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18 June 2015

SYRAH ANNOUNCES INTERNAL ECONOMIC ASSESSMENT FOR COATED SPHERICAL GRAPHITE

INTRODUCTION

Syrah Resources (ASX:SYR) is pleased to report the results of an Internal Economic Assessment (IEA) for a proposed coated spherical graphite facility in the United States. This IEA has been prepared with the assistance of China Aluminium International Engineering Corporation Limited (Chalieco) and a leading producer of coated spherical graphite.

Highlights:

- **Syrah has completed an Internal Economic Assessment (IEA) on the economics of the world's largest Coated Spherical Graphite Facility in the United States**
- **Feedback from major electric vehicle and battery producers have indicated strong demand for and confirmed the superior performance of Balama coated spherical graphite**
- **Initial capital expenditure of approximately US$80 million**
- **Annual pre-tax project free cash flows of US$104 million**
- **Annual production of 25,000 tonnes of coated spherical graphite and 25,000 tonnes of recarburiser by-product**
- **Average annual cash operating costs of US$3,200 per tonne free on board for coated spherical graphite (excluding recarburiser by-product credits)**
- **A major anode producer has forecast spherical graphite demand to increase at a compound annual growth rate of 26% from 2014 to 2020, to reach 133,000 tonnes per annum by 2020**
- **Appointment of a Chief Technology Advisor to assist with the implementation of Syrah's strategy to produce coated spherical graphite for lithium ion battery applications**

Syrah's Managing Director, Tolga Kumova commented "*Whilst development of the Balama Graphite Project remains our primary and immediate focus, this Internal Economic Assessment demonstrates that spherical graphite processing represents an exciting, value accretive future option for the Company. The decision to incorporate spherical graphite production into the overall business strategy is driven by global customer demand and the appointment of a Chief Technology Advisor will strengthen Syrah's technical capability in this area. The Company looks forward to participating in the expected significant increase in the spherical graphite industry from lithium ion battery applications.*"

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BACKGROUND

Battery grade spherical graphite is a physically and chemically altered form of natural graphite (-100 US mesh) or synthetic graphite and is the optimum product for use in anodes for battery technologies, particularly lithium (Li) ion batteries, which is a key component of electric vehicle and energy storage applications.

The following figure sets out the process of producing coated spherical graphite. Typically, -100 US mesh graphite is processed into spherical shapes measuring 10 to 25 microns and its purity increased to 99.95% carbon (C).

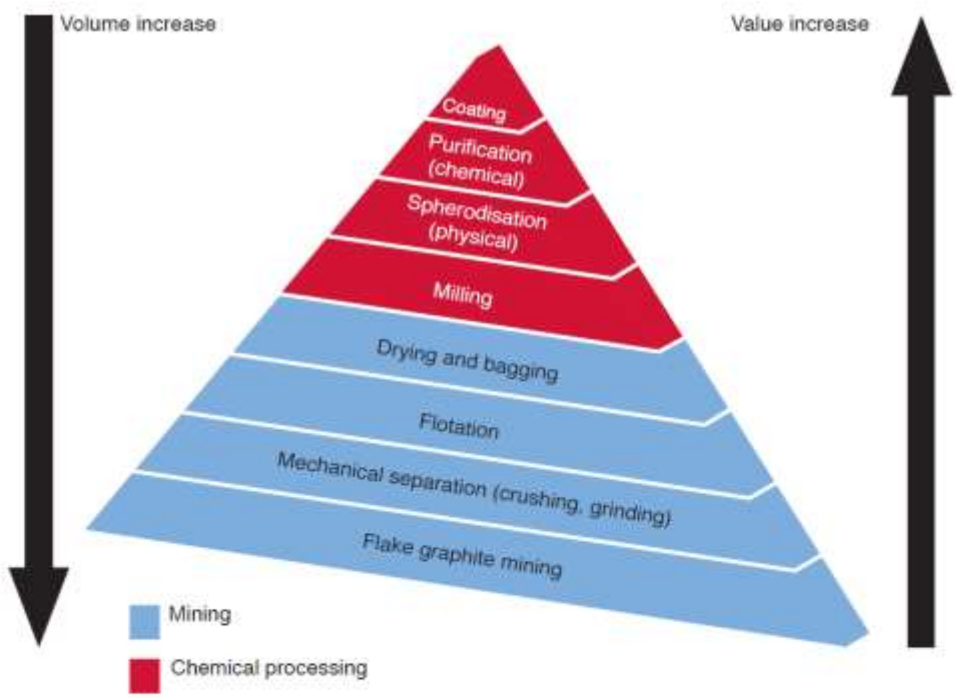

Figure 1 – The process from -100 US mesh graphite to spherical graphite (Source: Industrial Minerals)

The more spherical the graphite, the better it can be applied to battery anode applications. The spherical shape creates a lower specific surface area, which helps to reduce the irreversible charge loss that occurs during the first discharge cycle. Well rounded spherules also allow for more efficient packing and increases the tap density and overall volumetric energy capacity of the anode. A well-rounded spherule can also be coated more evenly than sub-rounded or angular grains, which adds to the efficiency of the battery anode.

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During 2014, Syrah announced that it successfully produced Li-ion battery grade uncoated spherical graphite from its spherical graphite pilot plant using -100 US mesh graphite (refer ASX announcement dated 20 November 2014).

This was followed by the successful coating of Balama spherical graphite by an anode producer in January 2015. This anode producer then manufactured Balama natural graphite anodes and a Li-ion battery using this coated Balama spherical graphite. Initial test results showed a first discharge capacity of 369.96 milliamphere-hour per gram and a first discharge efficiency of 94.5%. These initial results exceed the performance of typical Chinese natural graphite anodes and a leading synthetic graphite anode (refer ASX announcement dated 14 January 2015).

Subsequently, samples were sent to global electric vehicle and battery manufacturers, as well as other anode producers for testing. These parties confirmed the superior performance of Balama coated spherical graphite.

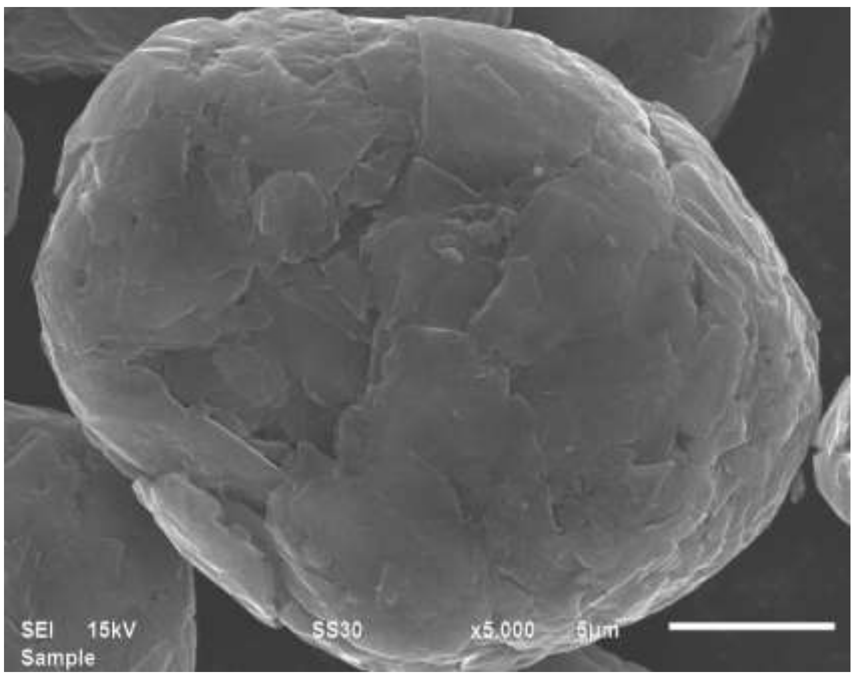

Figure 2 – Purified, coated Balama spherical graphite (Li-ion battery grade)

As a result of these successful trials, an IEA was prepared with the assistance of Chalieco and a leading coated spherical graphite producer for a 25,000 tonne per annum (tpa) Coated Spherical Graphite Facility in the United States.

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SPHERICAL GRAPHITE IEA

The Spherical Graphite IEA incorporates a 25,000 tpa Coated Spherical Graphite Facility, requiring 50,000 tpa of -100 US mesh graphite as feed. In addition, 25,000 tpa of 95% total graphitic carbon (TGC) recarburiser by-product will also be produced as part of the spheroidisation process. The key results of the Spherical Graphite IEA are summarised in the following table:

Operational metrics	Unit	
Raw material (-100 US mesh graphite)		
For 23 micron spherical graphite	tpa	25,000
For 16 & 10 micron spherical graphite	tpa	25,000
Recovery		
d50 23 micron spherical graphite (99.95% C)	tpa	50.0%
d50 16 micron spherical graphite (99.95% C)	tpa	37.5%
d50 10 micron spherical graphite (99.95% C)	tpa	12.5%
Coated spherical graphite product		
d50 23 micron (99.95% C)	tpa	12,500
d50 16 micron (99.95% C)	tpa	9,375
d50 10 micron (99.95% C)	tpa	3,125
95% TGC recarburiser by-product	tpa	25,000

Financial metrics	Unit	
Total initial capital expenditure		
23, 16 & 10 micron coated spherical graphite	US$ m	73
95% TGC recarburiser	US$ m	7
		80
Price assumptions (coated spherical graphite)		
d50 23 micron (99.95% C)	US$/t (FOB)	7,000
d50 16 micron (99.95% C)	US$/t (FOB)	7,000
d50 10 micron (99.95% C)	US$/t (FOB)	8,000
Operating cash costs [1]		
d50 23, 16 & 10 micron spherical graphite	US$/t product (FOB)	3,200
By-product credits - 95% TGC recarburiser [2]	US$/t product (FOB)	(465)
		2,735
Annual unlevered pre-tax project free cash flow	US$ m	104

Note 1: Includes raw material input costs at an assumed market price of US$800/t (FOB Port of Nacala) from the Balama Project.
Note 2: A selling price of US$1,000/t FOB has been assumed for 95% TGC recarburiser.

Table 1 – Key operational and financial metrics of the Coated Spherical Graphite IEA

The IEA considers the production of three different coated spherical graphite specifications as Syrah intends to target the following key sectors that are forecast to drive graphite demand growth:

- d50 23 micron – grid storage
- d50 16 micron – electric vehicles
- d50 10 micron – hybrid vehicles and consumer electronics.

Synthetic graphite has traditionally been the major anode material (55%) with natural graphite forming the balance (45%). However, an opportunity exists for Balama coated spherical graphite to displace synthetic graphite in the anode market. Use of natural graphite is increasing due to:

- Quality improvements (orientation property and tap density)
- Lower cost; synthetic graphite sells for around US$20,000 per tonne whilst coated spherical graphite currently sells for between US$7,000 to US$10,000 per tonne.

In addition, residual raw material (-100 US mesh graphite) from the spheroidisation process will be turned into high quality recarburiser briquettes that will be marketed to regional iron and steel producers. Recarburisers are carbon materials that are typically used to adjust the carbon content of steel before casting whilst it is still in liquid form. High quality recarburisers are also used in the production of other ferroalloys such as cast iron (refer ASX announcement dated 23 October 2014).

Figure 3 – Trial Balama graphite recarburiser briquettes

SPHERICAL GRAPHITE DEMAND, SUPPLY AND PRICING

Based on discussions with potential customers, coated spherical graphite currently sells for between US$7,000 to US$10,000 per tonne. Syrah believes, through discussions with major battery producers, that a significant increase in the global demand for lithium ion batteries is rapidly approaching with electric vehicles and battery storage breaking through to the mainstream. This is expected to shape a new era of demand in certain critical minerals, with graphite at the forefront. Initial test work has shown that anodes made from Balama coated spherical graphite are superior to Chinese natural graphite anodes and a leading synthetic graphite anode.

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ELECTRIC VEHICLES

The International Energy Agency forecasts that annual sales of electric vehicles will reach approximately 6 million units per annum by 2020. On average, approximately 42 kg of spherical graphite is required for most current electric vehicle models (refer ASX announcement dated 20 November 2014).

Syrah believes that as electric vehicle manufacturers seek to address consumer concerns over "range anxiety", newer models will increasingly have higher battery capacities which will result in greater spherical graphite demand. For example, Tesla Motors' (Tesla) Model S which has a market leading battery range of over 420 km is powered by an 85 kW battery which requires 170 kg of spherical graphite.

GRID STORAGE

Battery storage (and in particular, Li-ion batteries) is gaining increasing attention as a solution to:

- Balance peak and trough grid electricity demand
- Manage and integrate renewable energy sources (solar and wind) into the grid
- Defer or reduce the need for capital expenditure on transmission or distribution lines and peak generators
- Provide backup power during an electricity outage (uninterrupted power supply – UPS).

Several major automobile manufacturers and utilities have recently announced plans to enter the Li-ion battery energy storage market. These batteries can store electricity from the grid or a renewable energy source and will be initially targeted towards residential and small industrial users.

- Tesla unveiled the Powerwall which consists of a compact, wall-mounted and rechargeable battery (7 kWh or 10 kWh). Tesla has announced plans to dedicate 30% of its Gigafactory's capacity to this area and noted that it is having discussions with almost all the utility companies in the United States
- Daimler AG announced plans to market batteries as "stationary energy storage plants", with an option of either 2.5 kWh or 5.9 kWh
- AGL Energy announced its Power Advantage proposition, making it the first Australian energy retailer to allow consumers to manage their energy consumption. The initial product offering will be a 6 kWh battery suitable for an average family home.

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FORECAST BATTERY DEMAND & PRODUCTION CAPACITY BY 2020

The following table sets out the actual historical and forecast global spherical graphite demand from 2010 to 2020 as advised by a major anode producer. **The forecast compound annual growth rate (CAGR) from 2014 to 2020 is expected to be 26% per annum.**

	Historical (tonnes)					Forecast (tonnes)					
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Spherical graphite demand	330	1,150	4,300	10,600	26,400	45,000	64,000	83,000	98,000	115,000	133,000
-100 US mesh graphite required for feed [1]	825	2,875	10,750	26,500	66,000	112,500	160,000	207,500	245,000	287,500	332,500

Note 1: Assuming a 40% yield from the spherical graphite production process.

Table 2 – Actual historical and forecast global spherical graphite demand from 2010 to 2020 (Source: Major anode producer)

To satisfy this anticipated increase in demand for Li-ion batteries, several major corporations have commenced or announced plans to construct "giga" or "mega" Li-ion battery factories over the next 5 years. Benchmark Minerals forecasts that global Li-ion battery capacity will triple by 2020 to reach 120 GWh, based on planned production by LG Chem, Tesla, Foxconn, BYD Auto and Boston Power.

Figure 4 – Forecast Li-ion battery production capacity by 2020 (Source: Benchmark Minerals)

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At present, only -100 US mesh and smaller graphite is used to produce spherical graphite. Based on the flake size distribution profile of existing graphite mines, an additional 6 to 9 new mines producing the required size fraction will be needed by 2020.

As outlined in Syrah's Graphite Feasibility Study (refer ASX announcement dated 29 May 2015), 68% or 242,000 tpa of Syrah's estimated production over the first 10 years will be -100 US mesh or smaller graphite, which will be sufficient for the world's projected Li-ion battery demand. Accordingly, Syrah believes that:

- The metallurgical and production profile of the Balama Project positions Syrah to be a leading producer of spherical graphite for Li-ion battery applications due to its superior performance characteristics
- Over 40 years of Ore Reserves provides confidence to leading major battery producers that the Balama Project will enable Syrah's proposed Coated Spherical Graphite Facility to become a long term, sustainable supplier
- The resource at Balama is open along strike and down dip, providing significant upside for additional reserves and production increases should market conditions require it.

TECHNICAL APPOINTMENT

Syrah is pleased to announce the appointment of Dr. Jens Berkan as **Chief Technology Advisor**.

Jens has over 15 years of experience in the automobile industry which includes specialist engineering roles at General Motors Holden, BMW Group as well as several start up electric vehicle (EV) companies.

His previous role was Senior Manager of Electric Energy Storage, Propulsion and Conversion Systems for Qoros Auto where he was responsible for EV and hybrid sub-system and component specification, development, implementation and validation. Jens was also the Senior Engineer for Battery Development at E.V. Engineering working on the research and development of large lithium-ion batteries (430 V, 31 kWh).

He has a PhD in mechanical engineering from the Technical University of Clausthal in Germany.

NEXT STEPS

The robust economics demonstrated by the Spherical Graphite IEA supports Syrah's view that targeting high margin, processed graphite products is a highly value accretive strategy.

The Company has now commenced detailed work on the technical aspects of the Coated Spherical Graphite Facility as well as due diligence on the necessary regulatory approvals in the United States, so as to position the Company to enter this market following the successful delivery and ramp up of the

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Balama Graphite Project and thereby take advantage of an expected significant increase in spherical graphite demand from electric vehicle and energy storage applications.

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CAUTIONARY STATEMENT
The stated production target is based on Syrah's current expectations of future results or events and should not be solely relied upon by investors when making investment decisions. Further evaluation work and appropriate studies are required to establish sufficient confidence that this target will be met. Further, Syrah cautions that there is no certainty that the forecast financial information derived from production targets will be realised.

About Syrah Resources

Syrah Resources (ASX code: SYR) is an Australian resource company that is rapidly progressing its flagship Balama Graphite and Vanadium Project in Mozambique to production. The Project hosts the largest graphite ore reserves in the world with an Australasian Joint Ore Reserves Committee (JORC) compliant Ore Reserve of 81.4 Mt at 16.2% total graphitic carbon. Balama is a 110 km^2 granted Mining Concession located within the Cabo Delgado province in the district of Namuno in northern Mozambique. The Project is approximately 260 km by road west of Pemba and is accessible by a sealed, main road, running directly from Pemba Airport. The Port of Nacala is approximately 490 km by road south east of the Project and is the deepest port in Southern Africa.