



25 October 2019

## Lithium Australia Quarterly Activities Report for September 2019 – planning for a circular battery economy

### HIGHLIGHTS

#### Recycling

- **Lithium Australia completes acquisition programme for Envirostream Australia recycling alliance.**
- **Next-stage process development for recycled battery material underway at the Australian Nuclear Science and Technology Organisation; pilot plant design commenced.**
- **Lithium phosphate generated from spent lithium-ion batteries used to create cathode powder for new batteries.**
- **Lithium Australia establishes potential for recycled battery stream.**

#### Lithium chemicals

- **Lithium Australia's proprietary LieNA<sup>®</sup> process opens up lithium chemical conversion opportunities.**
- **Use of lithium phosphate streamlines the production of cathode materials for lithium-ion batteries.**

#### Batteries

- **Lithium Australia's alliance with leading battery producer DLG Battery Co. Ltd ongoing.**
- **Test programme for VSPC Ltd cathode powders continues at DLG Battery Co. Ltd.**
- **Lithium Australia develops business plan for battery supply into the Australian energy storage market**
- **Soluna Australia Pty Ltd incorporated as battery distribution business.**

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## Recycling

### Envirostream Australia Pty Ltd ('EA')

Lithium Australia NL (ASX: LIT, 'the Company') has increased its equity in EA, a national leader in battery recycling, to 23.9% ([announced to the ASX on 16 October 2019](#)).

Based in Victoria, Australia, EA operates the only facility nationally to shred spent batteries – including lithium-ion batteries ('LIBs') – and from them produce a mixed-metal dust ('MMD') containing critical metals. The MMD is currently exported to South Korea for refining.

Recently, EA added a further 50 collection points to those it has already established, an expansion facilitated by partnerships with LG Chem and the Milwaukee Electric Tool Corporation (a subsidiary of Techtronic Industries), among others.

LIT's partnership with EA has facilitated planning for an increase in EA's processing capacity. A plant upgrade to a design capacity of 1000 tonnes per annum has commenced and critical items of equipment have been delivered. This puts EA in a strong support position with respect to the national roll-out of a stewardship programme for batteries, as well as Victoria's ban on consigning spent batteries to landfill.

### Australian Nuclear Science and Technology Organisation ('ANSTO')

Meanwhile, LIT's research into the chemical processing of both alkaline batteries and LIBs is ongoing. The Company's programme for treating Australian recycled battery material involves finalising a practical hydrometallurgical flow sheet for the recovery of all battery metals, including lithium, from spent LIBs (which is significant, since at present most global recyclers are unable to do this).

LIT has awarded the next module of test work to ANSTO and design of the pilot plant has commenced. The processes the Company has under development are intended to recover the lithium from spent LIBs as lithium phosphate ('LP'). This will be used as direct feed for the production of cathode materials for lithium-ferro-phosphate ('LFP') batteries (an LFP battery is a type of LIB). Alternatively, the LP can be converted to lithium hydroxide should the market demand such a product.

### VSPC Ltd ('VSPC')

VSPC, LIT's wholly owned nanotechnology subsidiary, is located in Brisbane, Australia. It comprises a comprehensive pilot plant and advanced laboratory and testing facilities.

As announced to the [ASX on 3 October 2019](#), LIT recently applied its [proprietary technology](#) to the recovery of lithium as LP from feed material supplied by EA. VSPC then used that LP as direct feed in the production of cathode powder for LFP coin-cell batteries. When subsequently electrochemically tested by VSPC, the coin-cell batteries exceeded in-house test standards.



## The LIT/EA/VSPC production cycle

Together LIT, EA and VSPC plan to establish integrated processing operations for battery materials within Australia, paving the way for a cost-effective and genuinely renewable circular battery economy.

The LIT/EA/VSPC production cycle (i.e. lithium from recycled batteries → LP → LFP cathode material → new LIBs) reveals the potential to improve efficiency and reduce manufacturing costs in the battery industry, and in so doing meet the ethical, social and governance standards the community has come to expect. Indeed, these technologies could enhance global efforts to deal with climate change by improving resource sustainability and reducing the environmental footprint of portable power.

## Mine waste and spodumene fines

LIT has also demonstrated its ability to recycle mine waste ([lepidolite](#)) or [fine spodumene](#) for battery production, by virtue of its SiLeach<sup>®</sup> and LieNA<sup>®</sup> processes (see below).

## Lithium chemicals

LIT has developed a number of lithium extraction processes that, combined with its patented VSPC nanotechnology, permit the production of battery cathode powders directly from LP, without the requirement of an intermediate step to produce lithium hydroxide or carbonate. This potentially reduces the processing steps required to produce cathode materials for LIBs.

Patent applications have been lodged for various aspects of the Company's LP precipitation and refining process, with LIT advised that the means by which this is achieved are novel and so eligible to receive patent protection.

That said, the global market for lithium hydroxide is robust (it commands a premium over lithium carbonate), and to capitalise on this LIT is investigating the conversion of LP directly to lithium hydroxide.

Further, the Company has developed a cheap and simple way of removing impurities from the LP, thereby improving its quality and consistency, and this refining process is also the subject of patent applications. Test work at ANSTO has demonstrated an order-of-magnitude reduction in impurities such as sodium, potassium and sulphur. This refining step is equally applicable to the lithium chemicals produced by way of the Company's SiLeach<sup>®</sup> and LieNA<sup>®</sup> processing technologies.

LIT is continuing to develop LieNA<sup>®</sup>, a caustic digest process that provides an alternative to the thermal conversion of spodumene concentrates for the production of lithium chemicals. A preliminary feasibility study has been commenced, targeting the optimisation of leach, impurity-removal and product-recovery process conditions.



## Batteries

### VSPC

As noted, the assets of LIT's wholly-owned subsidiary VSPC comprise a comprehensive pilot plant and advanced laboratory and testing facilities in Brisbane, Queensland. VSPC uses proprietary nanotechnology to create advanced cathode materials – a lucrative element in the battery production cycle – and produce LIBs of superior quality.

The VSPC process begins with the creation of cathode metals in solution. From that solution, cathode nanoparticles are precipitated to produce the powders used in the manufacture of LFP cells. Creating those solutions can involve the use of LP generated via LIT's proprietary SiLeach® or LieNA® processes from hard-rock sources. Creating LFP cathode material in this way eliminates the need to produce the lithium carbonate or hydroxide conventionally used in LIB production. Indeed, there is the potential to remove a number of steps in the battery manufacturing process and in so doing reduce costs.

During the quarter VSPC's production of cathode materials continued, with international battery manufacturers in China, Japan and India currently evaluating samples of those materials.

### LIT/DLG Battery Co. Ltd ('DLG') alliance

Earlier in the year, the Company entered into [an agreement with DLG](#), a major Chinese battery manufacturer, with the aim of:

- commercialising VSPC cathode powders in China, and
- developing a battery distribution business within Australia.

VSPC will amend its prefeasibility study ('PFS') for the production of LFP cathode powders, in order to better reflect the anticipated outcomes of the LIT/DLG partnership. Meanwhile, testing of VSPC cathode materials by DLG, as well as by customers in Japan and India, continues. Results will be advised once received by LIT.

During the reporting period, Soluna Australia Pty Ltd ('Soluna') was incorporated as the LIT/DLG vehicle for distributing energy management systems nationally – in particular the Soluna™ range of battery products manufactured by DLG.



**SOLUNA™**  
SOLAR POWER BANKS



Soluna™ power banks are available in sizes to suit residential and industrial storage, with bespoke designs available for special applications. The components of the battery packs are modular, so units can be expanded as required without limitation.

All Soluna™ power banks will be available in a choice of nickel-cobalt-manganese (NCM) or LFP batteries. The latter boast many desirable attributes, among them the following.

- Superior operational life (typically twice the number of duty cycles of other LIB chemistries).
- Excellent safety credentials.
- High charge and discharge rates without thermal runaway (i.e. low fire risk).
- A wide operating temperature range (ideal for Australian energy storage system applications).
- Low supply chain risk (i.e. contain no nickel or cobalt).
- Lower cost, in that only readily available materials are used (no nickel or cobalt).

LIT is a great advocate of LFP batteries and, through VSPC, is working with DLG to test commercial-format cells manufactured using VSPC's cathode materials. Together, the two companies aim to commercialise VSPC cathode powders in China. If they succeed, VSPC will become DLG's preferred supplier of cathode materials.



## Raw materials

### Exploration activities for the quarter

At present, LIT's preferred supply model is to obtain lithium minerals from mining waste streams (historical dumps and tailings) or as discharge from currently operating mines; however, other supply opportunities continue to be evaluated.

Lithium micas, often associated with tin, tantalum and tungsten, as well as certain types of clay minerals, are prime targets. So too is the fine spodumene discharged as waste during the production of lithium concentrates.

### Appointment of exploration manager

On 15 July 2019, LIT advised its appointment of Mr Mark Strizek as Manager – Raw Materials. Mark is in the process of rationalising the Company's Australian tenement holdings, including ground in Western Australia, the Northern Territory, Queensland and South Australia. A complete review of all historic and recent exploration activity has been completed and summaries of the information made available to interested parties.

### Youanmi lithium project, Western Australia

In October 2018, LIT announced it had an option to acquire full rights and title to three exploration licences at Youanmi containing lithium, cesium and tantalum ('LCT') pegmatites, as well as vanadium mineralisation in a nearby layered mafic complex.

During the September 2019 quarter, LIT announced the results of exploration drilling at Youanmi ([ASX release dated 19 August 2019](#)).

While drilling confirmed mineralisation over 2.5 kilometres of strike, with assays reporting significant widths of high-grade lepidolite mineralisation hosted in LCT pegmatites, LIT considered further drill testing necessary to determine the extent of the mineralised system, a task it was not possible to undertake within the term of the option.

A maiden vanadium resource was also established at Youanmi during the option period; however, metallurgical test work indicated recoveries would be insufficient to demonstrate viability.

On 27 September 2019 LIT announced that its option over the Youanmi project had expired.

### Sadisdorf lithium project, Germany

During the quarter, LIT progressed its PFS over [the Sadisdorf lithium project](#), in order to investigate the viability of producing cathode materials for LIBs from that location. The PFS will include further resource modelling, sampling and SiLeach® processing.



## Medcalf lithium prospect, Western Australia

In 2018 and 2019, LIT identified lithium pegmatite swarms at its Medcalf prospect, part of the Company's Lake Johnston project. Medcalf lies within the highly lithium-prospective Yilgarn Craton, which hosts the major lithium deposits at Earl Grey (Kidman Resources and SQM), Mt Marion (NeoMetals, Gangfeng and Mineral Resources) and Mt Catlin (Galaxy).

Fieldwork undertaken at Medcalf in January 2019 (see ASX announcements dated [5 February 2019](#) and [15 April 2019](#)) confirmed that the outcrop of a spodumene-enriched pegmatite swarm is 450 metres long and 100 metres wide, trending in a northwest-southeast direction. That fieldwork included a geochemical soil-sampling programme over an area of 1,300 by 700 metres. Rock-chip sampling of the pegmatite outcrops indicated they were primarily spodumene-bearing rock. The Company believes drilling to test this target is warranted and is seeking approvals from the appropriate authorities.

## Corporate

Under a prospectus lodged with ASIC on [11 June 2019](#), the Company successfully completed a renounceable rights issue offered on the basis of one new share for every six shares held at \$0.06 per share. The Rights Issue closed on 28 June 2019, with LIT receiving \$2,747,524 from shareholders and new investors.

## Conclusion

The Company aims to ensure an ethical and sustainable supply of energy metals to the battery industry (enhancing energy security in the process) by creating a circular battery economy. The recycling of old LIBs to new is intrinsic to this plan. While rationalising its portfolio of lithium projects/alliances, LIT continues R&D on its proprietary extraction processes for the conversion of *all* lithium silicates (including mine waste), and of unused fines from spodumene processing, to lithium chemicals. From those chemicals, the Company plans to produce advanced components for the battery industry globally, and for stationary energy storage systems within Australia. By uniting resources and innovation, LIT seeks to vertically integrate lithium recycling, extraction and processing.



## Competent Persons' statement: Medcalf lithium prospect

The information contained in the report that relates to exploration results, together with any related assessments and interpretations, is based on information compiled by Mr Peter Spitalny on behalf of Mr Adrian Griffin, Managing Director of Lithium Australia NL. Mr Spitalny is a member of the Australasian Institute of Mining and Metallurgy and has sufficient experience relevant to the styles of mineralisation under consideration, and to the activity he has undertaken, to qualify as a Competent Person. Mr Griffin is a member of the Australasian Institute of Mining and Metallurgy and has sufficient experience relevant to the style of mineralisation under consideration, and to the activity being reported, to qualify as a Competent Person as defined under the *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (2012 edition)*. Mr Griffin consents to the inclusion in the report of the matters based on Mr Spitalny's data in the form and context in which it appears. The Company is not aware of any new information or data that materially affects the information in this report and such information is based on the information compiled on behalf of Mr Griffin.

## Forward-looking statements

This report contains forward-looking statements. Forward-looking statements are subject to a variety of risks and uncertainties that it is beyond the Company's ability to control or predict and which could cause actual events or results to differ materially from those anticipated in such forward-looking statements.



## Details of mining tenements as at quarter ended 30 September 2019

ASX Listing Rule 5.3.3

### Australian projects

Tenement ID	Name	Location	State	Interest
E09/2168	Yinnietharra	Gascoyne	WA	100%
E09/2191	Thomas River	Gascoyne	WA	100%
E09/2200	Mount James 2	Gascoyne	WA	100%
E09/2201	Mount James 1	Gascoyne	WA	100%
E09/2203	Mount James 3	Gascoyne	WA	100%
E27/562	Gindalbie	Gindalbie	WA	100%
E45/4660	Hillside 3	Pilbara	WA	100%
E45/4766	Moolyella	Pilbara	WA	100%
E57/978	Youanmi	Murchison	WA	100%
E57/1049	Youanmi	Murchison	WA	100%
E57/1056	Youanmi	Murchison	WA	100%
E63/1777	Lake Johnson	Dundas	WA	100%
E63/1805	Mt Day	Dundas	WA	100%
E63/1806	Mt Day A	Dundas	WA	100%
E63/1807	Mt Day B	Dundas	WA	100%
E63/1808	Mt Day C	Dundas	WA	100%
E63/1809	Lake Johnson	Dundas	WA	100%
E63/1866	Lake Johnson	Dundas	WA	100%
E63/1870	Lake Johnson	Dundas	WA	100%
E63/1903	Lake Johnson	Dundas	WA	100%
E70/4690	Greenbushes	Greenbushes	WA	100%
E70/4777	Greenbushes	Greenbushes	WA	100%
E70/4778	Greenbushes	Greenbushes	WA	100%
E70/4890	Greenbushes C	Greenbushes	WA	100%
E70/5023	Bridgetown	Stanifer	WA	100%
E70/5024	Boyup Brook	Stanifer	WA	100%
E70/5024	Boyup Brook	Stanifer	WA	100%
E70/5025	Boyup Brook	Stanifer	WA	100%
E70/5032	Manjimup	Stanifer	WA	100%
E70/5036	Nannup	Stanifer	WA	100%
E70/5047	Nannup	Stanifer	WA	100%
E70/5198	Mt Lawrence	Mt Lawrence	WA	100%
E74/0543	Ravensthorpe	Ravensthorpe	WA	100%
E77/2279	Lake Seabrook	Yilgarn	WA	100%
E77/2484	Lake Seabrook	Yilgarn	WA	100%
ELA30897	Angers	Bynoe	NT	100%
EL 6212	Dudley 1 Sa	Kangaroo Island	SA	100%
EL 6213	Dudley 2 Sa	Kangaroo Island	SA	100%
EPM 26252	Cape York 1	Cape York	QLD	100%
EPM 26254	Cape York 3	Cape York	QLD	100%



Tenement ID	Name	Location	State	Interest
EPM 26255	Cape York 4	Cape York	QLD	100%
EPM 26257	Cape York 5	Cape York	QLD	100%
EPM 26395	Amber 3	Amber	QLD	100%
EPM 26733	Croydon	Croydon	QLD	100%
M15/1809	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5574	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5575	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5625	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5626	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5629	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5738	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5739	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5740	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5741	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5742	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5743	Coolgardie	Coolgardie	WA	80% <sup>4</sup>
P15/5749	Coolgardie	Coolgardie	WA	80% <sup>4</sup>

<sup>4</sup> Coolgardie Rare Metals Venture

## International projects

Electra lithium project (Tecolote, Tule, Agua Fria concessions)	Mexico		54% <sup>5</sup>
Sadisdorf project, Saxony	Germany		100%
Eichigt project, Saxony	Germany		100%

<sup>5</sup> Electra Joint Venture – TSXV-listed Infinite Lithium Corp. (previously Alix Resources)

## Appendix 5B

### Mining exploration entity and oil and gas exploration entity quarterly report

Introduced 01/07/96 Origin Appendix 8 Amended 01/07/97, 01/07/98, 30/09/01, 01/06/10, 17/12/10, 01/05/13, 01/09/16

Name of entity

Lithium Australia NL

ABN

29 126 129 413

Quarter ended ('current quarter')

30 September 2019

Consolidated statement of cash flows	Current quarter \$A'000	Year to date (3 months) \$A'000
<b>1. Cash flows from operating activities</b>		
1.1 Receipts from customers	–	–
1.2 Payments for		
(a) exploration and evaluation	(738)	(738)
(b) development	–	–
(c) production	–	–
(d) staff costs	(844)	(844)
(e) administration and corporate costs	(828)	(828)
1.3 Dividends received (see note 3)	–	–
1.4 Interest received	4	4
1.5 Interest and other costs of finance paid	–	–
1.6 Income taxes paid	–	–
1.7 Research and development refunds	–	–
1.8 Other (provide details if material)	–	–
1.9 Net cash from/(used in) operating activities	(2,406)	(2,406)
<b>2. Cash flows from investing activities</b>		
2.1 Payments to acquire:		
(a) property, plant and equipment	(8)	(8)
(b) tenements (see item 10)	–	–
(c) investments	(200)	(200)
(d) other non-current assets	(302)	(302)
2.2 Proceeds from the disposal of:		
(a) property, plant and equipment	–	–
(b) tenements (see item 10)	–	–
(c) investments	–	–
(d) other non-current assets	–	–
2.3 Cash flows from loans to other entities	–	–
2.4 Dividends received (see note 3)	–	–
2.5 Other (provide details if material)	–	–
2.6 Net cash from/(used in) investing activities	(510)	(510)
<b>3. Cash flows from financing activities</b>		
3.1 Proceeds from issues of shares	2,800	2,800
3.2 Proceeds from issue of convertible notes	–	–

**Appendix 5B**  
**Mining exploration entity and oil and gas exploration entity quarterly report**

Consolidated statement of cash flows		Current quarter \$A'000	Year to date (3 months) \$A'000
3.3	Proceeds from exercise of share options	–	–
3.4	Transaction costs related to issues of shares, convertible notes or options	(229)	(229)
3.5	Proceeds from borrowings	–	–
3.6	Repayment of borrowings	–	–
3.7	Transaction costs related to loans and borrowings	–	–
3.8	Dividends paid	–	–
3.9	Other	–	–
3.10	Net cash from/(used in) financing activities	2,571	2,571

4.	Net increase/(decrease) in cash and cash equivalents for the period		
4.1	Cash and cash equivalents at beginning of period	2,706	2,706
4.2	Net cash from/(used in) operating activities (item 1.9 above)	(2,406)	(2,406)
4.3	Net cash from/(used in) investing activities (item 2.6 above)	(510)	(510)
4.4	Net cash from/(used in) financing activities (item 3.10 above)	2,571	2,571
4.5	Effect of movement in exchange rates on cash held	(1)	(1)
4.6	Cash and cash equivalents at end of period	2,360	2,360

5.	<b>Reconciliation of cash and cash equivalents</b> at the end of the quarter (as shown in the consolidated statement of cash flows) to the related items in the accounts	Current quarter \$A'000	Previous quarter \$A'000
5.1	Bank balances	2,271	889
5.2	Call deposits	89	1,817
5.3	Bank overdrafts	–	–
5.4	Other (Term Deposit)	–	–
5.5	Cash and cash equivalents at end of quarter (should equal item 4.6 above)	2,360	2,706

6.	Payments to directors of the entity and their associates	Current quarter \$A'000
6.1	Aggregate amount of payments to these parties included in item 1.2	115
6.2	Aggregate amount of cash flow from loans to these parties included in item 2.3	–
6.3	Include below any explanation necessary to understand the transactions included in items 6.1 and 6.2	

**Appendix 5B**  
**Mining exploration entity and oil and gas exploration entity quarterly report**

7.	Payments to related entities of the entity and their associates	Current quarter \$A'000
7.1	Aggregate amount of payments to these parties included in item 1.2	–
7.2	Aggregate amount of cash flow from loans to these parties included in item 2.3	–
7.3	Include below any explanation necessary to understand the transactions included in items 7.1 and 7.2	

8.	<b>Financing facilities available</b> Add notes as necessary for an understanding of the position	Total facility amount at quarter end \$A'000	Amount drawn at quarter end \$A'000
8.1	Loan facilities	–	–
8.2	Credit standby arrangements	–	–
8.3	Other (LITCEs)	42,962	–
8.4	Include below a description of each facility above, including the lender, interest rate and whether it is secured or unsecured. If any additional facilities have been entered into or are proposed to be entered into after quarter end, include details of those facilities as well.		

LITCE – Current outstanding amounts on LITCE – 25 cent contributing shares

9.	Estimated cash outflows for next quarter	\$A'000
9.1	Exploration and evaluation	200
9.2	Development	100
9.3	Production	-
9.4	Staff costs	433
9.5	Administration and corporate costs	577
9.6	Other (provide details if material)	200
9.7	Total estimated cash outflows	1,510

10.	Changes in tenements (items 2.1(b) and 2.2(b) above)	Tenement reference and location	Nature of interest	Interest at beginning of quarter (%)	Interest at end of quarter (%)
10.1	Interests in mining tenements and petroleum tenements lapsed, relinquished or reduced	P15/5576	Expired	80	0
		E70/4888	Surrendered	100	0
		E70/4889	Surrendered	100	0
		EPM26253	Surrendered	100	0
10.2	Interests in mining tenements and petroleum tenements acquired or increased				

**COMPLIANCE STATEMENT**

1. This statement has been prepared in accordance with accounting standards and policies which comply with Listing Rule 19.11A.
2. This statement gives a true and fair view of the matters disclosed.

Sign here: 'Barry Woodhouse'  
(~~Director~~/Company secretary)

Date: 25 October 2019

Print name: Barry Woodhouse

**Notes**

1. The quarterly report provides a basis for informing the market on how the entity's activities have been financed for the past quarter and the effect on its cash position. An entity that wishes to disclose additional information is encouraged to do so, in a note or notes included in or attached to this report.
2. If this quarterly report has been prepared in accordance with Australian Accounting Standards, the definitions in, and provisions of, AASB 6: Exploration for and Evaluation of Mineral Resources and AASB 107: Statement of Cash Flows apply to this report. If this quarterly report has been prepared in accordance with other accounting standards agreed by the ASX pursuant to Listing Rule 19.11A, the corresponding equivalent standards apply to this report.
3. Dividends received may be classified either as cash flows from operating activities or cash flows from investing activities, depending on the accounting policy of the entity.