



## BREAKTHROUGH GRAPHENE RESULTS FROM TALGA'S HIGH GRADE SWEDISH GRAPHITE DEPOSIT

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### Corporate Information

ASX Code **TLG**  
Shares on issue **85.1m**  
Options (unlisted) **3.75m**

### Company Directors

**Keith Coughlan**  
Non-Executive Chairman

**Mark Thompson**  
Managing Director

**Piers Lewis**  
Non-Executive Director

 **ASX Code: TLG**

Talga Resources Limited (ASX:TLG) ("Talga" or "the Company") is pleased to announce exceptional results from graphene testwork conducted by the University of Adelaide on drillcore from Talga's wholly-owned Nunasvaara graphite deposit in Sweden.

### Key conclusions of the testwork include:

- Graphene can be directly and rapidly liberated from unprocessed Nunasvaara graphite ore in a one-step process with no intermediate stages/products.
- Quality of graphene produced is outstanding and comparable to graphene made from synthetic routes.
- Uses a processing method well suited for upscaling to bulk production.
- Graphite is liberated as part of the graphene production stream offering a path to potentially cheaper graphite production.
- Nunasvaara ore has extraordinary physical properties that enable the graphene extraction process and that may be unique to the deposit.

### Proposed next steps (Mar 2014 - Dec 2014):

- Upscale testwork and measure graphene yield and characteristics in a potential production scenario.
- Test graphite recovery and purity arising from graphene production stream.
- Calculate initial capex and potential production costs to incorporate into current Nunasvaara graphite scoping study and complete with dual graphene/graphite focus.
- Develop trial batch plant and move to permitting for bulk sampling program on path to trial production.

### Talga Managing Director, Mr Mark Thompson:

"We are strongly encouraged by these initial test results which establish a firm, science-based foundation to drive the development of Nunasvaara to include graphene.

"Mainstream use of graphene is hampered by production methods that are not scalable to mass production or involve milling, harsh acids, high temperatures/pressures, microwaves, sonication and oxidation/reduction chemistries. Many of these methods cause structural defects and degrade the unique properties of pristine graphene.

"Talga's direct-from-ore capability is a breakthrough that allows us to avoid these degradational techniques yet easily produces a very high quality graphene with low defects, in potentially large quantities. The relatively simple process is rapid and sustainable, with high potential to be environmentally low impact and dramatically lower production costs.

"The results to date flag the possibility that the process may not be duplicable by others, as the raw ore-to-graphene method is enabled by potentially unique characteristics of the Nunasvaara deposit which Talga owns 100%."

## Graphene Test Results

As previously announced (ASX:TLG 17 January 2014) Talga contracted a graphite and graphene work program with Adelaide Research and Innovation Pty Ltd ("ARI"), the commercial development arm of the University of Adelaide. The testwork was conducted within the University's School of Chemical Engineering as a natural extension of metallurgical studies being undertaken as part of the Company's preliminary economic assessment ("Scoping Study") on the Nunasvaara graphite deposit.

The testwork was conducted on core from Nunasvaara diamond drillhole NUS12003 from 14-16m downhole depth. This interval grades 24.7% graphite ("Cg") which is within 0.3% Cg of the deposit's overall resource grade (see Appendix, ASX:TLG 16 October and 8 November 2012)<sup>1</sup>.

In characterising the graphite sample (Fig 1), it was noted that Nunasvaara ore has "extraordinary physical properties such as high conductivity and magnetism not observed in any previously tested graphite material".

During the testwork, both graphene and graphene oxide were successfully produced using a number of different extraction methods, and confirmed by scanning and transmission electron microscopy (see Fig 2 and Fig 7) and Raman spectroscopy.

Remarkably, it was discovered graphene could be produced directly from raw unprocessed Nunasvaara graphite ore in a single step process without any crushing, milling or preparation of any kind. The testwork reported that graphite and impurities are easily separated from the graphene in the process (see Fig 3) and concluded, after comparison of the Nunasvaara graphene Raman spectra to those from other methods, that **"The quality of the prepared graphene is outstanding and comparable with the synthetic graphene routes"**. Further technical details of the process and results must remain confidential at this time.

## Graphene Background

Technically, graphene refers to a single isolated layer of graphite formed as a one-atom-thick layer of carbon in a hexagonal lattice pattern, although the term is commonly used for up to 10 layers where its unique properties still operate. Graphene exceeds the stiffness of diamond and is hundreds of times stronger than steel, yet is extremely light, flexible and conducts electricity at room temperature faster than any other material. Researchers and companies are eyeing dozens of potential applications, from faster computer chips and flexible touchscreens to hyper-efficient solar cells, super-capacitors and desalination membranes.

Fig 1 Nunasvaara drillcore used in testwork.



Fig 2 Transmission electron microscope image of liberated Nunasvaara graphene.

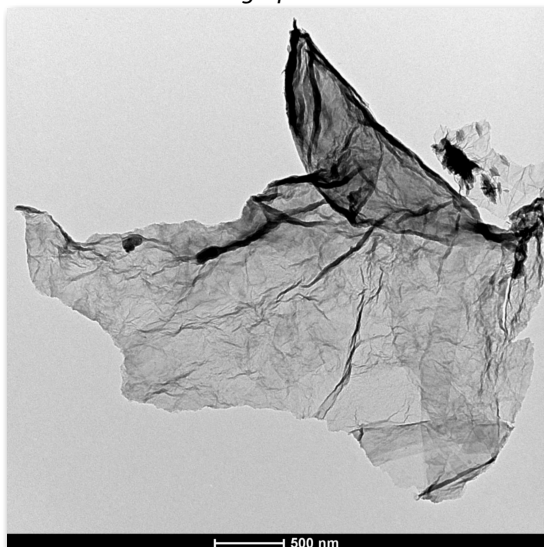
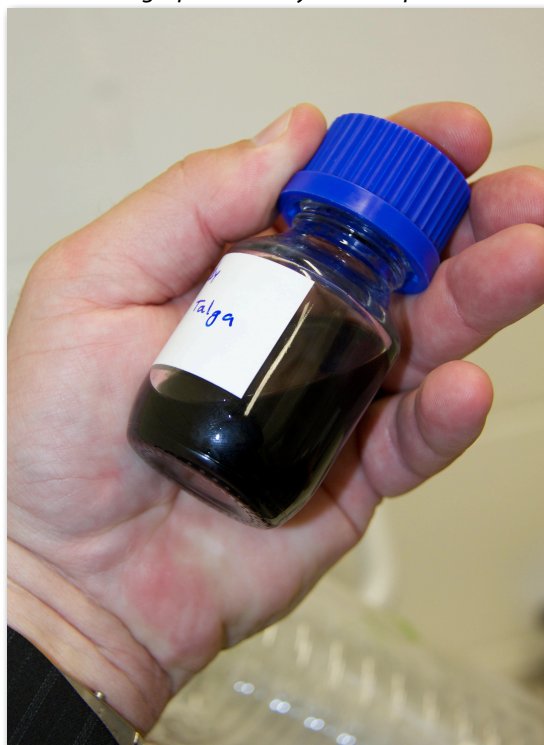


Fig 3 High density colloidal suspension of Nunasvaara graphene ready for transport.



The number of potential applications for graphene has caused intense worldwide attention and billions of dollars are being spent on research and development efforts. This is highlighted by the Swedish based Graphene Flagship project which represents a decade long €1.35 billion European investment to take graphene from the laboratory bench to the factory floor. Major technology product companies like BASF, Samsung, IBM, Hitachi, SanDisk, Fujitsu and Xerox are poised to commercialise developments as is evidenced by prodigious global graphene patent activity (Fig 4).

The high cost of graphene production to date has restricted the pace of commercialisation which makes it difficult to project future demand. Additionally the most promising techniques for commercial scale production damage the structure of graphene that underlie its unique and valuable properties. The industry is waiting for a breakthrough in producing high volumes of high quality, lower cost graphene.

### Comments and Next Steps

It has been noted in the testwork that Nunasvaara graphite ore has extraordinary properties. Talga considers this to be because Nunasvaara is hosted within volcanic greenstones rather than the gneissic rocks most typical for graphite deposits (See Fig 5 for project location and Fig 6 for summary geology). This has given Nunasvaara ore potentially unique mineralogy, crystallinity and other characteristics that mean Talga's direct-from-ore graphene process may not be duplicable by other companies.

It should be noted that this initial graphene testwork, while rigorous in its science, is the first conducted on this deposit and work is at an early stage. It is yet to be determined if the process can scale up and produce the same quality graphene at larger industrial scale. Although the process is relatively simple and similar methods are being used at industrial scale with no impediment, new tests will confirm scalability.

Additionally, the present work has been undertaken on a single core sample that may not be representative of the entire deposit. However, the graphite grade of the sample tested was within 0.3% of the resource grade, and geological logging records the deposit is remarkably homogenous. To address this, a suite of samples from throughout the deposit is being compiled and transported for next phase tests.

**Talga sees the potential co-production of both graphite and graphene to be a valuable development in commercialising the Nunasvaara deposit.** Upscaled tests of the graphene process will commence to further determine recoveries and characteristics of the graphite and graphene produced. Results will be incorporated into the current Nunasvaara graphite scoping study which will be extended to mid-year to allow investigation of a dual graphene/graphite production scenario.

In the medium term, permitting towards a bulk sample program will commence and a trial batch plant will be commissioned pending results from the next phase work. Graphene products from the testwork will be used for marketing purposes and also sold to potentially offset the cost of the program.

For further information, contact:

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Fig 4 Worldwide graphene patent publications. Source UK Intellectual Property Office. Red columns represent new data since last report (2010).

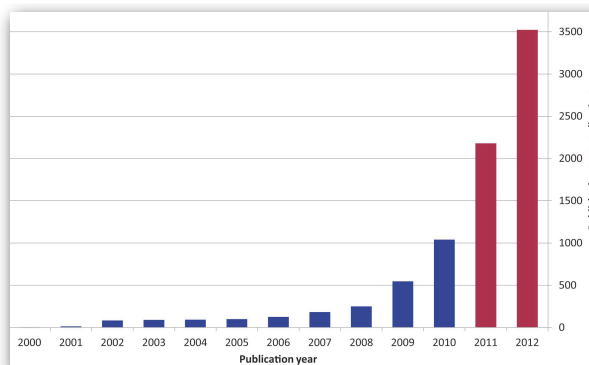




Fig 5. Talga Resources project locations in north Sweden.

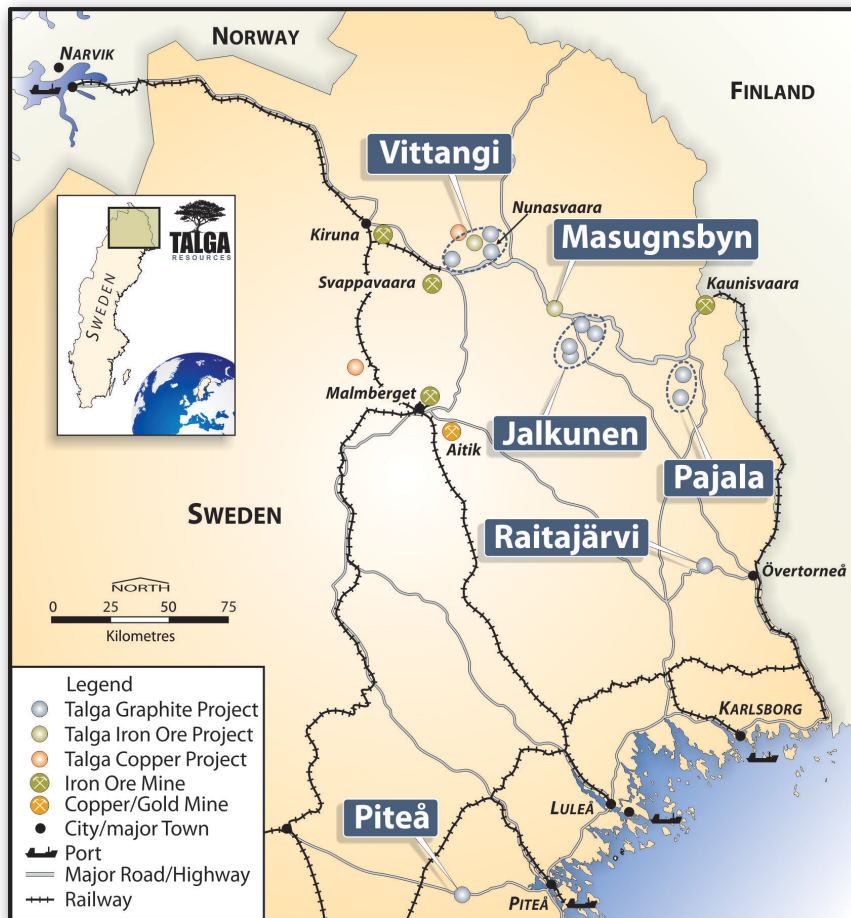


Fig 6. Rock geochemical sample location plan, Nunasvaara graphite unit, Vittangi project<sup>1</sup>. For details see ASX:TLG 15 November 2012.

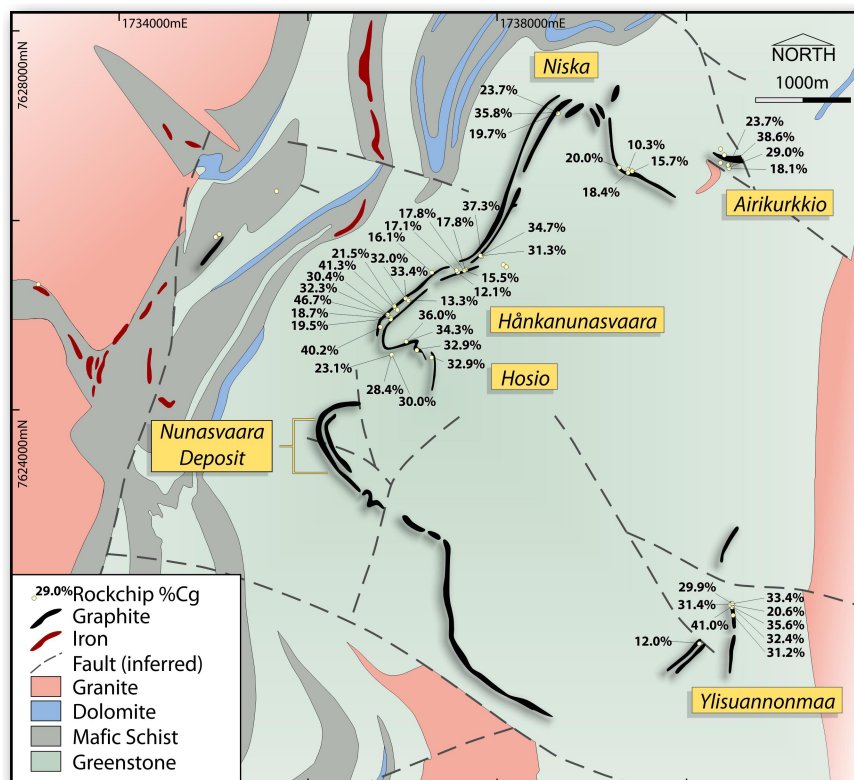
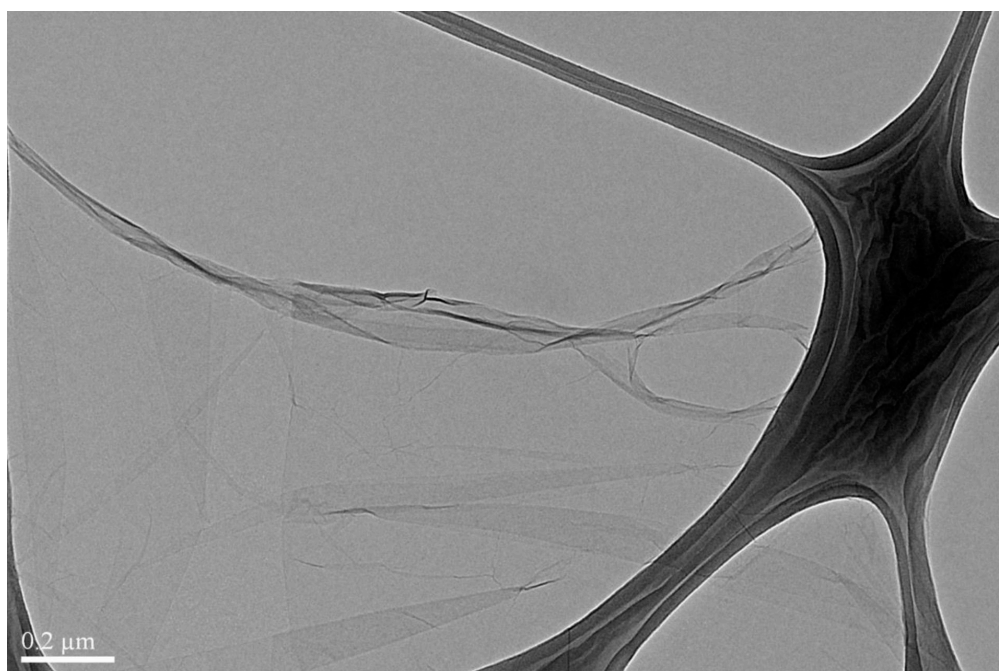


Fig 7. Close-up transmission electron microscope view of Nunasvaara graphene showing pristine nature of sheet.



## APPENDIX

### Nunasvaara Mineral Resource (10% Cg lower cut-off) Nov 2012<sup>1</sup>

JORC 2004 Classification	Tonnes (Mt)	Grade (%Cg)	Contained Graphite (tonnes)
Indicated	5.6	24.6	1,377,600
Inferred	2.0	24.0	480,000
<b>Total</b>	<b>7.6</b>	<b>24.4</b>	<b>1,857,600</b>

<sup>1</sup> Note: 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. The Company is not aware of any new information or data that materially affects the information included in the previous announcement and that all of the previous assumptions and technical parameters underpinning the estimates in the previous announcement have not materially changed.

#### Competent Person's Statement

The information in this report that relates to Exploration Results is based on information compiled and reviewed by Mr Darren Griggs and Mr Mark Thompson, who are members of the Australian Institute of Geoscientists. Mr Griggs and Mr Thompson are employees of the Company and have sufficient experience which is relevant to the activity which is being undertaken 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" ("JORC Code"). Mr Griggs and Mr Thompson consent to the inclusion in the report of the matters based on this information in the form and context in which it appears.

The information in this report that relates to Resource Estimation is based on information compiled and reviewed by Mr Simon Coxhell. Mr Coxhell is a consultant to the Company and a member of the Australian Institute of Mining and Metallurgy. Mr Coxhell has sufficient experience relevant to the styles of mineralisation and types of deposits which are covered in this document and to the activity 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" ("JORC Code"). Mr Coxhell consents to the inclusion in this report of the matters based on this information in the form and context in which it appears.