# MINERAL RESOURCE ESTIMATE FOR THE RÖNNBÄCKEN NICKEL PROJECT, SWEDEN

Report prepared under the Guidelines of National Instrument 43-101 and accompanying documents 43-101.F1 and 43-101.CP

**Report Prepared for:** 

# **IGE NORDIC AB**

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**Report Prepared by** 



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**APRIL 2010** 

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#### **APRIL 2010**

#### Effective Date:

21<sup>st</sup> April 2010

# **Executive Summary**

This report has been prepared for IGE Nordic AB (IGE) and made compliant with the National Instrument 43-101 (NI43-101). The author's scope of work for this document has been to produce a Mineral Resource Estimate of the Rönnbäcknäset and Vinberget deposits owned by IGE. The two assets form part of the Rönnbäcken Nickel Project (the Project).

The author's report serves as an independent report prepared by Mr Johan Bradley (CGeol FGS, EurGeol), Mr Howard Baker (MAusIMM) and reviewed by Dr Mike Armitage (CGeol FGS, CEng MIoM3). Mr Johan Bradley is a Qualified Person as defined by the Canadian National Instrument 43-101 and the companion policy 43-101CP in regard to the geology and style of mineralisation under investigation and Mr Howard Baker is a Qualified Person as defined by the Canadian National Instrument 43-101 and the companion policy 43-101CP in regard to the mineral Resource Estimation techniques and compilation of the Mineral Resource Statement.

The definitions of Measured, Indicated and Inferred Resources, as well as reserves as used by the author, conform to the definitions and guidelines of the CIM (Canadian Institute of Mining, Metallurgy and Petroleum) reporting codes.

A personal inspection was carried out by Mr Johan Bradley on 15<sup>th</sup> March, 2010 and 29<sup>th</sup> March, 2010, to assess the validity of the data provided by IGE, and to inspect the area under investigation. The Rönnbäcken Nickel Project is located 25 km south-southeast of Tärnaby, Storuman Municipality, Västerbotten County. The Rönnbäcken K nr 1 mining permit application is on Vinberget on the mainland south of Lake Gardiken. The Rönnbäcken K nr 2 mining permit application is located in what now is an island, Rönnbäcksnäset, in Lake Gardiken. The island was created in 1963 when a hydro power station was built and raised the water levels. The properties are centred at approximately:

- RT 90 2.5 gon v; 148200E, 726600N
- SWEREF 99 lat long (WGS84); north latitude 65°29'43"; west longitude 15°24'58"

The data used for the Mineral Resource Estimation, including drillhole databases and topographic surveys, was provided by IGE. Other sources of information are referenced throughout the document.

The data used in the estimation and the associated quality control quality assurance (QAQC) data was given from IGE to SRK. It is the opinion of SRK that the results of the certified standard used and the results of the blanks, duplicates, coarse reject duplicates and inter-laboratory duplicates show that a reasonable level of confidence can be attributed to the drill samples used in the Mineral Resource Estimate.

Mineralization in the project area is hosted by serpentines in Alpine-type ultramafic rocks, considered to be tectonically displaced from the mantle into the crust. Nickel-sulphides in the serpentinites are of epigenetic origin, having formed during the release of nickel from olivine through a process of alteration and serpentinization of the precursor dunite and peridotites rocks.

The purpose of the Project is to locate mineralization that can be recovered by established metallurgical methods, i.e., flotation of sulphide minerals. The adapted assay technique is partial-leach that selectively dissolves nickel in sulphides and leaves the nickel bearing silicates and oxides

unaffected. As the sulphur content is low, analyses of sulphur must be performed by methods with low detection limits, better than or equal to 0.01% S.

As the selective nickel leaching technique is not an accredited method for assaying nickel in sulphides, other accepted methods were included in the assay package such as Aqua Regia leach and Near Total Four Acid Leach. To support the values of the grades of nickel in sulphides, mineralogical studies and metallurgical tests were carried out by IGE.

SRK created a geological model of the host serpentinite body for the Rönnbäcksnäset and Vinberget deposits. Based on a statistical review of the validated drillhole data, SRK generated a low and high grade serpentinite domain for the Rönnbäcksnäset deposit and a single serpentinite domain for the Vinberget deposit. The Rönnbäcksnäset deposit also includes internal waste domains and internal mafic domains.

A 2m composite file was used in a geostatistical study (Variography and Quantitative Kriging Neighbourhood Analysis - QKNA) that enabled Ordinary Kriging (OK) to be used as the interpolation method. The results of the variography and the QKNA were utilised to determine the most appropriate search parameters.

The interpolated block model was validated through visual checks and a comparison of the mean composite and block grades. SRK is confident that the interpolated grades are a reasonable reflection of the available sample data.

The Mineral Resource Statement generated by SRK has been restricted to all classified material falling within the Whittle shell representing a metal price of 9 US\$/ lb and using a marginal cut off grade of 0.048% Ni-AC. Processing costs, mining costs, slope angles, mining recoveries and revenue assumptions were also used to demonstrate economic viability. The material within the Whittle shell represents the material which SRK considers has reasonable prospect for eventual economic extraction potential based on the above Whittle optimisation analysis. Table 1 shows the resulting Mineral Resource Statement for Rönnbäcksnäset and Vinberget. The statement has been classified by Qualified Person Howard Baker (MAusIMM) in accordance with the Guidelines of National Instrument 43-101 and accompanying documents 43-101.F1 and 43-101.CP. It has an effective date of 21<sup>st</sup> April, 2010.

DEPOSIT	CLASSIFICATION	TONNES (Mt)	Ni-Total %	Ni-AC %	Co-AC %	Ni-AC Tonnes
	Measured	-	-	-	-	-
Rönnbäcksnäset	Indicated	206.6	0.178	0.104	0.003	214
	Measured + Indicated	206.6	0.178	0.104	0.003	214
	Measured	28.2	0.188	0.132	0.006	37
Vinberget	Indicated	22.4	0.183	0.134	0.006	30
	Measured + Indicated	50.6	0.186	0.133	0.006	67
	Measured	28.2	0.188	0.132	0.006	37
TOTAL	Indicated	228.9	0.179	0.107	0.003	244
	Measured + Indicated	257.1	0.180	0.110	0.004	282
Rönnbäcksnäset	Inferred	76.9	0.176	0.100	0.003	77
Vinberget	Inferred	6.6	0.183	0.138	0.007	9
Total	Inferred	83.5	0.177	0.103	0.003	86

#### Table 1: Mineral Resource Statement using a marginal cut off grade of 0.048% Ni-AC

Note: Mineral resources which are not mineral reserves do not have demonstrated economic viability

In total, Rönnbäcksnäset and Vinberget have a combined Measured and Indicated resource of 257.1 Mt grading 0.180 Ni-Total, 0.110% Ni-AC and 0.004% Co-AC. Of this, 28.2 Mt grading 0.188% Ni-Total, 0.132% Ni-AC and 0.006% Co-AC is in the Measured category and 228.9 Mt grading 0.179% Ni-Total, 0.107% Ni-AC and 0.003% Co-AC is in the Indicated category. In addition to the Measured and Indicated resources, 83.5 Mt grading 0.103% Ni-AC and 0.003% Co-AC is in the Inferred category.

The quantity and grade of reported inferred resources in this estimation are uncertain in nature and there has been insufficient exploration to define these inferred resources as an indicated or measured mineral resource; and it is uncertain if further exploration will result in upgrading them to an indicated or measured mineral resource category.

In addition to the Mineral Resource Statement as quoted above there is an additional 1.8 Mt of material that falls within the Whittle pit shell at Rönnbäcksnäset that is currently unclassified due to the lack of exploration assay data. This material, based on a metal price of 9 US\$/lb is considered by SRK to be potentially economic, should sufficient exploration data be collected that confirms the geometry and continuation of the orebody and that enables a classified resource to be generated.

The Whittle optimisation was also run at Rönnbäcksnäset to include all unclassified material and to highlight the down dip potential should future exploration drilling confirm the down dip extension to the mineralisation. It is the opinion of SRK that an additional tonnage of between 40 and 80 Mt exists at the Rönnbäcksnäset deposit, when applying a metal price of 9 US\$/lb to the optimisation and assuming future exploration drilling succeeds in intersecting the mineralised serpentinite body.

The Mineral Resource Estimate has not been affected by any known environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.

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Appendix 1: VARIOGRAPHY DATA

Appendix 2: QUALITY ASSURANCE AND QUALITY CONTROL (QAQC)



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Our ref: P:\SE333 Rönnbäcken Resource Estimate\Project\Final Report\Rönnbäcken Res Est\_April 2010\_final.docx April 2010

# MINERAL RESOURCE ESTIMATE FOR THE **RÖNNBÄCKEN NICKEL PROJECT, SWEDEN**

#### 1 INTRODUCTION

This report has been prepared for IGE Nordic AB (IGE) and made compliant with the National Instrument 43-101 (NI43-101). The author's scope of work for this document has been to produce a Mineral Resource Estimate of the Rönnbäcknäset and Vinberget deposits owned by IGE. The two assets form part of the Rönnbäcken Nickel Project (the Project).

The author's report serves as an independent report prepared by Mr Johan Bradley (CGeol FGS, EurGeol), Mr Howard Baker (MAusIMM) and reviewed by Dr Mike Armitage (CGeol FGS, CEng MIoM3). Mr Johan Bradley is a Qualified Person as defined by the Canadian National Instrument 43-101 and the companion policy 43-101CP in regard to the geology and style of mineralisation under investigation and Mr Howard Baker is a Qualified Person as defined by the Canadian National Instrument 43-101 and the companion policy 43-101CP in regard to the Mineral Resource Estimation techniques and compilation of the Mineral Resource Statement.

A personal inspection was carried out by Johan Bradley, to assess the validity of the data provided by IGE, and to inspect the area under investigation.

The definitions of Measured, Indicated and Inferred Resources as used by the authors, conform to the definitions and guidelines of the CIM (Canadian Institute of Mining, Metallurgy and Petroleum) reporting codes.

The data used for the Mineral Resource Estimation, including drillhole databases and topographic surveys, was provided by IGE. Other sources of information are referenced throughout the document.

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### 2 RELIANCE ON OTHER EXPERTS

Sections 3 to 12 of this report are mainly extracts from the IGE report entitled Technical Report On The Preliminary Assessment Of Rönnbäcken Nickel Project, Sweden, dated 6 November 2009, which was prepared by the authors Jason J. Cox, Wayne W. Valliant, and Kevin C. Scott of Scott Wilson Roscoe Postle Associates Inc. on behalf of IGE.

The opinions and conclusions presented in the Scott Wilson Preliminary Assessment report are based largely on information and technical reports provided to the authors (Jason J. Cox, Wayne W. Valliant, and Kevin C. Scott), by IGE and its consultants. Some of the data used in the report were not within the control of the authors or IGE. It is believed by the previous authors, that the information contained herein is reliable under the conditions and subject to the qualifications set forth in the report.

### **3 PROPERTY, LOCATION & DESCRIPTION**

The Rönnbäcken Nickel Project is located 25 km south-southeast of Tärnaby, Storuman Municipality, Västerbotten County, as illustrated in Figure 3-1. The Rönnbäcken K nr 1 mining permit application is on Vinberget on the mainland south of Lake Gardiken. The Rönnbäcken K nr 2 mining permit application is located in what now is an island, Rönnbäcksnäset, in Lake Gardiken. The island was created in 1963 when a hydro power station was built and raised the water levels. The properties are centred at approximately:

- RT 90 2.5 gon v; 148200E, 726600N
- SWEREF 99 lat long (WGS84); north latitude 65°29'43"; west longitude 15°24'58"

#### 3.1 **Property Description**

The Project currently comprises three discrete deposits; Rönnbäcksnäset, Vinberget and Sundsberget. The Vinberget deposit is located within the Rönnbäcksjön nr 1 exploration licence and is covered by the Rönnbäcken K nr 1 exploitation concession application. The Rönnbäcksnäset deposit is surrounded by Rönnbäcksjön exploration licences nr 3, nr 4, and nr 6 and covered by the Rönnbäcken K nr 2 exploitation concession application. The Sundsberget exploration area is located within the Rönnbäcksjön nr 7 exploration licence. Exploration at Sundsberget is at an early stage and is not discussed in this report.



Figure 3-1: Rönnbäcken property location map



Figure 3-2: Rönnbäcken exploitation concession applications and exploration licences

### 3.2 Property Ownership

There are four types of licence necessary to bring a mine from exploration to production in Sweden. These are: exploration licences, followed by mining concessions (or exploitation licences), environmental permits (for rights to water supply and waste management), and building permits (for building infrastructure). For the purpose of this Mineral Resource Estimate, the exploration licences and exploitation concessions in application are all that are required to have permission and surface rights to the properties in question.

The exploration licences that comprise the Rönnbäcken project area are 100%-owned by IGE Nordic AB, a wholly-owned subsidiary of IGE Resources AB. The licences are not subject to any encumbrances, royalties or other obligations.

The Rönnbäcken property consists of six granted exploration licences (Rönnbäcksjön nr 1 and Rönnbäcksjön nr 3 to nr 7), totalling 3,445 ha. Exploration licences are granted initially for three years, with possible extensions of up to 15 years. Annual fees for the first three year period are SEK 4, SEK 6, and SEK 10 per hectare in each successive year. Table 3-1 summarizes the status of the Project exploration licences.

Exploration Licence Number	Licence Name	Grant Date	Expiry Date	Area (ha)
134-2005	Rönnbäcksjön nr 1	2005-08-01	2011-08-01	400
339-2007	Rönnbäcksjön nr 3	2007-12-11	2010-12-11	72
340-2007	Rönnbäcksjön nr 4	2007-12-11	2010-12-11	642
104-2009	Rönnbäcksjön nr 5	2009-06-11	2012-06-11	342
126-2009	Rönnbäcksjön nr 6	2009-06-25	2012-06-25	1683
161-2009	Rönnbäcksjön nr 7	2009-10-01	2012-10-01	306

Table 3-1: Exploration licence summary table

Applications for exploitation concessions for Vinberget (Rönnbäcken K nr 1) and Rönnbäcksnäset (Rönnbäcken K nr 2) were submitted by IGE Nordic AB to the Swedish Mining Inspector on 12<sup>th</sup> February 2010, see Figure 3-2 above. An exploitation concession (Bearbetningskoncession) gives the holder the right to exploit a proven, extractable mineral deposit for a period of 25 years, which may be prolonged. The exploitation concession is the next step in mine permitting after the granting of an exploration licence. IGE estimate the processing time for a decision on the exploitation concessions to be in the region of 4-6 months.

Table 3-2: Exploitation	concession	summary	details
-------------------------	------------	---------	---------

Exploitation Licence Name	Application Date	Status	Area (ha)
Rönnbäcken K nr 1	2010-02-12	Application	49.0
Rönnbäcken K nr 2	2010-02-12	Application	195.75

There is no requirement to legally survey the boundaries of exploitation permits in Sweden; instead they are assigned Swedish RT90 coordinates by the Inspector of Mines on granting. Coordinates, in the Swedish RT90 system, for the exploitation concessions under application are presented in Table 3-3 below.

Exploitation Licence Name	Vertex	Northing	Easting
Rönnbäcken K nr 1	1	7262350	1483700
	2	7262350	1484400
	3	7263050	1484400
	4	7263050	1483700
	1	7268250	1479675
	2	7268250	1480450
Rönnbäcken K nr 2	3	7268150	1480450
	4	7268150	1480650
	5	7269200	1481000
	6	7269000	1481600
	7	7267300	1481000
	8	7267300	1479675

# Table 3-3: Exploitation concession vertices as applied for by IGE Nordic AB, 2010-02-12 (Projection RT 90 2.5 gon v)

Figure 3-2 indicates a gap between the exploitation concession application Rönnbäcken K nr 2 and the surrounding exploration licences held by IGE. SRK note that according to Swedish Mining Law, an area extending 1km in all directions from the boundaries of the exploitation concession prohibits the application of additional exploration licences in the area. In the event that the Rönnbäcken K nr 2 exploitation concession application is refused, a pending IGE exploration licence application over the same area would be given preference to any other eventual competing applications. As such, SRK consider it reasonable to assume that IGE will maintain exclusive tenure over the Project area.

Figure 3-3 shows the licences discussed above in relation to the resource pit, as defined by SRK. Figure 3-3 clearly demonstrates that the modelled mineralisation lies within the licence boundary. The resource pit does not represent the final engineered pit, it is a shell to constrain the resources based on an optimistic nickel price.



Figure 3-3: SRK pit shells and licence boundaries

#### 3.3 Additional Permits and Payments

SRK is not aware of any royalties, back-in-rights, payments or any other agreements associated with the Rönnbäcken project. Any future payments will be negotiated at the commencement of mining activity.

SRK is not aware of any environmental liabilities associated with the Rönnbäcken project.

## 4 ACCESSIBILITY, CLIMATE, INFRASTRUCTURE

#### 4.1 Property Access

#### 4.1.1 International Access

The nearest airport is Hemavan Tärnaby Airport in Hemavan, 15 km northwest of Tärnaby and roughly 40km from the project area. The airport has daily flights from Stockholm depending on the season.

#### 4.1.2 Regional and Local Access

The Rönnbäcken Project can be accessed from the town Tärnaby by road E12 west for nine kilometres to the community of Ängesdal and then approximately 35 km of gravel roads to the Project.

#### 4.2 Physiography and Climate

#### 4.2.1 Physiography

The elevation within the claims ranges from 390 MASL to 666 MASL, i.e., a difference of about 280 m from the lowest to the highest point. The claims are in low mountain terrain which for the most part is covered by coniferous forest, principally spruce and pine trees, except for some higher areas in which birch trees predominate.

Lake Gardiken surrounds the island of Rönnbäcksnäset and is controlled by Gardiken hydro power station which is located at the Lake Gardiken outlet in Umeälven approximately 300 km from the river mouth. The power station dam created a head pond representing several years supply of approximately 875 million m<sup>3</sup>. Water levels throughout the year may vary as much as 20 m.

The continental glaciation movement direction in the area is from the southeast. The till cover in the claims is generally thin but can be up to 20 m thick in some places. The most frequent type of exposed lithology in the area is ultramafic rock, as this rock type has been more resistant to glacial erosion compared to the surrounding phyllites.



Figure 4-1: The island of Rönnbäcksnäset, looking north, viewed from the top of Vinberget.

#### 4.2.2 Climate

According to Köppen's climate classification, northern Sweden belongs wholly to the temperate coniferous-mixed forest zone with cold, wet winters, where the mean temperature of the warmest month is no lower than 10°C and that of the coldest month no higher than -3°C, and where the rainfall is, on average, moderate in all seasons.

Between the years 1961 and 1990, the average annual temperature in Hemavan (about 15 km northwest of Tärnaby) was -0.5°C, with an average rainfall of 745 mm/year. Annual rainfall in the Lapland Mountains ranges between 1,000 mm and 1,500 mm. The mean winter temperature (December-January) in Tärnaby is -11.5°C, with occasional low temperatures of -40°C. Bogs, lakes and rivers are frozen for four to five months of the year.

Exploration work can be conducted during the winter by taking advantage of the frozen ground, which minimises environmental impact during access. If the project goes into operation, it should be able to operate throughout the entire year.

The main influence on northern Sweden's climate is its arctic location between the 60th and 70th northern parallels located in the Eurasian continent's coastal zone. This region has characteristics of both maritime and continental climate depending on the direction of airflow. When westerly winds prevail, the weather is warm and clear due to the airflows from the Atlantic Gulf Stream. When airflow is from the east, the Asian continental climate prevails resulting in severe cold in winter and extreme heat in summer. The mean temperature in northern Sweden is several degrees higher than that of other areas in these latitudes such as Siberia and southern Greenland due to the moderating effect of the Atlantic Ocean and the Baltic Sea.

Weather patterns in the project area and in the general region can change quite rapidly, particularly in winter, because northern Sweden is located in a zone of prevailing westerly winds where cooling sub tropical and polar air masses collide. The weather systems known to have the greatest influence on the climate are the low-pressure systems originating near Iceland and the high-pressure systems drifting in from Siberia and the Azores.

#### 4.3 Local Resources and Regional Infrastructure

The Ajaure hydro power plant, rated for 75 MW, is located upstream of Lake Gardiken, approximately 20 km from the Project site by gravel road. European route E12 is 27 km from the Project site, running in a southeast-northwest direction connecting Storuman to the port of Mo i Rana in Norway. This port is 148 km distant and is the closest of three within 500 km. The nearest rail access is at the town of Storuman, 127 km to the southeast. Water is plentiful around the site, but permission must be obtained to use it.

#### 4.4 Surface Rights

For the purposes of the Mineral Resource Estimate, all surface rights are covered by the Rönnbäcksjön exploration licences and Rönnbäcken exploitation concession applications as detailed in Table 3-1 and Table 3-2. No additional licences are required.

### 5 HISTORY

The chromite exploration campaign during the Second World War resulted in a discovery of nickel rich sulphides in the ultra-mafic rocks from Björkvattnet-Seimajaure region. Some extraction test work for nickel was undertaken without success.

The Boliden Mining Company (Boliden) first staked claims in two areas in 1942. New metallurgical tests to recover nickel were performed in the 1960s with promising results. Nickel metal prices were rising at the time and a number of companies began to explore in the mountain chain and investigated assay techniques for nickel.

In the 1970s, Professor P. G. Khilstedt at the Royal Institute of Technology (KTH) in Stockholm conducted research studies on the extraction of nickel from the peridotites and serpentinites from the Caledonian mountain chain. The work was funded by the Board for Technical Development (STU, today NUTEC), The Northland Fund (Norrlandsfonden), and a private company of the Johnson Group. Three diamond drill holes were drilled at the Murfjället, Graipisvare, and Rotiken properties funded by the Northland Fund. The cores were used for metallurgical test work. Boliden drilled one core hole in 1972 along the road below IGE's Vinberget deposit. The core intersected 125 m of serpentinite and was used for metallurgical tests at KTH in Stockholm and Boliden. The surveys were supplemented by studies of the possible by-products, including magnesite and brucite, for extraction of magnesium.

Boliden performed extensive studies during the 1970s on the sulphide nickel-bearing ultramafic rocks along the Caledonian mountain chain. In Rönnbäcken, grab samples were taken by blasting of exposed outcrops (68 samples in total). The samples were distributed over the exposed outcrops on Vinberget and on parts of Rönnbäcksnäset. The samples were analyzed for sulphur, total nickel, and bromine-methanol-soluble nickel. The latter was intended to reflect the grades of nickel sulphides. Metallurgical tests were carried out on some of the samples.

Boliden drilled a total of 21 holes in the area. Apart from the hole below Vinberget Hill, they drilled 20 core holes on the Rönnbäcksnäset Island. The holes on Rönnbäcksnäset consisted mainly of short vertical holes of approximately 10 m, one vertical hole down to 50 m, and one inclined hole (50°) to 81.4 m. Analysis was conducted on sulphur, total nickel, and bromine-methanol-soluble nickel, the latter representing sulphide nickel. The boreholes were not drilled for Mineral Resource Estimates, but to highlight the vertical distribution of nickel sulphides. Analysis was made in intervals of 10 cm to five metres. No significant leaching of sulphide nickel was detected at surface. The leaching of nickel in sulphides was to a depth of less than 0.5 cm to 1.0 cm and this correlates to the weathering that also could visually be seen in the colour, brown to greyish, of the surface.

Pilot mining of 4,000 tonnes in an open pit was conducted in 1974 by the road below Vinberget. The average grade of the bulk sample was 0.21% Ni, 0.11% Ni in sulphides, and 0.07% S. The sample was used for metallurgical test work in Boliden's pilot plant in Boliden, which produced nickel concentrates grading 26% Ni to 34% Ni, 1.5% Co, 5 g/t Au, and 2 g/t

combined PGM at a recovery of 67% to 73%. SRK note that these grades are not considered to be representative of mineralisation at the Rönnbäcken project and are thought to be the consequence of contamination with sample material from other sites under investigation at the time by Boliden.

The investigations in outcrops, core drilling, and beneficiation experiments were compiled and used for an application of mining leases ("utmålsansökan") submitted in 1976 for an area on Rönnbäcksnäset and one area on Vinberget.

A mining licence was only granted to those restricted areas where the drill holes and pilot mine were located, and not the parts that were sampled in outcrops. The mining leases Rönnbäck no. 26 and no. 59 were granted to Boliden in 1982 following the application in 1976. In 1990-1993, Boliden held a claim in connection with the mining leases, but no exploration was carried out. The mining leases were released in 2003 by a notification of withdrawal from Boliden Mineral AB.

IGE was granted the Rönnbäcksjön no. 1 exploration permit in the area around Vinberget in 2005. Three licences were granted over Rönnbäcksjön in 2007 and three more in 2009.

# 6 GEOLOGICAL SETTING

#### 6.1 Regional Geology

The Rönnbäcken Project is located in the Swedish Caledonian mountains. The mountain chain was formed approximately 400-510 million years ago with the closure of the lapetus Ocean, previously formed during the late Precambrian off the continent of Baltica. The ocean crust moved downward along a subduction zone, with simultaneous build-up of sediment-filled basins linked to island arcs along the marginal zones of the ocean. The closure of the lapetus Ocean and eventual collision between the two continents Baltica and Laurentia, created an extensive rock complex that was then thrusted over the Fennoscandian shield. These units are termed allochthons, subdivided into nappe and nappe complexes, and may have been transported several hundreds of kilometres to the east or southeast over the shield. The top nappe is usually associated with the longest transport distance, while the lower units tend to be more local. Alpine-type ultramafic rocks are tectonically displaced from the mantle into the crust. They occur along nappe boundaries in the Scandinavian Caledonides and most frequently in the Upper Allochtonous which host the Seve and Köli nappes. The regional geology is illustrated in Figure 6-1 and Figure 6-2 below.



Figure 6-1: Tectonostratigraphy and alpine-type ultramafic rocks of the Scandinavian Caledonides



Figure 6-2: Location of the Rönnbäcken ultramafics and other ultramafics in Västerbotten and Northern Jämtland County

#### 6.2 Local Geology

The geology in the Rönnbäcken area is dominated by the Köli Nappe which is situated near the border to the Seve Nappe in the east. The Köli Nappe includes rocks of greenschist metamorphic facies and the Seve Nappe rocks, which are of higher metamorphic facies, mainly amphibolite facies. The rocks in the Köli Nappe include the Tjopasi Group, in the Rönnbäcken area, that consists of phyllite and felsic to mafic metavolcanics and nickel bearing ultramafic rocks. The ultramafic rocks occur as lenses of various sizes over an area of approximately 15 km2. The complex folding has resulted in local variations in strike and dip. The ultramafic rocks are serpentinized, which is seen in the colour of the weathering surface. The most serpentinized rock is often grey, while more olivine and pyroxene rich rocks have a more brownish colour. The rocks vary from massive lenses to compositional layered rocks to erosion products such as serpentinized in the Köli Nappe, while the Seve Nappe consists of rocks that are more olivine and pyroxene rich and also contain less nickel in sulphides. Figure 6-3 illustrates the local geology.



Figure 6-3: Local geology

# 7 DEPOSIT TYPE

Mineralization in the project area is hosted by serpentine and is mainly of an epigenetic, nickel-sulphide type, with minor magmatic nickel sulphides. Nickel was originally located mainly in the olivine lattice in the ultramafic rocks, such as dunites and peridotites.

Due to serpentinization of the olivine, the nickel in the olivine was released and nickel bearing sulphides were formed depending on sulphur availability. Olivine in the ultramafic rocks is magnesium-dominant and contains up to 0.5% NiO. Serpentinization of ultramafic rocks and the olivine occurs through the supply of water, S, and CO<sub>2</sub>. The reaction can be summarised as follows:

 $Olivine (Ni) + H_2O + S_2 + CO_2 \rightarrow Serpentinite + Brucite + Carbonates + Fe_3O_4 + NixSy* + H_2$ 

\* Ni-rich sulphides

By experimental studies, synthetic nickel bearing olivine has been serpentinized at  $350^{\circ}$ C under a pressure of 2 kbar by adding sulphur and water. Olivine was transformed to serpentinite, brucite, and magnetite, and nickel rich sulphides were formed such as millerite (NiS), pentlandite ((Fe, Ni)<sub>9</sub> S<sub>8</sub>), heazlewoodite (Ni<sub>3</sub>S<sub>2</sub>), and bravoite ((Fe, Ni, Co) S<sub>2</sub>). Low sulphur fugacity favours the formation of heazlewoodite and nickel rich magnetite. At higher sulphur fugacity, lower nickel values are found in magnetite, including iron sulphides as pyrite. Dehydration experiments (at 500°C) have shown that, based on the presence of brucite and serpentine, it is possible to get reformation of new olivine which is more magnesium rich than the original olivine. This is interpreted as magnetite and pentlandite being stable during the created metamorphic conditions.

### 8 MINERALIZATION

Nickel sulphide mineralization is hosted in serpentinized ultramafic rocks, which were altered from dunites and peridotites. The gangue mineralogy is dominated by antigorite, olivine, pyroxene, chlorite, carbonates (mainly calcite and dolomite), brucite, chrysotile, magnetite, and chromite.

The dominating nickel-rich sulphides at Vinberget and Rönnbäcksnäset are pentlandite  $(Fe,Ni,Co)_{9}S_{8}$ , often containing more than 40% Ni and various amounts of Co, heazlewoodite  $(Ni_{3}S_{2})$ , and millerite (NiS). Other minerals found are cobaltite (CoAsS) and maucherite (NinAs8), which probably are the most frequent arsenic bearing minerals. The dominating cobalt bearing minerals are pentlandite, millerite, and cobaltite. Only traces of pyrrhotite and pyrite are present. Nickel is also found in various amounts in olivine, serpentine, magnetite, and brucite.

In Vinberget, pentlandite dominates as the most frequent nickel rich sulphide. In Rönnbäcksnäset, mineralization is more variable, both in terms of grade, nickel sulphide species and host rock type. In some parts, millerite dominates and in other areas heazlewoodite occurs as the most frequent nickel sulphide. Rönnbäcksnäset also contains more arsenic and gold than Vinberget. Arsenic and gold are more frequent in the northern area (lower serpentinite unit) and the southeastern area (upper serpentinite unit). The elements arsenic, gold, and sulphur are not unique to any of the lithologies. They may have been introduced later or have been remobilized. Overall, the nickel sulphides are fine grained (often about 25  $\mu$ m) and occur as individual grains in serpentine or oxides or as mineral aggregates together with other nickel sulphides or magnetite.

SRK note that visible sulphides are very rarely present in the serpentinite hand specimen.

#### MINERALOGICAL STUDIES

Various mineralogical investigations were done by Ekström Mineral AB (Ekström), Xstrata Process Support (Xstrata), Outotec Research Oy (Outotec research centre, or ORC), Finland, and Qumex Material Teknik AB (Qumex).

#### EKSTRÖM - OPTICAL MICROSCOPY

Eleven samples from six drill cores, two from Rönnbäcksnäset and four from Vinberget, were sent to Ekström for basic mineralogical thin section study and for Scanning Electron Microscope/Energy Dispersive Spectroscopy (SEM/EDS) analysis of the sulphides.

#### Rock forming minerals

All of the samples were found to be dominated by serpentine, except one sample from Rönnbäcksnäset (RON 5801) which was found to be dominated by chlorite with lesser pyroxene. Carbonate was found to be common in samples from Vinberget. Chrysotile asbestos was identified in three of the samples.

#### Opaque oxides

Magnetite and chromite dominate the opaque minerals, with magnetite formed as an alteration product from chromite during the serpentinization process.

#### **Sulphides**

Pentlandite and heazlewoodite were identified in all samples except RON 5801, with pentlandite as the dominant sulphide phase. Accessory and rare sulphide phases are detailed below. The results of the study are illustrated in Table 8-1 to Table 8-3

Hole	Sample Number	Sample Depth	SEM	Rock Type
RON57	RON5702	50.4		Serpentinite
RON58	RON5801	31.0		Pyroxenite
RON58	RON5802	47.2	Х	Serpentinite
VIN26	VIN2601	20.0		Serpentinite
VIN26	VIN2604	80.0	х	Serpentinite
VIN27	VIN2702	40.0	Х	Serpentinite
VIN30	VIN3001	40.0	Х	Serpentinite
VIN30	VIN3003	120.0		Serpentinite
VIN30	VIN3005	200.0		Serpentinite
VIN31	VIN3101	10.0		Serpentinite
VIN31	VIN3103	90.0		Serpentinite

Table 8-1: Thin section sample summary

Drill core number	RON 5801	RON 5802	RON 5702
Sampled at	31.0 m	47.2 m	50.4 m
serpentine (antigorite)		XXXX	XXXX
carbonate	X		X
chlorite	XXXX	X	
amphibole	XX		X
olivine			XX
pyroxene	XXX		XX
phlogopite	XX	XX	Market Market De
chrysotile asbestos		XX	
bolingwite			xx
iddingsite			X
brucite		XX	XX+
epidote	XX		
magnetite		XXX	XXX
chromite		XX	x
pentlandite		XX	XX
heazlewoodite		x	X
maucherite		XX	r
millerite		X	r
violarite, mackinawite		x	
chalcopyrite	X		and the second second
pyrrhotite			
ilmenite	r		

# Table 8-2: Mineral composition and relative frequency of samples from Rönnbäcksnäset

# Table 8-3: Mineral composition and relative frequency of samples from Vinberget

Drill core number	Vin2601	Vin2604	Vin2702	Vin3001	Vin3003	Vin3005	Vin3101	Vin3103
Sampled at	20.0 m	80.0 m	40.0 m	40.0 m	120.0 m	200.0 m	10.0 m	90.0 m
serpentine antigorite	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
carbonate	XXXX	XXX	XXX	XXX		XX	XXX	XXX
chlorite								х
amphibole					2			XX
olivine	XX					pseu	XX	х
pyroxene	Х				XX	pseu		XX
phlogopite		and the second	-				Х	
chrysotile asbestos		XXX					х	
epidote			1 2 1 C					
iddingsite	x						X	
brucite	x	X	r	х		XX	Х	
magnetite	XXX	X	XXXX	XXX	XXX	XX	XXX	XXX
chromite	XX	Х	XXX	XX	XXX	XX	XX	x
pentlandite	XX	XX	XX	XX	XX	XX	XX	XX
heazlewoodite	x	X		XX	XX	x	х	x
maucherite			Sector Sector	X	r			
millerite	r							
violarite mackinawite	r		X			ALC: NO		
chalcopyrite		X						
pyrrhotite		X						
awaruite				A REPORT	r			r
cobaltite						XX	х	х
pyrite		x						

Mineral	Formula	Range % Ni	Range % As	Range % Co	Comment
Pentlandite	(Ni,Fe,Co)9S8	39.8-44.2		1.5-2.8	
Millerite	NiS	69.1-69.8			
Heazlewoodite	Ni3S2	71.5-76.3			
Maucherite	Ni11As8	50.8-51.4	44.6-45.85	0.2-0.4	1.5-1.7%Sb
Cobaltite	CoAsS			23	
Pyrrhotite		1.6-2.3			
Chromite					>5% Mn

Table 8-4: SEM-EDS	Analysis	(RON58 & 57	VIN26	30 & 3	1)
	Analysis		, viit <b>z</b> u,	<b>JU U J</b>	••)

#### EKSTRÖM - QUALITATIVE FIBRE MEASUREMENT

Two samples of diamond drill core from VIN30 at 219.2 m and RON58 at 52.3 m were selected for qualitative analysis of fibres, and examined with optical microscopy by Ekström for light refraction, anisotropy, angle of extinction, elongation, and pleochroism. Both samples showed the same optical properties as chrysotile.

#### XSTRATA - QEMSCAN AND EPMA

Mineralogical studies were performed by Xstrata, Sudbury, Canada, using Quantitative Elevation of Materials by Scanning Electron Microscope (QEMSCAM) and Electron Probe Micro Analysis (EPMA) on four composite samples. The samples were composed of a quarter of the core and crushed and successively sieved at Xstrata to avoid the finest fraction.

The objective of the study was to characterise the Ni bearing species in each composite and to produce quantitative measurements of Ni deportment as a basis for comparison to total nickel and sulphide nickel chemical assays. The assays were completed at ALS Chemex in Vancouver Canada and at Labtium in Finland. Modal mineralogy, grain size distributions, and mineral composition data was also presented as part of the study.

 Table 8-5: Xstrata QEMSCAN samples

Hole	Interval (m)
VIN30	20.0-26.0
VIN30	192.0-198.0
RON53	52.0-58.0
RON53	76.0-82.0

The modal abundance of gangue and sulphide minerals present in each sample is presented is presented in Figure 8-1 and Figure 8-2 below.







Figure 8-2: Sulphide Mineralogy in IGE Nordic samples

Modal analysis highlights minor mineralogical differences between the RON53 and VIN30 samples, including a higher percentage of carbonates in the VIN samples and the presence of brucite in the RON samples. The samples were also found to vary with respect to the proportion and type of Ni (Fe) sulphide as indicated above. Cobalt was found to occur in solid solution in pentlandite and millerite. A few cobaltite grains were also found.

The following observations were made with respect to these Ni deportment calculations:

- Gangue mineralogy (oxide + silicate) contributes approximately 30% of the total Ni in the VIN30 samples, and 40% of the total Ni in the RON53 samples.
- The major Ni bearing sulphide in the two RON53 samples is millerite. A minor amount of the nickel is contributed from pentlandite and heazlewoodite.
- The two VIN30 samples have different proportions of Ni-bearing sulphide species. VIN20 20-16m contains much more heazlewoodite, compared to VIN30 192-198m, which is dominated by pentlandite.

One of the key objectives of the mineralogical study performed by Xstrata was to assess the reliability of assays, both in terms of total Ni and sulphide Ni. Analysis was completed on nine size fractions from VIN30 (20 m to 26 m) plus the coarse fraction (-600/-300  $\mu$ m) from the remaining composite.

Reconciliation between total nickel chemical assays and calculated total nickel assays from mineralogy was found to be, in general, very good. The analysis was completed on the 9 size fractions from VIN30 20-26m, plus the coarse fraction ( $-600\mu$ m/+ $300\mu$ m) from the remaining 3 composites. The difference between measured and calculated total nickel was found to be less than 0.02% in nine of the twelve measurements. In one of the twelve comparisons the difference was marginally greater than 0.03%Ni.

Reconciliation between sulphide nickel chemical assays and sulphide nickel calculated from mineralogy was completed on the same twelve samples. Seven of the twelve measurements compared very well (within 0.01% Ni), while the chemical assay and calculated assay differed by 0.03%-0.06% Ni in the remaining five samples. These results are summarised in Figure 8-3 below.

SRK note that comparison of calculated sulphide Ni determined from the mineralogical measurements was made against sulphide Ni assays performed at ALS Chemex using method ME-OG62. A comparison against sulphide Ni assays performed at Labtium using ammonium citrate hydrogen peroxide leach with ICP-AES finish (method code 240P), may have been more appropriate given that this is IGE's principal laboratory and assay method used for determination of sulphide nickel Rönnbäcken.


# Figure 8-3: Sulphide Ni assays performed at ALS Chemex vs calculated sulphide Ni determined from mineralogical measurements

Nickel sulphide grain size distribution was assessed as part of the Xstrata study. The size fraction chosen for measurement was -600µm/+300µm, coarser than the liberation state, so as to ensure all textures and original grain sizes were maintained. QEMSCAN measurements of Ni-bearing sulphides were isolated and plotted as a distribution. All nickel-bearing sulphide species were combined and are referred to as Ni (Fe) Sulphide. A total of 11,121 Ni (Fe) Sulphide particles were included in this analysis. The grain size distributions of Ni (Fe) sulphide for each of the four samples given in Table 8-5 are presented in Figure 8-4 below.



# Figure 8-4: Grain Size distributions of Ni (Fe) Sulphides from -600µm/+300µm fraction

Results indicate that the majority of nickel-bearing sulphides fall within the range of 15 to  $50\mu m$  with averages closer to 25  $\mu m$ .

#### **QUMEX - QUANTITATIVE FIBRE MEASUREMENT**

Samples were collected from particularly fibrous-rich parts in the cores and sent to Qumex for quantitative analysis of fibres. The samples were prepared, crushed, and pulverized for the standard intervals, for assaying of two metre core length. The samples were evaluated in the electron microscope with a magnification of 250 times, with 25 fields per sample evaluated regarding fibre content (volume units).

Hole	Section	Fibrous Volume	Report	Date	
VIN27	20.0 – 22.0	0.1	4360-01-08	2008-06-03	
RON53	92.0 - 94.0	0.5	4431-01-08	2008-11-19	

#### Table 8-6: Fibrous volume in samples

# 9 EXPLORATION

Exploration programmes at the Project comprise geological mapping, sampling outcrops, ground magnetic surveys, and magnetic susceptibility surveys. The results of the programmes will be used to plan future drill targets to possibly expand the tonnage and/or grade of the Mineral Resources.

# 9.1 Geological Mapping and Sampling

IGE sampled serpentinite outcrops in the Rönnbäcken area for the first time in the summer of 2005 within the framework of a regional sampling programme. The programme included tests on several claims along the borders of the Caledonian mountains with the objective of testing the serpentinites for potential nickel, platinum, and palladium.

Areas that were tested apart from the Rönnbäcken area were Klumpliklumpen, Rotiken, and Fjelkaområdet. In total, approximately 70 samples were taken of which five were from Rönnbäcksnäset, four from the Rönnbäcksjön no. 1 claim, and one sample from the Rönnbäcksjön no. 4 claim. In 2007, additional sampling of 30 samples was conducted by IGE. The emphasis on the sampling programme was the serpentinite outcrops within the claims Rönnbäcksjön nos. 3 and 4.

In summer 2009, IGE mapped approximately 15 km<sup>2</sup> and collected 117 samples for analyses by the ammonium citrate method for Ni, Co, Cu, and S in an attempt to identify ultramafic rocks suitable for future drill targets. Twenty-three of the samples returned values greater than 1,000 ppm (0.1%) Ni as determined by ammonium citrate method (Ni-AC). In addition to analysis of nickel in sulphides, analysis of major elements, trace elements and precious metals were performed as well as surveys of specific gravity and magnetic susceptibility.

In total IGE has taken 156 rock samples within the Rönnbäcken licences.

# 9.2 Geophysics

#### 9.2.1 Magnetic susceptibility and specific gravity surveys

Much of the magnetite in the project area is secondary, having formed during the process of serpentinization, and as such, has been used by IGE geologists as an exploration tool in the field as well as during the core logging to identify areas of serpentinization and possible nickel sulphide mineralisation.

Magnetic susceptibility measurements on core were initially taken routinely every metre, on every bag of coarse rejects, as well as on outcrops during the geological mapping programme.

Measurements were taken with an SM-20 Magnetic Susceptibility Meter from GF Instruments, a hand-held instrument with a sensitivity of  $1 \times 10-6$  SI units. The measurement gives relative readings and no corrections have been made for geometry or volume of the

sample bags of coarse reject from the sample preparation of drill cores or rocks (see also Section 10.6 CORE LOGGING, below).

Field susceptibility surveys were carried out at Vinberget to identify the presence and extent of serpentinization of ultramafics in the project area. Measurements were taken at ten metre intervals on 20 m section lines. At each surveyed point, two measurements were taken separated by a distance of 10 cm to 20 cm on a flat surface of the outcrop. Sections were surveyed between 390N to 2140N in the Vinberget local grid. The surveys at Vinberget were carried out during July and August 2008, and a total of approximately 450 measurements over approximately 17 ha were taken.

In 2009 magnetic susceptibility surveys were taken on all outcrops mapped on the Rönnbäcken project. A total of 2,287 readings were taken.

#### 9.2.2 Ground magnetic surveys

Ground magnetic surveys were performed with a GEM system, GSM-19T proton magnetometer, in 2008-2009. Measurements were taken at ten metre intervals on 100 m or 200 m sections. The results of the ground magnetic surveys for the Vinberget and Rönnbäcksnäset projects are illustrated in Figure 9-1 and Figure 9-2, respectively. Low magnetic areas, blue in Figure 9-2, are caused by rough topography and a consequent absence of data.

#### Vinberget

The first ground magnetic surveys at Vinberget were carried out in the spring of 2008 on the southwest side of the deposit. The survey covered sections 0 to 1200N, with additional more detailed measurements taken from sections 550N to 950N to better understand the horseshoe-shaped serpentinite outcrop south of Vinberget. During the same period in the summer of 2008, surveys were expanded to also cover the north side of Vinberget.

In 2009 additional surveys were carried out to cover the remainder of the ultramafic rocks in the Rönnbäcksjön no. 1 claim. In total, approximately 25 line-km have been surveyed at Vinberget.

#### Rönnbäcksnäset

During the spring of 2008, ground magnetic surveys at Rönnbäcksnäset were carried out over sections 0 to 500E in the south area and 0 to 1300N in the north area. During the summer of 2008, the survey was expanded to cover sections 100W to 600W in the south area. Towards the end of the drill programme, the survey was extended further south to assist locating "satellite holes" RON205 and RON206. After completion of the drilling programme, the survey was extended in several areas to facilitate planning of the next phase of diamond drilling. In 2009 additional surveys were carried out to cover the remainder of the ultramafic rocks in the Rönnbäcksnäset area. A total of approximately 64 line-km have been surveyed at Rönnbäcksnäset.



Figure 9-1: Ground magnetic survey grid (TMI), Rönnbäcksnäset



Figure 9-2: Ground magnetic survey grid (TMI), Vinberget

# 9.3 Geochemistry

The only geochemical surveys performed in the area were the rock geochemistry programmemes described in Section 9.1, Geological Sampling and Mapping.

## 9.4 Exploration Potential

Exploration to date has concentrated principally on the Vinberget and Rönnbäcksnäset deposits. IGE's winter 2009 / 2010 drill programme is focused on investigating nickel sulphide bearing serpentinites at the Sundsberget area, which lies on the mainland, immediately northeast of the Rönnbäcksnäset deposit.

SRK note that IGE's outcrop mapping and ground magnetic surveys suggest the presence of an ultramafic body at Sundsberget roughly 1km in strike by 400m in width at surface. Initial drill holes have confirmed the presence of this ultramafic unit at several locations below the overburden. The size, geometry, mineralogy and sulphide nickel content of this ultramafic unit are as yet poorly understood. Should on-going drilling and pending assay results confirm initial interpretations of size and indicate a comparable mineralogy and nickel in sulphide grade to Rönnbäcksnäset and Vinberget, the Sundsberget deposit could add significant additional tonnages to the existing Project Mineral Resource.

The Rönnbäcksnäset deposit is open down dip of the existing drill data and the pit optimisation studies undertaken by SRK and described in the Mineral Resource Estimation section show the potential to increase the resources in this direction when applying optimistic parameters.

Additional targets have been identified to the north and south of Vinberget with the potential to add tonnage to the current Mineral Resource Statement, should exploration activity prove to be successful.

# 10 DRILLING

The diamond drilling was performed by the contactor RATE Diamantborrning AB (RATE). Two Onram 1000 drill rigs, mounted on Morooka 1500 band dumpers, were used to drill BTW core (42 mm). RATE used environmentally certified hydraulic fluids for minimum environmental impacts in case of a leak.

IGE report that a total of 21 historic holes were drilled by Boliden in the 1970s for 443.5 m.

IGE commenced Phase 1 drilling campaign, approximately 8,000 m, in April 2008. Phase 2, approximately 8,000 m, started in October 2008, with drilling completed in January 2009. SRK note that IGE have carried out additional drilling campaigns that are ongoing at the time of writing.

The Rönnbäcken drill hole database received by SRK from IGE include 110 drill holes, for a total of 17,193.35m. The database does not include any holes drilled by Boliden and as such no historic drill data has been used as a basis for this Mineral Resource Estimate.

Due to an absence of information, certain drill holes were excluded from the database as received from IGE, as presented below in Table 10-2. In the majority of cases, drill holes lacking information were drilled during the winter 2009 programme with results pending.

A summary of drill holes, total meters drill and associated total number of nickel assays (ammonium citrate method) used as a basis for this estimate is present in Table 10-1 below.

Table 10-1: Summary of drill holes by deposit used in this Mineral Resource estimate (Ni\_AC = Nickel in sulphide by ammonium citrate leach and ICP-AES finish)

Deposit Number of drill holes		Metres drilled	Metres assay by Ni_AC method	
Rönnbäcksnäset	54	7,770	5,124	
Vinberget	38	7,602	6,723	

		Reason for exclusion	
	Absent Geological Data	Absent Assay Data	Absent Survey Data
VIN113	Х	Х	
VIN114	Х	Х	
VIN115	Х	Х	
VIN116	Х	Х	
VIN117	Х	Х	
VIN118	Х	Х	
VIN119	Х	Х	
VIN120	Х	Х	
VIN121	Х	Х	
VIN122	Х	Х	
VIN123	Х	Х	
VIN124	X	Х	
VIN111			Х
VIN22		Х	Х
VIN50			Х
VIN119			Х
VIN25		Х	
RON51			Х
RON76			Х
RON200			Х

#### Table 10-2: IGE drill holes excluded from the database

## 10.1 Vinberget

Steep slopes on either side of the Vinberget ridge dictated the drilling pattern at Vinberget. Drilling was carried out in fans from a several positions at the top of the ridge and designed to achieve a horizontal distance between holes of 50m to 60m at a down hole depth of 150m. The drillhole locations are shown in Figure 10-2.

IGE report that drilling conditions were for the most part favourable, with occasional clay zones causing bogging of the drill rods, particularly when drilling towards the southwest.



Figure 10-1: Vinberget drillhole collar locations

# 10.2 Rönnbäcksnäset

Drilling began on Rönnbäcksnäset northeast with three drill holes at 50 m intervals on 100 m sections. Thereafter, a fourth hole was drilled in every second section to check for a possible downward extension of the mineralization and to investigate the associated magnetic anomaly. The drillhole locations are shown in Figure 10-2.

Drilling conditions at Rönnbäcksnäset were found to be more variable than in Vinberget given the lower competency of some units.



Figure 10-2: Rönnbäcksnäset drillhole collar locations

# 10.3 Casing

IGE have indicated that casings above ground level were cut in accordance with Swedish Association of Mines, Mineral and Metal Producers' (SveMin) guidelines to less than 10 cm above ground, and sealed with the cap stamped with the drill hole number. SRK were however unable to confirm due to the depth of snow cover at the time of the site visit.

# 10.4 Downhole Surveys

The deviation survey has been performed with a Reflex Maxibor II instrument which measures the trace of the drill hole with optical technology. Surveys were mainly carried out by IGE staff and, to a lesser extent, by contractors Sten Wikström, Skellefteå Bergsupport AB and/or Elin Broström, RATE.

The first holes in Vinberget and Rönnbäcksnäset were surveyed with an instrument length of 3.0 m and a survey interval of 1.5 m. Most, however, were measured with full instrument length of 6.0 m and a survey interval of 3.0 m for greater accuracy. Several measurements had unreliable dip measurements; therefore, some drill holes were measured twice, both up hole and down hole.

During the first half of the programmeme, the Maxibor surveys were conducted by lowering the instrument using the drilling rig hoist cable system. Spray paint was used as a marker on the wire to get regular data points of 1.5 m and 3.0 m.

For the second half of the program, measurements were carried out by pumping the instrument to the bottom of the hole and surveying as the drill string was taken up. For measurements in the wireline system, it appeared that lowering the instrument in the drill hole gave the best results. All measurements made with the instrument raised with the drill string have a survey interval of 3.0 m.

The database received by SRK from IGE includes 50 holes from Vinberget, for a total of 3512 records and 54 holes from Rönnbäcksnäset for a total of 2949 records.

## 10.5 Collar Surveys

Drill hole locations were set out using a hand held GPS. The collars were later surveyed by Tyréns and Mikael Norén, surveyors, using Leica System 1200 GPS technology, using the following projection and with the following measurement accuracy as presented in the final report:

- Plan projection: RT 90 2,5 gon V 0:-15
- Accuracy in plan projection +/- 2cm to 3cm
- Vertical projection: RH 70
- Accuracy in vertical projection +/- 3cm to 4cm

IGE indicated that drill collar azimuths were calculated from two survey points, one from the top of the casing and another at the top of a 3 m long steel rod that were put down 1 m inside the casing.

#### 10.6 Core Logging

An IGE geologist or field technician inspected drill core at the site during drilling on a continuous basis and stopped the drilling at a predetermined depth in mineralized material or at a particular lithological intersection. The drill contractor was responsible for transportation of the drill core to IGE's core archive and logging facility in Skellefteå.

The core was photographed and logged at IGE's logging facility. All of IGE's drill cores were logged by IGE staff or sub-contractors to capture relevant geological and geophysical (susceptibility logs) information. The geologic logging intervals were based on lithological variations in the rock and in addition a qualitative estimate of fibrous asbestiform mineral content was noted.

Rock Quality Designation (RQD) measurements were taken on the basis of the assay intervals (roughly every 2m). The database contains a total of 2,694 measurements from Rönnbäcksnäset and 3,377 from Vinberget.

Initially, magnetic susceptibility was measured at every metre in mafic and ultramafic intersections, using a SM-20 instrument manufactured by GF Instruments. This procedure was abandoned in the 2009-2010 drilling campaign, with susceptibility measurements instead being taken on coarse rejects representing assayed intervals. The database received

by SRK from IGE contains a total of 2,703 magnetic susceptibility measurements from Rönnbäcksnäset drill core and 3,414 from Vinberget drill core.

Density measurements were carried out by IGE staff or sub-contractors at the core logging facility using the water immersion method on unsealed drill core. Within the serpentinite, density measurements were taken at every assayed interval (every two metres). Representative density measurements were also taken for the main waste rock lithologies. The IGE database contains a total of 2,701 measurements for Rönnbäcken and 3,416 measurements for Vinberget.

The specific gravity of the core was measured to obtain densities for the Mineral Resource Estimates but also to get a value of the degree of serpentinization. The transformation of olivine to serpentine lowers the density from greater than 3.0 g/cm3 down to 2.7 g/cm3. For similar reasons, the magnetic susceptibility has been surveyed on drill core, outcrops, and on sample bags of the coarse rejects from the sample preparation. Magnetite is formed as a secondary product during serpentinization.

All core logging data was recorded onto paper and later entered into Microsoft Excel spreadsheets. A hardcopy check list was prepared and completed as standard for each drill hole by the supervising geologist / technician to maintain IGE data capture protocol.

#### **10.7** Interpretation of Results

On the basis of IGE's drilling, two mineralisation wireframes were digitized by SRK using Datamine software; Rönnbäcksnäset and Vinberget.

Rönnbäcksnäset is the larger of the two mineralised wireframes and contains the most drillhole intercepts. It measures 2.5km along strike, 1.6km on a  $16^{\circ}$  azimuth, in the northwest, and 1.2km along strike on a  $85^{\circ}$  azimuth in the southeast. The south-eastern portion has a maximum true thickness of roughly 350m and dips at  $25^{\circ}$  towards the northnorthwest, while the northeast portion has a maximum true thickness of roughly 60m and dips at  $40^{\circ}$  towards the west-northwest.

The Rönnbäcksnäset wireframe was modelled to an elevation of -1m (ASL), and contains 337.4 million m3 of material.

Vinberget measures 686m along strike, on an azimuth of 321°, and 300m across strike at the widest point. It was modeled to a depth of 307m (ASL), with a sub-vertical dip. The Vinberget wireframe contains 22.3 million m<sup>3</sup> of material.

# 11 SAMPLING METHODS & APPROACH, ANALYSIS

The nickel sulphides are expected to be evenly disseminated and fine grained. Cobalt, gold, platinum, and palladium may contribute to the value of the deposits, however, their distribution is less well understood.

# 11.1 Samples for Assay

All serpentinite core intersections were sampled, along with most of the weakly mineralised mafic unit at Rönnbäcksnäset, to ensure that all sulphide nickel mineralisation was entirely captured.

The core was marked for sampling by an IGE staff geologist or sub-contracting technician, starting at the contact of the mineralization and then every two metres beginning at the first even numbered metre. Consequently every sample at the footwall and hanging wall of the mineralized material represents a non-regular length.

Two metre sample intervals were initially selected to better understand the distribution of the accessory mineralization and to provide sufficient detail to correlate possible layered ultramafics. Sample intervals and numbers were either recorded onto paper and then entered into a Microsoft Excel spreadsheet, or entered directly into Microsoft Excel. SRK consider that IGE have sampled the host serpentinite in an unbiased fashion, using a consistent technique for all intersections.

Once assays were issued by the laboratory (Labtium) in Excel format, they were merged with the sample interval data in Excel by either IGE's exploration manager or the project geologist. The merged files were imported into Mircomine and validated.

SRK note that no systematic logging of core recovery has been carried out by IGE. However, serpentinite intersections in drill core observed during the field visit to Rönnbäcken and IGE's core logging and storage facilities in Skellefteå, showed very good recovery and generally good quality core. SRK do not consider core loss at Rönnbäcksnäset or Vinberget to have an impact on the quality of the Mineral Resource Estimate.



Figure 11-1: Typical example of drill core quality in Serpentinite from the Project area. (Photo represents core from hole 16 at a depth of 275m, Sundsberget.)

#### 11.2 Thin Section Samples

A sample was collected for thin section work every 40 m.

#### **11.3** Samples for Metallurgical Tests

Two samples of 20 kg to 30 kg each were taken from the old Boliden test pit and were tested at Minpro AB. The pit is located at the road one kilometre north of the drilled area at Vinberget. The sample was a composite sample comprised of small fragments throughout the pit.

In an early stage of the drill programme, five samples of 30 kg to 35 kg each were taken for new tests at the Outokumpu Research Centre (ORC), three from Vinberget and two from Rönnbäcksnäset. At Vinberget, three samples were taken from the coarse reject from the sample preparation of two drill holes, VIN30 and VIN29. The sample from VIN30 represented one lower grade zone higher up and one higher grade zone deeper down in the hole. A third similar type of sample was collected in VIN29. At Rönnbäcksnäset, two samples were collected from drill hole RON53 in the same way as in VIN30. RON53 is located in the north-eastern part of the Rönnbäcksnäset deposit. For the second phase of testing at ORC, two composite samples were prepared using coarse rejects from the two drilled areas at the end of the drill programme.

At Vinberget, all sample rejects were composited into a 2.5 tonne sample from selected holes. The samples represent the mineralization from 630m to 500m (ASL) and a total of 1,008 samples representing 1,216 m of core drilling. At Rönnbäcksnäset, the samples were selected from coarse rejects from 15 core holes drilled in the south-western part of Rönnbäcksnäset.

The samples were split in two halves, with one half included in the sample. A total of 264 samples were included, weighing 366 kg and representing 528 m core drilling. This in turn represents approximately two years of production from the area down to 400 MASL. The sample was dominated by the upper pyroxene bearing serpentinite and not much of the higher grade lower serpentinite zone with similarities to the Vinberget serpentinite. The sample does not include any of the low grade mafic intrusion material or the low grade zone with almost no sulphides.

SRK note that further clarification of metallurgical sample provenance (hole number, interval and sample weight) should be made available for future studies to verify metallurgical representation, to understand test work results in the context of deposit geology and to provide support to core sample assays via reconciliation of concentrate grade with original sample grade.

# 12 SAMPLE PREPARATION, ANALYSIS AND SECURITY

The sample preparation was conducted by an independent company to IGE. The structure of the preparation is highlighted below.

The Rönnbäcken nickel project comprises two low grade nickel deposits. The sulphur is mainly associated with nickel sulphides. The nickel content in silicate and oxide minerals, such as olivine, serpentine, and magnetite, contains similar grades of nickel as the mineralized rock containing nickel sulphides. The nickel in sulphides is considered to originate from olivine altered to serpentine in the host rock itself while the sulphur is considered to have been introduced into the system during alteration.

The purpose of the Project is to locate mineralization that could be recovered by established metallurgical methods, i.e., flotation of sulphide minerals. The adapted assay technique is partial-leach that selectively dissolves nickel in sulphides and leaves the nickel bearing silicates and oxides unaffected. As the sulphur content is low, analyses of sulphur must be performed by methods with low detection limits, better than or equal to 0.01% S.

As the selective nickel leaching technique is not an accredited method for assaying nickel in sulphides, other accepted methods were included in the assay package such as Aqua Regia leach and Near Total Four Acid Leach. To support the values of the grades of nickel in sulphides, mineralogical studies and metallurgical tests were carried out by IGE. These studies are discussed elsewhere in this report.

Sulphur assays from four acid and aqua regia digestion give higher sulphur values, when compared with associated sulphur-AC results. Sulphur assays using the ammonium citrate

technique are thought to dissolve the free milled and the exposed sulphides at oxide and silicate mineral surfaces and thereby present a better indication of the nickel sulphides amenable to recovery by convention milling and flotation techniques.

#### 12.1 Chain of Custody and Sample Preparation

The drill contractor was responsible for transportation of the drill core from site to IGE's core archive and logging facility in Skellefteå.

During the logging stage, the core was measured and sample intervals selected by an IGE staff geologist or sub-contracting technician for sample analyses. These intervals were marked on the core and on the core boxes.

ALS Sweden AB, a subsidiary of ALS Chemex (ALS), was contracted to split the core and carry out the sample preparation. A separate room for sample preparation was set up for the Rönnbäcken Nickel Project as a precaution against the health risks associated with asbestos. No other samples were treated in the room during the drilling campaigns.

The samples were logged in the tracking system, weighed, and split with a diamond saw (Almonte Core Saw). One half of the sawed core was treated according to ALS code PREP-31, which included drying and crushing to 70% minus 2 mm (Tyler 9 mesh. US Std. No. 10). A split of up to 300 g was taken and pulverized to 85% minus 75  $\mu$ m (Tyler 200 mesh. US Std. No. 200). The 300 g sample pulp was then split in two or three subsamples and sent to two different primary assay laboratories (Labtium and ALS Chemex). A third laboratory (ACME) was used for control assays.

The remainder of the coarse reject was labelled with the analytical number and stored at the assay laboratories. After a holding period at the laboratories, all of the rejects and pulps were returned to the IGE storage facility in Skellefteå. The pulps at Labtium Oy in Rovaniemi, Finland (Labtium), duplicates of the pulps stored in Skellefteå, have been discarded.

A more detailed description is illustrated in the flowchart in Figure 12-1. Note that the sample split is modified to up to 300 g instead of 250 g.



#### Figure 12-1: Sample preparation flow sheet (modified from ALS Chemex 2009)

#### 12.2 Sample Analysis

Two assay laboratories were contracted for analyses: Labtium in Rovaniemi, Finland, and ALS in Vancouver, Canada. Check analyses were mainly performed by Acme Analytical Laboratories Ltd. (Acme) in Vancouver, Canada. The analyses carried out by the three laboratories are summarised in below.

Lab	Lab code	Sample digestion	Туре	Sample size (g)	Analytes	Main interest	Use
ALS Chemex	ME- ICP61	Four-acid	Near total	0.25	33	Ni, Co, S	Normal
ALS Chemex	PGM- ICP23	Fire Assay	Total	30.00	3	Au, Pt, Pd	Normal
Labtium	240P	H2O2+NH4 citrate	Sulphides	0.15	3	Ni, Co	Normal
Labtium	510P	Aqua regia	Partial	0.15	14	Ni, S	Normal
Acme	G7TD	Hot four- acid	Near total	0.50	23	Ni, S	QC
Acme	8NiS	H2O2+NH4 citrate	Sulphides	1.00	1	Ni	QC
Labtium	307P	HF +HCIO4	Near total	0.20	13	Ni	QC
Labitum	720P	Na2O2 Fusion	Total	0.20	12	NI, S	QC

Table 12-1: Analytical methods

In the database received by SRK from IGE, a total of 6,747 analyses were performed of which 6,125 were core and 622 or 10% of the available data were a variety of QA/QC analyses. This is considered by SRK to be a reasonable number of check assays. A summary of the analyses is presented in Table 12-2 below.

Table 12-2: Analysis Summary

Deposit	Core	IGE duplicates	UM-4 (reference material)	Blank	Acme check	Coarse reject	Sub- total QC	Total assay	Labtium internal duplicates
VIN	3419	107	68	76	68	15	334	3753	130
RON	2706	94	58	66	56	14	288	2994	105
Total	6125	201	126	142	124	29	622	6747	235

#### 12.2.1 Labtium

Labtium has FINAS T025 accreditation ISO/IEC 17025:2005. According to FINAS, "a laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems Requirements and are aligned with its pertinent requirements". This accreditation represents a higher standard than ISO 9001:2000. According to the website of Labtium, "Labtium's quality system fulfills the requirements of the Standards Council of Canada (CAN-P-1579), Guidelines for Accreditation of Mineral Analysis Testing Laboratories". However, the ammonium citrate leach procedure is not covered by the accreditation, as the method is relatively new to Labtium.

Ammonium citrate hydrogen peroxide leach (AC), Labtium code 240P, is described as follows. A 0.15 g subsample is leached in a mixture of ammonium citrate and hydrogen peroxide (1:2; total volume 15 mL). The leach is done on a shaking table for two hours at room temperature. The solution is decanted from the sample powder directly after the leach. The solutions are diluted (5:1) and measured with ICP atomic emission spectroscopy (ICP-AES). It is a partial leach and is selective at dissolving nickel, cobalt, and copper from sulphide mineral species while leaving those elements in silicates unaffected. The detection limits are 10 ppm.

This method was used to determine the recoverable nickel content for this Project, i.e., specifically to obtain accurate estimates of the metals that can be recovered by established metallurgical methods, such as flotation of sulphide minerals.

Aqua regia digestion, lab code 510P at Labtium, is described as follows. A 0.15 g subsample is digested with aqua regia (3:1 mixture of concentrated hydrochloric acid and concentrated nitric acid) by heating at 90°C in an aluminium-heating block for 1.5 hours and diluted to 15 mL with water. An aliquot is centrifuged before instrumental analysis. Aqua regia is a partial leach for silicates, but is an almost complete leach for sulphides and oxides. It is a much better leach for this Project than the "near total" leach, however, as silicates are partially dissolved, even this method will overestimate the metal content. It is mainly included as a comparison to the sulphide nickel method for the sulphur content and other elements, such as arsenic, that can exist in sulphide phases.

The results from Labtium are reported with three significant digits (zero uncounted) or <X where X is the detection limit. The latter is preferable to the ALS reporting method, even if the last digits are not significant.

IGE report that for the 2009-2010 exploration programme, aqua regia digestion has been abandoned in preference for the 240P method.

# 12.2.2 ALS

ALS is accredited by ISO 9001:2000 overall and conforms to the requirements of CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) by the Standards Council of Canada (SCC) for a number of specific test procedures, including the two methods employed by IGE.

A more detailed description of ALS code ME-ICP61 follows. The pulp is digested with perchloric, nitric, hydrofluoric, and hydrochloric acids (HNO3-HClO4-HF-HCl). The residue is topped up with dilute hydrochloric acid and the resulting solution is analyzed by ICP-AES. Results are corrected for spectral inter-element interferences. Four acid digestions are able to dissolve most minerals. However, although the term "near-total" is used, depending on the sample matrix, not all elements are quantitatively extracted. Therefore, the leach is less useful to the Project as an estimate of recoverable metals. It is mainly included to demonstrate the need of the partial leach method and to provide an extra check of sulphur content. The elements analyzed and ranges of the procedure are shown in Table 12-3. The upper limits have never been reached.

Ana	Analytes & Ranges (ppm)								
Ag	0.5-100	Cr	1-10,000	Na	0.01%-10%	Ti	0.01%-10%		
AI	0.01%-50%	Cu	1-10,000	Ni	1-10,000	ΤI	10-10,000		
As	5-10,000	Fe	0.01%-50%	Ρ	10-10,000	U	10-10,000		
Ва	10-10,000	Ga	10-10,000	Pb	2-10,000	V	1-10,000		
Ве	0.5-1,000	к	0.01%-10%	S	0.01%-10%	W	10-10,000		
Bi	2-10,000	La	10-10,000	Sb	5-10,000	Zn	2-10,000		
Са	0.01%-50%	Mg	0.01%-50%	Sc	1-10,000				
Cd	0.5-1,000	Mn	5-100,000	Sr	1-10,000				
Co	1-10,000	Мо	1-10,000	Th	20-10,000				

 Table 12-3: Analytes and Ranges of ME-ICP61

The detection limits of PGM-ICP23 are 1 ppb for Au and Pt and 5 ppb for Pd. The upper limit is 10 ppm and has never been reached.

The results from ALS are reported by increments of the detection limits. For example, if the detection limit is 1, the result given is <1, 1, 2, 3, etc., with some exceptions such as Pb (<2, 2, 3, 4, etc.).

IGE report that for the 2009-2010 exploration programme, the PGM-ICP23 method is used but the ME-ICP61 has been replaced by a "Complete Charateraization Package" which includes the methods ME-ICP06, S-IR08, C-IR07, OA-GRA05, ME-4ACD81, ME-MS42, ME-MS81. The new package is intended to provide additional information on rock type to aid in the geological interpretation.

#### 12.2.3 ACME

Acme is accredited as complying with ISO 9001:2000. Check assays were mostly done at Acme using the four acid digestion and ammonium citrate methods.

# 12.3 Quality Assurance and Quality Control (QAQC)

The IGE Quality Control/Quality Assurance (QA/QC) programme comprised submitting sample blanks, standard reference samples, sample duplicates, and interlaboratory check samples. The approximate rate of sample submissions is summarized in Table 12-4 below.

Sample Type	Frequency
Blank	1/50
UM-4 (Reference material)	1/50
Duplicate	1/25
Interlab Check Assays	1/50

#### Table 12-4: QC Sample Frequency

Additional checks were done on near total and total nickel on coarse rejects. In addition, the laboratories performed analyses of duplicates, in-house standards, etc., which were also forwarded to IGE. The QA/QC results from the laboratory were checked as they were returned.

#### 12.3.1 Sample Blanks

IGE submitted 142 sample blanks into the sample stream to check for contamination and drift. The blanks were prepared from pale coloured granite and were inserted by the sample preparation laboratory (ALS Chemex, Piteå).

The relevant checks in the Project are for Ni, Ni-AC, and Co-AC and their detection limits are 1 ppm, 10 ppm, and 1 ppm, respectively.

#### 12.3.2 Reference Material

Reference Samples were inserted in the sample stream to check the accuracy of the assay laboratory. Reference UM-4 sample was purchased from CANMET Mining and Mineral Sciences Laboratories (CANMET) and originated from the Werner Lake - Gordon Lake district of north-western Ontario, Canada. The reference sample is intended as a reference material for the determination of ascorbic acid/hydrogen peroxide-soluble copper, nickel, and cobalt in ultramafic rocks. There are no certified standards for the sulphide selective leach method used, mostly due to the lack of laboratories offering such analytical services. Therefore, no Round Robin Test was done and no performance gates were recommended which are normally based on the Round Robin statistics. The reference grades recommended by CANMET are 0.19% Ni and 0.007% Co.

IGE submitted 126 UM-4 samples for analysis by the ammonium citrate method (Ni- AC) described in Section 12.2.1 above.

#### 12.3.3 Duplicate Pulp Samples

IGE renumbered and submitted 201 sample pulps to Labtium for assay as duplicates.

#### 12.3.4 Duplicate Coarse Reject Samples

Twenty-eight samples of coarse rejects were renumbered and resubmitted for assay in order to test if the 70% minus 2 mm crush size would achieve repeatable results.

#### 12.3.5 Interlaboratory Check Assays

A total of 123 samples originally assayed at Labtium were submitted for assay at Acme principally as a check on the accuracy of the Ni-AC results.

#### 12.3.6 SRK Consulting Duplicate Samples

During a visit to IGE's exploration office and core archive facilities in Skellefteå, SRK collected 16 sample pulps at random from IGE's sample pulp archive originating from the

Project area. These sample pulps were re-bagged, assigned a new sample numbers and sent to Labtium for assay by method code 240P.

#### 12.3.7 Density Measurements

The specific gravity was measured at ALS Chemex (Piteå) on a total of 79 samples using the water immersion method. Of these samples, 44 were from Vinberget and 35 from Rönnbäcksnäset.

## 12.4 SRK QAQC Analysis

SRK undertook an analysis of the QAQC data provided by IGE. This includes blanks, reference material and duplicates as described above. The results of the QAQC have not been split into the individual deposits, but include all data supplied to SRK for Rönnbäcksnäset and Vinberget.

#### 12.4.1 Reference Material (UM-4)

Figure 12-2 shows the performance of the Labtium laboratory analysis of Ni-AC in reference material UM-4. The majority of results lie within 5% of the reference grade recommended by CANMET (0.19% Ni). There does not appear to be a bias over time and the results appear to be evenly distributed about the recommended grade.



Figure 12-2: Labtium Ni-AC in Reference Material UM-4

Figure 12-3 shows the performance of the Labtium laboratory analysis of Co-AC in reference material UM-4. The majority of results lie within plus 10% to minus 5% of the reference grade recommended by CANMET (0.007% Co). The results exhibit a positive skew and appear to be distributed around plus 5% of the recommended grade. There does not appear to be a bias over time.



Figure 12-3: Labtium Co-AC in Reference Material UM-4

#### Summary - Standards

The results of the QAQC standards show that the majority of the samples fall within an acceptable range relative to the nickel and cobalt grades recommended by CANMET. Given that CANMET's recommended grades of the UM-4 reference material were obtained through a different dissolution procedure compared the methodology used by Labtium (ascorbic acid hydrogen peroxide leach as opposed to ammonium citrate hydrogen peroxide leach) SRK consider that these results indicate acceptable accuracy of assays for nickel and cobalt in sulphides.

However, SRK note that in addition to being referenced against a different assay method, the recommended nickel grade of the UM-4 reference material lies well above typical sulphide nickel grades found in the Project serpentinites. SRK suggest that IGE consider creating reference material from a composite of Rönnbäcken serpentinite as a more suitable means of gauging future exploration Ni-AC assay precision.

#### 12.4.2 Blanks

Figure 12-4 shows the performance of the Labtium laboratory analysis of Ni-AC in sample blanks. IGE replaced all results reporting at less than the detection limit to 0.5 times the

detection limit, or 5ppm Ni-AC. A total of 11 samples (8 %) had laboratory results which were at or above the detection limit of 10ppm Ni-AC. Four samples (3%) assayed greater than twice the detection limit i.e. greater than 20ppm Ni-AC.

The results indicate a potential for minor contamination during sample preparation at ALS Chemex or instrument drift during assaying at Labtium. The grouped nature of slightly high results may indicate periods in which the routine cleaning of equipment between samples was not undertaken thoroughly. A alternative explanation, though perhaps more unlikely, could be that minor silicate Ni from mafic minerals in the granite was leached in these instances.



Figure 12-4: Sample Blanks Ni-AC

Figure 12-5 shows the performance of the Labtium laboratory analysis of Co-AC in sample blanks. IGE replaced all results reporting at less than the detection limit to 0.5 times the detection limit, or 5ppm Co-AC. All samples returned values below detection limit.



#### Figure 12-5: Sample Blanks Co-AC

#### Summary - Blanks

In SRK's opinion, the results of the sample blank assays indicate an acceptable level of contamination and drift at the sample laboratories. SRK suggest that IGE consider using barren quartz material for sample blanks to eliminate any potential for contamination, of Ni from mafic minerals in granite currently used as sample blank.

#### 12.4.3 Duplicates

Figure 12-6 and Figure 12-7 show the results of the laboratory duplicates for Ni-AC and Co-AC. The duplicate samples show a strong correlation to the original sample. In SRK's opinion, sample preparation and analysis shows an acceptable level of repeatability.



Figure 12-6: Ni-AC Duplicate Analysis



Figure 12-7: Co-AC Duplicate Analysis

## 12.4.4 Duplicate Coarse Reject Samples

Figure 12-8 and Figure 12-9 show the results of the coarse reject duplicates for Ni-AC and Co-AC. The coarse reject duplicate samples show a strong correlation to the original sample. In SRK's opinion, Ni-AC and Co-AC grades in coarse rejects exhibit an acceptable level of repeatability.



Figure 12-8: Ni-AC Coarse Reject Duplicate Analysis





#### 12.4.5 Interlaboratory Check Assays

Figure 12-10 show the results of the control analysis for Ni-AC carried out at Acme, against the original Ni-AC analysis carried out at Labtium. The control assays display a strong correlation to the original assays, with similar mean grades of 1126 ppm Ni-AC and 1133 ppm Ni-AC for Acme and Labtium respectively. In SRK's opinion, the interlaboratory check assays performed at Acme provide good support for Ni-AC assays carried out by Labtium.



#### Figure 12-10: Control samples Ni-AC Labtium against Ni-AC Acme

#### 12.4.6 SRK Consulting Duplicate Samples

Table 12-5 details assay results received by SRK for 16 pulp samples sent to Labtium for analysis by method code 240P. Corresponding original assay results are presented for comparison. Results below detection have been amended to half the detection limit for consistency with IGE data.

Figure 12-11 and Figure 12-12 show the results of SRK's duplicate sample analysis for Ni-AC and Co-AC carried out at Labtium by method 240P, against IGE's original Ni-AC and Co-AC analysis carried out at Labtium using the same method. SRK duplicates display a strong correlation to the original assays, with similar mean grades of 1116 ppm Ni-AC and 1064 ppm Ni-AC, and 42 ppm Co-AC and 43 ppm Co-AC for SRK duplicate and original respectively.

The number of duplicate samples selected by SRK represent a very small proportion of the overall number of Ni-AC and Co-AC analysis carried out on the Project to date. Notwithstanding this, the results add further support to the repeatability of Labtium's 240P method for nickel and cobalt.

Table 12-5: Details of SRK Duplicate assays for Ni-AC and Co-AC wit	h respect
to IGE original assay results	

SRK Sample ID	Co-AC (SRK)	Ni-AC (SRK)	IGE Original Analysis ID	Co-AC (IGE)	Ni-AC (IGE)
314201	68	1490	VIN1071116	70	1440
314202	44	1390	VIN291047	38	1270
314203	73	1650	VIN1071040	77	1630
314206	70	1440	VIN411012	79	1480
314207	5	133	RON2021091	5	137
314209	66	1430	VIN0392058	66	1360
314210	69	1370	VIN301086	72	1310
314211	10	182	RON0701035	5	164
314212	40	923	RON0881023	33	788
314213	45	1110	RON2041121	45	1110
314215	50	842	VIN281006	50	792
314216	23	1640	RON0981004	22	1490
314217	5	933	RON0921015	5	773
314218	49	999	VIN381029	51	949
314219	59	1240	VIN0392034	66	1310
314220	5	1090	RON0891016	5	1020



Figure 12-11: Ni-AC SRK Duplicate Samples against IGE Originals



#### Figure 12-12: Co-AC SRK Duplicate Samples against IGE Originals

#### 12.4.7 Density Measurements

Figure 12-13 illustrates specific gravity of 79 samples measured at ALS Chemex and using the water immersion method, as compared to IGE density measurements using the same method. With the exception of a single outlier, the results from ALS Chemex provide good support for density measurements taken by IGE.



#### Figure 12-13: Density measurement comparison ALS Chemex against IGE

#### 12.5 Security

#### 12.5.1 Storage Of Drill Cores

Drill core, coarse rejects, and pulps are stored in a locked unheated storage building inside a fenced area at IGE's core depot in Skellefteå. All drill core from Vinberget and Rönnbäcksnäset are stored on separate pallets.

#### 12.5.2 Database

All project data are stored on the IGE exploration office server, with data backup.

# 13 DATA VERFICATION

Qualified Person Mr Johan Bradley has verified that the data provided by IGE seems to be correct and viable for use in a Mineral Resource Estimate.

# 13.1 Verification of Recent Drilling Results

## 13.1.1 QAQC

The quality controls measures in place are discussed in the previous section. It is SRK's opinion that the correct protocols were followed and as such an appropriate degree of quality assurance has been attained.

# 14 ADJACENT PROPERTIES

Not applicable

# 15 MINERAL PROCESSING AND METALLURGICAL TESTING

## 15.1 Metallurgy

Previously published reviews of the historical metallurgical testwork conducted on various samples from the Rönnbäcken area have indicated that nickel can be recovered in to commercially acceptable sulphide concentrates at between 67 and 73% nickel recovery and concentrate grades of 26 to 34% Ni. Typically a primary grind of  $P_{80}$  44µm was required using a combination of AG and pebble mills. The competency of Vinberget ore media for use in AG milling was demonstrated at commercial scale by Boliden confirming that it would be suitable for AG grinding using large diameter mills.

Additional testwork was started by IGE in 2007.

In 2008, five samples from the drilling campaign were sent by IGE to Outotec Research Centre (ORC) in Finland. The samples were from two drill holes at Vinberget (VIN29 and VIN30) and one drill hole at Rönnbäcksnäset (RON53). The five samples ranged from 0.104% NiS to 0.153% NiS and 0.182% Ni<sub>T</sub> to 0.202% Ni<sub>T</sub> (using bromine methanol (BM) assay methods for determination of sulphide nickel and four acid digestion for total nickel Ni<sub>T</sub>).

A total of 14 standard rougher flotation tests were conducted over a range of grind sizes,  $P_{80}$  40, 50 and 80 $\mu$ m. Typically the tests results could be summarized as follows.

- Recovery of sulphide nickel to rougher concentrate ranges from 75% to 85%.
- Finer grinding provided improved results.
- The assay methods used for NiS were confirmed as acceptable.
- The rougher concentrate typically contained around 1% NiS and contained many liberated gangue minerals.
- Sedimentation of solids in the tailings was slow but manageable.
- Two Bond ball mill work index tests on individual core samples from Vinberget and Rönnbäcksnäset resulted in values of 17.5 kWh/t and 16.4 kWh/t, respectively.

Phase 2 of the ORC test program commenced in March 2009 and finished in July 2009. The objective of this testing was to produce higher grade concentrates in laboratory scale batch flotation tests while improving operating costs.

Two composite samples representing the Vinberget and Rönnbäcksnäset deposits were prepared by IGE and sent to ORC. The composite sample assays were:

```
        Vinberget
        0.118% Ni-AC
        0.006% Co-AC
        0.177% Ni<sub>Total</sub>
        0.009% Co<sub>Total</sub>

        Rönnbäcksnäset
        0.117% Ni-AC
        0.002% Co-AC
        0.189% Ni<sub>Total</sub>
        0.009% Co<sub>Total</sub>
```

This test work focused on standard flotation tests using a finer grind. Initial tests were conducted at a  $P_{80}$  50 $\mu$ m, while in the later stages of the program the grind size was varied

between  $P_{80}$  38µm and 31µm. The reagent additions were modified throughout the testing using the following general scheme:

- PAX as a collector
- Dowfroth 250 as a frother
- H2SO4 as a pH modifier
- Carboxymethyl Cellulose (CMC) as a dispersant or MgO depressant (predominantly for Viberget)
- A second standard dispersant (predominantly for Rönnbäcksnäset)

A total of 18 rougher flotation tests and 14 cleaner flotation tests were conducted on the two composite samples and were limited to open circuit batch tests.

The finer grind sizes,  $P_{80}$  38 and 31µm, produced much better results than coarser grinding. Concentrate grades of 25% to 35% were produced at overall sulphide nickel recoveries of 50% to 60%. Typical rougher recoveries at the finer grind were 77% to 83%, and typical cleaner recoveries were 66% to 70%.

The quality of concentrate produced from these cleaner tests was high. Typical concentrate analyses from the two composites are given in Table 15-1. It should be noted that this concentrate would be considered fairly unique amongst Ni concentrates as it has a high Ni content and very low Fe content, owing to the high percentage of Ni contained in heazlewoodite ( $Ni_3S_2$ ). This makes this concentrate attractive to smelters.

Deposit	%Ni	%Co	%S	%Fe	%As	%MgO	%SiO <sub>2</sub>
Vinberget	26.3	1.33	19.8	13.5	0.295	12.7	19.8
Rönnbäcksnäset	36.0	0.74	16.3	3.7	0.173	13.4	16.3

Table 15-1: Average concentrate analyses from batch tests

The main concern with these concentrates is the high MgO content which may result in smelter penalties at levels greater than 8% MgO and sometimes as low as 4% MgO, depending on the smelter. SiO<sub>2</sub> is also high but does not normally attract penalties. The As content may also attract a penalty depending upon the smelter treating the concentrate. However, the attractiveness of the high Ni:Fe ratio in the concentrate will probably offset potential disadvantages from the MgO, SiO<sub>2</sub>, and As levels.

Following this testwork Outotec simulated closed circuit metallurgical performance in a commercial plant using HSC Chemistry®, steady state simulation software, by using the kinetic information from the laboratory results for the Vinberget ore only. The results were validated against the open circuit results for Vinberget but have not been validated on closed circuit results, i.e. via locked cycle tests. Based on the simulation work, after four stages of cleaning, ORC predicted that a cleaner concentrate would contain 28% Ni at 74.5% recovery and approximately 1.0% Co.
Phase 3 testing was performed in November 2009 through March 2010 to investigate the effects of a coarser primary grind prior to rougher flotation followed by cleaning incorporating concentrate regrinding. The primary grind was  $P_{80}$  50 to 60µm. In general the results of the batch flotation tests indicated an improvement in metallurgical performance and, based on the previous simulations, recoveries of nickel in a commercial plant are likely to support the values of 78% recovery at 28% concentrate grade assumed in this study.

In March 2010 mini pilot plant testing was performed in Finland using 50:50 blends of samples of Vinberget and Rönnbäcksnäset ores. Six 10 hour test runs were performed. At the time of this report final results were still under review, but preliminary metallurgical results, based on composite surveys, indicated that metallurgical performance similar to that established in Phase 3 could be expected in a commercial plant.

# 16 MINERAL RESOURCE ESTIMATE

#### 16.1 Introduction

A statistical study of the available data for the Rönnbäcksnäset and Vinberget deposits was undertaken to determine suitable geological domains to be used in the Mineral Resource Estimation. It is clear that the dominant Ni mineralisation is limited to the serpentinite body at both the Rönnbäcksnäset and Vinberget deposits with a hard contact to the host metasediments. Internal mafic units also contain low levels of Ni mineralisation that are present at Rönnbäcksnäset in addition to internal zones of non mineralised serpentinite that are present at Rönnbäcksnäset. The Vinberget deposit is a single body of serpentinite that does not contain any inclusions of mafics or internal non mineralised zones within the serpentinite.

## 16.2 Statistical Analysis and Geological Domaining

#### 16.2.1 Rönnbäcksnäset

The Rönnbäcksnäset deposit consists of a single serpentinite body that strikes in an east-west orientation to the south-western portion of the deposit and a north-south orientation in the north-eastern portion of the deposit. Figure 16-1 shows the drillhole distribution and solid wireframe created for the serpentinite body and Figure 16-2 shows the histogram of Ni-AC distribution for all assays associated with the mineralised serpentinite body. As shown in Figure 16-2, two clear populations of data exist in the Rönnbäcksnäset deposit. Figure 16-3 shows the probability plot for Ni-AC for the same data with grade breaks being evident at 0.04% Ni-AC, 0.08% Ni-AC and 0.15% Ni-AC. When applying the identified grade breaks to the drillhole file, it is clear that a low grade domain exists in the north-eastern portion of the Rönnbäcksnäset deposit on the hanging wall side of the serpentinite body. Figure 16-4 shows a cross section containing drillholes RON54, RON53 and RON64 with the low grade Ni-AC domain being highlighted. The section shown also highlights the mafic units within the serpentinite.

The Ni-AC distribution of the identified grade domains for the Rönnbäcksnäset deposit are shown in Figure 16-5 to Figure 16-8. The histograms show a near normal distribution within the mineralised serpentinite with the exception of a small low grade tail within the high grade population. This is related to individual low grade samples that cannot be domained out. Conversely, the mafic domain and internal waste domain show a high grade tail where individual samples occur within the larger modelled domain.



Figure 16-1: Rönnbäcksnäset serpentinite body and drillhole locations



Figure 16-2: Ni-AC histogram for the Rönnbäcksnäset serpentinite



Figure 16-3: Probability plot for the Rönnbäcksnäset serpentinite



Figure 16-4: Cross section showing low grade Ni-AC domain on the hangingwall side of the serpentinite body (view looking north)



Figure 16-5: Ni-AC distribution of the high grade serpentinite



Figure 16-6: Ni-AC distribution of the low grade serpentinite



Figure 16-7: Ni-AC distribution of the mafic unit



Figure 16-8: Ni-AC distribution of the internal waste domain

#### 16.2.2 Vinberget

The Vinberget deposit consists of a single serpentinite body that strikes in a northwestsoutheast orientation. Figure 16-9 shows the drillhole distribution and solid wireframe created for the serpentinite body and Figure 16-10 shows the histogram of Ni-AC distribution for all assays associated with the mineralised serpentinite body. As shown in Figure 16-10, a near normal population of data exists in the Vinberget deposit. Figure 16-11 shows the probability plot for Ni-AC for the same data with subtle grade breaks being evident at 0.075% Ni-AC and 0.12% Ni-AC. When applying the identified grade breaks to the drillhole file, no clear trends in the mineralisation are observed. This is shown in Figure 16-12. The serpentinite body has therefore not been domained in any greater detail.



Figure 16-9: Vinberget serpentinite body and drillhole locations



Figure 16-10: Ni-AC histogram for the Vinberget serpentinite



Figure 16-11: Probability plot for the Vinberget serpentinite



Figure 16-12: Vinberget drillhole file coloured by grade domains identified (looking west-northwest)

#### 16.3 Geological Modelling and Block Model Creation

The geological modelling was conducted in Datamine Studio 3 software and comprised the following:

- importing the collar, survey, assay and geology data into Datamine to create a desurveyed drillhole file;
- importing the topography data file;
- the creation of mineralisation wireframes for the Rönnbäcksnäset and Vinberget deposits based on the logged serpentinite body and the grade domains outlined above; and

• the creation of an empty block model coded by zone to distinguish the different geological domains identified (Figure 16-13 to Figure 16-15 and Table 16-1). The empty block model created used a parent cell size of 50mN by 50mE by 10mZ for the Rönnbäcksnäset deposit and a 25mN by 25mE by 10mZ for the Vinberget deposit, representing a division of the current drillhole spacing observed at each deposit (Table 16-2).



Figure 16-13: Rönnbäcksnäset empty block model (looking east, block height = 10m)



Figure 16-14: Rönnbäcksnäset empty block model showing internal waste pods (looking east, block height = 10m)



Figure 16-15: Vinberget empty block model (looking northwest, block height = 10m)

Table 16-1 shows the coding applied to the various geological domains in the Rönnbäcksnäset and Vinberget geological model.

Deposit	Geology	Code
	Metasediments	0
	Overburden	2
	Internal waste (NE)	102
Rönnbäcksnäset	Internal waste (SW)	112
	High Grade Serpentinite	151
	Low Grade Serpentinite	152
	Mafics	205
	Metasediments	0
Vinberget	Overburden	2
	Serpentinite	151

Table 16-1: Zone codes created for Rönnbäcken Nickel Sulphide Project

Table 16-2 shows the block model parameters used to build the empty block models for the Rönnbäcksnäset and Vinberget deposits.

DEPOSIT	DIRECTION	ORIGIN	BLOCK SIZE	NO. OF BLOCKS
	Х	1479250	50	55
Rönnbäcksnäset	Y	7267000	50	60
	Z	0	10	75
	Х	1483600	25	50
Vinberget	Y	7262200	25	50
	Z	250	10	100

## 16.4 Available Data

The Rönnbäcksnäset deposit consists of 54 diamond drillholes for a total of 7,770 drilled meters. Of this, 5,124 drilled meters have been assayed for Ni-AC. The Vinberget deposit consists of 38 diamond drillholes for a total of 7,602 drilled meters. Of this, 6,723 drilled meters have been assayed for Ni-AC. This is shown in

#### Table 16-3: Available data

DEPOSIT	No. of drillholes	Total Meters Drilled	Ni-AC Assayed Meters		
Rönnbäcksnäset	54	7,770	5,124		
Vinberget	38	7,602	6,723		

# 16.5 Data Validation

All available data was validated through the production of histograms and scatterplots and through the use of the Datamine drillhole validation tools upon creation of a desurveyed drillhole file. 20 drillholes were removed from the database (17 drill holes from Vinberget and 3 from Rönnbäcksnäset) due to a lack of associated survey, assay and/or geological data but no additional errors were found in the data files provided. SRK is satisfied that the data is suitable to be used in the Mineral Resource Estimate.

#### 16.6 Raw Statistics

Table 16-4 shows the raw statistics for the domains modelled at the Rönnbäcksnäset and Vinberget deposits. The main serpentinite zones are highlighted in red. As shown, the mean Ni-AC grade of the Rönnbäcksnäset high grade serpentinite is 0.111% and the mean grade of the low grade serpentinite is 0.054%. The mean grade of the Vinberget serpentinite is 0.131% Ni-AC.

The Coefficient of Variation (CoV) can be used to describe the shape of the distribution and is defined as the ratio of the standard deviation to the mean. A CoV greater than one indicates the presence of some erratic high values that may have a significant impact on the final estimation. Within the main serpentinite domains, Table 16-4 shows that CoV values are very low, being 0.23 and 0.25 respectively and indicating the low variability of the data.

DEPOSIT	ZONE	NSAMPLES	MIN	MAX	RANGE	MEAN %	VAR	SDEV	CoV
	102	131	0.001	0.081	0.080	0.015	0.000	0.012	0.80
	112	104	0.002	0.096	0.094	0.016	0.000	0.014	0.88
Bon	120	67	0.002	0.116	0.114	0.037	0.001	0.033	0.89
RUN	151	1,684	0.003	0.192	0.189	0.111	0.001	0.026	0.23
	152	410	0.004	0.154	0.150	0.054	0.000	0.020	0.37
	205	315	0.001	0.139	0.138	0.030	0.001	0.029	0.97
Vin	151	3,632	0.001	0.222	0.221	0.131	0.001	0.033	0.25

Table 16-4: Length weighted Ni-AC statistics for the Rönnbäcksnäset and Vinberget deposits

#### 16.7 Compositing

Data compositing is commonly undertaken to reduce the inherent variability that exists within the population and to generate samples more appropriate to the scale of the mining operation envisaged. It is also necessary for the estimation process, as all samples are assumed to be of equal weighting, and should therefore be of equal length.

The majority of samples in both the Rönnbäcksnäset and Vinberget drillhole files are 2m in length with smaller samples being present to mark the geological contacts. Due to the very low CoV observed in the database and the near normal populations shown in the histograms of the raw data, all samples have been composited to 2m as increasing the sample to a larger composite length has little impact on the variability of the database. The composite statistics for the Rönnbäcksnäset and Vinberget domains are shown in Table 16-5.

			1		1				
DEPOSIT	ZONE	NSAMPLES	MIN	MAX	RANGE	MEAN %	VAR	SDEV	CoV
	102	109	0.001	0.077	0.076	0.015	0.000	0.011	0.73
	112	103	0.004	0.075	0.071	0.016	0.000	0.013	0.81
<b>B</b> and	120	67	0.002	0.100	0.098	0.037	0.001	0.033	0.89
ROI	151	1,589	0.004	0.192	0.188	0.111	0.001	0.026	0.23
	152	354	0.008	0.135	0.127	0.054	0.000	0.019	0.35
	205	250	0.001	0.139	0.138	0.029	0.001	0.029	1.00
Vin	151	3275	0.001	0.215	0.214	0.131	0.001	0.032	0.24

Table 16-5: 2m composite Ni-AC statistics for the Rönnbäcksnäset and Vinberget deposits

#### 16.8 Density Analysis

A comprehensive density dataset has been generated by IGE using the methodology described in Section 10.6. In total, 2,701 density measurements are present for the Rönnbäcksnäset domains and 3,416 density measurements are present for the Vinberget domains. Table 16-6 shows the breakdown of samples per domain for Rönnbäcksnäset and

Vinberget deposits. Density measurements have also been acquired for the waste domains allowing accurate tonnages to be determined for all material types.

DEPOSIT	DOMAIN	NSAMPLES	MIN	MAX	RANGE	MEAN (g/cm <sup>3</sup> )	VAR	SDEV
	0	114	2.57	3.14	0.57	2.74	0.010	0.102
	102	118	2.64	3.25	0.61	2.79	0.033	0.181
	112	104	2.6	3.03	0.43	0.43 2.70		0.063
Ron	120	65	2.48	3.04	0.56	2.69	0.006	0.077
	151	1681	2.48	3.38	0.9	2.73	0.008	0.087
	152	435	2.54	3.24	0.7	2.73	0.012	0.107
	205	307	2.65	3.26	0.61	2.96	0.035	0.187
	0	94	2.63	3.21	0.58	2.80	0.01	0.10
Vin	2	1	2.67	2.67	0.00	2.67	-	-
	151	3619	2.46	3.06	0.60	2.71	0.00	0.05

#### Table 16-6: Density measurements

# 16.9 Geostatistical study

#### 16.9.1 Variography

The 2m composited drillhole database, coded by the modelled domains, was imported into ISATIS software for the geostatistical analysis. Variography was attempted on the main serpentinite ore domain (151), but due to the low number of samples and poor variograms produced in the low grade serpentinite domain (152) and the waste domains, variography was not possible and those produced for domain 151 were utilised in the interpolation of all other domains.

Directional experimental semi-variograms were produced for Ni-AC and Co-AC for the Rönnbäcksnäset deposit and omni directional experimental semi-variograms were produced for the Vinberget deposit. Directional semi-variograms were produced for Rönnbäcksnäset due to the interpreted dip and strike direction observed for the serpentinite body. Omni directional semi-variograms were produced for Vinberget due to the apparent lack of mineralisation trends in the sub-vertical serpentinite body. The directional semi variograms that were attempted for Vinberget, using a near vertical dip to the search ellipse produced near identical ranges and structures in the down-dip, along strike and down-hole directions indicating the appropriateness of an omni directional variogram.

The semi-variograms were produced using a 2m (composite length) lag in the downhole / omni directional direction allowing the short-scale structures and nugget variance to be determined. Along strike and down-dip variograms for the Rönnbäcksnäset deposit were then produced with the nugget fixed from the downhole variogram, and using a lag spacing of 100m with a 50% tolerance being applied to the lag spacing.

Figure 16-16 shows the plane used to define the directional variography for the northeast portion of the Rönnbäcksnäset deposit, using a 016° azimuth, 40° dip to the west and a 45° plunge.



Figure 16-16: Directional variography plane for Rönnbäcksnäset northeast

Figure 16-17 shows the plane used to define the directional variography for the southwest portion of the Rönnbäcksnäset deposit, using a 085° azimuth, 25° dip to the west and no plunge.



Figure 16-17: Directional variography plane for Rönnbäcksnäset southwest

Figure 16-18 to Figure 16-24 show the Ni-AC semi-variograms for Rönnbäcksnäset and Vinberget. Sample pairs are not displayed on the variograms for easier visualisation purposes; however, they were checked in the variography process with sufficient numbers being used.

Variograms produced for Co-AC showed similar structures and ranges.

Density was modelled using omni directional semi variograms. These are shown in Figure 16-25 to Figure 16-27.

The results of the variography are shown in Table 16-7 and Table 16-8.

All variograms generated can be found in Appendix 1.







Figure 16-19: Ni-AC downhole semi-variogram for Rönnbäcksnäset southwest



Figure 16-20: Ni-AC along strike semi-variogram for Rönnbäcksnäset northeast (016°)



Figure 16-21: Ni-AC along strike semi-variogram for Rönnbäcksnäset southwest (085°)







Figure 16-23: Ni-AC down-dip semi-variogram for Rönnbäcksnäset southwest (025° north)



Figure 16-24: Ni-AC omni directional semi-variogram for Vinberget



Figure 16-25: Density omni directional semi-variogram for Rönnbäcksnäset northeast



Figure 16-26: Density omni directional semi-variogram for Rönnbäcksnäset southwest



Figure 16-27: Density omni directional semi-variogram for Vinberget

Table 16-7: Variography Results for Rönnbäcksnäset

Deposit A	A	Assay Nugget	Structure 1 - Range			Varianaa	Structure 2 - Range			Varianco	Sill	Relative
	Assay		Down-Dip (40°)	Along-Strike (016°)	Downhole	variance	Down-Dip (40°)	Along-Strike (016°)	Downhole	varialice	511	Nugget (%)
Ronn - NE (151) -	Ni-AC	0.00007	50	125	35	0.00098	250	300	35	0.00038	0.00143	5
	Co- PPM*	16.84	100	125	30	235.7	200	300	35	91.4	343.94	5
	Density	0.0006	7	7	7	0.00027	45	45	45	0.00027	0.00114	53

Deposit Ass	A	Numer	Structure 1 - Range		Varianaa	Structure 2 - Range			Variance	Sill	Relative	
	ASSay	Nugget	Down-Dip (25°)	Along-Strike (085°)	Downhole	vanance	Down-Dip (25°)	Along-Strike (085°)	Downhole	variance	5	Nugget (%)
	Ni-AC	0.00015	200	300	60	0.000225	400	450	80	0.00038	0.0006	25
SW (151)	Co- PPM*	31	125	200	60	264.5	450	300	90	264.5	560	6
(151)	Density	0.0025	80	80	80	0.00163	-	-	-	-	0.00413	61

\*variography based on Co-PPM due to very low variance observed

Table 16-8: Variography Results for Vinberget

Denesit	A	Nugget	Structure 1 - Range			Varianaa	St	Varianco		
Deposit	Assay		Down-Dip (Omni)	Along-Strike (Omni)	Downhole (Omni)	vanance	Down-Dip (Omni)	Along-Strike (Omni)	Downhole (Omni)	Vanance
Ronn NE (151)	Ni-AC	0.00014	15	15	15	0.000405	200	200	200	0.000491
	Co- PPM*	25	25	25	25	60.36	60	60	60	55.36
	Density	0.0005	10	10	10	0.000405	40	40	40	0.00041

S	tructure 3 - Rang	je	Verience	6:11	Relative	
Down-Dip (Omni)	Along-Strike (Omni)	Downhole (Omni)	variance	511	(%)	
-	-	0.00143	5	0.00104	14	
200	200	343.94	5	206.08	12	
-	-	0.00114	53	0.001315	38	

\*variography based on Co-PPM due to very low variance observed

#### 16.9.2 Summary

The directional experimental semi-variograms produced for Rönnbäcksnäset northeast allowed the generation of very robust variogram models to be generated in the downhole and down-dip directions (40° to the west) for Ni-AC and Co-AC. Along strike (016°) variograms were however poor with little or no structure being observed.

The directional experimental semi-variograms produced for Rönnbäcksnäset southeast allowed the generation of very robust variogram models to be generated in the downhole and down-dip directions (25° to the north) for Ni-AC and Co-AC. Along strike (085°) variograms were also modelled for Ni-AC with a simple 2 structure spherical model. Co-AC variograms were however poor in the along strike direction.

The omni directional experimental semi-variograms produced for Vinberget allowed the generation of very robust variogram models to be generated for Ni-AC and Co-AC.

Similarly, the omni directional experimental semi-variograms produced for Rönnbäcksnäset and Vinberget allowed the generation of very robust variogram models to be generated for density.

The results of the variography are used in the interpolation to assign the appropriate weighting to the samples pairs being utilised to calculate the block model grade. The total ranges modelled have also been used to help define the optimum search parameters and the search ellipse dimensions used in the interpolation. Ideally, sample pairs that fall within the range of the variogram where a strong covariance exists between the sample pairs should be utilised if the data allows. Applying a  $2/3^{rd}$  rule to the total range of the variograms in the search ellipse dimensions forces the interpolation to use samples where covariance between samples exists.

Deposit	Parameter	Along Strike	Down Dip	Across Strike
	Average Total Range	338m	325m	60m
Ronnbacksnaset (Directional)	2/3 Average Range	225m	217m	40m
(Dirootional)	Search Ellipse Chosen	225m	217m	20m
	Average Total Range	200m	200m	200m
Vinberget (Omni Directional)	2/3 Average Range	133m	133m	133m
	Search Ellipse Chosen	100m	100m	100m

Table 16-9: Ranges and 2/3<sup>rd</sup> ranges for Rönnbäcksnäset

As a result of the variography, ordinary kriging (OK) was deemed the most appropriate interpolation technique to be applied to Ni-AC, Co-AC and density.

# 16.10 Quantitative Kriging Neighbourhood Analysis (QKNA)

To better define the ideal search parameters used in the interpolation, Quantitative Kriging Neighbourhood Analysis ("QKNA") was also undertaken on the data.

#### 16.10.1 QKNA Process

QKNA, as presented by Vann et al (2003), is used to refine the search parameters in the interpolation process to help ensure 'conditional unbiasedness' in the resulting estimates. 'Conditional unbiasedness' is defined by David (1977) as "...on average, all blocks Z which are estimated to have a grade equal to Zo will have that grade". The criteria considered when evaluating a search area through QKNA, in order of priority, are (Vann et al 2003):

- the slope of regression of the 'true' block grade on the 'estimated' block grade;
- the weight of the mean for a simple kriging;
- the distribution of kriging weights, and proportion of negative weights; and
- the kriging variance.

Under the assumption that the variogram is valid, and the regression is linear, the regression between the 'true' and 'estimated' blocks can be calculated. The actual scatter plot can never be demonstrated, as the 'true' grades are never known, but the covariance between 'true' and 'estimated' blocks can be calculated. The slope of regression should be as close to one as possible, implying conditional unbiasedness. If the slope of regression equals one, the estimated block grade will approximately equate to the unknown 'true' block grades (Vann et al, 2003).

During OK, the sum of the kriging weights is equal to one. When Simple Kriging (SK) is used, the sum of kriging weights is not constrained to add up to one, with the remaining kriging weight being allocated to the mean grade of the input data. Therefore, not only the data within the search area is used to krige the block grade, but the mean grade of the input data also influences the final block grade. The kriging weight assigned to the input data mean grade is termed "the weight of the mean". The weight of the mean of a SK is a good indication of the search area as it shows the influence of the Screen Effect. A sample is 'screened' if another sample lies between it and the point being estimated, causing the weight of the screened sample to be reduced. The Screen Effect is stronger when there are high levels of continuity denoted by the variogram. A high nugget effect (low continuity) will allow weights to be spread far from a block in order to reduce bias (Vann et al 2003). The weight of the mean for a SK demonstrates the strength of the Screen Effect the larger the weight of the mean, the weaker the Screen Effect will be. The general rule is that the weight of the mean should be as close to zero as possible. QKNA is a balancing act between maximising the slope of regression, and minimising the weight of the mean for a SK (Vann et al, 2003). The margins of an optimised search will contain samples with very small or slightly negative weights. Visual checks of the search area should be made in order to verify this. The proportion of negative weights in the search area should be less than 5% (Vann et al 2003).

QKNA provides a useful technique that uses mathematically sound tools to optimise a search area. It is an invaluable step in determining the correct search area for any estimation or simulation exercise.

#### 16.10.2 Interpolation Process

Neighbourhood tests were run on ore domains 151 and 152 for Rönnbäcksnäset and domain 151 for Vinberget with the search ellipse dimensions being fixed against the optimum ranges identified in the variography and as highlighted in Table 16-9. Search ellipse range parameters were not tested in the QKNA process due to the robust variograms produced highlighting the optimum search ranges that should be used.

Should an insufficient number of blocks be estimated using the optimum ellipse ranges, additional QKNA scenarios should be run to test the optimum ellipse dimensions at an increasing ellipse size. This was however, not necessary and all QKNA models were based on a first pass interpolation.

Table 16-10 outlines the chosen parameters used in the QKNA tests.

QKNA Model	Search Ellipse Dimension (m)			Min	Max Samplas	Max Samples	
	Along Strike	Down Dip	Across Strike	Samples	wax Samples	per Drillhole	
Ron NE	225	217	20	6	12	6	
Ron SW	225	217	20	6	12	6	
Vin	100	100	100	12	24	3	

Table 16-10: QKNA model parameters

The number of blocks filled in the neighbourhood run was checked to ensure that an adequate number of blocks were filled ensuring that meaningful results were generated. The slope of regression was estimated into the individual models and each QKNA run compared. The results of the QKNA checks are shown in Table 16-11. As shown, a high number of blocks have been estimated using the optimum search parameters defined with a relatively high mean slope of regression in Rönnbäcksnäset (0.6 and 0.4) and a high mean slope of regression in Vinberget (0.85).

Table 16-11: QKNA results: slope of	regression and percent block filled
-------------------------------------	-------------------------------------

Deposit	Min	Max	Mean	% Filled in Run 1
Ron (151)	0.013	0.981	0.60	62
Ron (152)	0.011	0.803	0.40	94
Vin (151)	0.409	0.969	0.85	75

The distribution of Ni-AC slope of regression values is shown in Figure 16-28 to Figure 16-30 for Rönnbäcksnäset. A high slope of regression (>0.8) can be seen around well-informed blocks with the slope of regression value decreasing towards the base of the model where the blocks are less well-informed with sample data. The slope of regression data shows that the southwest portion of the deposit is better informed with data than the northeast portion of the deposit, despite a closer drill spacing in the northeast portion of the deposit.



Figure 16-28: Rönnbäcksnäset block model coloured by slope of regression (looking northeast)



Figure 16-29: Rönnbäcksnäset southwest block model coloured by slope of regression (looking east)



Figure 16-30: Rönnbäcksnäset northeast block model coloured by slope of regression (looking north)

The distribution of Ni-AC slope of regression values is shown in Figure 16-31 and Figure 16-32 for Vinberget. A high slope of regression (>0.8) can be seen around well-informed blocks with the slope of regression value decreasing towards the base and edges of the model where the blocks are less well-informed with sample data.



Figure 16-31: Vinberget block model coloured by slope of regression (looking north)



Figure 16-32: Vinberget block model coloured by slope of regression (looking northwest)

# 16.11 Mineral Resource Estimation

#### 16.11.1 Interpolation

An empty block model was generated using the lithology wireframes with block dimensions as shown in Table 16-12. These block dimensions approximate half the drillhole spacing at Rönnbäcksnäset northeast and at Vinberget. Due to the low nugget effect observed at the Rönnbäcksnäset deposit, it is deemed appropriate to use blocks smaller than half the drillhole spacing at Rönnbäcksnäset southwest as it is assumed that blocks that are not supported by drillhole intersections are supported by data within the short scale range observed in the variograms. The results of the QKNA study also highlight that the blocks in the Rönnbäcksnäset southwest deposit are well supported by data. A block height of 10m was chosen, being the assumed working bench height of the operating pit. Table 16-12 summarizes the block model parameters.

DEPOSIT	DIRECTION	ORIGIN	BLOCK SIZE	NO. OF BLOCKS	
	Х	1479250	50	55	
Rönnbäcksnäset	Y	7267000	50	60	
	Z	0	10	75	
Vinberget	Х	1483600	25	50	
	Y	7262200	25	50	
	Z	250	10	100	

Table 16-12: Block Model Framework

Grades of Ni-AC, Co-AC and Ni-Total were interpolated into the model using OK and using the kriging parameters as given in Table 16-7 and Table 16-8. Ni-Total was interpolated using the Ni-AC kriging parameters and represents the nickel present in both silicate and sulphide phases.

All domains were interpolated using OK, with the mafic units and internal waste domains at Rönnbäcksnäset utilising the variography data determined for the main serpentinite domain (151).

#### 16.11.2 Search Ellipse Parameters

The dip and strike of the Rönnbäcksnäset deposit varies, with the strike changing from a near east-west orientation in the southwest to a near north-south orientation in the northeast. Due to the varying nature of the strike, it was necessary to either divide the deposit into two separate domains based on strike, or use the dynamic anisotropy function in Datamine Studio 3 to move the search ellipse with the changing strike direction. Dividing the deposit into unique domains based on strike, would have resulted in an artificial "hard" boundary between the northeast and southwest portions of the deposit beingan inaccurate representation of Rönnbäcksnäset geology, given that the nature of Ni-AC mineralisation appears to be consistent across these strike change boundaries. As such, dynamic anisotropy was selected to provide a continuous estimation and honour the observed geological structure in the estimation process.

Dynamic anisotropy uses angle data generated from the orebody wireframe to assign dip and dip direction to every block in the model. The search ellipse is rotated upon estimation of the block by honouring the associated dip and dip direction of that block. Figure 16-33 shows the search ellipse generated at various points of the Rönnbäcksnäset deposit, with the dip and strike of the ellipse corresponding with the dip and strike of the orebody wireframe.



# Figure 16-33: First pass search ellipses used in the interpolation of Rönnbäcksnäset (looking north, search ellipse radii measures 225m along strike)

The Vinberget deposit used an isotropic search ellipse of 100m by 100m by 100m. This is shown in Figure 16-34.



Figure 16-34: First pass search ellipses used in the interpolation of Vinberget (looking north, search ellipse radii measures 100m)

Three different grade estimation runs with specific sample criteria were undertaken. The first run uses the parameters determined by the QKNA testwork and is considered the optimum set of interpolation parameters. The second run doubles the dimensions of the search ellipse and the third run multiplies the original search ellipse by a factor of ten and reduces the minimum number of samples required to estimate the block grades. The third run is designed to estimate any blocks not estimated in runs one and two and therefore, decreases the confidence in the estimation results. This is due to the search ellipse looking for samples that are greatly outside the geostatistical range of the samples as shown in the geostatistical analysis.

Table 16-13 shows the search ellipse parameters used for the three estimation runs.

ZONE	STRIKE (°)	DIP (°)	RUN	ALONG STRIKE RADII	Down Dip Radii	ACROSS STRIKE RADII	MIN SAMPS	MAX SAMPS
	Defined by dynamic anisotropy		1	225	217	20	6	12
Rönnbäcksnäset			2	450	450	40	6	12
			3	2250	2250	200	3	12
	Isotropic		1	100	100	100	12	24
Vinberget			2	200	200	200	12	24
			3	1000	1000	1000	12	24

#### Table 16-13: Search ellipse parameters

#### 16.11.3 Block Model Validation

The block model has been validated using the following techniques:

- visual inspection of block grades in plan and section and comparison with drillhole grades;
- comparison of global mean block grades and sample grades.

#### **Visual Validation**

Figure 16-35 to Figure 16-37 show examples of the visual validation checks between block Ni-AC grades and the input composite Ni-AC grade for the Rönnbäcksnäset deposit. The grades follow the strike and dip of the orebody showing that the search ellipse orientation has been used appropriately with Figure 16-37 showing that the grade has been interpolated through the change of strike of the serpentinite body.



Figure 16-35: Visual validation of block grades against 2m composite sample grades for Rönnbäcksnäset northeast (looking north)



Figure 16-36: Visual validation of block grades against 2m composite sample grades for Rönnbäcksnäset southwest (looking east)



Figure 16-37: Visual validation of block grades against 2m composite sample grades for Rönnbäcksnäset (plan view, RL set at 360m)

Figure 16-38 to Figure 16-40 show examples of the visual validation checks between block Ni-AC grades and the input composite Ni-AC grade for the Vinberget deposit. Due to the homogenous nature of the Ni-AC distribution, grade trends are difficult to pick. However, from the cross section, long section and plan view, it is clear that the block model grades correspond with the composite sample grades.


Figure 16-38: Visual validation of block grades against 2m composite sample grades for Vinberget (looking northwest)



Figure 16-39: Visual validation of block grades against 2m composite sample grades for Vinberget (looking northeast)



Figure 16-40: Visual validation of block grades against 2m composite sample grades for Vinberget (plan view, RL set at 570m)

#### Global mean grade comparison

Table 16-14 shows a comparison of the global block mean grades with the global sample means grades for Ni-AC, Co-AC and density.

Overall, SRK is confident that the interpolated grades are a reasonable reflection of the available sample data with the key grade fields being well within acceptable limits.

DEPOSIT	DOMAIN	FIELD	<b>BLOCK MEAN</b>	COMP MEAN	DIFFERANCE
	102	NI_AC	0.016	0.015	0.001
	112	NI_AC	0.018	0.016	0.002
	151	NI_AC	0.106	0.111	-0.005
	152	NI_AC	0.055	0.054	0.001
	205	NI_AC	0.035	0.029	0.006
	102	NI_TOT	0.145	0.148	-0.003
	112	NI_TOT	0.167	0.167	0.000
	151	NI_TOT	0.180 0.183		-0.003
Rönnbäcksnäset	152	NI_TOT	0.165	0.167	-0.002
	205	NI_TOT	0.072	0.067	0.005
	102	CO_AC	0.001	0.001	0.000
	112	CO_AC	0.001	0.001	0.000
	151	CO_AC	0.003 0.003		0.000
	152	CO_AC	0.003	0.003	0.000
	205	CO_AC	0.002	0.002	0.000
	102	DENSITY	2.79	2.79	0.00
	112	DENSITY	2.70 2.70		0.00
	151	DENSITY	2.74 2.73		0.01
	152	DENSITY	2.72	2.73	0.00
	205	DENSITY	2.95	2.96	0.00
Vinberget	151	NI_AC	0.132	0.131	0.001
	151	NI_TOT	0.186	0.187	-0.001
	151	CO_AC	0.006	0.006	0.000
	151	DENSITY	2.71	2.71	0.00

 Table 16-14: Comparison of block and sample mean grades

#### 16.12 Mineral Resource Classification

The definitions given in the following section are taken from the 2000 Canadian Institute of Mining Standing Committee on Reserve Definitions' guidelines on Mineral Resources and Reserves, to comply with National Instrument 43-101.

#### 16.12.1 CIM Definitions

#### **Mineral Resource**

Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource.

A Mineral Resource is a concentration or occurrence of natural, solid, inorganic or fossilized organic material in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge.

The term Mineral Resource covers mineralisation and natural material of intrinsic economic interest which has been identified and estimated through exploration and sampling and within which Mineral Reserves may subsequently be defined by the consideration and application of technical, economic, legal, environmental, socio-economic and governmental factors. The phrase 'reasonable prospects for economic extraction' implies a judgement by the Qualified Person in respect of the technical and economic factors likely to influence the prospect of economic extraction. A Mineral Resource is an inventory of mineralisation that, under realistically assumed and justifiable technical and economic conditions, might become economically extractable. These assumptions must be presented explicitly in both public and technical reports.

#### **Inferred Mineral Resource**

An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drillholes.

Due to the uncertainty which may attach to Inferred Mineral Resources, it cannot be assumed that all or any part of an Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration. Confidence in the estimate is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure. Inferred Mineral Resources must be excluded from estimates forming the basis of feasibility or other economic studies.

#### **Indicated Mineral Resource**

An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drillholes that are spaced closely enough for geological and grade continuity to be reasonably assumed.

Mineralisation may be classified as an Indicated Mineral Resource by the Qualified Person when the nature, quality, quantity and distribution of data are such as to allow confident interpretation of the geological framework and to reasonably assume the continuity of mineralisation. The Qualified Person must recognize the importance of the Indicated Mineral Resource category to the advancement of the feasibility of the project. An Indicated Mineral Resource estimate is of sufficient quality to support a Preliminary Feasibility Study which can serve as the basis for major development decisions.

#### **Measured Mineral Resource**

A 'Measured Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drillholes that are spaced closely enough to confirm both geological and grade continuity.

Mineralisation or other natural material of economic interest may be classified as a Measured Mineral Resource by the Qualified Person when the nature, quality, quantity and distribution of data are such that the tonnage and grade of the mineralisation can be estimated to within close limits and that variation from the estimate would not significantly affect potential economic viability. This category requires a high level of confidence in, and understanding of, the geology and controls of the mineral deposit.

#### 16.12.2 Classification

#### Introduction

To classify the Rönnbäcksnäset and Vinberget deposits, the following key indicators were used:

• geological complexity;

- quality of data used in the estimation:
  - QAQC, density analysis
- results of the geostatistical analysis
  - o variography, and
  - QKNA results; and
- quality of the estimated block model.

#### **Geological Complexity**

Due to the large amount of drill data, it is possible to see clear geological continuity between sections and deduce a clear geological model for both the Rönnbäcksnäset and Vinberget deposits with all of the mineralisation occurring within the serpentinite body. The drill spacing has allowed for the interpretation of a continuous zone of mafic material with a low associated Ni-AC grade. Internal waste pods have been interpreted that are harder to join from adjacent sections but these are limited in number and form a small part of the overall serpentinite body.

A statistical study of the Rönnbäcksnäset and Vinberget data shows a very low variability to the grade distribution with near normal populations of data being present. A continuous low grade serpentinite unit has been identified from the statistical study that was subsequently domained as a separate unit.

It is the opinion of SRK that the associated risk relating to geological complexity is low.

#### Quality of the Data used in the Estimation

Quality assurance and quality control (QAQC) checks were implemented throughout the assaying period that included the insertion of standards, blanks, laboratory duplicates and the use of an umpire laboratory. The results of the QAQC checks provided reasonable results.

Overall, SRK is confident that the results of the QAQC analysis have validated the accuracy of the database being used to generate the Mineral Resource Estimate.

A full analysis of the QAQC can be found in Appendix 2.

A comprehensive dataset of density has also been generated by IGE throughout the sampling period that has enabled SRK to estimate density into the model using OK. SRK is therefore confident that the associated tonnages are a reasonable reflection of the Rönnbäcksnäset and Vinberget deposits.

#### **Results of the Geostatistical Analysis**

The data used in the geostatistical analysis resulted in robust variogram models being produced for both Rönnbäcksnäset and Vinberget. This enabled the nugget and short-scale variation in grade to be determined with a high level of confidence. The detailed

variography allowed for the determination of appropriate search ellipse parameters to be determined through the application of multiple QKNA tests prior to the grade interpolation.

#### **Quality of the Estimated Block Model**

The validation tools show that the input data used to estimate the model is replicated in the estimation. Mean grades of the block model and composites are comparable for all modelled domains.

#### Classification

Rönnbäcksnäset and Vinberget have been classified as containing Measured, Indicated and Inferred Resources.

Measured Resources have been limited to Vinberget due to the closer drill spacing that has resulted in well supported block estimates as highlighted by the following criteria:

- Very low geological complexity;
- drillhole spacing of much less than the 2/3rd geostatistical range;
- all blocks were estimated in search volume one, using the optimum search parameters determined; and
- slope of regression values dominantly greater than 0.8.

Indicated Resources have been given on the basis of all the information above, except with a slope of regression dominantly greater than 0.5. Indicated Resources at Rönnbäcksnäset have been extended approximately 100m down dip of the last drillhole intersection on the section line.

Inferred Resources at Rönnbäcksnäset have been calculated by extending the Indicated boundary 50m down-dip and by including areas where internal waste pods are defined and unsupported by more than two drillholes on a section line.

Figure 16-41 shows the Rönnbäcksnäset block model coloured by classification.

Figure 16-42 shows the Vinberget block model coloured by classification.



Figure 16-41: Rönnbäcksnäset classification. Blue = Indicated; Red = Inferred; Purple = Unclassified (looking east)



# Figure 16-42: Vinberget classification. Green = Measured; Blue = Indicated; Red = Inferred (looking north)

To determine the final Mineral Resource Statement, and so as to comply with the NI 43-101 guidelines, the resulting blocks have been subjected to a Whittle pit optimisation exercise to determine the proportion of the material defined that has a reasonable prospect of economic extraction. This exercise is not intended to generate a Mineral Reserve and is purely used to assist in determining the possible extent of the resource model.

#### **16.13 Whittle Parameters**

The Whittle optimisation requires the input of reasonable processing and mining cost parameters in addition to appropriate pit slope angles and processing recoveries. Table 16-15 shows the assumptions applied in the Whittle optimisation.

The Whittle optimisation has assumed that only the serpentinite domains (151 and 152) are to be treated as potential ore material.

Revenue				
Ni Price	USD 9/lb			
Govt Royalty	0.2%			
Private Royalty	0%			
Discount Rate	0%			
Process and Mining Statistics				
Overall Slope Angle	52°			
Mining Recovery	95%			
Mining Dilution	2.5%			
Process Recovery	78%			
OP Mining Cost at surface.	1.0 USD/tonne			
Incremental Mining Cost above surface	0.05 USD/tonne/10m			
Incremental Mining Cost below surface	0.07 USD/tonne/10m			
Processing Cost	4.24 USD / ore tonne			
Effective charges per lb Ni in smelter feed	2.26 USD / lb			
General & Administration	1.0 USD / ore tonne			
Rail / Road Transport Cost	0.35 USD / ore tonne			
Concentrate Grade	28.0%			

#### Table 16-15: Whittle parameters

#### 16.14 Mineral Resource Statement

The Mineral Resource Statement generated by SRK has been restricted to all classified material falling within the Whittle shell representing a metal price of 9 US\$/lb and through the application of the parameters outlined in Section 16.13. SRK assumed an optimistic nickel price of USD9.00/lb in a whittle open pit optimisation exercise to limit the material reported to that which SRK considers has reasonable prospects for eventual economic extraction and applied a cut off grade of 0.048% Ni-AC representing the calculated marginal cut off grade for the deposits. This approach is in line with industry best practise as used by several major producers. The USD9.00/lb nickel price includes a 30% premium above the consensus long-term nickel price, determined from over 30 market forecasts.

Table 16-16 shows the resulting Mineral Resource Statement for Rönnbäcksnäset and Vinberget respectively.

The statement has been classified by Qualified Person Howard Baker (MAusIMM) in accordance with the Guidelines of National Instrument 43-101 and accompanying documents 43-101.F1 and 43-101.CP. It has an effective date of 21<sup>st</sup> April, 2010.

Mineral resources that are not mineral reserves do not have demonstrated economic viability and SRK and IGE are not aware of any factors (environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant factors) that have materially affected the Mineral Resource Estimate. The Rönnbäcksnäset and Vinberget deposits are greenfield sites and therefore are not affected by any mining, metallurgical or infrastructure factors.

DEPOSIT	CLASSIFICATION	TONNES (Mt)	Ni-Total %	Ni-AC %	Co-AC %	Ni-AC Tonnes
Rönnbäcksnäset	Measured	-	-	-	-	-
	Indicated	206.6	0.178	0.104	0.003	214
	Measured + Indicated	206.6	0.178	0.104	0.003	214
Vinberget	Measured	28.2	0.188	0.132	0.006	37
	Indicated	22.4	0.183	0.134	0.006	30
	Measured + Indicated	50.6	0.186	0.133	0.006	67
TOTAL	Measured	28.2	0.188	0.132	0.006	37
	Indicated	228.9	0.179	0.107	0.003	244
	Measured + Indicated	257.1	0.180	0.110	0.004	282
Rönnbäcksnäset	Inferred	76.9	0.176	0.100	0.003	77
Vinberget	Inferred	6.6	0.183	0.138	0.007	9
Total	Inferred	83.5	0.177	0.103	0.003	86

#### Table 16-16: Mineral Resource Statement

(1) The effective date of the Mineral Resource is April 21, 2010

(2) The Mineral Resource Estimate for the Rönnbäcksnäset and Vinberget deposits was constrained within serpentinite solids and within a Lerchs-Grossman pit shell defined by the following assumptions; a marginal cut-off-grade of 0.048% Ni-AC, a metal price of 9 US\$/lb; slope angles of 52 degrees; a mining recovery of 95%; a mining dilution of 2.5%; an average mine operating cost of 1.58USD/tonne (with a base case of 1.0USD/tonne and an incremental mine operating costs of 0.07USD/tonne/10m below the 450m reference RL and 0.05USD/tonne/10m above the 450m reference RL); process operating costs of 4.24USD/tonne ore; an effective charge per lb Ni in smelter feed of \$2.26 and G&A costs of 1.0USD/tonne ore.

(3) Mineral Resources for the Rönnbäcksnäset and Vinberget deposits have been classified according to the "CIM Standards on Mineral Resources and Reserves: Definitions and Guidelines (December 2005) by Howard Baker (MAusIMM) an independent Qualified Person as defined by National Instrument 43-101.

In total, Rönnbäcksnäset and Vinberget have a combined Measured and Indicated resource of 257.1 Mt grading 0.180 Ni-Total, 0.110% Ni-AC and 0.004% Co-AC. Of this, 28.2 Mt grading 0.188% Ni-Total, 0.132% Ni-AC and 0.006% Co-AC is in the Measured category and 228.9 Mt grading 0.179% Ni-Total, 0.107% Ni-AC and 0.003% Co-AC is in the Indicated category. In addition to the Measured and Indicated resources, 83.5 Mt grading 0.103% Ni-AC and 0.003% Co-AC is in the Inferred category.

Figure 16-43 shows the Rönnbäcksnäset Whittle pit shell generated using a metal price of 9 US\$/lb and through the application of the parameters outlined in Section 16.13.



# Figure 16-43: Rönnbäcksnäset Whittle pit shell (based on a metal price of 9 US\$/lb, looking north).

Figure 16-44 and Figure 16-43 show the Vinberget Whittle pit shell generated using a metal price of 9 US\$/lb and through the application of the parameters outlined in Section 16.13.



# Figure 16-44: Vinberget Whittle pit shell (based on a metal price of 9 US\$/Ib, looking north)

#### 16.15 Strip Ratio

The calculated waste to ore strip ratio from the Whittle optimisation for the Rönnbäcksnäset deposit is 0.79 with a total waste tonnage of 217 Mt. The calculated waste to ore strip ratio from the Whittle optimisation for the Vinberget deposit is 0.33 with a total waste tonnage of 19 Mt.

#### 16.16 Grade Tonnage Curves

Grade-tonnage curves for the Rönnbäcksnäset and Vinberget are shown in Figure 16-45 and Figure 16-46 for Ni-AC%. The curve shows the relationship between the modelled tonnage and grade at increasing Ni-AC% cut-offs.

The Rönnbäcksnäset grade-tonnage curve shows a gentle decreasing tonnage with an associated gentle increasing Ni-AC% grade up to a Ni-AC cut off of approximately 0.09%. This low grade material relates to the low grade serpentinite unit at Rönnbäcksnäset northeast. Above a cut off of 0.09% Ni-AC, tonnage drops from approximately 225 Mt with an associated sharp increase in Ni-AC%.

The Vinberget grade-tonnage curve shows that all material is above the marginal cut off grade of 0.048% Ni-AC with a steadily dropping tonnage and increasing Ni-AC% from approximately 0.1% Ni-AC cut off.



Figure 16-45: Rönnbäcksnäset Grade Tonnage Curve – All classification categories above Whittle pit shell (green line marks 0.048% marginal cut off grade)



Figure 16-46: Vinberget Grade Tonnage Curve – All classification categories above Whittle pit shell (green line marks 0.048% marginal cut off grade)

#### **16.17 Exploration Potential**

In addition to the Mineral Resource Statement as quoted above in Table 16-16, there is an additional 1.8 Mt of material that falls within the Whittle pit shell at Rönnbäcksnäset that is currently unclassified due to the lack of exploration assay data. This material, based on a metal price of 9 US\$/lb is considered by SRK to be potentially economic, should sufficient exploration data be collected that confirms the geometry and continuation of the orebody and that enables a classified resource to be generated.

The Whittle optimisation was also run at Rönnbäcksnäset to include all unclassified material. Figure 16-47 shows the pit shell generated (yellow) and highlights the down dip potential should future exploration drilling confirm the down dip extension to the mineralisation. It is the opinion of SRK that an additional tonnage of between 40 and 80 Mt exists at the Rönnbäcksnäset deposit, when applying a metal price of 9 US\$/lb to the optimisation and assuming future exploration drilling succeeds in intersecting the mineralised serpentinite body.

This also highlights the areas of interest for future exploration drill programmes with the majority of the additional drill data being required at Rönnbäcksnäset southwest. A discussion of appropriate drill hole spacing is presented in Section 16.19 below.



Figure 16-47: Whittle pit shell based on a metal price of 9 US\$/lb and including the unclassified material (looking north)

#### 16.18 Comparison to 2009 Scott Wilson Mining Mineral Resource Estimate

The Mineral Resource Estimate presented here represents the findings of SRK after a review of the available data for the Rönnbäcksnäset and Vinberget deposits. The previous Mineral Resource Estimate was undertaking by Scott Wilson Roscoe Postle Associates Inc. (Scott Wilson) and the results presented in the report entitled the "Technical Report on the Preliminary Assessment of Rönnbäcken Nickel Project, Sweden" dated 6 November 2009. Table 16-17 shows the results of the Scott Wilson Mineral Resource Estimate.

DEPOSIT	CLASSIFICATION	TONNES (Mt)	Ni-Total %	Ni-AC %	Co %	Ni-AC Tonnes
Rönnbäcksnäset	Measured	-	-	-	-	-
	Indicated	-	-	-	-	-
	Measured +Indicated	-	-	-	-	-
Vinberget	Measured	-	-	-	-	-
	Indicated	54.9	0.187	0.137	0.009	75
	Measured +Indicated	54.9	0.187	0.137	0.009	75
TOTAL	Measured	-	-	-	-	-
	Indicated	54.9	0.187	0.137	0.009	75
	Measured +Indicated	54.9	0.187	0.137	0.009	75
Rönnbäcksnäset	Inferred	192.9	0.178	0.107	0.009	206
Vinberget	Vinberget Inferred		-	-	-	-
Total	Inferred	192.9	0.178	0.107	0.009	206

 Table 16-17: November 2009 Scott Wilson Mineral Resource Statement

Scott Wilson report resources above a Whittle shell representing a metal price of 7.5 US\$/lb and at a cut off grade of 0.065% Ni-AC. Scott Wilson report all Mineral Resources at the Rönnbäcksnäset deposit as Inferred Mineral Resources and all Mineral Resources at the Vinberget deposit as Indicated Mineral Resources.

The Mineral Resource update undertaken by SRK utilises the same exploration data that was available to Scott Wilson. However, SRK's work benefits from; an updated geological model based on IGE's re-interpretation of lithologies in the context of multi-element assay and updated metallurgical testwork results.

The geological contacts to the serpentinite body were remodelled and SRK extended the model at depth to enable the evaluation of the down dip potential of the deposits. SRK utilised a metal price of 9 US\$/lb which represents the material which SRK considers has reasonable prospect for eventual economic extraction potential based on the whittle optimisation analysis. SRK applied a lower cut off grade of 0.048% Ni-AC in the reporting of the Mineral Resources, representing the calculated marginal cut off grade for the deposits.

SRK considered that the low geological complexity, very homogenous nature of the Ni-AC distribution, robust variograms, detailed QNKA results and a drill spacing within the geostatistical ranges observed were adequate to support Measured Mineral Resources for Vinberget and Indicated Mineral Resources for Rönnbäcksnäset.

#### 16.19 Optimum Drill Spacing

Where drill hole spacing is greater than the geostatistical range, there is zero covariance between samples. That is, samples beyond the geostatistical range are independent of each other. If the spacing is sufficiently large, there will also be areas that are effectively unsampled. Covariance will only be detected when the drill spacing is equal to, or less than the geostatistical range (Annels 1991), which is illustrated by Figure 16-48 and Figure 16-49.

In order to produce a conservative estimate, the ideal drillhole spacing maybe taken as 2/3 of the geostatistical range (Annels 1991). This allows covariance between samples to be detected, and also provides data at less than the geostatistical range for the variogram to be modelled at lower lags.



Figure 16-48: Grid spacing and the geostatistical range (assuming isotropy) (after Annels 1991). Grid spacing at twice the geostatistical range



Figure 16-49: Grid spacing and the geostatistical range (assuming isotropy) (after Annels 1991). Grid spacing equals the geostatistical range

At Rönnbäcksnäset southwest, in the down dip direction, Ni-AC shows a range of 400m. Applying the two-thirds rule, a drill spacing of 267m is calculated from the variography. The current drill spacing in the down dip direction is 100m, well within the area of the down dip variogram where a strong covariance exists.

The along strike variograms have been modelled to a range of 450m. The along strike variograms are however poor and only modelled using the point where the third and fourth lag distances cross the sill. It is therefore, in the opinion of SRK, not possible to apply the  $2/3^{rd}$  rule in the along strike direction and that the current along strike drillhole spacing is insufficient in modelling the grade distribution in this direction. However, the downhole variogram, defining the short scale structures of the Ni-AC distribution, show a modelled range of 80m. Applying the two-thirds rule, a drill spacing of 53m is calculated from the variography that could enable sufficient sample coverage in the along strike direction.

Variography was also attempted for the Rönnbäcksnäset northeast deposit with similar models being developed. Again, high quality variograms were produced in the downhole and down dip direction with ranges of 35m and 250m being modelled. The downhole range is shorter than that observed at Rönnbäcksnäset southwest (80m) due to the Rönnbäcksnäset northeast deposit being considerably thinner in dimension than Rönnbäcksnäset southwest. However, the along strike variogram for Rönnbäcksnäset northeast was poor with all points lying on the variogram sill. The average drillhole spacing at the Rönnbäcksnäset northeast deposit is 100m along strike by 50m across strike / down dip.

Currently, the Rönnbäcksnäset southwest deposit is drilled on a 200m spacing in the along strike direction and on a 100m spacing in the across strike / down dip direction. In addition, three of the five drill lines at Rönnbäcksnäset southwest have an extra drillhole, 200m down dip to prove the geological continuity of the mineralisation.

The Vinberget deposit has been drilled on a 50m line spacing with a series of fan pattern drillholes. Due to the shape and apparent homogenous nature of the grade distribution at Vinberget, SRK chose an omnidirectional semi variogram to model the Ni-AC grade as compared to a directional semi variogram used at the Rönnbäcksnäset deposit. No obvious directions or controls in the direction of mineralisation are apparent for the Vinberget deposit. A clear structure is observed with a low nugget effect and a range of 200m in all directions. Directional variograms were tested for the Vinberget deposit by applying a dip and strike direction in line with the overall dip and strike of the Vinberget orebody. The results of which were very similar to the nugget and ranges observed in the omnidirectional variogram. SRK is therefore confident that the omnidirectional approach is suitable in interpolating grade into the block model. Using the results of the variography, a search ellipse of 100m in all directions was chosen, being half the ranges identified in the geostatistical study.

#### 16.19.1 Drill Spacing Summary

The results of the variography were utilised in a QKNA study that gave positive results for both Rönnbäcksnäset and Vinberget with the Mineral Resource Estimation resulting in a portion of Measured Resources at the Vinberget deposit and majority Indicated Resources at Rönnbäcksnäset. It is the opinion of SRK that a drillhole spacing of 50m could be adequate in the along strike direction at Rönnbäcksnäset to generate potential Measured Resources. The current down dip drill at Rönnbäcksnäset is adequate and provides detailed variography results in this direction. It must however be noted that this could be deposit specific and remains untested at the Rönnbäcksnäset deposit.

## 17 OTHER RELEVANT DATA & INFORMATION

#### 17.1 Block Model Variables

Table 17-1 shows the complete list of variables in the Rönnbäcksnäset and Vinberget block models.

Variable	Description
хс	Easting block centre
YC	Northing block centre
zc	Elevation block centre
XINC	Easting block size
YINC	Northing Block size
ZINC	Elevation Block size
IJK	Block Identifier
ZONE	Geological Zone
NI_AC	Assay Grade
CO_AC	Assay Grade
NI_AC_KV	Kriging Variance
NI_AC_BV	Block Variance
NI_AC_SL	Slope of Regression
NI_AC_EF	Kriging Efficiency
TRDIPDIR	True Dip Direction
TRDIP	True Dip
NUMSAM	Number of samples used to estimate the block grade
SVOL	Search volume used to estimate the block grade
VOLUME	Block Volume
DENSITY	Block density
TONNES	Block tonnes
CLASS	Classification. 1=Measured, 2=Indicated, 3=Inferred, 4=None Classified
ΟΡΤΙ	1=Within optimised pit shell, 0=outside optimised pit shell
XMORIG	Model X origin
YMORIG	Model Y origin
ZMORIG	Model Z Origin
NX	Number of blocks in the X direction
NY	Number of blocks in the Y direction
NZ	Number of blocks in the Z direction

## 18 INTERPRETATION AND CONCLUSIONS

The primary aim of this report was to generate a Mineral Resource Estimate for the Rönnbäcken Nickel Project owned by IGE Nordic AB using all available and valid data as of April 2010. Qualified Person Johan Bradley and Qualified person Howard Baker believe the aim has been achieved and that the project has met the original objectives.

It is the opinion of SRK that the quantity and quality of available data is sufficient to generate Measured, Indicated and Inferred resources and that the Mineral Resource Statement has been classified in accordance with the Guidelines of National Instrument 43-101 and accompanying documents 43-101.F1 and 43-101.CP. It has an effective date of 21<sup>st</sup> April, 2010.

In total, Rönnbäcksnäset and Vinberget have a combined Measured and Indicated resource of 257.1 Mt grading 0.180 Ni-Total, 0.110% Ni-AC and 0.004% Co-AC. Of this, 28.2 Mt grading 0.188% Ni-Total, 0.132% Ni-AC and 0.006% Co-AC is in the Measured category and 228.9 Mt grading 0.179% Ni-Total, 0.107% Ni-AC and 0.003% Co-AC is in the Indicated category. In addition to the Measured and Indicated resources, 83.5 Mt grading 0.103% Ni-AC and 0.003% Co-AC is in the Inferred category.

The Mineral Resource Statement generated by SRK has been restricted to all classified material falling within a Whittle Shell representing a metal price of 9 USD / lb for nickel concentrate and through the application of reasonable mining and processing costs and recoveries. This represents the material which SRK considers has reasonable prospect for eventual economic extraction potential.

It is the opinion of SRK that the geological block model generated is suitable for detailed mine planning activities.

## **19 RECOMMENDATIONS**

SRK recommends that in order to increase the Mineral Resource classification from an Indicated to Measured category at Rönnbäcksnäset, a drill spacing of 50 m along strike is required. A down dip spacing of 100m is recommended at Rönnbäcksnäset to highlight the continuation of internal waste domains.

Based on the results of the whittle optimisation, it is the recommendation of SRK that additional drill holes targeting the serpentinite body at depth are required at Rönnbäcksnäset.

Infill drilling is required at the north-western end of the Vinberget deposit to increase the geological confidence in the model and to upgrade the Inferred Resources. It is anticipated that a 50m line spacing and adopting the current fan drilling will results in additional Measured and Indicated Resources.

It is the understanding of SRK that IGE are in the process of drilling the Sundsberget deposit that lies to the north of Rönnbäcksnäset in addition to targets at Vinberget that lie to the north and south of the existing deposit covered by this Mineral Resource Estimate. IGE have developed a Pre-Feasibility Study budget of 10.5 MUSD for the 2010 financial year to cover the geological development of the Rönnbäcken Nickel Sulphide project, which is deemed adequate by SRK.

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### 21 ADDITIONAL REQUIREMENTS FOR TECHNICAL REPORTS ON DEVELOPMENT PROPERTIES AND PRODUCTION PROPERTIES

Not applicable

### 22 CERTIFICATES

To accompany the report dated 22<sup>nd</sup> April 2010 entitled "MINERAL RESOURCE ESTIMATE FOR THE RÖNNBÄCKEN NICKEL PROJECT, SWEDEN"

#### **Howard Baker**

I, Howard Baker, MSc, AusIMM hereby certify that:

- 1. I am a Principal Mining Geologist with SRK Consulting (UK) Ltd, 5<sup>th</sup> Floor, Churchill House, Churchill Way, Cardiff CF10 3HH;
- 2. I graduated with a degree in Applied Geology from Oxford Brookes University in 1994. In addition, I have obtained a Masters degree (MSc) in Mineral Resources from Cardiff University, UK in 1995;
- 3. I am a Member of the Australasian Institute of Mining and Metallurgy (AusIMM);
- 4. I have worked as a geologist for a total of 13 years since my graduation from university;
- 5. I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Rönnbäcken Project or securities in IGE Nordic AB
- 6. I have read National Instrument 43-101 and Form 43-101F1 and, by reason of my education and past relevant work experience, I fulfil the requirements to be a "Qualified Person" for the purposes of National Instrument 43-101. This technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
- 7. I, as a Qualified Person, am independent of the issuer as defined in Section 1.4 of National Instrument 43-101
- 8. I am co-author of the report and take overall responsibility for the accompanying technical report;
- 9. As of the date of this certificate, to the best of my knowledge, information and belief, this Independent Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading;
- 10. SRK was retained by IGE Nordic AB, to prepare an Independent Technical Report for the Rönnbäcken Project in accordance with National Instrument 43-101. The preceding report is based on our review of project files and information provided by IGE Nordic AB, and discussion with personnel of IGE;
- 11. I consent to the use of this report and our name for public filing any Provincial regulatory authority.

Dated this 21st day of April, 2010.

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Howard Baker, MSc, MAusIMM

To accompany the report dated 22<sup>nd</sup> April 2010 entitled "MINERAL RESOURCE ESTIMATE FOR THE RÖNNBÄCKEN NICKEL PROJECT, SWEDEN"

#### Johan Bradley

I, Johan Bradley, MSc, FGS CGeol, EurGeol hereby certify that:

- 1. I am a Senior Geologist with SRK Consulting (Sweden) AB, Trädgårdsgatan 13-15, 931 31 Skellefteå, Sweden;
- 2. I graduated with a degree in Geology from the University of Oxford in 1996. In addition, I have obtained a Masters degree (MSc) in Mineral Deposit Evaluation (Mineral Exploration) from the Royal School of Mines, Imperial College, University of London, UK in 1998;
- 3. I am a Chartered Geologist (CGeol), Fellow of the Geological Society of London (FGS) and a member of the European Federation of Geologist (EurGeol);
- 4. I have worked as a geologist for a total of 11 years since my graduation from university;
- 5. I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Rönnbäcken Project or securities in IGE Nordic AB;
- 6. I have read National Instrument 43-101 and Form 43-101F1 and, by reason of my education and past relevant work experience, I fulfil the requirements to be a "Qualified Person" for the purposes of National Instrument 43-101. This technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
- 7. I, as a Qualified Person, am independent of the issuer as defined in Section 1.4 of National Instrument 43-101
- 8. I am co-author of the report and responsible for all Sections excluding 15, 16 and 17 of the Technical Report;
- 9. I took part in the site visit to Rönnbäcken in March 2010 as part of this report;
- 10. As of the date of this certificate, to the best of my knowledge, information and belief, this Independent Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading;
- 11. SRK was retained by IGE Nordic AB, to prepare an Independent Technical Report for the Rönnbäcken Project in accordance with National Instrument 43-101. The preceding report is based on our review of project files and information provided by IGE Nordic AB, and discussion with personnel of IGE;

Dated this 21st day of April, 2010.



Johan Bradley, MSc, FGS CGeol, EurGeol

#### For and on behalf of SRK Consulting (Sweden) AB

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Johan Bradley Managing Director Appendix 1: VARIOGRAPHY DATA

### **VINBERGET**





## **RÖNNBÄCKSNÄSET**











## Appendix 2: QUALITY ASSURANCE AND QUALITY CONTROL (QAQC)






















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