

# VITTANGI GRAPHITE RESOURCE UPGRADE

# **Highlights**

- Update of Vittangi Project JORC 2004 graphite resource to JORC 2012 status increases total size and grade
- Vittangi total 2012 JORC resource now 9.8 million tonnes @ 25.3% graphite
- Represents a 29% increase in total tonnes and increase in grade from 24.4% graphite to 25.3% graphite
- · Resource starts from surface
- Remains open, providing potential for further increase in resource if and when required
- Provides additional support for Talga's future production plans with permitting for full scale Swedish development underway

Advanced materials company, Talga Resources Ltd ("Talga") (ASX: TLG), is pleased to announce an updated mineral resource of its Nunasvaara graphite deposit, as part of the Vittangi project ("Vittangi") in Sweden.

As part of permitting underway for future production from the project, Talga has updated the status of its 2004 Vittangi Mineral Resource to comply with the Australian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves ("JORC") 2012.

The updated JORC 2012 compliant Indicated and Inferred mineral resource estimate for Vittangi now totals 9.8 million tonnes ("Mt") at 25.3% graphitic carbon ("Cg") for 2.4Mt of contained graphite, based on a 10% Cg lower cut-off. Further details and parameters relevant to the estimation are provided in Table 1 and text below.

Table 1 - Nunasvaara JORC 2012 Mineral Resource (10% Cg low cut-off, May 2016).

Resource Category	Tonnes	Graphite (%Cg)	Contained Graphite (Tonnes)
Indicated	6,900,000	24.2	1,669,800
Inferred	2,900,000	28.1	814,900
Total	9,800,000	25.3	2,403,500

The update to the previous resource from JORC 2004 status to JORC 2012 was completed by geological consultants CoxsRocks Pty Ltd and utilises new data from drilling in 2014 and trial mining undertaken in 2015. Significantly, the update results in a 29% increase in total resource tonnes and increase in the average graphite grade from 24.4% Cg to 25.3% Cg.

#### Talga Managing Director Mark Thompson commented:

"The upgraded and expanded Vittangi resource confirms Talga's world-leading position in grade of graphite resources<sup>1</sup>. In discussions with leading consumers of graphene and graphite we understand that certainty of long term supply from robust compliant resources in quality jurisdictions is a key requirement. Vittangi provides this long-term supply and Talga is busily progressing full scale project permitting. Expanding proposed mine-life is not our present focus, however future growth would be well supported by our 136-250 million tonnes @ 18-25% Cg exploration target defined to date<sup>2</sup>."

<sup>&</sup>lt;sup>2</sup> JORC compliant Exploration Target details see ASX 26 February 2015 and Appendix 4. Note: Exploration Targets are based on a number of assumptions and limitations with the potential grade and



<sup>&</sup>lt;sup>1</sup> Technology Metals Research Advanced Graphite Projects Index

quantity being conceptual in nature. There has been insufficient exploration to estimate a Mineral Resource Estimate in accordance with the JORC Code and it is uncertain if future exploration will result in the estimation of a Mineral Resource.

#### **Vittangi Mineral Resource**

Talga wholly owns five graphite projects in north Sweden (see Figure 1 and Appendix 3-4) hosting multiple deposits spanning the size spectrum of natural flake graphite, including the Vittangi graphite project situated 50km east from Kiruna.

The Vittangi project comprises a number of 100% owned exploration licences covering approximately 119km<sup>2</sup> that contains multiple high grade graphite deposits and prospects over approximately 32km strike. This includes the previous Nunasvaara JORC 2004 mineral resource totalling 7.6 million tonnes at 24.4%Cg defined in 2012 (see ASX:TLG 8 Nov 2012) in accordance with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves ("JORC").

As part of the permitting process underway at Nunasvaara, Talga requested CoxsRocks Pty Ltd ("CoxsRocks"), an independent mining and resource consultancy to update the Nunasvaara estimate from JORC 2004 to JORC 2012 status.

FINLAND Vittangi SWEDEN Raitajärvi Talga Graphite Projec

**Figure 1** *Talga graphite project locations, Sweden.* 

The classification of Mineral Resources was completed by Mr Simon Coxhell and was based principally on data density, representativeness of sampling, geological confidence criteria and grade distribution. New data was incorporated from test mining of the historic quarry area in 2015 and diamond drilling completed in September 2014, both in the quarry area and along strike to the north and south from the 2004 JORC resource.

Talga Iron Ore Project Talga Copper Project

Iron Ore Mine Copper/Gold Mine

City/major Town Port Major Road/Highway Railway

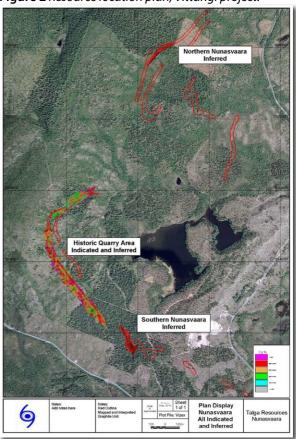
A total of three individual areas make up the resource, the main historic quarry area, which comprises both Indicated and Inferred Resources and an area to the north and the south of the historic guarry where drill holes NUN14001-14002 and NUN14005-14006 intersected significant graphite mineralization along strike in September 2014 (Figure 2 and Appendix 1-2). Airborne and ground based EM, coupled to systematic rock chip sampling and the diamond holes allows classification of this material as Inferred. Further drilling on a 100m by 50m drill pattern in these areas would be expected to result in Indicated Resources being estimated.

A recently completed open pit trial mining operation has allowed excellent visual understanding of the graphite deposit in three dimensions to be evaluated (Figure 4). Validating this data with the previous model has allowed a modified estimate and greater confidence in the indicated portions of the previous 2004 JORC resource. Consequently the Indicated Resource has increased.

The resource block models and estimates are considered an undiluted resource, as based on the results of the trial mining, a strong visual, textural and colour control of the graphite mineralisation is apparent and minimal dilution is to be expected.

**Figure 2** *Resource location plan, Vittangi project.* 

Piteå



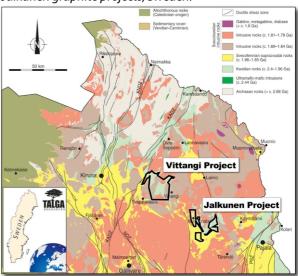
# Listing Rule 5.8.1 Disclosures - Geology and Geological Interpretation

The project area geology consists greenstones (basalts to andesites), metasediments (quartzite, schist, marble) and metadolerites which form part of the Vittangi Greenstone Group. These units represent part of the Palaeoproterozoic volcanosedimentary domain of northern Sweden (ca. 2.40 – 1.96 Ga) which unconformably rest on an Archean basement and collectively form part of the Fennoscandian shield (see Figure 3).

Stratiform to stratabound graphite mineralisation occurs at Vittangi as sub vertical 10-50 metre wide lithologically continuous units of a very fine grained dark grey to black graphite rock containing 10-45% graphitic carbon as highly crystalline ultra-fine flakes.

#### Sampling and Sub-sampling Techniques

**Figure 3** *Geology and location plan of Vittangi and Jalkunen graphite projects, Sweden.* 



Diamond drill core was sampled as either half or quarter core at 1m or 2m intervals. Samples were dried, crushed and pulverised to achieve 85% passing  $75\mu m$  prior to assay techniques. The graphite is very homogenous and duplicate analysis indicated no sample bias.

#### **Drilling Techniques**

Drilling comprises historic diamond core size WL56, 39mm core diameter completed by LKAB in 1982 and diamond core size WL66, 50.5mm core diameter completed by Talga in 2012 and 2014. Core recoveries were considered excellent.

#### Mineral Resource Classification Criteria

The resource model uses a classification scheme based upon both block estimation parameters and other relevant modifying factors as determined by the Competent Person, including drill spacing at 50-100m for Indicated classification and Inferred classification where spacing was in excess of this but continuity and predictability was high. The block estimation parameters initially used for classification guidance included average distance of points, closest points, number of points and standard deviation. These inputs were used to derive relative confidence levels with a range of other modifying factor considerations as identified by the Competent Person including the geological understanding of the mineralisation, zone geometries and the material types present. This was then used to guide resource reporting according to the guidelines for the JORC Code (2012 Edition).

#### Sample Analysis Method

Talga drill core was processed by ALS-Chemex via Piteå, Sweden for 48 element analyses via ICP following 4-acid digest, and graphitic carbon was analysed via ALS-Chemex method C-IR18 (Graphitic Carbon via Leco). The methods are appropriate for graphite deposit assessment and are considered a total digest and analysis. For historical drillholes graphite analyses was by IR-detector which is industry standard for carbon analysis today and as such the method used historically is considered appropriate. Check assaying of several historic core intervals by Talga returned analytical results within 1% of the historical data, confirming the original assay results.

**Figure 4** Open pit trial mining operation of part of Nunasyaara graphite resource in September 2015.



#### **Estimation Methodology**

Coxsrocks imported all of the historic and recent drilling into Micromine Mining Software and validated the drilling with the original drill logs and analytical data. Plots of all drilling was completed and

incorporated with GIS datasets incorporating geology, magnetics and EM data. Cross sections of the drilling were generated and interpretations completed at a nominal 10% Cg grade. All graphite intersections were included within the interpretations. Wireframes of the interpretation were generated and all assay intervals lying within the wireframes were subset and interpolated with a range of search ellipses parallel to the dominant trends. A nominal search of 100 metres along strike and 50 metres down dip was adopted which broadly corresponds to double the drill hole spacing. A uniform block size of 5m X 5m X 5m (X, Y, Z) were used for the model, with sub-blocking to ensure the wireframe volumes were accurately reflected.

Inverse distance cubed (ID3) was used for the interpolation and any block lying outside of the validated wireframes were removed from the model. Graphitic carbon was modelled with a lower cut of 10% Cg and no top cuts used. Graphitic Carbon and other elements were interpolated during the modelling. The Inferred Resources along strike from the quarry at Nunasvaara and relating to the intersections in drill holes NUN14001-14002 and NUN14005-14006 are simply the mean grade lying within the validated wireframe solids. All of the material is classified as fresh with an average insitu bulk density ("ISBD") of 2.60 used. A total of 62 measurements of the ISBD were made on the 2012 core and results ranged from 1.81-3.25 tonnes per cubic metre with a mean of 2.65 t/bcm.

Table 3 - Nunasvaara JORC 2012 Resource, additional detail. For locations see Figure 2.

Area	JORC Classification	Resource Tonnes	Grade Graphite (%Cg)
Nunasvaara Historic Quarry Area	Indicated	6,900,000	24.2
Nunasvaara Historic Quarry Area	Inferred	700,000	24.8
	Total	7,600,000	24.2
Northern Nunasvaara	Inferred	1,500,000	31.0
Southern Nunasvaara	Inferred	700,000	25.0
	Grand Total	9,800,000	25.3

Table 4 - Previous Nunasvaara JORC 2004 Mineral Resource (10% Cg low cut-off).

Area	JORC Classification	Resource Tonnes	Grade Graphite (%Cg)
Nunasvaara Historic Quarry Area	Indicated	5,600,000	24.6
Nunasvaara Historic Quarry Area	Inferred	2,000,000	24.0
	Total	7,600,000	24.4

#### **Cut-off Grades**

The cut-off grade of 10% Cg is a geological boundary which accurately defines the lithological graphitic host rock from waste. In addition, the cut-off grade reflects the anticipated open pit mining practices as tested in the 2015 trial mining exercise and is higher than other known economically viable deposits around the world.

#### Mining and Metallurgical Methods and Parameters

The Mineral Resource utilises standardised operating parameters and assumes open cut mining practices. The graphite mineralisation is sharply defined visually and a high level of mining selectivity can be achieved in ore/waste delineation processes as demonstrated during the 2015 trial mine program.

Metallurgical test work at IMO, Nagrom and the University of Adelaide, and the Max Planck Institute of Polymer research and Technical University of Dresden have successfully produced micrographite and graphene products from Vittangi graphite rock via direct electrochemical means, with product particle lengths 1-15 microns and thickness down to single layer graphene. Preliminary marketing of

these products with a range of buyers has suggested economic potential and Talga completed a Scoping Study (see ASX:TLG 9 Oct 2014) which supported eventual economic extraction of the graphite mineralisation. The graphite rock quarried during the 2015 trial mine program is being processed at the Company's pilot test plant facility in Rudolstadt, Germany with positive results (see ASX:TLG 7 Sept 2015).

#### Assumptions and Background

The JORC 2012 estimate was based on all drilling completed at Nunasvaara up until September 2014. Drilling at Nunasvaara comprises historic diamond drilling and costeans completed by LKAB in 1982. A total of 12 costeans for 414 metres were trenched and sampled by LKAB followed by the drilling of 20 diamond drill holes for a total of 1,949 metres on a nominal 50 metre spacing. Talga followed up on this drilling in 2012 and drilled a total of 19 holes for 1,697 metres with hole depths ranging from 58-158 metres.

In late 2012 CoxsRocks completed a JORC 2004 compliant resource estimate for Talga focused on the immediate area of the historic quarry (see Table 3). A cut-off of 10% graphitic carbon was used and this cut-off accurately relates to the geology characterised as the graphite geological unit. No top cuts were applied to the data. The latest JORC 2012 estimate has used an identical 10% Cg cut-off and no top cut.

In September 2014 Talga completed a more regional drilling program targeting extensions to the Nunasvaara deposit along strike to the north and south. A total of 10 holes for 1,091 metres were drilled with all holes intersecting the graphite horizon (Appendix 1). Drill core was processed by ALS-Chemex in Piteå, Sweden and assayed for graphitic carbon by LECO and multi-element suites by ICP-MS. In 2015 the Company completed trial open pit mining at Nunasvaara and extracted approximately 200m³ graphite ore as whole blocks via diamond saw and cable cutting, demonstrating quarry techniques are a viable open pit mining option with minimal dilution (see Figure 4).

All 2012 drill holes (and the LKAB historic holes and costeans) have been surveyed with DGPS. The 2014 drill holes were surveyed with conventional GPS (+/- 5 metres). Downhole surveys of the 2012 and 2014 drilling at nominal 4 metre increments was completed utilizing a DeviFlex downhole Gyro survey tool.

For further information, visit <u>www.talgaresources.com</u> or contact:

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Talga Resources Ltd

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#### References

1 http://www.techmetalsresearch.com/metrics-indices/tmr-advanced-graphite-projects-index/

2 JORC compliant Exploration Target details see ASX 26 February 2015. Note: Exploration Targets are based on a number of assumptions and limitations with the potential grade and quantity being conceptual in nature. There has been insufficient exploration to estimate a Mineral Resource Estimate in accordance with the JORC Code and it is uncertain if future exploration will result in the estimation of a Mineral Resource.

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

The information in this report that relates to Exploration Results and Exploration Targets is based on information compiled and reviewed by Mr Simon Coxhell, a consultant to the Company and a member of the Australian Institute of Mining and Metallurgy and Mr Mark Thompson, who is an employee of the Company and a member of the Australian Institute of Geoscientists. Mr Thompson and Mr Coxhell 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 Thompson and Mr Coxhell 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.

#### **APPENDIX 1**

2014 Vittangi exploration drilling results/ significant graphite intercepts\*.

Intersection **From** Hole ID Type\* (m) (m) (Graphite %Cg) NUN14001 14.7 41.2 27m @ 25.4% Cg HW NUN14002 76.6 84 7m @ 24.3% Cg HW 50 56 6m @ 26.7% Cg HW NUN14003 70 80 10m @ 21.9% Cg HW NUN14004 96 122 26m @ 18.2% Cg HW 47m @ 30.8% Cg 1 48 HW NUN14005 102 122 20m @ 14.4% Cg FW 52 HW 98 46m @ 31.4% Cg NUN14006 168 186 18m @ 19.9% Cg FW 54 58 4m @ 13.6% Cg FW NUN14007 62 66 4m @ 13.2% Cg FW 76 18m @ 26.9% Cg 26 32 6m @ 13.5% Cg FW NUN14008 38 44 6m @ 14.3% Cg FW 48 64 HW 16m @ 26.6% Cg 19.1 24 5m@ 36.4% Cg HW 36 48 12m @ 19.1% Cg HW NUN14009 52 70 18m@ 16.6% Cg FW 60 70 10m @ 13.4% Cg FW 50 58 8m @ 29.8% Cg HW NUN14010 78 86 8m @ 18.2% Cg FW

2014 Vittangi project diamond drill hole location and hole data.

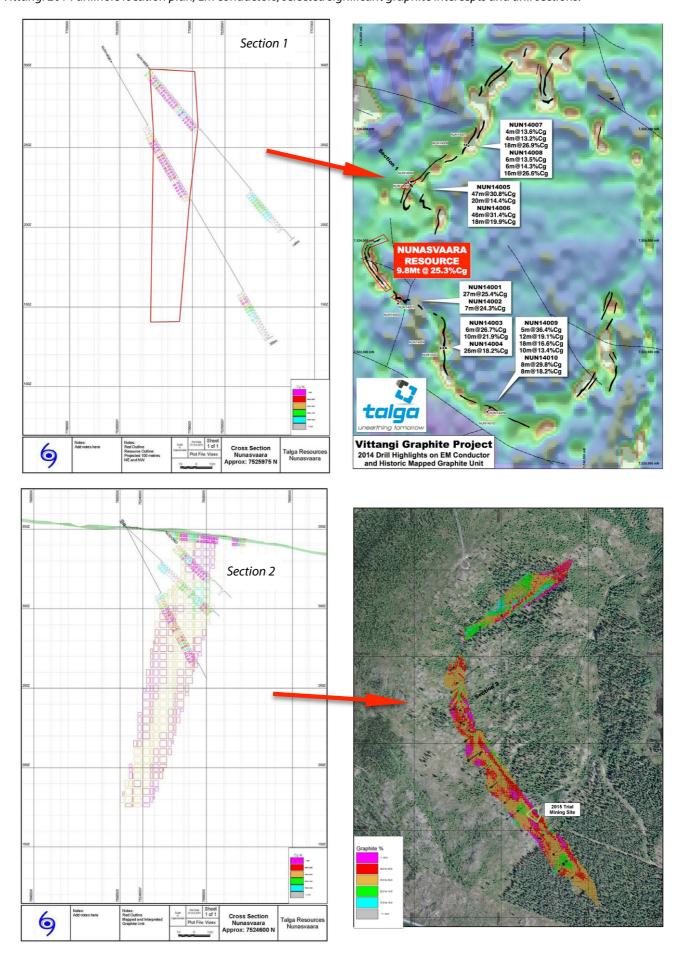
Hole ID	Easting (Sweref99)	Northing (Sweref99)	RL	Azi	Dip	EOH Depth (m)
NUN14001	770463	7523867	302	345	-60	68.1
NUN14002	770468	7523820	300	348	-60	103.0
NUN14003	771291	7523030	300	90	-60	101.0
NUN14004	771240	7523030	300	89	-50	130.4
NUN14005	770632	7525986	300	139	-50	140.0
NUN14006	770619	7526006	304	140	-60	200.0
NUN14007	771628	7526682	300	116	-50	80.0
NUN14008	771660	7526680	299	120	-60	73.2
NUN14009	772113	7521925	300	25	-50	100.0
NUN14010	772091	7521900	300	25	-60	95.7

<sup>\*</sup>Selected at 10%Cg cut-off and up to 2m internal dilution. Note: Interval lengths are rounded.

<sup>\*\*</sup> Hanging Wall Unit("HW"), Footwall Unit("FW").

**APPENDIX 2** 

Vittangi 2014 drillhole location plan, EM conductors, selected significant graphite intercepts and drill sections.



#### **APPENDIX 3**

#### **Talga JORC Resource Inventory**

Nunasvaara Mineral Resource (10% Cg low cut-off, May 2016)

Project	Classification	Tonnes	Graphite (%Cg)	Contained Graphite Tonnes
	Indicated	6,900,000	24.2	1,669,800
Vittangi	Inferred	2,900,000	28.1	814,900
	Total	9,800,000	25.3	2,403,500

#### Jalkunen Mineral Resource (10% Cg low cut-off, Aug 2015)

Project	Classification	Tonnes	Graphite (%Cg)	Contained Graphite Tonnes
Jalkunen	Inferred	31,500,000	14.9	4,693,500

Raitajärvi Mineral Resource\* (5% Cg low cut-off Aug 2013)

Project	Classification	Tonnes	Graphite (%Cg)	Contained Graphite Tonnes
	Indicated	3,400,000	7.3	
Raitajärvi	Inferred	900,000	6.4	
	Total	4,300,000	7.1	305,300

<sup>\*</sup> 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.

# APPENDIX 4 Talga JORC exploration targets<sup>2</sup>

Project	Exploration Target	Lengt	th (m)	Width (m)	Tonr (0-100m			ohite Cg)
		Min.	Max.		Min.	Max.	Min.	Max.
	Nunasvaara	12,000	18,000	20	62,400,000	93,600,000	20	30
Vittangi	Kotajärvi	3,200	5,800	20	16,640,000	30,160,000	20	25
	Maltosrova	4,000	10,000	20	20,800,000	52,000,000	20	25
	Tiankijokki	500	1,000	20	2,600,000	5,200,000	15	25
lalkunan	Nybrännan	1,000	2,000	20	5,200,000	10,400,000	20	30
Jalkunen	Suinavaara	500	1,100	20	2,600,000	5,720,000	15	25
	Lautakoski	5,000	10,000	20	26,000,000	52,000,000	15	25
			•	TOTAL:	136,240,000	249,080,000	19	27
			ROL	INDED:	136,000,000	250,000,000	18	25

2 JORC compliant Exploration Target details see ASX 26 February 2015. Note: Exploration Targets are based on a number of assumptions and limitations with the potential grade and quantity being conceptual in nature. There has been insufficient exploration to estimate a Mineral Resource Estimate in accordance with the JORC Code and it is uncertain if future exploration will result in the estimation of a Mineral Resource.

#### **JORC Code 2012 Edition**

## **Section 1 Sampling Techniques and Data**

Criteria	JORC Code explanation	Commentary
Sampling techniques	<ul> <li>Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as downhole 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. 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 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.</li> </ul>	<ul> <li>Diamond drillholes were sampled based on observed graphite mineralisation.</li> <li>Historic drillholes, WL56 with core diameter of 39mm were half-cut and sampled over 2m intervals. Samples were assayed for carbon via an IR-detector and sulphur and trace elements via an unknown method.</li> <li>Talga drillholes WL66 with core diameter of 50.5mm were quarter-cut and sampled over 1m intervals (approx. 3kg/sample). A total of 48 elements were analysed via ICP following 4-acid digest. Graphitic carbon was analysed via ALS-Chemex method C-IR18 (Graphitic Carbon via Leco).</li> </ul>
Drilling techniques	Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, 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.).	<ul> <li>Historic drillholes, WL56 conventional diamond drilling with core diameter of 39mm. Core not oriented.</li> <li>Talga drillholes, WL66 conventional diamond drilling with core diameter of 50.5mm. Core not orientated.</li> </ul>
Drill sample recovery	<ul> <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> <li>For historic drillholes, core recovery was recorded by the geologists logging the core.</li> <li>For Talga drillholes, core recoveries are logged and recorded in a database. In general excellent recoveries (&gt;95% returned).</li> <li>Careful drilling techniques in areas of broken ground are employed with communication between the geologist and drillers to maximise the understanding and recovery.</li> <li>Insufficient data is available, but given the nature of the competent diamond core, no sample bias expected.</li> </ul>
Logging	<ul> <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> <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>	<ul> <li>For historic drillholes, geological logging was conducted to a reasonable standard noting alteration, structures, lithology, mineralisation and core loss.</li> <li>For Talga drillholes, geological logging of diamond core captures lithology, mineralogy, mineralisation and structural observations. Core is photographed in both wet and dry states.</li> <li>Diamond core logging is primarily a qualitative activity with pertinent relevant features recorded: lithology, mineralogy, mineralogy, mineralisation, structural, weathering, alteration, colour and other features of the samples.</li> <li>All samples were logged.</li> </ul>

Criteria	JORC Code explanation	Commentary
Sub-sampling techniques and sample preparation	<ul> <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 subsampling 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/secondhalf sampling.</li> <li>Whether sample sizes are appropriate to the grain size of the material being sampled.</li> </ul>	<ul> <li>For historical drillholes, core was half-cut, prepared into nominal 2 metre composite samples. Samples were assayed for sulphur and trace elements via an unknown method at LKAB's laboratory in Malmberget. Carbon was assayed via an IR-detector at SSAB's laboratory in Luleå. No other information regarding sample preparation or quality control procedures in known. Check assaying of two historical LKAB cores showed &lt;0.3%C variation to historical LKAB cores showed &lt;10.3%C variation to historical data.</li> <li>For Talga drillholes, core was cut in quarter, prepared into nominal 1 metre composite samples, with an average weight of 3-3.5 kilogram.</li> <li>The sample preparation for all samples follows industry best practice and was undertaken by ALS in Sweden. The samples are dried and pulverised to produce a sub sample for analysis. Sample preparation involving oven drying, coarse crushing, followed by total pulverisation LM2 grinding mills to a grind size of 85% passing 75 microns.</li> <li>QC for sub sampling follows ALS procedures, and is reviewed by the company. In addition blanks and standards (1:30) are inserted into the sample runs, on a blind basis.</li> <li>No field duplicates have been taken.</li> <li>The sample sizes are considered to be appropriate to correctly represent the style of mineralisation.</li> </ul>
Quality of assay data and laboratory tests	<ul> <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> <li>For historical drillholes, the exact method used to determine sulphur and multi-element analyses is not known so no comment can be made as it its appropriateness. For carbon analysis it was noted that an IR-detector was utilized; whilst there is no other information other than the type of detector, IR-detectors are still industry standard for carbon analysis today and as such the method used historically is considered appropriate.</li> <li>For Talga drillholes, the laboratory (ALS) uses a four acid digest multi-element suite with an ICP/MS and ICP/AES finish on a 25 gram sub sample. Both total carbon and graphitic carbon are analyzed. The technique is considered a total digest and analysis.</li> <li>No geophysical tools were used to determine any element concentrations.</li> <li>Laboratory QA/QC involves the use of internal lab standards using certified reference material, blanks, splits and duplicates as part of the in house procedures. Blind blanks and standards are inserted by the company at a rate of 1:30.</li> <li>Lab repeat or duplicate analysis for samples shows that the precision of samples is within acceptable limits.</li> <li>Grind size checks by the laboratory (1:25) reveals all samples have a grind size of &lt;75micron.</li> </ul>
Verification of sampling and assaying	<ul> <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> <li>The Company's Managing Director Mr. Mark         Thompson has visually reviewed the diamond core         samples and correlated results with the geology. The         author of the current MRE, independent consultant         Mr. Simon Coxhell has also visually reviewed the         diamond core samples and correlated results with the         geology.</li> <li>No twin holes have been drilled.</li> <li>Data captured on logging sheets and transferred to a         series of excel spreadsheets, prior to import into         Micromine and merging of electronic sample         analytical result data.</li> <li>No adjustments or calibrations were made to any         assay data used in this report.</li> </ul>

Criteria	JORC Code explanation	Commentary
Location of data points	<ul> <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> <li>All drillholes (historic and Talga) have been located by GPS. For Talga drillholes, downhole surveys are captured using the Deviflex downhole system with readings captured every 3 metres.</li> <li>The grid system is Swedish Coordinate System Sweref 99, which correlates with WGS84 Z 34 Northern Hemisphere.</li> <li>Topographic control is based on a detailed DTM over the project site.</li> </ul>
Data spacing and distribution	<ul> <li>Data spacing for reporting of Exploration Results.</li> <li>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.</li> <li>Whether sample compositing has been applied.</li> </ul>	<ul> <li>Drill hole spacing is varied but is typically at 50m profile spacing. See attached plans, cross sections and tables.</li> <li>The drilling combined with trial mining, trenching, rock chip sampling of outcropping ore and detailed electromagnetic (EM) geophysical data show and confirm excellent continuity of the stratigraphic graphite unit. The drillhole spacing at Nunasvaara has allowed for a JORC-compliant Indicated and Inferred Mineral Resource Estimate (MRE) to be completed.</li> <li>For historical drillholes, 2 metre sample composites were applied.</li> <li>For Talga drillholes regular 1 metre samples have been collected from the diamond drilling and submitted for analysis.</li> </ul>
Orientation of data in relation to geological structure	<ul> <li>Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.</li> <li>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.</li> </ul>	<ul> <li>The orientation is considered appropriate for the sampling completed, with the drill holes drilled perpendicular to the interpreted strike of the geological units and graphite mineralisation.</li> <li>No sample bias as a consequence of orientation based sampling has been identified.</li> </ul>
Sample security	The measures taken to ensure sample security.	<ul> <li>For historia drillholes, sample security measures are not known.</li> <li>For Talga drillholes, sample chain of custody is managed by the Company.</li> <li>Samples are transported to the laboratory via registered couriers with samples safely consigned to ALS for preparation and analysis.</li> <li>Whilst in storage, they are kept in a locked yard. Tracking sheets are used to track the progress of batches of samples.</li> </ul>
Audits or reviews	The results of any audits or reviews of sampling techniques and data.	No review of the data management system has been carried out.

## **Section 2 Reporting of Exploration Results**

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	<ul> <li>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.</li> <li>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.</li> </ul>	<ul> <li>The Nunasvaara Graphite Project is located on licences Nunasvaara nr 2, Vittangi nr 2 and Vittangi nr 3 owned 100% by the Company's Swedish subsidiary, Talga Mining Pty Ltd Filial Sweden. The current MRE for Nunasvaara is located entirely on licence Nunasvaara nr 2.</li> <li>The licences are wholly owned by the Company and are located in forested areas. The area is used for seasonal grazing by local indigenous Sami reindeer herders. The Natura 2000 registered Torne River is located approximately 1km to the south of the current MRE for Nunasvaara.</li> <li>The licence is in good standing with no known impediments.</li> </ul>
Exploration done by other parties	Acknowledgment and appraisal of exploration by other parties.	Graphite was first identified at Nunasvaara in the early 1900's and has been extensively explored since that time. In the early 1980's LKAB completed diamond drilling and test mining at Nunasvaara. More recently the area has been explored by Anglo American and Teck Cominco for copper and base metals prospectivity.
Geology	Deposit type, geological setting and style of mineralisation.	<ul> <li>The mineralisation at Nunasvaara is sub-vertical, 20-50m wide lithologically continuous unit of very fine grained, dark-grey to black graphite containing 10-45% graphitic carbon. The hangingwall is comprised of volcanoclastics and tuffacous units and the footwall to the mineralisation is a mafic intrusive. The graphite units are regionally extensive over many kilometres and are interpreted to have developed in a shallow fresh water basin in the early Proterozoic (Circa 1.8 billion years). Subsequent deformation, possibly related to domal intrusive bodies have metamorphosed and tilted the units to the sub-vertical orientations present today.</li> <li>The graphite at Nunasvaara is very fine grained highly crystalline flake and very high grade. A study of the ore by CSIRO found the graphite flakes to be homogenously distributued through the ore matrix with intrusions of coarse-grained vein graphite. Metallurgical testwork completed by the Company shows graphite and graphene products can be produced with average particle length &lt;15 micron.</li> </ul>
Drill hole Information	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:  a 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.  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.	<ul> <li>Drill hole locations used in the current MRE are shown in the figures and tables in the text of the report. Appropriate maps and plans also accompany this announcement.</li> <li>Trenching at Nunasvaara completed by LKAB comprises 12 costeans for 414m.</li> <li>Drilling at Nunasvaara completed by LKAB comprises 20 diamond drillholes for a total of 1949m.</li> <li>Drilling at Nunasvaara completed by Talga comprises 19 holes for a total of 1697m completed in 2012 and 10 holes for a total of 1091m completed in 2014.</li> </ul>
Data aggregation methods	<ul> <li>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.</li> <li>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.</li> <li>The assumptions used for any reporting of metal equivalent values should be clearly stated.</li> </ul>	<ul> <li>Drillholes were not composited</li> <li>For the current MRE a nominal lower cut of 10% Graphitic carbon (Cg) has been used.</li> <li>No top cuts have been applied to the current MRE.</li> <li>No metal equivalent values have been used in the current MRE.</li> </ul>

Criteria	JORC Code explanation	Commentary
Relationship between mineralisation widths and intercept lengths	<ul> <li>These relationships are particularly important in the reporting of Exploration Results.</li> <li>If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.</li> <li>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').</li> </ul>	The orientation or geometry of the mineralised zone at Nunasvaara is well understood. All drillholes used in the current MRE have been drilled perpendicular to the strike of the mineralisation.
Diagrams	<ul> <li>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.</li> </ul>	<ul> <li>The appropriate plans and sections have been included in the text of this document.</li> </ul>
Balanced reporting	<ul> <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> <li>All grades above a nominal 10% Graphitic carbon have been reported.</li> </ul>
Other substantive exploration data	<ul> <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> <li>A substantial amount of work has been completed at Nunasvaara by both historic explorers and since 2012 by Talga. Work has included geophysical surveys, rock chip sampling, MMI soil sampling, trenching, diamond drilling, metallurgical testwork and trial mining. Baseline environmental surveys at Nunasvaara are currently ongoing.</li> </ul>
Further work	<ul> <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> <li>Further trial mining is scheduled for July-October 2016-17. Diamond drilling has also been scheduled for July-October 2016 and will test the northern extension of the graphite unit at Nunasvaara. Metallurgical and process testwork at the Company's German test facility is ongoing.</li> </ul>

# **Section 3 Estimation and Reporting of Mineral Resources**

Criteria	JORC Code explanation	Commentary
Database integrity	<ul> <li>Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.</li> <li>Data validation procedures used.</li> </ul>	<ul> <li>Data was imported from excel files as validated and cross checked with drillhole logs/surveys/assays/collars. These were digitally imported into Micromine Mining Software. Micromine validation routines were run to confirm validity of all data.</li> <li>Analytical results have all been electronically merged to avoid any transcription errors.</li> </ul>
Site visits	<ul> <li>Comment on any site visits undertaken by the Competent Person and the outcome of those visits.</li> <li>If no site visits have been undertaken indicate why this is the case.</li> </ul>	<ul> <li>The author of the current MRE, Mr. Simon Coxhell has completed numerous site visits and has reviewed the drilling techniques and sampling methods employed by the Company. Mr. Coxhell has also viewed and logged historical drillcore to verify the graphite mineralisation reported by LKAB.</li> </ul>
Geological interpretation	<ul> <li>Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.</li> <li>Nature of the data used and of any assumptions made.</li> <li>The effect, if any, of alternative interpretations on Mineral Resource estimation.</li> <li>The use of geology in guiding and controlling Mineral Resource estimation.</li> <li>The factors affecting continuity both of grade and geology.</li> </ul>	<ul> <li>The confidence in the geological interpretation at Nunasvaara is high given the detailed diamond drilling completed, historic trenches, trial mining and detailed EM geophysical surveys highlighting the conductive graphitic unit.</li> <li>In areas where the drillhole spacing is &gt;50m EM and rock chip sampling of mineralized outcrop has been use to aid in extrapolation of the ore.</li> <li>Geological boundaries are determined by the spatial locations of the various mineralized zones as logged and assayed in diamond drilling, coupled to interpretation of detailed EM data.</li> <li>Graphite rich zones are clearly associated with conductive anomalies in the EM data.</li> </ul>
Dimensions	<ul> <li>The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.</li> </ul>	The Nunasvaara MRE is 900 metres long by 80 metres wide and has been estimated to a maximum of 200 metres vertical depth.
Estimation and modelling techniques	<ul> <li>The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.</li> <li>The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.</li> <li>The assumptions made regarding recovery of byproducts.</li> <li>Estimation of deleterious elements or other nongrade variables of economic significance (eg sulphur for acid mine drainage characterisation).</li> <li>In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.</li> <li>Any assumptions behind modelling of selective mining units.</li> <li>Any assumptions about correlation between variables.</li> <li>Description of how the geological interpretation was used to control the resource estimates.</li> <li>Discussion of basis for using or not using grade cutting or capping.</li> <li>The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.</li> </ul>	<ul> <li>Grade Estimation using Inverse Distance Squared applied to a block model was used for the Inferred Mineral Resources. Two Wireframes were used to subset and constrain the data points used in the interpolation and only individual grades from individual wireframes were used.</li> <li>All of the Inferred Mineral Resources are based on the mean grade of the various elements lying within a validated wireframed solid.</li> <li>A previous historic non-JORC compliant resource was made by LKAB and is consistent with this latest estimate given the drilling at the time.</li> <li>No assumptions have been made regarding recovery of by-products.</li> <li>No estimation of any deleterious elements have been made.</li> <li>The block model was constructed using a 5m X 5m x 5m block size, constrained by two individual wireframes.  One interpolation passes were made, with a 120m X 100 m X 4 m (Y, X, Z) search orientated parallel to the azimuth and dip of the mineralized zone (no plunge component assumed) to ensure all portions of the wireframe were filled.</li> <li>Geological interpretation of a consistent steep west dipping lithological graphite rich unit shallow dipping vein structure (20-50 metres true thickness, dipping at 75-80 degrees to the west).</li> <li>Visual validation of comparing block grades with drill hole assay values, via cross sections, plans and long sections was completed.</li> </ul>
Moisture	<ul> <li>Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.</li> </ul>	Tonnages are estimated on a dry basis.
Cut-off parameters	<ul> <li>The basis of the adopted cut-off grade(s) or quality parameters applied.</li> </ul>	<ul> <li>A nominal cut off 10% Graphitic carbon corresponds with the visual mineralization as determined by visual graphite lithologies.</li> </ul>

Criteria	JORC Code explanation	Commentary
Mining factors or assumptions	Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.	<ul> <li>The mining scenario if the deposit is shown to be economically viable would be a simple open pit mine. In 2015 the Company completed trial open pit mining at Nunasvaara and extracted approximately 200m³ of material as quarried whole blocks via diamond saw and cable cutting, demonstrating quarry techniques are a viable open pit mining option with minimal dilution.</li> </ul>
Metallurgical factors or assumptions	The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.	<ul> <li>Representative samples have been collected from both historic and Talga drillholes to conduct preliminary metallurgical testwork.</li> <li>In 2015 the Company completed trial mining at Nunasvaara and extracted approximately 200m³ of material for additional metallurgical testwork at the Company's German test facility.</li> <li>Recent results from the testwork have shown that the Company's propriatory processing technology can produce graphite and graphene products.</li> </ul>
Environmen-tal factors or assumptions	Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.	<ul> <li>No assumptions at this stage in regards to environmental factors have been made but there is ample space and suitable topography for development.</li> <li>Similarly the Company's propriatory processing technology utilises no major chemical inputs and the processing methods being developed and considered by the Company are not likely to pose an environmental threat at Nunasvaara.</li> </ul>
Bulk density	Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.      The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.      Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.	An insitu bulk density of 2.60 tonnes per cubic metre has been assumed for the mineralisation. This is the average of 62 ISBD measurements made on the drillcore samples. The results ranged from 1.81-3.25t/bcm with a mean value of 2.65t/bcm.
Classification	<ul> <li>The basis for the classification of the Mineral Resources into varying confidence categories.</li> <li>Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).</li> <li>Whether the result appropriately reflects the Competent Person's view of the deposit.</li> </ul>	<ul> <li>The MRE for Nunasvaara contains resources classified as both Indicated and Inferred. In the main part of the orebody where data density and consequently geological confidence is highest the MRE has been classified as Indicated. In the southern part of the orebody the MRE has been classified as Inferred due to the wider drill spacing completed to date.</li> <li>Additional diamond drilling at closer spacing (from ≥100m to ≤50m will likely result in the Inferred Resource being upgraded to Indicated assuming exploration success.</li> <li>The results of the current MRE for Nunasvaara</li> </ul>
Audits or reviews	The results of any audits or reviews of Mineral	reflects the view of the Competent Person.  • This is the first JORC 2012 Resource Estimate for

Criteria	JORC Code explanation	Commentary
Discussion of relative accuracy/ confidence	<ul> <li>Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.</li> <li>The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.</li> <li>These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.</li> </ul>	<ul> <li>The relative accuracy of the MRE is reflected in the reporting of the MRE as per the guidelines of the 2012 JOC Code.</li> <li>The statement relates to global estimates of tonnes and grade.</li> </ul>