



ARDIDEN

12 February 2018

## HIGH PURITY BATTERY GRADE LITHIUM CARBONATE PRODUCED FROM SEYMOUR LAKE CONCENTRATE

### HIGHLIGHTS:

- Battery grade Lithium Carbonate at **99.52%**  $\text{Li}_2\text{CO}_3$  produced from initial downstream processing testwork by leading producer Shandong Ruifu Lithium Co. Ltd
- Tests confirm the high purity  $\text{Li}_2\text{CO}_3$  can be made from the spodumene concentrate obtained from the Seymour Lake Lithium Project bulk sample, and demonstrate robust conversion and recovery rates
- Strategic development partner Yantai continues to complete extensive metallurgical testwork programs on the spodumene bulk samples

Lithium developer Ardiden Limited (“**ADV**” or “**the Company**”) (ASX: ADV) has produced battery-grade lithium carbonate from preliminary metallurgical test work using concentrate sourced from its 100%-owned advanced **Seymour Lake Lithium Project** in Ontario, Canada.

The test-work showed that battery grade lithium carbonate of 99.5%  $\text{Li}_2\text{CO}_3$  could be made from the Dense Media Separation (DMS) lithium concentrate that was produced by strategic development partner, Yantai Jinyuan Mining Machinery Co. Ltd, and sourced from Seymour Lake’s North Aubry deposit.

The aim of this initial testing program was to test the spodumene concentrate suitability for commercial downstream Lithium Carbonate ( $\text{Li}_2\text{CO}_3$ ) production. The initial tests found the beta lithium converting rate produced a satisfactory 90%, however further testing will determine if the rate can be improved further.

Brad Boyle, Ardiden CEO, commented: *“These are highly encouraging results. To be able to produce battery grade lithium carbonate of such high quality from early testing highlights the exceptional high quality of the Seymour Lake spodumene concentrate. We maintain a high level of confidence that the Seymour Lake project is well placed to potentially become a strategic supplier to the lithium sectors in both America and Asia.”*

### TESTWORK DETAILS

The testwork was conducted by leading lithium carbonate and hydroxide producer Shandong Ruifu Lithium Co. Ltd. (“Ruifu”).

As previously announced (15 November 2017), Ardiden’s Chinese strategic partner Yantai Jinyuan Mining Machinery Co., Ltd. had undertaken the metallurgical test work on a bulk sample which demonstrated that the Seymour Lake ore can be processed by Dense Media Separation producing very high-grade lithium concentrate of >6.0% Lithium Oxide ( $\text{Li}_2\text{O}$ ) concentrate.

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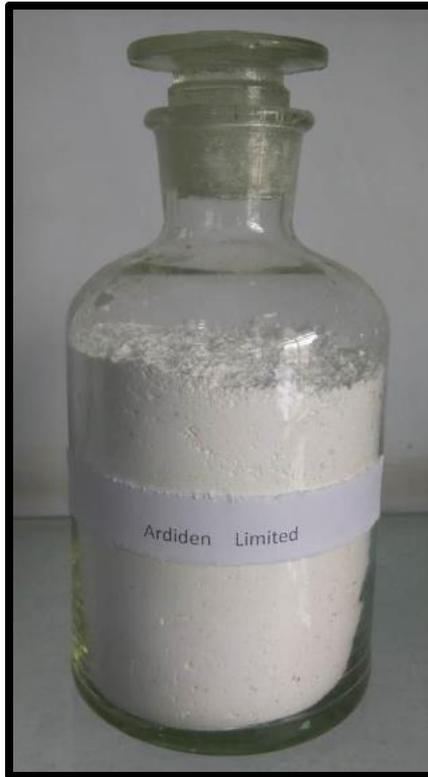
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**Figure 1.** Final Lithium Carbonate ( $\text{Li}_2\text{CO}_3$ ) products of battery level.

Ruifu testwork report stated “After cross checking with the battery level lithium carbonate standards in China, we are confident to confirm that battery level  $\text{Li}_2\text{CO}_3$  can be produced from the concentrate produced from Ardiden Limited samples...”

*Further, the Ruifu report concluded: “With the feature of low viscosity and impurities of the concentrate after calcination and high efficiency in acidification, Ruifu thinks the concentrate can be fed into Ruifu’s operating facilities to produce high quality battery level  $\text{Li}_2\text{CO}_3$  and it should be a premium product if it can come into the market in the future.”*

## **COMMERICAL PRODUCTION POTENTIAL**

These latest downstream processing testwork results obtained from Ruifu once again confirm that the North Aubry spodumene quality is world-class and appears to contain only trace amounts of deleterious minerals (announced 12 April 2017). High purity lithium carbonate with excellent convertible rates can also be achieved.

The Company anticipates the development of a robust commercial process flowsheet from the bulk sample testwork program currently being completed by Yantai.

## **CONCLUSION**

Ardiden considers these preliminary testwork results from Ruifu to be extremely encouraging. The Company looks forward to advancing the development of an optimal process flowsheet to produce a commercial grade lithium concentrate which is ideally suited for the lithium end users such as Ruifu.

Ardiden confirms that as these are still only preliminary test-work results and further work is underway.

The Company looks forward to providing further updates as they come to hand.

**Table 1.** Li<sub>2</sub>CO<sub>3</sub> product produced by Shandong Ruifu Lithium Co. Ltd from the Seymour Lake spodumene concentrate.

Test Standard 检验依据		Lithium Industry Standard,China YS/T582-2013 中国行业标准 YS/T582-2013		Quantity of Sample 代表产品数量	300g
Test Data 检验数据					
Item 项目	Standard 标准值 (%)	Test result 测定值 (%)	Item 项目	Standard 标准值 (%)	Test result 测定值 (%)
Li <sub>2</sub> CO <sub>3</sub>	≥99.5	99.52	Pb	≤0.0003	<0.0002
Na	≤0.025	0.023	Si	≤0.003	0.0007
Mg	≤0.008	0.0005	Al	≤0.001	<0.001
Ca	≤0.005	0.0031	Mn	≤0.0003	<0.0003
K	≤0.001	<0.001	Ni	≤0.001	<0.001
Fe	≤0.001	0.0002	SO <sub>4</sub> <sup>2-</sup>	≤0.08	0.073
Zn	≤0.0003	<0.0003	Cl <sup>-</sup>	≤0.003	0.0025
Cu	≤0.0003	<0.0003	H <sub>2</sub> O	≤0.25	0.25

## ENDS

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**About Ardiden Ltd**

Ardiden Limited (ASX: ADV) is an emerging international diversified exploration and development company possessing a mature multi-element asset portfolio, with a near term development pipeline, focused quality projects located in the established mining jurisdiction of Ontario, Canada.

The 100%-owned Seymour Lake Lithium Project comprises 7,019 Ha of mining claims and has over 4,000m of historic drilling. Mineralisation is hosted in extensive outcropping spodumene-bearing pegmatite structures with widths up to 26.13m and grades of up to 6.0% Li<sub>2</sub>O. These high-grade pegmatite structures have been defined over a 5km strike length.

The 100%-owned Wisa Lake Lithium project is located 80km east of Fort Frances, in Ontario, Canada and only 8km north of the Minnesota/US border. The property is connected to Highway 11 (Trans-Canada), which is located 65km north via an all-weather road that crosses the centre of the project. The Wisa Lake Lithium Project consists of five claims (1,200 hectares) and covers the historical drilling location of the North Zone. Ardiden is aiming to commence a limited drill program to drill test and verify the historical lithium results.

The Pickle Lake Gold Properties (under option to acquire 100%) are located within the prolific gold-producing Meen-Dempster Greenstone Belt of the Uchi Geological Sub-province of the Canadian Shield, in close proximity to several of the Company's existing projects and to the regional mining centre of Thunder Bay. The Properties consists of four separate gold properties offering both advanced development opportunities and early stage exploration. Over 25,000m of historical diamond drilling completed across the Pickle Lake Gold Properties, confirming the potential for multiple extensive gold mineralised zones at both Dorothy-Dobie Lake and Kasagiminnis Lake, with gold mineralisation remaining open along strike and at depth.

The 100%-owned Root Lake Lithium Project is located in Ontario, Canada. The project comprises 1,013 Ha of mining claims and has over 10,000m of historic drilling. Mineralisation is hosted in extensive outcropping spodumene-bearing pegmatite structures with widths up to 19m and grades of up to 5.10% Li<sub>2</sub>O. In addition, tantalum grades of up to 380 ppm were intersected.

The 100%-owned Root Bay lithium project is strategically located approximately 5km to the east of the recently acquired Root Lake Lithium Project and consists of three claim areas, totalling 720 hectares. The project was staked by Ardiden as part of its regional exploration focus in and around the Root Bay spodumene-bearing pegmatite. Initial observations of the exposed pegmatite are characterized by coarse white albite, grey quartz and pale grey-green spodumene crystals up to 10cm long.

The 100%-owned Manitouwadge Flake Graphite Project covers an area 5,300 Ha and has a 20km strike length of EM anomalies with graphite prospectivity. Previous preliminary metallurgical test work indicated that up to 80% of the graphite at Manitouwadge is high value jumbo or large flake graphite. Test-work also indicated that simple, gravity and flotation beneficiation can produce graphite purity levels of up to 96.8% for jumbo flake and 96.8% for large flake. With the proven caustic bake process, ultra-high purity (>99.95%) graphite can be produced. The graphite can also be processed into high value expandable graphite, high quality graphene and graphene oxide.

The 100%-owned Bold Properties project is located approximately 50km north-east of the town of Mine Centre in Ontario, Canada. The property is connected to Highway 11 (Trans-Canada), which is located 25km south via an all-weather road. The Bold Property Project consists of four claims (1,024 hectares) and covers a number of anomalous sulphide zones. In 1992, Hexagon Gold (Ontario) Ltd. completed a total of 17 drill holes in multiple locations on and around the Bold Property

Project at various depths of up to 428m down-hole. The nine grab samples that were collected by Hexagon in 1992 returned encouraging cobalt, copper and nickel grades, confirming the significant exploration potential.

All projects located in an established mining province, with good access to infrastructure (road, rail, power, phone and port facilities) and local contractors and suppliers.

#### **Competent Person's Statement**

The information in this report that relates to exploration results for the Seymour Lake Lithium project and is based on, and fairly represents, information and supporting geological information and documentation in this report has been reviewed by Mr Robert Chataway who is a member of the Association of Professional Geologists of Ontario. Mr Chataway is not a full-time employee of the Company. Mr Chataway is employed as a Consultant Geologist. Mr Chataway has more than five years relevant exploration experience, and qualifies as a Competent Person as defined in the 2012 edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves" (the JORC Code). Mr Chataway consents to the inclusion of the information in this report in the form and context in which it appears.

#### **Forward Looking Statement**

This announcement may contain some references to forecasts, estimates, assumptions and other forward-looking statements. Although the company believes that its expectations, estimates and forecast outcomes are based on reasonable assumptions, it can give no assurance that they will be achieved. They may be affected by a variety of variables and changes in underlying assumptions that are subject to risk factors associated with the nature of the business, which could cause actual results to differ materially from those expressed herein. All references to dollars (\$) and cents in this presentation are to Australian currency, unless otherwise stated. Investors should make and rely upon their own enquires and assessments before deciding to acquire or deal in the Company's securities.

## Table 2: Seymour Lake Lithium Project (Claim Title 1245661)

### Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	<ul style="list-style-type: none"> <li>• Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.</li> <li>• Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.</li> <li>• Aspects of the determination of mineralisation that are Material to the Public Report.</li> <li>• In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.</li> </ul>	<ul style="list-style-type: none"> <li>• A bulk sample was taken using a hydraulic rockbreaker and excavator to load several tonnes of material into a rock truck for shipment and export to Canada for process flow test work</li> <li>• The bulk sample will be utilised by Yantai, a potential project partner, to assess optimise process flow, recovery techniques and other metallurgical factors as part of their due diligence into the project.</li> </ul>
Drilling techniques	<ul style="list-style-type: none"> <li>• Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).</li> </ul>	<ul style="list-style-type: none"> <li>• No drilling was undertaken</li> </ul>
Drill sample recovery	<ul style="list-style-type: none"> <li>• Method of recording and assessing core and chip sample recoveries and results assessed.</li> <li>• Measures taken to maximise sample recovery and ensure representative nature of the samples.</li> <li>• Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.</li> </ul>	<ul style="list-style-type: none"> <li>• No drilling was undertaken</li> </ul>
Logging	<ul style="list-style-type: none"> <li>• Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.</li> </ul>	<p>No logging was undertaken</p>

Criteria	JORC Code explanation	Commentary
	<ul style="list-style-type: none"> <li>• Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.</li> <li>• The total length and percentage of the relevant intersections logged.</li> </ul>	
Sub-sampling techniques and sample preparation	<ul style="list-style-type: none"> <li>• If core, whether cut or sawn and whether quarter, half or all core taken.</li> <li>• If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.</li> <li>• For all sample types, the nature, quality and appropriateness of the sample preparation technique.</li> <li>• Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.</li> <li>• Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.</li> <li>• Whether sample sizes are appropriate to the grain size of the material being sampled.</li> </ul>	<ul style="list-style-type: none"> <li>• No sampling was undertaken</li> </ul>
Quality of assay data and laboratory tests	<ul style="list-style-type: none"> <li>• The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.</li> <li>• For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.</li> <li>• Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory testing is being undertaken in China by Yantai, a potential project partner</li> <li>• Preliminary metallurgical testwork results are reported in the main body of the text and in Table 1</li> <li>•</li> </ul>
verification of sampling and assaying	<ul style="list-style-type: none"> <li>• The verification of significant intersections by either independent or alternative company personnel.</li> <li>• The use of twinned holes.</li> <li>• Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.</li> <li>• Discuss any adjustment to assay data.</li> </ul>	<ul style="list-style-type: none"> <li>• No sampling was undertaken</li> </ul>
Location of data points	<ul style="list-style-type: none"> <li>• Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.</li> <li>• Specification of the grid system used.</li> <li>• Quality and adequacy of topographic control.</li> </ul>	<ul style="list-style-type: none"> <li>• The bulk sample excavation was taken at 5585185N and 3969000E from the North Aubry Lithium Deposit at Seymour Lake.</li> <li>• A DGPS handheld unit was used to record the location and this method is deemed appropriate for use.</li> </ul>

Criteria	JORC Code explanation	Commentary
<i>Data spacing and distribution</i>	<ul style="list-style-type: none"> <li>• <i>Data spacing for reporting of Exploration Results.</i></li> <li>• <i>Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.</i></li> <li>• <i>Whether sample compositing has been applied.</i></li> </ul>	<ul style="list-style-type: none"> <li>• No Exploration results are reported</li> <li>• No Mineral Resource estimate is reported</li> </ul>
<i>Orientation of data in relation to geological structure</i>	<ul style="list-style-type: none"> <li>• <i>Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.</i></li> <li>• <i>If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.</i></li> </ul>	<ul style="list-style-type: none"> <li>• No grab sampling, channel sampling, trench sampling or drill core sampling was undertaken</li> <li>• A bulk sample was taken for metallurgical testwork</li> </ul>
<i>Sample security</i>	<ul style="list-style-type: none"> <li>• <i>The measures taken to ensure sample security.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Samples were secured and delivered to China under chain of custody controls by Gardewine transport, and Global Pack and Send via road shipment to Winnipeg then Vancouver and by slow boat to China</li> </ul>
<i>Audits or reviews</i>	<ul style="list-style-type: none"> <li>• <i>The results of any audits or reviews of sampling techniques and data.</i></li> </ul>	<ul style="list-style-type: none"> <li>• No audits or reviews of the bulk excavation have been conducted</li> </ul>

## Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
<i>Mineral tenement and land tenure status</i>	<ul style="list-style-type: none"> <li>• <i>Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.</i></li> <li>• <i>The security of the tenure held at the time of reporting along with any known impediments to obtaining a license to operate in the area.</i></li> </ul>	<ul style="list-style-type: none"> <li>• All claims in the Seymour Lake Lithium project are in good standing and claims 1245661 1245648 1245662 1245664 1245646, 4270593, 4270594, 4270595, 4270596, 4270597, 4270598, 4279875, 4279876, 4279877, 4279878, 4279879, 4279880, 4279881, 4279882, 4279883, 4279884, 4279885, 4279886, 4279887, 4279888, 4279889, 4279890, 4279891, 4279869, 4279870, 4279871, 4279872, 4279873 and 4279874.</li> </ul>
<i>Exploration done by other parties</i>	<ul style="list-style-type: none"> <li>• <i>Acknowledgment and appraisal of exploration by other parties.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Other parties have not appraised the exploration carried out to date</li> </ul>
<i>Geology</i>	<ul style="list-style-type: none"> <li>• <i>Deposit type, geological setting and style of mineralisation.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Seymour Lake area pegmatites have been classified as belonging to the</li> </ul>

Criteria	JORC Code explanation	Commentary
		Complex-type, Spodumene-subtype. Mineralization is dominated by spodumene (Li), with lesser tantalite(Ta) hosted in a series of variably steeply dipping pegmatite dykes and and sills.
<i>Drill hole Information</i>	<ul style="list-style-type: none"> <li>• <i>A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:</i> <ul style="list-style-type: none"> <li>○ <i>easting and northing of the drill hole collar</i></li> <li>○ <i>elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar</i></li> <li>○ <i>dip and azimuth of the hole</i></li> <li>○ <i>down hole length and interception depth</i></li> <li>○ <i>hole length.</i></li> </ul> </li> <li>• <i>If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.</i></li> </ul>	<ul style="list-style-type: none"> <li>• No drilling is reported</li> </ul>
<i>Data aggregation methods</i>	<ul style="list-style-type: none"> <li>• <i>In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated.</i></li> <li>• <i>Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.</i></li> <li>• <i>The assumptions used for any reporting of metal equivalent values should be clearly stated.</i></li> </ul>	<ul style="list-style-type: none"> <li>• No exploration results are reported</li> <li>• No drilling is reported</li> </ul>
<i>Relationship between mineralisation widths and intercept lengths</i>	<ul style="list-style-type: none"> <li>• <i>These relationships are particularly important in the reporting of Exploration Results.</i></li> <li>• <i>If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.</i></li> <li>• <i>If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. ‘down hole length, true width not known’).</i></li> </ul>	<ul style="list-style-type: none"> <li>• No drilling is reported</li> </ul>
<i>diagrams</i>	<ul style="list-style-type: none"> <li>• <i>Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.</i></li> </ul>	The bulk sample excavation was taken at 5585185N and 3969000E from the North Aubry Lithium Deposit at Seymour Lake.

Criteria	JORC Code explanation	Commentary
<i>Balanced reporting</i>	<ul style="list-style-type: none"> <li>Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.</li> </ul>	<ul style="list-style-type: none"> <li>No comprehensive report has been completed to date to include the latest Ardiden exploration results.</li> </ul>
<i>Other substantive exploration data</i>	<ul style="list-style-type: none"> <li>Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.</li> </ul>	<ul style="list-style-type: none"> <li>All meaningful and material data is reported</li> </ul>
<i>Further work</i>	<ul style="list-style-type: none"> <li>The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).</li> <li>Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to text within the report.</li> </ul>