



## ASX Release

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### Company Details

ASX Code:	STB
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Shares on issue	128M
Company options	22M
Cash at Bank	\$11M

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## Positive results from processing review studies on Colluli Potash Project

### ***Metallurgical test work will now be conducted to confirm preferred development route***

#### Key Points:

- Processing review studies successfully completed with encouraging results.
- Results confirm three commercially attractive alternatives to the original development path, based on extracting all potassium-bearing salts from the resource.
- Mining costs in all scenarios reduced by over 40% relative to previous work as a result of a material reduction in strip ratio.
- All three options take consideration of full resource utilisation.
- Potassium sulphate (SOP), a premium potassium fertiliser product that achieves a higher market price than potassium chloride (MOP), is produced in all three options.
- Metallurgical test work will shortly commence to determine the preferred development route. This will enable South Boulder Mines to complete the Colluli Definitive Feasibility Study.

South Boulder Mines (ASX: STB) ("South Boulder" or "the Company") is pleased to report positive results from recently completed processing studies on the Company's Colluli Potash Project in Eritrea.

The company engaged independent consultants in mid-2013 to conduct a comprehensive review of processing options in order to maximise the value realised from the Colluli resource.

The original development approach was based on processing sylvinitite only to produce a fertiliser product called muriate of potash (MOP). However, sylvinitite represents only 16% of the 1 billion tonnes of potassium bearing salts that have so far been defined within the resource (the remainder of the resource consists of carnallitite and kainitite). The stratified nature of the resource means that the recovery of all mineralised material is critical to ensure long term competitiveness of the operation.

As a result of these studies, South Boulder Mines has now short listed three development and processing options for the Colluli project. Each option has a different capital and operating cost structure, and a slightly different product mix. New final products include sulphate of potash (SOP), which is a premium fertiliser product in contrast to the more common MOP. Importantly, each of these new options can process all potassium bearing salts in the resource.

This breakthrough has significant ramifications for the project economics, because material that was previously classified as waste is now recoverable material. This reduces the strip ratio, lowers the operating costs and extends the life of the project. More recent work at a scoping level points to a reduction in mining costs from \$122 to \$70 per tonne of product. The waste to ore ratio has dropped from 6.4:1 to less than 3:1 (refer to ASX announcement dated 21 March 2013).

In light of these findings, South Boulder intends to appoint a consultant to carry out metallurgical test work to determine the preferred development route for the project. This will enable the company to complete the Definitive Feasibility Study (DFS) on the project.

South Boulder Mines Chief Executive Officer Mr. Paul Donaldson said the processing review studies have been extremely successful and have improved confidence in the robustness of the project. He said the company is looking forward to conducting the metallurgical test work to confirm the findings, and move the project forward with the most attractive development option.

“Our key objective in this exercise has been to utilise all the potassium bearing salts in the resource, and ensure the processing options are correctly matched to what the resource can deliver in the most cost effective manner.

“This has involved looking at product options beyond MOP. There is huge economic potential in the kainite material, which represents more than 50 per cent of the resource and has been historically used as a direct application fertiliser. It is also a key ingredient in the production of SOP, a premium fertiliser product when compared with the more common MOP.

“The trade-off between mining costs, processing costs, capital intensity and what the resource can actually deliver is absolutely central to the success of this project, and the most recent analysis has put more emphasis on these issues than previous studies.

“After successfully completing these studies, we are now in a much stronger position to move forward with confidence to confirm our preferred development option, complete the Definitive Feasibility Study and begin project development.

“The ultimate scale of the project is also impacted by these findings. We are turning our attention now to a pragmatic development approach that gives more consideration to start up scale and modularity to mitigate safety, resource and commercial risk.”

### **Joint Venture with ENAMCO**

South Boulder Mines finalised the Joint Venture Agreement (JVA) with ENAMCO in November 2013, and is now in the final stages of setting up Colluli Mining Share Company (CMSC). South Boulder and ENAMCO will each own 50% of CMSC. All of the exploration leases and other assets in Eritrea are in the process of being transferred to CMSC. The JVA with ENAMCO sets out the legal and commercial terms under which Colluli will be developed (refer to ASX Announcement dated 11 November 2013).

Further details on the project are provided in the attached Appendix A and a copy has been updated on the South Boulder Mines website [www.southbouldermines.com.au](http://www.southbouldermines.com.au).

## APPENDIX A

### The Colluli Potash Project: Update and Background

#### Overview of the Colluli Resource

The Colluli exploration concession is located in the Danakil Depression in Eritrea, approximately 350km South East of the country capital, Asmara. The deposit is approximately 70km from the Red Sea coast. The Danakil Depression has a long history of exploration spanning almost 100 years, and potassium mineralisation was first discovered in the early 20<sup>th</sup> century on the Ethiopian side of the depression. Since South Boulder commenced exploration drilling within the Colluli concession in 2010, over 1 billion tonnes of potassium bearing salts has been identified, as shown in Table 1.

**Table 1: Breakdown of the identified potassium bearing salts in the Colluli resource**

Occurrence	Tonnes (Mt)	Equivalent KCl	Contained KCl (Mt)	% of Total Resource
Sylvinite(KCl.NaCl)	110	28.4%	31	16%
Polysulphate(K <sub>2</sub> SO <sub>4</sub> .NaCl.MgSO <sub>4</sub> .H <sub>2</sub> O)	65	10.8%	7	4%
Carnallite(KCl.MgCl <sub>2</sub> .H <sub>2</sub> O)	309	12.3%	38	19%
Kainite(KCl.MgSO <sub>4</sub> .H <sub>2</sub> O)	596	19.8%	118	61%
<b>Total</b>	<b>1,080</b>	<b>18.0%</b>	<b>194</b>	<b>100%</b>

*Note: This information above was prepared and first disclosed under the JORC Code 2004. It has not been updated since to comply with the JORC Code 2012 on the basis that the information has not materially changed since it was last reported by independent consultants ERCOSPLAN and announced to the ASX by South Boulder on 16 April 2012.*

#### Background

The Colluli Potash Project (Colluli) resource has a stratified orebody containing a variety of potassium-bearing salts suitable for the production of potassium-based fertilisers, commonly known as potash. This means that the different salt types sit in layers on top of each other. They all lie under layers of sand, clay and rock salt. The more of the salt layers that are mined and processed simultaneously, the lower the ratio of waste to ore and therefore the lower the mining costs. Maximising resource utilisation also increases both mine life and ultimate scale of the project.

The principle potassium-based salts in the Colluli resource are:

1. Sylvinite (16% of the Colluli resource)

Sylvinite is the most common mineral used for the production of potassium chloride. It is essentially a combination of sylvite (which is potassium chloride) and sodium chloride (common salt). Potassium Chloride is also known as Muriate of Potash or MOP. MOP is the most common type of potash fertiliser with a total global market of approximately 55 to 60 million tonnes a year.

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Sylvinitite is typically processed by crushing and grinding followed by flotation, which separates sodium chloride (common salt) from the potassium chloride. The final potassium chloride is dried and may be compacted prior to transportation to market.

2. Carnallitite (19% of the Colluli resource)

Carnallitite is a combination of carnallite (which is potassium chloride and magnesium chloride) and sodium chloride.

Historically, carnallite was the first potassium salt used for the production of potash but is typically lower grade than sylvinitite and is now less commonly used. Recovery of potassium chloride from carnallite can be achieved by thermal dissolution followed by controlled crystallisation.

In the presence of sulphates, potassium sulphate can be formed from carnallite via the intermediate potassium magnesium product known as Schoenite. Potassium sulphate is a chloride-free potassium based fertiliser. It is less common than potassium chloride with a market in the order of six million tonnes a year. Potassium sulphate sells at a premium price to potassium chloride. Schoenite is also suitable as a fertiliser.

3. Kainitite (61% of the Colluli resource)

Kainitite is a combination of kainite and sodium chloride and kainite is a combination of potassium chloride and magnesium sulphate. Kainite has historically been used for the production of potassium sulphate and has also been used as a direct application fertiliser. In the presence of sufficient sulphate, kainite converts to potassium sulphate via an interim product known as Schoenite, which is also suitable as a fertiliser product.

### **Previous Studies undertaken on the Colluli Project**

Previous studies focused only on the production of potassium chloride. The initial scoping study, ESS1, considered production of potassium chloride from sylvinitite. This resulted in a forecast mine life of about 27 years.

However, the resource is dominated by kainitite. Utilising the kainitite not only results in a lower strip ratio and therefore lower mining costs, it provides the opportunity to produce a premium fertiliser product, potassium sulphate. Only a limited number of the world's potash resources can generate this product.

The previous studies did not examine the possibility of processing the kainitite.

### **Latest Processing Review**

The processing review was conducted with three primary objectives:

1. Reduce mining costs
2. Maximise resource utilisation
3. Understand trade-offs between mining costs, processing costs and overall project economics by processing a portion of the lower-grade materials

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## **Preliminary Outcomes of the Review**

Three potential processing options have been identified through a comprehensive desktop study. The options have different capital and operating costs. However, each option utilises all salt types, resulting in a material reduction in operating costs.

The key differences between the processing routes are:

- The product suite
- The form of energy required for salt separation (electrical versus solar)
- The number of processing circuits required

## **Products**

All processing options would produce potassium sulphate (SOP), which is a premium potassium fertiliser product. Two of the three options would also produce potassium chloride (MOP) and one option would also produce kieserite, a magnesium sulphate fertiliser, in addition to the potassium fertiliser products.

## **Impact on Economics**

The review found that there is scope to materially reduce the overall mining strip ratio from approximately 6.4:1 to approximately 2.5:1. This would in turn reduce mining costs from \$122 per tonne of product to less than \$70 per tonne of product.

The most recent mining studies have progressed the mining costs to a pre-feasibility level of plus or minus 25%.

The overall project economics for Colluli will be published once the metallurgical testing has been completed and the preferred processing route has been selected.

## **Project Impact**

Work on the definitive feasibility study (DFS) has been progressing. However, the review of processing options and the required metallurgical testing means the timetable for completion of the DFS is currently being re-assessed. The timeline now depends on the time needed to conduct the metallurgical testwork. South Boulder is in the process of selecting a suitable service provider to conduct this work.

## **Why South Boulder conducted this review**

Previous studies did not assess the economic potential of the lower layer material. It is clear from the processing options identified that blends of upper and lower layer materials not only reduce mining costs, but also generate higher value products, specifically potassium sulphate (SOP) which achieves a price premium relative to potassium chloride.

Requisite consideration was not given to the balance between what the resource can potentially deliver, the processing route/s required, and the operating cost benefits that may be achieved with full consideration of the operating environment (eg The Danakil Depression is a favourable environment for evaporation).

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The revised study has looked at the total resource to determine the best economic outcome and most favourable mine life.

### **Next Steps**

South Boulder is currently in discussions with service providers to initiate the metallurgical testwork as quickly as possible without compromising the quality of the program. Work continues in relation to the mining area as part of the feasibility study. Material characterisation and baseline environmental reports are almost complete.

Upon completion of the metallurgical testwork, South Boulder will review both the overall economics and the start-up module size. This will then enable the DFS to be fully resumed.

- ENDS -

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**CHIEF EXECUTIVE OFFICER**

Flavio Garofalo  
**COMPANY SECRETARY**

**About South Boulder Mines Ltd**

South Boulder is an ASX-listed (ASX: STB) resources company currently developing the emerging, world-class Colluli Potash Project located in Eritrea, Africa. The Colluli Potash Project is located in the Danakil Depression region of Eritrea ~65km from the coast comprising approximately 500km<sup>2</sup>. South Boulder Mines Limited has been actively exploring for potash at the Colluli Potash Project in Eritrea since 2009. Colluli is the world's shallowest potash deposit (starting at 16m), facilitating the low capex open pit mining and favourably positioned to supply the world's fastest growing markets.

The JORC/NI43-101 Compliant Mineral Resource Estimate for the flagship Colluli Potash Project now stands at 1.08 billion tonnes @ 18% KCl for 194Mt of contained potash. Substantial project upside exists in higher production capacity and market development for other contained products. Engineering Scoping Study (ESS) results were favourable, proving that an economic 2Mt p.a. potash mine can be built at a materially lower cost than typical potash development. The start-up capital cost for Colluli is one of the lowest in the industry; couple this with cheap expansion capability via open pit mining methods, excellent infrastructure and location, and it becomes even more attractive, ensuring South Boulder gains a high level of investment interest for the long term. South Boulder Mines Ltd is working steadily towards developing the world's first, modern, open pit potash mine.

**Competent Persons and Responsibility Statement**

The Colluli Potash Project has a current JORC/NI43-101 Compliant Measured, Indicated and Inferred Mineral Resource Estimate of 1,079.00Mt @ 17.97% KCl or 11.35% K<sub>2</sub>O (total contained potash of 194.09Mt KCl or 122.61Mt K<sub>2</sub>O). The resource contains 261.81Mt @ 17.94% KCl or 11.33% K<sub>2</sub>O of Measured Resources, 674.48Mt @ 17.98% KCl or 11.36% K<sub>2</sub>O of Indicated Resources and 143.50Mt @ 18.00% KCl or 11.37% K<sub>2</sub>O of Inferred Resources.

This information was prepared and first disclosed under the JORC Code 2004. It has not been updated since to comply with the JORC Code 2012 on the basis that the information has not materially changed since it was last reported by independent consultants ERCOSPLAN and announced by South Boulder on 16 April 2012.

The information in this report that relates to Exploration Results and Mineral Resources is based on information compiled by Greg Knox using estimates supplied by South Boulder Mines Ltd under supervision by Ercosplan. Dr Henry Rauche and Dr Sebastiaan Van Der Klauw are co-authors of the JORC and NI43-101 compliant resource report. Greg Knox is a member in good standing of the Australian Institute of Mining and Metallurgy and Dr.s' Rauche and Van Der Klauw are members in good standing of the European Federation of Geologists (EurGeo) which is a "Recognised Overseas Professional Organisation" (ROPO). A ROPO is an accredited organisation to which Competent Persons must belong for the purpose of preparing reports on Exploration Results, Mineral Resources and Ore Reserves for submission to the ASX.

Mr Knox, Dr Rauche and Dr Van Der Klauw are geologists and they have sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which they have undertaken to qualify as a Competent Person as defined in the 2004 Edition of the "Australian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". Mr Knox, Dr Rauche and Dr Van Der Klauw consent to the inclusion in the report of the matters based on information in the form and context in which it appears.

**Quality Control and Quality Assurance**

South Boulder Exploration programs follow standard operating and quality assurance procedures to ensure that all sampling techniques and sample results meet international reporting standards. Drill holes are located using GPS coordinates using WGS84 Datum, all mineralisation intervals are downhole and are true width intervals. Assay values are shown above a cut-off of 6% K<sub>2</sub>O. The samples are derived from HQ diamond drill core, which in the case of carnallite ores, are sealed in heat sealed plastic tubing immediately as it is drilled to preserve the sample. Significant sample intervals are dry quarter cut using a diamond saw and then resealed and double bagged for transport to the laboratory. Halite blanks and duplicate samples are submitted with each hole. Chemical analyses were conducted by Kali-Umwelttechnik GmbH Sondershausen, Germany utilising flame emission spectrometry, atomic absorption spectroscopy and ionchromatography. Kali-Umwelttechnik (KUTEC) Sondershausen1 have extensive experience in analysis of salt rock and brine samples and is certified according by DIN EN ISO/IEC 17025 by the Deutsche Akkreditierungssystem Prüfwesen GmbH (DAR). The laboratory follow standard procedures for the analysis of potash salt rocks chemical analysis (K<sup>+</sup>, Na<sup>+</sup>, Mg<sup>2+</sup>, Ca<sup>2+</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, H<sub>2</sub>O) and X-ray diffraction (XRD) analysis of the same samples as for chemical analysis to determine a qualitative mineral composition, which combined with the chemical analysis gives a quantitative mineral composition.

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