ni and 0.06% Co	sub economic in terms of size	69_544
BHP Minerals	1965	1967	Fe, Ni, Cu Zn, Mb, Cr, limest one	Stream sediment sampling, aero magnetic survey, Drilling, trenching, 99 - 3m deep pits	Drilling intersected magnetite bearing serpentinite	Sub economic mineral grades in all elements tested.	67_465
Consolidat ed Zinc	1957	1958	Ni	Series of auger samples at 100ft and 200ft intervals focused on previous work by Ben Lomond mining intervals resulting in	Intersected Ni grades between 1.2 to 1.8%	Didn't meet expected grade of 2.5%Ni considered economic at time.	58_0195
Ben Lomond Mining	1955	1956	Ni	Reconnaissance Sampling	Showed Ni rich clays developed on serpentinites more widespread than known before	JV sort with Consolidated Zinc.	
Dept. of Mines	1929	1929	Ni	13 holes – location information sketchy	Difficulty in locating holes	Reconnaissance Ni laterite drilling	

TABLE 1 SUMMARY OF HISTORIC EXPLORATION ACTIVITIES

The Scotts Hill and Mt Vulcan tenement sits in the Badger Head region of northern Tasmania, an important structural location, considered to be the area in which the Tamar Fracture System separates the western and eastern Tasmanian terrains. The area has a complex nature, a result of thrusting during the Devonian and later normal faulting in the Jurassic and Tertiary. The Precambrian Badger Head Block possibly overlies younger units of the Cambrian Port Sorell Block. The Andersons Creek Ultramafic Complex (ACUC) is considered to be a thrust slice caught up in this deformation. The ACUC is a layered wedge of Cambrian mafic and ultramafic stratigraphy consisting mainly of serpentinite, pyroxenite and gabbro.

A review of previous work and explanation of geological setting, as well as historical minerals resource and metallurgical testwork was presented in the 2017-2018 Annual report for EL 2/2017 (Richard, 2018) and may be used for reference.

3 EXPLORATION COMPLETED DURING THE REPORTING PERIOD

Pre-feasibility study level testwork in ongoing. This report provides preliminary results which will form part of a formal report to be issued at the end of the current program of testwork.

The most recent work on EL2/2017 has been undertaken by Tasmania Energy Metals Pty Ltd (Richard, 2020). This reporting period saw further samples drawn from the metallurgical composite (itself from the 2019 drilling program) and utilised in further testing. The first stage of additional testwork was undertaken by the BGRIMM Technology Group (“BGRIMM”), an ISO certified laboratory in China with known expertise in nickel leaching for metallurgical testwork.

That testwork applied screening to isolate a magnesium rich neutralisation material contained in the coarse ore fraction. This in-pit neutraliser was screened from saprock ore, and successfully split a high grade (HG) saprock for Ni production leaching from a low grade (LG) ore that had elevated magnesium (Mg) and was effective in lowering the acidity in leach solutions. This was followed by a replication of earlier leach testing (to show reliability) and then a new stage of tertiary leaching used to achieve initial neutralisation of the end process liquid. This adoption of an in-pit neutraliser would, if successful, reduce the need for input limestone. Importantly it only requires griding before application, and so has no direct CO2 impact unlike other common neutralisation alternatives.

Following this a detailed program of geochemical and mineralogical assessment was undertaken. This included QXRD, QEMSCAN and Electron Probe Micro Analyzer (EPMA) assessment. That work was undertaken by the CSIRO minerals processing laboratory in Waterford, Western Australia. This examined the mineralogical composition of the ores and their liberation features. A major finding of this was the presence of a substantial volume of liberated magnetite throughout the ore domains (see Table 2 below).

Ore Domain	Magnetite (%vol)
Limonite	19
Transitional	12
Saprolite	12
Saprock	9

TABLE 2 MAGNETITE BY VOLUME (CSIRO BY EPMA)

Following this, CSIRO implemented pre-concentration beneficiation including screening, scrubbing and Low Intensity Magnetic Separation (LIMS). LIMS on scrubbed ores was very successful and produced a Fe concentrate with low impurities that is likely to be suitable for sale.

4 DISCUSSION OF RESULTS

The results met expectations and have suggested a processing pathway for the development of the project. The main results are discussed in this section.

4.1 Neutralisation Leaching

Prior to neutralization leaching to reduce acidity (which was to be a tertiary leaching stage after the product focused primary and secondary leaching stages), two new tests were undertaken to replicate earlier results. These saw both primary and secondary leaching performed on additional samples of ore. The composition of the ore, leaching conditions (including the "Acid to ore ratio", being the amount of fresh acid added at that leach stage per unit of ore) and leaching results from those new tests are presented below.

Test ID	Leach stage	Particle size	Pulp conc. (%)	Temp (°C)	t/h	Acid-ore ratio	Original Ore Composition (%)						
							Ni	Co	Fe	Mg	Al	Mn	Si
ZH-7	1	P85-200mesh	30.00	95	6	0.95	0.77	0.07	22.45	4.99	3.34	0.39	13.62
	2	P85-200mesh	30.00	170	3	0.00	0.79	0.06	19.32	7.26	2.67	0.39	14.95
ZH-8	1	P85-200mesh	30.00	95	6	0.95	0.77	0.07	22.45	4.99	3.34	0.39	13.62
	2	P85-200mesh	30.00	160	3	0.00	0.79	0.06	19.32	7.26	2.67	0.39	14.95

TABLE 3 PRIMARY AND SECONDARY LEACH REPLICATION CONDITIONS (BGRIMM)

Test ID	Leach stage	Grade (%)						Metals Extraction (from solids) (%)			
		Ni	Co	Fe	Mg	Al	Mn	Ni	Co	Fe	Mg
ZH-7	1										
	2	0.05	0.01	18.83	0.71	1.66	0.04	95.44	90.14	30.07	93.00
ZH-8	1										
	2	0.10	0.00	18.91	0.80	1.25	0.05	90.83	100	30.51	92.18

TABLE 4 LEACH REPLICATION RESULTS (BGRIMM)

These results were consistent with earlier ones and supported the main Ni and Co extractions that are central to the successful implementation of the inverse leaching process. However, in these experimental results a larger proportion of the Fe went into solution. This is due to a longer residence time adopted for this experiment (3 hours vs. 2 hours in the selected optimal conditions). This provided a confirmation that although longer residence could lead to higher Ni and Co extractions (though that result was not itself stable), it would reliably lead to an undesirable substantial increase in the Fe content in solution – with Fe extraction more than doubling from 13.19% extraction to ~30%.

Leaching Extraction	Testwork Average	Replication ZH-7	Replication ZH-8
% Ni	91.31	95.44	90.83
% Co	92.89	90.14	100
% Fe	13.19	30.07	30.51
% Mg	92.21	93.00	92.18

TABLE 5 COMPARISON OF PRIMARY AND SECONDARY LEACH RESULTS (BGRIMM)

Mg extractions were also confirmed, showing that Mg is readily dissolved, such that adding residence does not increase extractions. The cobalt extraction in ZH-8 was close to 100%, with the remaining Co in the residues being below the limit of detection (LOD) in the final analysis of the tailings residue. These results showed that LPAL could support very high extractions of both Ni and Co over 95%.

Using the intermediate solids/liquids produced from the replications of the primary and secondary leach tests, first-pass tertiary leach tests were conducted. After measuring the ore splits across the leaching stages, the best ratio was established as:

Ore Ratio: Prim-Sec-Tert	
Primary (%)	53.59
Secondary (%)	29.86
Tertiary (%)	16.56

TABLE 6 COMPARISON OF PRIMARY AND SECONDARY LEACH RESULTS (BGRIMM)

The remaining saprock sample was then processed using these conditions to generate a neutralisation ore feed for use in the next stage of experimental test work. The characteristics of the generated neutralisation saprock are:

No	sample	Ni	Fe	Mg	Cu	Co	Mn	Zn	Ca	Cr	Al
1#	Saprock (<1mm)	0.65	9.99	13.42	<0.01	0.02	0.14	0.01	0.18	0.39	1.08

TABLE 7 SCREENED SAPROCK FOR NEUTRALISATION LEACHING (BGRIMM)

This was very suitable, with high Mg values (compared to <2% Mg recorded for the naturally occurring upper domains of the ore body). This material was then used for the test work with a screened fraction of saprock providing a high-Mg neutralisation feedstock. Despite being from a waste fraction, these feeds still carried material quantities of valuable Co and Ni (0.02% and 0.65% respectively). Accordingly, the experimental design was arranged to also take account of the potential to capture additional Ni and Co credits in the processing.

The first test evaluated the level the pH of slurry would reach as the neutralization feed increases (i.e., through the addition of beneficiated saprock). Under the experimental setup, the pH value was measured every 20 minutes and additional neutralization feed added. All tests were undertaken with an initial acid consumption of 950 kg/t ore (added in the Primary leach) and a Pulp Concentration of 30% in all leaching stages. The initial test conditions and results were as below.

Neutralization feed: Ore #2
Prim Ore/Sec Ore : 130g/71.56g;
Prim /Sec/Tertiary Temperature: 95ºC/150ºC/70ºC;
Prim/Sec Leach Residence time: 6h/2h;
Prim/Sec/Tertiary Ore Particle Size: P85/P85/P53 -0.074;

No.	Time (h:m)	Feed Addition (g)	pH	NO.	Time	Feed Addition	pH
1	0:20	4.4	0.75	12	13:20	139.18	1.14
2	0:40	10.83	0.72	13	13:40	151.39	1.16
3	1:00	22.56	0.83	14	14:00	164.38	1.14
4	1:20	32.68	0.84	15	14:30	176.73	1.2
5	1:40	44.43	0.96	16	15:00	194.52	1.27
6	2:00	55.47	0.86	17	15:30	205.71	1.35
7	2:20	78.96	0.92	18	16:00	221.19	1.35
8	2:40	93.68	0.94	19	16:30	234.33	1.56
9	3:00	104.94	0.96	20	17:00	250.34	1.71
10	3:20	115.36	1.02	21	17:30	272.55	1.69
11	3:40	124.66	1.09	22	18:00	272.55	1.8
	Residue	426.34 g	Remaining solids %			89.92%	

TABLE 8 INITIAL NEUTRALISATION LEACH RESULTS (BGRIMM)

The test results showed that the pH value increased as neutralization feed was added, but the neutralization effect was weaker than expected in advance. Consequently, it was determined that the experimental conditions should be varied to apply neutralisation under more aggressive conditions.

In the next experimental test, the tertiary leach temperature raised to 80 degC and the beneficiated saprock ground more finely. Only 40g of neutralisation ore was used (vs. 124.66g in the first less aggressive test). The test conditions and results were as below.

Neutralization feed: Ore #1
Prim/Sec/Tertiary Ore : 130g/71.56/40g;
Prim /Sec/Tertiary Temperature: 95^{o}C/160^{o}C/80^{o}C;
Prim/Sec/Tertiary Leach Residence time: 6h/3h/4h;
Prim/Sec/Tertiary Ore Particle Size: P85/P85/P85 -0.074;

Test No	Time (h:m)	pH	Residual solid composition /%						Element Extraction /%			
			Ni	Fe	Mg	Co	Mn	Al	Ni	Co	Fe	Mg
ZH-8-4	4:00	0.78	0.139	16.72	2.73	0.01	0.06	1.12	86.75	89.50	30.32	76.75
			Residual solid /%				74.49%					

TABLE 9 FURTHER NEUTRALISATION LEACH RESULTS (BGRIMM)

This showed some improvement, but a further experiment was then implemented at a higher neutralisation temperature of 90 °C. The test conditions and results were as below.

Neutralization feed: Ore #1
Prim/Sec/Tertiary Ore : 130g/71.56/40g;
Prim /Sec/Tertiary Temperature: 95^{o}C/170^{o}C/90^{o}C;
Prim/Sec/Tertiary Leach Residence time: 6h/3h/4h;
Prim/Sec/Tertiary Ore Particle Size: P85/P85/P85 -0.074;

Test No	Time (h:m)	pH	Residual solid composition /%						Element Extraction /%			
			Ni	Fe	Mg	Co	Mn	Al	Ni	Co	Fe	Mg
ZH-7-4	4:00	1.23	0.11	20.91	2.03	0.01	0.04	1.86	89.93	90.89	18.47	83.81
			Residual solid /%				69.69%					

TABLE 10 FINAL NEUTRALISATION LEACH RESULTS (BGRIMM)

This test achieved a much better result, getting the pH up to 1.23 with only a limited amount of ore. Extractions of Ni and Co were also strong at 89.93 % and 90.89 % respectively.

4.2 Mineralogy and Liberation

To identify potential further processing opportunities, advanced mineralogical characterisation was undertaken. CSIRO applied QEMSCAN and Electron Probe Micro-Analyser (EPMA) to provide mineralogical and liberation data for all major minerals.

After sample preparation, initial QAQC work was undertaken to ensure the samples being used for analytical work were representative of the resource body and not subject to contamination. Multiple methods were used to ensure accuracy, with the samples returning assay results using the preferred X-ray Fluorescence (XRF) as given below. These were within statistical sampling error of the resource averages and judged suitable for the detailed analysis that followed. The assays are presented in the table below:

Sample (ID)	Method	Si %	Fe %	Mg %	Cr %	Al %	Ni %	Co %
Limonite (TEM-#4)	XRF	5.56	41.44	0.988	3.995	4.207	0.385	0.182
Transitional (TEM-#6)	XRF	12.65	28.61	1.996	3.605	3.541	0.747	0.126
Saprolite (TEM-#7)	XRF	17.16	18.50	6.966	1.761	2.717	0.831	0.076
Saprock (TEM-#5)	XRF	19.79	10.33	15.794	1.307	0.720	0.645	0.046

TABLE 11 MINERALOGICAL COMPOSITE SAMPLE ASSAYS (CSIRO)

The results of QEMSCAN (a mineralogical analytical tool using automated electron microscopy to quantitatively evaluate mineralogy and petrography) identified the constituent minerals, and are presented below.

	Limonite	Transitional	Saprolite	Saprock
Mass in Fraction	100.00	100.00	100.00	100.00
Mineral	Mass %	Mass %	Mass %	Mass %
Hematite	4.59	2.35	0.86	0.78
Chromite	**10.96**	**10.73**	**5.67**	**4.00**
Magnetite	**13.39**	**14.05**	**8.77**	**8.88**
Goethite	22.95	6.21	3.14	2.43
Mn Phases (Lithiophorite?)	2.16	1.81	1.08	0.66
Quartz	0.48	1.88	2.42	3.08
Talc	0.10	0.34	13.08	24.80
Kaolinite	0.92	1.26	0.36	0.05
Serpentine	0.19	0.73	4.95	30.66
Chlorite	1.05	3.23	13.25	2.29
FeOx/Silicate intergrowth	25.15	37.43	39.45	17.18
Al-silicate intergrowth	8.28	16.41	2.41	0.35
Rutile/Anatase/Ti Minerals	0.15	0.15	0.09	0.05
FeOx/Hydrox trap	7.67	0.64	0.22	0.04
Feldspars	0.00	0.16	0.01	0.00
Amphibole (Hornblende)	0.00	0.13	0.76	0.35
Others	1.95	2.47	3.47	4.39

TABLE 12 COMPOSITE SAMPLE QEMSCAN MINERALOGY RESULTS (CSIRO)

The iron (Fe) results were particularly positive, as they suggest a substantial volume of magnetite that can be targeted by magnetic methods. The chrome is also mainly present as chromite, which is an important ore mineral and can be pursued through gravity methods. To confirm this, higher resolution EPMA was conducted by CSIRO. This confirmed substantial magnetite as present across all fractions. Those levels are below:

Minerals	**Ideal mineral formula**	**Limonite**	**Transitional**	**Saprolite**	**Saprock**
Hematite	Fe2O3	24	11	6	3
Goethite	FeOOH	23	14	3	1
Maghemite/magnetite	Fe2O3	19	12	12	9
Kaolinite	Al2Si2O5(OH)4	16	8	6	
Chromite	FeIICr2O4	6	7	3	2
Smectite (e.g. nontronite)	Na0.3FeIII2(Si,Al)4O10(OH)2•n(H2O)	4	33	28	21
Mn oxides/hydroxides	(Al,Li)MnIVO2(OH)2	3	2	1	0.7
Quartz	SiO2	2	5	2	0.2
Chlorite (e.g. clinochlore)	(Mg,FeII)5Al(Si3Al)O10(OH)8	2	5	8	16
Serpentine (e.g. antigorite)	(Mg,FeII)3Si2O5(OH)4	1	4	27	48
Amphiboles (actinolite)	Ca2(Mg,FeII)5Si8O22(OH)2			2	
Talc	Mg3Si4O10(OH)2			2	
	Sum	100	100	100	100

TABLE 13 COMPOSITE SAMPLE EPMA MINERALOGY RESULTS (CSIRO)

This was followed by liberation assessment. That was conducted using the QEMSCAN software, and evaluated the proportion of each particle composed of each constituent mineral (e.g., the liberation class of 90-100% are those proportion of particles where over 90% of that particle is the targeted mineral by volume). This was performed without grinding. As shown in Table 14, magnetite had significant volumes of near liberated magnetite.

Magnetite	**TEM 4**	**TEM 6**	**TEM 7**	**TEM 5**
	Limonite	**Transitional**	**Saprolite**	**Saprock**
Liberation Class	**Mass %**	**Mass %**	**Mass %**	**Mass %**
<= 10%	3.17	3.29	6.04	4.89
<= 20%	2.26	1.46	3.17	4.12
<= 30%	2.33	4.49	3.38	2.44
<= 40%	2.02	3.87	4.08	4.27
<= 50%	5.52	4.39	5.36	2.86
<= 60%	4.04	4.24	9.46	5.40
<= 70%	15.59	11.83	12.18	7.16
<= 80%	17.76	20.75	19.48	19.03
<= 90%	33.28	37.09	33.06	34.33
< 100%	14.03	8.58	3.78	15.51
100%	0.00	0.00	0.00	0.00

TABLE 14 MAGNETITE LIBERATION BY QEMSCAN (CSIRO)

Results for paramagnetic iron species were far weaker. Despite being present in significant quantities (especially when considered jointly as alternative paramagnetic iron species), both hematite and goethite showed only very limited liberation as shown in Tables 15 and 16 below.

Hematite	TEM 4	TEM 6	TEM 7	TEM 5
	Limonite	Transitional	Saprolite	Saprock
Liberation Class	Mass %	Mass %	Mass %	Mass %
<= 10%	48.45	57.98	24.25	33.64
<= 20%	36.37	23.58	18.88	16.08
<= 30%	3.18	5.90	12.84	3.38
<= 40%	1.05	1.09	8.87	5.56
<= 50%	1.70	2.24	5.55	12.01
<= 60%	7.85	9.21	8.25	3.29
<= 70%	1.41	0.00	12.59	6.28
<= 80%	0.00	0.00	1.91	17.52
<= 90%	0.00	0.00	6.86	2.25
< 100%	0.00	0.00	0.00	0.00
100%	0.00	0.00	0.00	0.00

TABLE 15 HEMATITE LIBERATION BY QEMSCAN (CSIRO)

Goethite	TEM 4	TEM 6	TEM 7	TEM 5
	Limonite	Transitional	Saprolite	Saprock
Liberation Class	Mass %	Mass %	Mass %	Mass %
<= 10%	11.94	14.97	3.13	16.30
<= 20%	17.54	18.84	8.04	18.61
<= 30%	15.47	14.63	8.83	10.63
<= 40%	10.79	12.72	8.77	13.68
<= 50%	7.62	6.63	11.15	7.84
<= 60%	10.01	8.78	10.89	6.68
<= 70%	7.48	6.88	12.35	7.51
<= 80%	5.65	3.69	11.04	8.23
<= 90%	6.77	7.08	10.94	6.19
< 100%	5.07	3.96	14.28	3.19
100%	1.66	1.83	0.56	1.14

TABLE 16 GOETHITE LIBERATION BY QEMSCAN (CSIRO)

These results suggested that Fe extraction using traditional early-stage beneficiation (such as the magnetite rich fraction drawn using magnetic separation using a limited field strength) could produce a value-added product.

4.3 Pre-Concentration Testwork

Based on the mineralogical and liberation assessment, a program of beneficiation testwork was undertaken to examine potential by-products and the ability to produce an enhanced leaching feed grade. The Fe-rich ironstone cap that occurs over some laterites has been mined for its Fe content. However, generally the economic are unfavourable relative to other sources of iron ore. Accordingly, testwork sought to utilise established bulk minerals processing techniques to commercially recover Fe before leaching as part of a single integrated process. This then focused on investigating the potential to do that with a focus on magnetite and other Fe minerals with high magnetic susceptibility.

Low Intensity Magnetic Separation was applied using a magnetic drum with a field intensity of 1,000 gauss for material sizing -1mm. Magnetics for +1mm were removed using magnetic bar. This gave the results below in Table 17.

	Mass pull (%)	Al %	Co %	Cr %	Fe %	Mg %	Mn %	Ni %	Si %
Limonite	**41.7%**	0.86	0.09	3.31	62.79	0.54	0.41	0.20	0.80
Transition	**27.7%**	0.66	0.07	3.68	61.25	0.70	0.30	0.22	1.53
Saprolite	**15.1%**	1.12	0.10	4.97	53.63	1.65	0.34	0.38	4.11
Saprock	**12.1%**	0.30	0.04	2.58	54.39	4.16	0.16	0.24	4.05
	Mag Conc.	0.84	0.08	3.92	58.31	1.34	0.33	0.28	2.48

TABLE 17 MAGNETIC CONCENTRATE FROM BENCHSCALE LIMS/MAGNETIC BAR (CSIRO)

Mass pull was better than expected, delivering potentially economic quantities of Fe concentrate given typical laterite processing rates. This test confirmed that the magnetite was substantial and liberated. Importantly the magnetite occurs in all the nickel domains (as below - so forms 12.5% of the resource).

This suggested that magnetite is recoverable through magnetic separation (i.e., LIMS). The table below presents the assayed grade of Non-magnetic (NM) ore remaining after removal of the magnetics. Importantly the magnetite does not carry substantial nickel, and so removing it improved overall leach feed Ni grades (by approx. 16.5%).

	% Mass	Ni %	Co %	Mg %	Fe %	Si %	Al %	Mn %)	Cr %
Limonite feed	**100.0%**	0.42	0.19	1.21	47.43	6.08	2.84	0.80	2.80
Limonite NM	**58.3%**	0.58	0.25	1.69	36.45	9.86	4.25	1.08	2.43
Upgrade	-42%	**37%**	**36%**	**40%**	**-23%**	**62%**	**50%**	**35%**	**-13%**
Transitional feed	**100.0%**	0.74	0.11	2.13	31.94	14.45	3.48	0.42	3.04
Transitional NM	**72.3%**	0.93	0.13	2.68	20.69	19.41	4.56	0.47	2.79
Upgrade	-28%	**27%**	**15%**	**26%**	**-35%**	**34%**	**31%**	**11%**	**-8%**
Saprolite feed	**100.0%**	0.81	0.07	7.09	22.39	17.66	2.06	0.27	1.88
Saprolite NM	**84.9%**	0.88	0.06	8.05	16.83	20.07	2.23	0.26	1.34
Upgrade	-15%	**9%**	**-9%**	**14%**	**-25%**	**14%**	**8%**	**-5%**	**-29%**
Saprock feed	**100.0%**	0.58	0.02	17.35	13.78	17.75	0.75	0.16	0.96
Saprock NM	**87.9%**	0.62	0.02	19.16	8.21	19.63	0.81	0.16	0.74
Upgrade	-12%	**8%**	**-11%**	**10%**	**-40%**	**11%**	**8%**	**0%**	**-23%**

TABLE 18 COMPARISON OF FEED AND NON-MAGNETICS AFTER LIMS/MAGNETIC BAR (CSIRO)

5 CONCLUSIONS

The LIMS magnetic separation was very successful and produced a saleable Fe concentrate with low impurities. Importantly, the removal of an Fe by-product resulted in improved leach feed parameters including higher Ni/Co and lower Fe. This is encouragement for further development of the Scotts Hill–Mt Vulcan resource, and in particular the assessment of Wet Intensity Magnetic Separation (WHIMS) to add additional incremental recoverable hematite and goethite to the recovered magnetite.

6 PROPOSED EXPLORATION

Work planned for the coming year will include completion of the current program and release of a scoping study. Further metallurgical analysis, including iron ore beneficiation with WHIMS, will also be undertaken. The focus will then shift to the identification of final testwork required for a Pre-Feasibility Study

The activities proposed to be undertaken at the Scotts Hill and Mt Vulcan Project on EL2/2017 in the coming term include:

- Receipt from the CSIRO of the formal report on the mineralogical assessment and testwork program completed so far.
- Basic engineering design to further evaluate the production of saleable Magnetite (Fe) concentrates using LIMS.
- Following the successful LIMS program outlined in this report, further magnetic separation is planned. This will pursue paramagnetic iron species identified as partly liberated (e.g., goethite and hematite) in the mineralogical and liberation studies completed to date.

7 ENVIRONMENTAL MANAGEMENT

The site was visited several times during the period in the course of ongoing water monitoring and in preparation for environmental studies. No extractive ground work was undertaken in this reporting period. No new environmental or rehabilitation concerns were reported.

8 EXPENDITURE

Expenditure from 15th August 2020 to 14th August 2021 is summarised below for the Scotts Hill and Mt Vulcan EL2/2017 licence.

TABLE 2 EXPENDITURE 15 AUGUST 2020 TO 14 AUGUST 2021.

1. Geoscience	$22,654.03
2. Drilling and Gridding	$0
3. Land Access	$8,264.46
4. Rehabilitation	$0
5. Feasibility Studies	$82,250.00
6. Other	$0
7. Administration	$4,514.94
TOTAL - ELIGIBLE	**$117,683.43**

9 KEY REFERENCES

Jannink, A (2006) JORC Indicated category confirmation letter for Barnes Hill, Scotts and Mt Vulcan Resources EL 18/2006 Beaconsfield, Tasmania. Douglas McKenna and Partners Pty Ltd (Author A Jannink), (12 December 2006)

Richard, P (2018) EL2/2017 Annual Report 15th August 2017 to 14th August 2018. Scotts Hill and Mt Vulcan Project. Available from Mineral Resources Tasmania.

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