

90% LITHIUM RECOVERIES FROM METALLURGICAL TESTING

Highlights

- **Lithium recoveries of 90% demonstrated by preliminary results from metallurgical testing of the Big Sandy Sedimentary Lithium Mineralisation.**
- **Iron (Fe), aluminium (Al) and magnesium (Mg) removal from the leach solution was successful with minimal lithium losses.**
- **Hazen Research is on track to produce battery-grade Li_2CO_3 (lithium carbonate) by the end of February 2021.**

USA focused diversified explorer, Hawkstone Mining Limited (**ASX:HWK**) (“**Hawkstone**”, the “**Company**”) is pleased to announce that results from ongoing metallurgical test work have demonstrated positive results with initial lithium recoveries in the 90% range, and successful removal of iron (Fe), aluminium (Al) and magnesium (Mg), with minimal losses of recovered lithium (Li) values, from leach solution produced from the mineralised material.

Current test work is focused on the removal of calcium (Ca) and sodium (Na) from the leach solution which will result in the purification and concentration of the lithium sulphate (Li_2SO_4) enabling final processing to produce “battery grade” lithium carbonate (Li_2CO_3).

Hawkstone believes this initial work has validated its choice of the basic processing approach. Accordingly and concurrent to this current test work, an intellectual property development program is being developed focused on certain unit operations of the planned flow sheet, and optimisation of the planned interlocking steps of ore beneficiation, slurry pipeline transport and ore leaching. Hawkstone believes these developments will be unique to the development of the Big Sandy project and could also improve the viability of other sedimentary clay projects.

With Joe Biden now inaugurated as President of the USA, the global investment community has awoken to the potential value of “battery metals”. Hawkstone is extremely well positioned with Joe Biden’s vision of a 100% clean energy economy and a target of net-zero emissions by 2050, which will concurrently support the domestic production of metals and batteries crucial to this plan¹. The Company’s Big Sandy Sedimentary Lithium Project is strategically located halfway between Phoenix, Arizona and Las Vegas, Nevada, straddling US 93 and the new I-11 Pan American corridor, and only 80 km from one of two US transcontinental railroads, in the southwest “Sun Belt”, a rapidly growing renewable energy hub.

Metallurgical Testing at Big Sandy Project

In November 2020, Hawkstone appointed Hazen Research to commence metallurgical test work on the lithium mineralised sedimentary material from the Big Sandy Project, with the aim of producing battery grade Li_2CO_3 .

This test work will be used to develop a feasible and economic processing route leading to more extensive bench and bankable pilot scale testing.

¹ <https://www.reuters.com/article/usa-election-mining/exclusive-biden-campaign-tells-miners-it-supports-domestic-production-of-ev-metals-idINKBN27808B>

Previous test work completed by Kappes, Cassidy and Assoc. (**KCA**) of Reno, Nevada established²:

- Recoveries ranging from 85 to 97% lithium in a simple, unoptimized sulphuric acid leach flow sheet.
- Leach times of 1 to 24 hours were evaluated with the optimal being 1-4 hours.
- No crushing or fine grinding appear to be required.
- Minimal pre-leach heating necessary.

The Company's successful 2019 drill program at Big Sandy resulted in the estimation of a total Indicated and Inferred JORC resource of 32.5 million tonnes grading 1,850 ppm Li for 320,800 tonnes Li₂CO₃ (above an 300ppm Li cut-off).³

This represents 4% of the Big Sandy Project area that contains an estimated exploration target of between 271.1Mt to 483.15Mt at 1,000 - >2,000ppm Li.⁴ *Note that the potential quantity and grade of the estimated geological potential (Exploration Target) is conceptual in nature. There has been insufficient exploration to estimate a mineral resource and it is uncertain whether future exploration will result in the definition of a mineral resource. It has been estimated using a range of thicknesses for the mineralised sediments calculated from drill intercepts, surface sampling and geological mapping. The grade estimates a range of values demonstrated from drilling and surface sampling.*

Preliminary engineering studies have been completed by the Company's Phoenix-based engineer to determine process scenarios, possible mining, processing and consumable/product logistics scenarios, in addition to establishing contacts within the local, State and Federal governments. A broad level of support, including tangible economic incentives, has been demonstrated.

Baseline environmental and cultural surveys forming part of the Plan of Exploration (POE) process were completed in 2020, and the Company is awaiting approval by the BLM to enable drilling to extend the known resource to the north and south. Approval for a bulk sample to allow larger-scale pilot plant testing in 2021 is also pending.

Hawkstone Mining Managing Director, Paul Lloyd, commented: *"The Company is pleased to announce the positive steps being made by Hazen Research in the completion of bench scale testing of the Big Sandy lithium mineralisation, with the aim of producing battery grade lithium and in the process developing a preliminary process flow sheet. With drill approval imminent at Big Sandy, the Company will rapidly progress development of the Project to realise its full economic potential."*



Image 1 – Big Sandy, Extensive Lithium Mineralised Sediments

² Hawkstone Announcement, Nov 29, 2018, Preliminary Met Test Work Proves Highly Successful

³ Hawkstone Announcement Sept 26, 2019, Big Sandy Lithium Project, Maiden Mineral Resource

⁴ Hawkstone Announcement Nov 7, 2019, Big Sandy Lithium Project, Exploration Target Update

Hazen Research

Hazen Research was selected and engaged to complete the test work, having previously completed test work for Lithium Americas, Ioneer Ltd, Lake Resources and Cypress Development Corp. A 50 kg sample of mineralised drill core from the 2019 Big Sandy drill campaign was dispatched to Hazen Research with final results expected by the end of February 2021.

A recent update has shown positive results with preliminary lithium recoveries in the 90% range with Fe, Al and Mg successfully removed from the leach solution. The testing now progresses to the removal of Ca and Na followed by the final processing steps to produce battery-grade Li_2CO_3 .



**Image 2 – Hazen Laboratories
Bulk Neutralisation Process**

Program of Exploration

The final reports on cultural and biological surveys were submitted to the BLM in late 2020 as part of the Programme of Exploration (POE) process. A draft POE has been circulated within the BLM and finalisation is expected during the current quarter allowing further drilling to commence at Big Sandy. Discussions with drill contractors indicate availability from early March 2021.

This announcement has been authorised for release by the Board of Hawkstone Mining Limited.

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Competent Person's Statement

The information in this announcement that relates to the Big Sandy Sedimentary Lithium Project (including the information provided pursuant to ASX Listing Rules 5.12.2 to 5.12.7 (inclusive)) is based on, and fairly represents information compiled by Gregory L Smith who is a Member of the Australasian Institute of Mining and Metallurgy (AusIMM) and has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity to which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". Mr. Smith is a Director of the Company and holds shares in the Company. Mr. Smith consents to the inclusion in this announcement of the matters based on this information in the form and context in which it appears. The Company confirms that the material assumptions and technical parameters underpinning the Resource estimate have not materially changed.

APPENDIX 1: JORC Code, 2012 Edition – Table 1

Section 1 Sampling Techniques and Data

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

Criteria	JORC Code Explanation	Commentary
Sampling techniques	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.	This announcement relates to metallurgical test work completed on ½ diamond drill core from a previously completed and announced drill program.
	Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.	Samples for metallurgical test work of the remaining ½ drillcore were taken over intervals as identified by previous sampling and analysis of the other ½ of the drill core as reported in prior announcements.
	Aspects of the determination of mineralisation that are Material to the Public Report. In cases where ‘industry standard’ work has been done this would be relatively simple (e.g. ‘reverse circulation drilling was used to obtain 1m samples from which 3 kg was pulverised to produce a 30 g 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.	
Drilling techniques	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,	The drilling was completed using a Mooroka mounted Longyear 44 and core recovered in a standard 1.52m core barrel. It produced HQ sized core of 63.5mm in diameter.

	depth of diamond tails, face sampling bit or other type, whether core is oriented and if so, by what method, etc.).	As all of the stratigraphy is flat lying all holes are drilled vertical and no core orientation is required. As all known mineralised zones lie within 100m of surface no downhole surveys were completed.
Drill sample recovery	Method of recording and assessing core and chip sample recoveries and results assessed.	All recoveries were first calculated and 1m downhole depths marked prior to geological logging and sampling.
	Measures taken to maximise sample recovery and ensure representative nature of the samples.	The core was drilled with a bit that has been found to work exceptionally well in tuffs/clays. Both the rotation speed and feed rate were slowed to maximise recovery.
	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.	Core recovery was greater than +90% in the mineralised intervals. The Li mineralisation is hosted in clay that is extremely fine grained and even textured sedimentary material.
Logging	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.	Geological logging was completed on all core noting the rock type, grain size, colour, presence of carbonate and clay type to a level required to support Mineral Resource estimation, mining studies and metallurgical studies.
	Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc.) photography	Logging has been completed in the form of geology and recoveries. All core has been photographed both wet and dry.
	The total length and percentage of the relevant intersections logged.	The entire core is logged noting any intervals of low or non-recovery.
Sub-sampling techniques and sample preparation	If core, whether cut or sawn and whether quarter, half or all core taken.	All core was halved using a paint scraper or diamond saw depending upon the hardness of the material.
	If non-core, whether riffled, tube sampled, rotary split, etc. and whether sampled wet or dry.	Half core was previously taken and bagged in consecutively numbered bags for analysis. The core used for the metallurgical test work is the remaining ½ core.

	For all sample types, the nature, quality and appropriateness of the sample preparation technique.	Representative of material drilled.
	Quality control procedures adopted for all subsampling stages to maximise representivity of samples.	Hazen crushed the received half core to 100% passing 25mm. From the minus 25mm material samples were split out for testing. From the subsample material was crushed and oven dried. Duplicate spits were analysed for a series of elements.
	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.	Previously half core was taken as the sample with the exception of the duplicate samples where the half core was split into 2 samples consisting of a quarter core each. The sample for metallurgical test work was the remaining half core.
	Whether sample sizes are appropriate to the grain size of the material being sampled.	Sample sizes are appropriate for grain size of material sampled. Lithium hosted in micron scale clay minerals.
Quality of assay data and laboratory tests	The nature, quality and appropriateness of the Assaying and laboratory procedures used and whether the technique is considered partial or total.	The assay technique (ME-MS61) is a total process, as a 4 acid digest is used to remove the lithium from the clay prior to analysis. This method was used for the core samples.
	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. 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.	These geophysical instruments are not used in assessing the mineralisation at the Project. Previously quality control procedures consisted of inserting a standard, blank or duplicate sample into the sample stream at a ratio of 1:10. From the data to date the results of the QC samples are within acceptable levels.
Verification of sampling and assaying	The verification of significant intersections by either independent or alternative company personnel.	All diamond drill results were examined by GL Smith, a Director of the company.

	The use of twinned holes.	No twin holes were drilled or have been drilled.
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	The data are currently stored in hardcopy and digital format in the Company's office. A hard drive copy of this is stored with GL Smith and in the cloud.
	Discuss any adjustment to assay data.	No adjustment was made to assay data.
Location of data points	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.	All diamond drill holes have been set out utilizing hand held GPS units, having an accuracy of $\pm 3m$ in open ground.
	Specification of the grid system used.	UTM NAD83 Zone 12
	Quality and adequacy of topographic control.	No survey has been undertaken. Hand held GPS coordinates have been utilized to locate drill holes to date.
Data spacing and distribution	Data spacing for reporting of Exploration Results.	The diamond drilling described in the report preceding this table were completed at approximately 100m centres.
	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.	The diamond drilling described in the report preceding this table are holes specifically used to determine the lithium grades below the surface oxidation, the geology and potential extent.
	Whether sample compositing has been applied.	No sample compositing has been applied.
Orientation of data in relation to geological structure	Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.	The diamond holes were holes to a depth of $\sim 100m$ to determine the geology, grade distribution and potential extents.
	If the relationship between the drilling orientation and the orientation of key mineralised structures are considered to have introduced a sampling bias, this should be assessed and reported if material.	No sampling bias occurs as the vertical diamond holes were drilled into a near flat lying lacustrine sediments.

Sample security	The measures taken to ensure sample security.	The sampling for the metallurgical testwork was completed under the supervision of G Smith at the company's storage facility in Kingman, Arizona. The material was placed in calico sample bags, sealed in plastic buckets and dispatched by UPS to Hazen's facilities in Golden, Colorado, USA.
Audits or reviews	The results of any audits or reviews of sampling techniques and data.	No reviews have yet been completed.

Section 2 Reporting of Exploration Results

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

Criteria	JORC Code Explanation	Commentary
Mineral tenement and land tenure status	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.	The Big Sandy project consists of 311 mining claims of approximately 20 acres each, physically staked on Bureau of Land Management, Federally administered land. All indigenous title is cleared and there are no other known historical or environmentally sensitive areas.
	The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	The claims have been granted and are subject to an annual payment. Other than the payment there is no requirement for minimum exploration or reporting. There is no expiry date on the claims.
Exploration done by other parties	Acknowledgment and appraisal of exploration by other parties.	There has been no exploration for lithium mineralisation on this project other than that completed previously by Big Sandy Inc (wholly owned subsidiary of Hawkstone Mining Ltd).

Drill hole Information	<p>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:</p> <ul style="list-style-type: none"> • easting and northing of the drill hole collar • elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar • dip and azimuth of the hole • down hole length and interception depth • hole length. 	All information as listed is provided in previous announcements on the Project.
	<p>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.</p>	This information has not been excluded.
Data aggregation methods	<p>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.</p>	No data aggregation applied. Total sample interval was used in metallurgical test work.
	<p>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.</p>	Samples were a composite of half core determined by previous sampling.
	<p>The assumptions used for any reporting of metal equivalent values should be clearly stated.</p>	No metal equivalent values are stated.

Relationship between mineralization widths and intercept lengths	These relationships are particularly important in the reporting of Exploration Results. If the geometry of the mineralization with respect to the drill hole angle is known, its nature should be reported.	Not applicable.
	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').	As above.
Diagrams	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.	Appropriate maps are included in a previous announcement.
Balanced reporting	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.	This release includes partial results of the metallurgical test work.
Other substantive exploration data	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.	This information will be supplied as the project advances and said data is generated.
Further work	The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).	Environmental and archaeological surveys have been completed as part of a Proposal of Exploration that has been submitted to the BLM for the approval of planned further drilling and bulk sampling.



Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.

Diagrams of proposed drill locations and mineralised zones are included in previous announcements.

