# MINERAL RESOURCE ESTIMATE FOR THE RÖNNBÄCKNÄSET NICKEL DEPOSIT, SWEDEN. JANUARY 2012.

Prepared For NICKEL MOUNTAIN RESOURCES AB

**Report Prepared by** 



SRK Consulting (Sweden) AB SE386

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## MINERAL RESOURCE ESTIMATE FOR THE RÖNNBÄCKNÄSET NICKEL DEPOSIT, SWEDEN. JANUARY 2012.

## 1. SUMMARY

#### 1.1 Introduction

The Rönnbäcken Nickel Project (Rönnbäcken or the Project), owned by Nickel Mountain Resources AB (Nickel Mountain, or "the Company"), is located in the northwest part of Sweden, about 20 km to the south of the village of Tärnaby, Västerbotten County. The Project comprises three discrete sulphide nickel deposits; Rönnbäcknäset, Vinberget and Sundsberget.

This report comprises an updated Mineral Resource Estimate (MRE) of the Rönnbäcknäset deposit and has been prepared by SRK Consulting (Sweden) AB (SRK) on behalf of Nickel Mountain. This update incorporates an additional six strategically placed drillholes that targeted potential downdip mineralisation, bringing the total drillholes available for the updated MRE to 63.

SRK previously authored a Preliminary Economic Assessment (PEA) for the Project on behalf the Company in December 2011. As part of its work in the PEA study, SRK prepared independent Mineral Resource estimates for each of the deposits and in addition, reviewed all other technical work completed on the Project by the Company and its other contractors and consultants to a sufficient level to have enabled SRK to present its own opinions on the Project and to derive an audited NPV for the PEA study. No additional studies in the PEA have been updated as part of this MRE update.

This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). SRK most recently visited the property on 7 February 2011.

SRK understands that the Company have initiated a pre-feasibility study on the Project and subject to the results of this, the Company expects to commence a feasibility study in 2013.

#### 1.2 Geology

The Project is located in the Swedish Caledonian Mountains and is hosted by rocks which formed approximately 400-510 million years ago. The geology in the Rönnbäcken area is dominated by the Köli Nappe consisting of phyllite and felsic to mafic metavolcanics and nickel bearing ultramafic rocks. The ultramafic rocks occur as lenses of various sizes over the Project area together covering an area of roughly 15 km<sup>2</sup>.

The nickel-sulphide mineralization which is the target of the proposed mining operation is hosted by serpentines, tectonically displaced from the mantle into the crust, and is considered to be of epigenetic origin and to have formed during the release of nickel from olivine through a process of alteration and serpentinization of the precursor dunite and peridotite rocks.

The Rönnbäcknäset deposit comprises two separate serpentinized mineralised bodies separated by between 80 m and 140 m of chloritic phyllite. The mineralised bodies dip at approximately 45° west in the north and flatten out into a bowl shaped geometry to a dip of roughly 30° north in the southwest. The deposit has a strike length of roughly 2.4 km and a

width of up to 400 m at its widest point.

#### 1.3 Mineral Resources

Table 1-1 below presents the updated Mineral Resource Statement for the Rönnbäcknäset deposit. As is typical of ultramafic-hosted disseminated nickel sulphide deposits, nickel is contained both in nickel sulphides and in silicates such as antigorite, olivine and pyroxene. Conventionally with these deposits, the reported nickel grades and recoveries are "Total Ni" which incorporates both the nickel in sulphides and silicates. For Rönnbäcknäset however, an analysis of the nickel in sulphide has been carried out through the use an analytical technique utilising a weak acid digest. This assay technique is termed Ni-AC. This has enabled evaluation of the project based on the metallurgical performance of the nickel in sulphides only, rather than considering the deportment of nickel in both sulphides and silicates. The rational is that a high proportion of the sulphide nickel is recovered in the flotation process whereas the non-sulphide nickel reports predominantly to tailings. The Ni-AC results here are referred to in this report as "Sulphide Ni" grades and recoveries.

The Resources are presented according to CIM Guidelines for the reporting of Mineral Resources.

DEPOSIT	CLASSIFICATION	TONNES (Mt)	Ni-Total %	Sulphide Ni (Ni-AC) %	Sulphide Co (Co-AC) %	Fe-Total %	Ni-Total ktonnes	Sulphide Ni ktonnes
	Measured							
Pönnhäcknäset	Indicated	319.9	0.179	0.103	0.003	5.50	573	329
Ronnbackhaset	Measured + Indicated	319.9	0.179	0.103	0.003	5.50	573	329
	Inferred	12.2	0.166	0.085	0.004	5.11	20	10

#### Table 1-1: Rönnbäcknäset Mineral Resource Statement

(1) The effective date of the Mineral Resource Statement for Rönnbäcknäset is January 23, 2012.

(2) The Mineral Resource reported for Rönnbäcknäset was constrained within a Lerchs-Grossman pit shell defined by a marginal cut-off-grade of 0.0323% Ni-AC, a metal price of USD11/lb; slope angles of 48°; a mining recovery of 95%; a mining dilution of 2.5%; a base mining cost of USD1.35/tonne and an incremental mine operating costs of USD0.07/tonne/10 m below the 450m reference RL and USD0.05/tonne/10m above the 450m reference RL); process operating costs of USD4.96/tonne ore; an effective charge per lb Ni in smelter feed of USD1.14, G&A costs of USD0.40/tonne ore and concentrate transport cost USD0.10/tonne.

#### **1.4 Interpretation And Conclusions**

The primary aim of this report was to generate an updated Mineral Resource Estimate for the Rönnbäcknäset Ni asset owned by Nickel Mountain using all available and valid data as of December 2011. Qualified Person Howard Baker (MAusIMM(CP)) believes 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 Indicated and Inferred resources and that the Mineral Resource Statement has been classified by Howard Baker (MAusIMM(CP)), who is a Qualified Person, 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 23 January 2012.

In total, Rönnbäcknäset has an Indicated Resource of 319.9 Mt grading 0.103% Ni-AC, 0.003% Co-AC and 5.50% Fe. In addition, 12.2 Mt grading 0.085% Ni-AC, 0.004% Co-AC and 5.11% Fe is in the Inferred category.

SRK understands that the Company is proposing to undertake a pre-feasibility study commencing in Q2 2012, with completion expected by late Q3 2013. The budget for the study is some USD8.5M, excluding overheads.

Subject to the results of the pre-feasibility study, the Company expects to commence a full feasibility study in Q3 2013 for completion towards the end of 2014 or early 2015.

#### 1.5 Recommendations

SRK previously made several recommendations in the PEA of December 2011, regarding work that it considers should be undertaken as part of the planned pre-feasibility study. This work is detailed later in this report. Certainly, in SRK's opinion, the commissioning of a pre-feasibility study is justified by the potential of the Project and the timing and budgets proposed for this by the Company are reasonable given the work planned to be undertaken, which incorporates all of the work SRK has recommended in this MRE.

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## 1 INTRODUCTION

This report comprises an update of the Mineral Resource statement for the Rönnbäcknäset Nickel deposit, which is one of three deposits that comprise the Rönnbäcken Project (or "the Project"). The update has been prepared by SRK Consulting (Sweden) AB (SRK) on behalf of Nickel Mountain Resources AB (Nickel Mountain or the Company), the parent company of Nickel Mountain AB which is the project owner.

The Project is at a conceptual stage but it is currently envisaged that it will comprise three open pit mines feeding a single processing operation producing both a nickel sulphide concentrate and a magnetite concentrate through conventional flotation and magnetic separation.

As part of a previous commission on behalf of the Company, SRK prepared a Preliminary Economic Assessment (or "PEA") for the Project in December 2011, which involved independent Mineral Resource estimates for Rönnbäcknäset, Vinberget and Sundsberget, in addition to reviewing all other technical work completed on the Project by the Company and its other contractors and consultants to a sufficient level to have enabled SRK to present its own opinions on the Project and to derive an audited NPV for this.

Since completion of the December 2011 PEA, the Company received assay results for six strategically placed drillholes that targeted downdip mineralisation at Rönnbäcknäset. The availability of this additional data prompted the Company to commission SRK to produce an updated independent MRE for the Rönnbäcknäset deposit. SRK understands that no other material technical aspects of the Project have changed since the December PEA. As such, aspects of the Project not directly related to the updated MRE in this report (specifically Sections 16 through 24), are extracts from the Summary section of the PEA document. The reader is referred to the December 2011 PEA for more detailed discussions.

The work undertaken by SRK in compiling this report has been managed by Mr Johan Bradley (CGeol FGS, EurGeol) and Mr Howard Baker (MAusIMMM(CP). Both Mr Johan Bradley and Mr Baker are Qualified Persons (QP) as defined in National Instrument 43-101 of the Canadian Securities Administrators (NI 43-101).

As part of this work, SRK has undertaken site visits and made first hand observations of the core, collection and core logging procedures employed and reviewed all the Project data available. The most recent site visit was undertaken by Mr Bradley on 7 February, 2011.

## 2 RELIANCE ON OTHER EXPERTS

SRK has confirmed that the mineral resources reported herein are within the exploration permit boundaries given below and that the exploration permits and exploitation concessions as presented by the Company reflect the publicly available information at the Mining Inspectorate of Sweden. SRK has not, however, conducted any legal due diligence on the ownership of the exploration permits or exploitation concessions themselves.

## **3 PROPERTY DESCRIPTION AND LOCATION**

The Rönnbäcken Nickel Project is located 40 km by road south-southeast of Tärnaby, Storuman Municipality, Västerbotten County, as illustrated in Figure 3-1 and Figure 3-2. The Rönnbäcken K nr 1 exploitation concession is on Vinberget on the mainland south of Lake Gardiken. The Rönnbäcken K nr 2 exploitation concession is located on what now is an island, Rönnbäcknäset, in Lake Gardiken. The island was created in 1963 when a hydro power station was built and raised the water levels. An application for a third exploitation concession was submitted to the mining expectorate in the end of December 2011, the applied area covers the Sundsberget deposit on the mainland, directly to the north of Rönnbäcknäset, on a hill called Sundsberget. 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: Rönnbäcknäset, Vinberget and Sundsberget, located within and surrounded by two exploitation concessions and 7 contiguous exploration permits, see Figure 3-2 below. The Vinberget deposit is located within the Rönnbäcksjön nr 1 exploration permit and is covered by the Rönnbäcken K nr 1 exploitation concession. The Rönnbäcknäset deposit is located within the Rönnbäcksjön nr 8 exploration permit and covered by the Rönnbäcken K nr 2 exploitation concession. The Sundsberget deposit is located within the Rönnbäcksjön nr 7 exploration permit.



Figure 3-1: Rönnbäcken property location in Scandinavia



Figure 3-2: Rönnbäcken granted exploitation concessions (yellow polygons), applied exploitation concession (red polygon) and exploration permits (black polygons).

#### 3.2 **Property Ownership**

There are four types of permits necessary to develop a deposit from the exploration stage to the development stage in Sweden. These are: exploration permits, exploitation concessions, environmental permits, and building permits. For the purpose of this report, the exploration permits and exploitation concessions are all that are required to provide the Company with exclusive mineral rights to the properties in question. Notwithstanding this, SRK notes that final access to land and water areas is a process of negotiation that the Company will need to

undertake and must be finalized along with filing an application for an environmental permit. No estimate of the cost of this has been included in the TEM presented later in this report. However, given the low population density and current land use in the Project area, SRK does not anticipate these costs to be material, although further study will be necessary, particularly with regard to reindeer husbandry.

On June 2, 2010, Nickel Mountain and its parent company IGE Resources AB entered into an agreement (the "MRG Agreement") with Mitchell River Group Pty Ltd. ("MRG") of Australia to form a strategic partnership. Pursuant to the MRG Agreement, MRG agreed to provide experienced personnel, systems and technical resources for the development of the Rönnbäcken Nickel Project for an initial term of 18 months, commencing June 2010. In return MRG received an option to acquire a 10% interest in the Project (the "Rönnbäcken Option") for an agreed upon cash payment. For more details on the MRG Agreement, the reader is referred to the December 2011 PEA report.

The Rönnbäcken property consists of seven granted exploration permits (Rönnbäcksjön nr 1 and Rönnbäcksjön nr 3 to nr 8), totalling 3,718 ha. Exploration permits are granted initially for three years, with possible extensions of up to 15 years. Annual fees for the first three year period are SEK4, SEK6, and SEK10/ha in each successive year. Table 3-1 summarizes the status of the Project exploration permits.

Exploration Permit Number	Permit Name	Grant Date	Expiry Date	Area (ha)
2005:134	Rönnbäcksjön nr 1	2005-08-01	2014-08-01	351
2007:339	Rönnbäcksjön nr 3	2007-12-11	2013-12-11	72
2007:340	Rönnbäcksjön nr 4	2007-12-11	2013-12-11	642
2009:104	Rönnbäcksjön nr 5	2009-06-11	2012-06-11	342
2009:126	Rönnbäcksjön nr 6	2009-06-25	2012-06-25	1683
2009:161	Rönnbäcksjön nr 7	2009-10-01	2012-10-01	306
2010:163	Rönnbäcksjön nr 8	2010-11-04	2013-11-04	322

Table 3-1:	Exploration	permit	summary	v table
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Applications for exploitation concessions for Vinberget (Rönnbäcken K nr 1) and Rönnbäcknäset (Rönnbäcken K nr 2) were granted by the Swedish Mining Inspector on 23 June 2010, see Figure 3-2 below. 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 extended. The exploitation concession is the next step in mine permitting after the granting of an exploration permit.

Table 3-2:	Exploitation	concession	summary	details
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Exploitation concession	Application Date	Status	Area (ha)
Rönnbäcken K nr 1	2010-02-12	Granted 2010-06-23	49.0
Rönnbäcken K nr 2	2010-02-12	Granted 2010-06-23	195.75
Rönnbäcken K nr 3	2012-12-23	Pending	144.44

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

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

Table 3-3:Exploitation concession vertices, 2010-02-12(Projection RT 90 2.5 gon v)

Figure 3-3 shows the exploration permits discussed above in relation to the optimised pits generated to constrain the mineral resource presented later in this report. Figure 3-3 clearly



demonstrates that the modelled mineralisation lies within the permit boundaries.

Figure 3-3: Rönnbäcken Project pit shells and boundaries for exploration permits (red polygons) and granted exploitation concession (yellow polygons)

#### 3.3 Additional Permits and Payments

SRK is not aware of any special royalties in addition to the 0.20% royalties prescribed by the Swedish Mining Act, back-in-rights, payments or any other agreements associated with the Rönnbäcken Project.

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

#### 3.4 Surface Rights

For the purposes of this report, all surface rights are covered by the Rönnbäcksjön exploration permits and Rönnbäcken exploitation concessions as detailed in Table 3-1 and Table 3-2 above. Additional permitting is required prior to commencement of mining operations and a discussion of these is presented in Section 20, below. In addition, a discussion of potential tailings storage area, potential waste storage area and potential processing plant sites are included in Section 18 below.

## 4 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

#### 4.1 **Property Access**

#### 4.1.1 International Access

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

#### 4.1.2 Regional and Local Access

The Project can be accessed from both north and south from highway E12. From the north via the town Tärnaby (E12), it is necessary to travel west for 9 km and then on gravel roads approximately 31 km passing the community of Ängesdal on the way to the project site. From the E12 in the south, over the Ajaure hydro dam, it is approximately 14 km of gravel road to the Project site.

#### 4.2 Physiography and Climate

#### 4.2.1 Physiography

The elevation within the exploration permits ranges from 395 metres above sea level (masl) to 666 masl; that is, a difference of about 270 m from the lowest to the highest point. The exploration permits 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 Rönnbäcknäset 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. Water levels throughout the year may vary by as much as 20 m.

The continental glaciation movement direction in the area is from the southeast. The till cover in the exploration permit 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.

#### 4.2.2 Climate

Northern Sweden belongs to the temperate coniferous-mixed forest zone (Köppen classification) 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 precipitation 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 precipitation of 745 mm/year. Annual precipitation in the Lappland 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 typically frozen for four to five months of the year.

Exploration work can also be conducted during the winter by taking advantage of the frozen ground, which minimises environmental impact during access. Notwithstanding this, should the Project be put into operation, it should be able to operate throughout the entire year.

Northern Sweden has aspects of both maritime and continental climate depending on the direction of airflow. When westerly winds from the Atlantic Gulf Stream prevail, the weather is warm and clear. When airflow is from the east, the Asian continental airflow prevails resulting in severe cold in winter and dry 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.

#### 4.3 Local Resources and Regional Infrastructure

The Ajaure hydro power plant, rated for 85 MW, is located upstream of Lake Gardiken, approximately 12 km from the Project site by gravel road. European route E12 is 14 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 166 km distant and is the closest of three within 500 km. The nearest rail access is at the town of Storuman, 107 km to the southeast. Water is plentiful around the site, but permission must be obtained to use it.

## 5 HISTORY

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

The Boliden Mining Company (Boliden) first staked exploration permits in two areas in 1942. 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. Kihlstedt 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 which was part of the Johnson Group. Three diamond drillholes 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 the 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 Rönnbäcknäset. The samples were analyzed for sulphur, total nickel, and bromine-methanol-soluble nickel. The latter was intended to determine the proportion of nickel present in 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, the company drilled 20 core holes on the Rönnbäcknäset Island. The holes on Rönnbäcknäset 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 boreholes were not drilled for the purpose of producing a resource estimate but rather just to highlight the vertical distribution of nickel sulphides. Analysis was made in intervals of 10 cm to 5 m. 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 which correlates to the weathering that also could visually be seen in the colour, brown to greyish, of the surface.

Pilot mining of 4,000 t in an open pit was conducted by Boliden in 1974 adjacent to the road below Vinberget. The average grade of the bulk sample was 0.21% Ni, 0.11% Ni in sulphide, 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 sulphide nickel recovery of 67% to 73%. SRK notes that the grades of this sample are not representative of the current resource at the Rönnbäcken project.

The investigations in outcrops, core drilling, and beneficiation experiments were compiled and used for an application of exploitation concessions (called "Utmål" at the time, later replaced by the new term "Bearbetningskoncession") submitted in 1976 for an area on Rönnbäcknäset and one area on Vinberget.

An exploitation concession was only granted to those restricted areas where the drillholes and pilot mine were located, and not the parts that were sampled in outcrops. The exploitation concessions Rönnbäck nr 26 and nr 59 were granted to Boliden in 1982 following the application in 1976. In 1990-1993, Boliden held an exploration permit in connection with the exploitation concessions, but no exploration was carried out. The exploitation concessions were released in 2003 by a notification of withdrawal from Boliden.

IGE Resources AB was granted the Rönnbäcksjön nr 1 exploration permit in the area around Vinberget in 2005, which was later transferred to its subsidiary Nickel Mountain Resources AB in 2007. The remaining exploration permits were granted to the Company in 2007, 2009 and 2010 and the exploitation concessions in June 2010.

The Company carried out ground magnetic surveys and core drilling on Vinberget and Rönnbäcknäset in the spring of 2008. In addition, metallurgical testwork was carried out on drill core material and material from Boliden's historic test mining pit. A first NI 43-101 compliant report inclusive of a Mineral Resource estimate was prepared by Scott Wilson Roscoe Postle Associates Inc. and was published in April 2009.

Geological mapping, geophysical surveys and outcrop sampling around the Project area was conducted in the summer of 2009 and the Scott Wilson PA Report was then completed in November 2009. Three new exploration permits were also granted, Rönnbäckssjön nr 5-7, during 2009.

From the mapping and sampling carried out during the summer of 2009, several potential drill targets were identified. Drilling commenced at Sundsberget at the end of 2009 and following this, on several other targets in the Project area. A reconnaissance ground magnetic survey was then conducted in 2010, covering a large part of the Project area.

On 12 February 2010 two exploitation concession applications were submitted to the Mining Inspectorate of Sweden (Bergsstaten), namely Rönnbäcken K nr 1 (Vinberget) and Rönnbäcken K nr 2 (Rönnbäcknäset). These exploitation concessions were granted on 23 June 2010, and took legal effect on 22 October 2010. On granting of the exploitation concessions, an extension to the exploration permit Rönnbäcksjön nr 2 was also granted, now called Rönnbäcksjön nr 8.

On 5 October 2010, the Rönnbäcken exploration permits and exploitation concessions were transferred to Nickel Mountain AB.'

On 23 December 2011 the exploitation concession application for K nr 3 (Sundsberget), were submitted to the Mining Inspectorate. A decision regarding the concession is expected in mid 2012.

## 6 GEOLOGICAL SETTING AND MINERALIZATION

### 6.1 Regional Geology

The Project is located in the Swedish Caledonian mountain chain which 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. It is generally believed that 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. Source: Roberts & Gee 1985 and Qvale & Stigh 1985



Figure 6-2: Location of the Rönnbäcken ultramafics and other ultramafics in Västerbotten and Northern Jämtland County. Source: Stigh. J, 1979

#### 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 which in the Rönnbäcken area consist primarily 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 km<sup>2</sup>. 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. Source: SGU Ai 162

#### 6.3 **Property Geology**

The geology in the immediate Project area comprises highly serpentinized rocks which have been the target for the exploration of sulphide nickel mineralization. Some of the ultramafic lenses known in the area are less serpentinized and are therefore of less interest for nickel sulphide mineralization.

The Vinberget deposit comprises a homogeneous serpentinized tabular-shaped deposit up to 350 m thick, 300 m wide and 700 m long. The deposit is steeply dipping to the northeast and

plunges to the northwest and is primarily hosted within a graphite bearing pelitic phyllite with intense quartz veining. A zone of soapstone between 1 to 5 m wide has been intersected at the contact between the mineralisation and the phyllite. The foliation of the phyllite follows the contact zone.

The Rönnbäcknäset deposit comprises two seprentenite horizons separated by 80 m to 140 m of chloritic phyllite. The horizons dip approximately 45° west in the north and flatten out into a bowl shaped geometry to a dip of roughly 30° north in the southwest. The deposit has a strike length of roughly 2.4 km and a width of up to 400 m at its widest point. The upper horizon is thin and of less economic interest and is most likely not present in the southwestern area. This is overlain by pelitic phyllites, while chlorite dominates altered phyllite between the upper and lower horizons. The lower serpentinite horizon that is of economic interest is divided into the following four units:

- 1. Upper serpentinite unit.
- 2. Lower serpentinite unit.
- 3. Mafic intrusion unit (pyroxenite).
- 4. Low sulphur unit.

The mafic intrusion is found mainly between the upper and lower serpentinite unit throughout the area. The low sulphur unit is found in the two western sections in the Rönnbäcknäset south area. The lower serpentinite horizon is underlaion by pelitic phyllites though near the contact with the mineralisation these contain a series of minor quartz conglomerate horizons.

The Sundsberget deposit consists of a single serpentinite body that strikes in a northnortheast to south-southwest orientation and dips roughly 30° to the north-northwest. The deposit measures roughly 1.2 km along strike and 500 to 600 m in width. The serpentinite is overlain mainly by chloritic phyllite and pelitic phyllites. Below the serpentinite, in the footwall pelitic phyllites dominates but as at Rönnbäcknäset there are also quartz conglomerate horizons. There are mafic intrusions within the serpentine unit, but the geometry of these is not yet certain.

Talc alteration zones are a common feature at the contacts zones between serpentinite and country rock in all three deposits.

#### 6.4 Mineralization

To date, the majority of work to characterise the nature of mineralisation in the Project area has been undertaken on samples collected from the Rönnbäcknäset and Vinberget deposits. As such, the following sections of this report focus on these deposits. The initial indication from visual inspection of drill core, multi-element ICP analysis and metallurgical testwork is that the nickel sulphide mineralisation at Sundsberget is of a similar character to that at Rönnbäcknäset and Vinberget.

The nickel sulphide mineralization in the Project area 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), magnetite, and chromite.

The dominating nickel-rich sulphides in the deposits Rönnbäcknäset, Sundsberget and

Vinberget are heazlewoodite (Ni<sub>3</sub>S<sub>2</sub>), pentlandite (Fe,Ni,Co)<sub>9</sub>S<sub>8</sub>, often containing more than 40% Ni and various amounts of Co, and to a lesser extent millerite (NiS). Other minerals found are awaruite (Ni<sub>2</sub>Fe to Ni<sub>3</sub>Fe), cobaltite (CoAsS), and maucherite (Ni<sub>11</sub>As<sub>8</sub>), 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 Rönnbäcknäset and Sundsberget, however, the mineralization is more variable, both in terms of grade, nickel sulphide species and host rock type. In some parts, heazlewoodite dominates and in other areas pentlandite occurs as the most frequent nickel sulphide.

The elements arsenic, gold, and sulphur are not unique to any of the lithologies and 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.

#### 6.4.1 Specific Mineralogical Studies

Various mineralogical investigations have been carried out by Ekström Mineral AB (Ekström), Xstrata Process Support (Xstrata), Outotec Research Oy (Outotec research centre, or ORC), Finland, Qumex Material Teknik AB (Qumex), and more recently by the Geological Survey of Finland (GTK). The reader is referred to the December 2011 PEA for a discussion of this work.

## 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<sub>2</sub>O + S<sub>2</sub> + CO<sub>2</sub>  $\rightarrow$  Serpentinite + Brucite + Carbonates + Fe<sub>3</sub>O<sub>4</sub> + Ni<sub>x</sub>S<sub>y</sub>\* + H<sub>2</sub> \* Ni-rich sulphides

Serpentinization of the ultramafics within the three deposits (Vinberget, Rönnbäcknäset and Sundsberget) is pervasive. As a consequence, both nickel sulphide and magnetite are widespread and of relatively consistent grade throughout.

## 8 **EXPLORATION**

#### 8.1 Introduction

Exploration programmes carried out to date at the Project have comprised geological mapping, outcrop sampling, ground magnetic surveys, magnetic susceptibility surveys and drilling programmes.

#### 8.2 Geological Mapping and Sampling

The Company 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 exploration permits along the borders of the Caledonian mountains with the objective of testing the serpentinites for potential nickel, platinum, and palladium.

The Klumpliklumpen, Rotiken and Fjelkaområdet areas were tested in addition to Rönnbäcken. In total, approximately 70 samples were taken of which five were from Rönnbäcknäset, four from the Rönnbäcksjön nr. 1 exploration permit, and one sample from the Rönnbäcksjön nr 4 exploration permit. In 2007, an additional 30 samples were collected by the Company, the emphasis this time being the serpentinite outcrops within the exploration permits Rönnbäcksjön nr 3 and nr 4.

In the summer of 2009, the Company 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, the Company has now collected 157 rock samples from within the Rönnbäcken permits.

#### 8.3 Geophysics

#### 8.3.1 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 the Company's 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 9.7 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 to 20 cm on a flat surface of the outcrop. Sections were surveyed between 390N to 2140N in the Vinberget local grid. These surveys were carried out during July and August 2008 and a total of approximately 450 measurements collected from an area of 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.

#### 8.3.2 Ground magnetic surveys

Between 2008 and 2010, ground magnetic surveys were performed with a GEM system, GSM-19T proton magnetometer. Measurements were taken at ten metre intervals along sections some 100 m or 200 m apart. For the reconnaissance survey of the Project area, measurements were taken at twenty metre intervals on 500 m sections. The results of the ground magnetic surveys for the Rönnbäcken Project are illustrated in Figure 8-1. Low magnetic areas, blue in Figure 8-1, are in most cases caused by rough topography and a consequent absence of data. The anomaly east of Sundsberget is caused by the power line (dotted black line).

#### 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 nr 1 exploration permit. In total, approximately 25 line-km have now been surveyed at Vinberget.

#### Rönnbäcknäset

During the spring of 2008, ground magnetic surveys at Rönnbäcknäset 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 Rönnbäcknäset area. A total of approximately 64 line-km have been surveyed at Rönnbäcknäset.

#### Sundsberget

A ground magnetic survey was carried out at Sundsberget in 2009 over an area of roughly 3 km<sup>2</sup> and using 10 m station spacing on 100 m spaced sections, totalling approximately 21 line-km.



Figure 8-1: Ground magnetic survey grid (TMI), Rönnbäcken Project

### 8.4 Geochemistry

The only geochemical surveys performed in the area were the rock geochemistry programmes described above.

## 9 DRILLING

#### 9.1 Introduction

The Company reported that a total of 21 historic holes were drilled by Boliden in the 1970s for 443.5 m.

The Company commenced its Phase 1 drilling campaign, comprising approximately 8,000 m, in April 2008. Phase 2, also approximately 8,000 m, started in October 2008, with drilling completed in January 2009. Subsequent to this, a drill programme was initiated in December 2009 and continued during 2010. Drilling at Rönnbäcknäset was on-going during SRK's field visit in February 2011. All drilling has been diamond core drilling.

All diamond drilling by the Company to date has been performed by the contactor Styrud Arctic AB (Styrud), previously known as Bergteamet AB and RATE Diamantborrning AB. Initially, two Onram 1000 drill rigs were used. These were later changed to Atlas Copco DIAMEC U6 rigs. Both drill rig types were mounted on Morooka 1500 band dumpers to drill BTW core (42 mm). Drilling in the Project area has consistently been undertaken using environmentally certified hydraulic fluids to minimise environmental impacts in the event of leakage.

The Rönnbäcken drillhole database provided by the Company and used by SRK to derive the MRE for Rönnbäcknäset includes information for 63 drillholes, for a total of 10 523 m. The database does not include any holes drilled by Boliden and as such no historic drill data was used.

#### 9.2 Drilling 2008-2010

Drilling began on Rönnbäcknäset northeast with three drill holes at 50 m intervals along 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.

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

#### 9.3 Drilling 2011

As a result of identifying additional exploration potential in the previous MRE by SRK, the Company decided to drill additional holes down-dip in the southwest portion of the deposit. In total, 6 new holes were added to the database for 2 396 m for inclusion in the updated MRE

The drillhole locations covering the Rönnbäcknäset deposit are shown in Figure 9-1.


Figure 9-1: Rönnbäcknäset drillhole collar locations (Blue = 2008-2010; Red = 2011)

# 9.4 Casing

The Company has 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 drillhole number. SRK was however unable to confirm this due to the depth of snow cover at the time of the site visit.

## 9.5 Downhole Surveys

All the deviation surveys were performed using a Reflex Maxibor II instrument which measures the trace of the drillhole with optical technology. Surveys from Rönnbäcknäset were mainly carried out by Company staff and, to a lesser extent, by contractors Sten Wikström, Skellefteå Bergsupport AB and/or Elin Broström, Styrud.

The database received by SRK from the Company includes 61 holes from Rönnbäcknäset for a total of 3 903 records.

# 9.6 Collar Surveys

Drillhole locations were set out using a hand-held GPS. The collars were later surveyed by Mikael Norén from Tyréns using Leica System 1200 GPS technology, using the following projection and with the following measurement accuracy as presented in the final report, 2008-11-03:

- plan projection: RT 90 2,5 gon V 0:-15;
- accuracy in plan projection ±2 to 3 cm;
- vertical projection: RH 70; and
- accuracy in vertical projection ±3 to 4 cm.

The Company 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.

Holes drilled after 2008-11-03 were surveyed by hand-held Garmin 60csx GPS only. A list of these holes is presented in Table 9-1 below.

Vinberget	Rönnbä	icknäset	Sunds	sberget
VIN109	RON99	RON215	SUN01	SUN18
VIN110	RON100	RON216	SUN02	SUN19
VIN111	RON200	RON217	SUN03	SUN20
VIN112	RON201	RON218	SUN04	SUN21
VIN113	RON202	RON219	SUN05	SUN22
VIN114	RON203	RON220	SUN06	SUN23
VIN115	RON204	RON221	SUN07	SUN24
VIN116	RON205	RON222	SUN08	SUN25
VIN117	RON206	RON223	SUN09	SUN26
VIN118	RON207		SUN10	SUN27
VIN119	RON208		SUN11	SUN28
VIN120	RON209		SUN12	SUN29
VIN121	RON210		SUN13	SUN30
VIN122	RON211		SUN14	SUN31
VIN123	RON212		SUN15	SUN32
VIN124	RON213		SUN16	SUN33
	RON214		SUN17	

Table 9-1:Drillhole surveyed with handheld GPS

# 9.7 Core Logging

A Company 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 the Company's core archive and logging facility in Skellefteå.

The core was photographed and logged at the Company's logging facility. All of the Company's drill cores were logged by staff members 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 2 m).

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 henceforth being taken only on coarse rejects representing assayed intervals. The database received by SRK from the Company contains a total of 3,386 magnetic susceptibility measurements from Rönnbäcknäset drill core and 3,414 from Vinberget drill core. No magnetic susceptibility data has been supplied to SRK for the Sundsberget deposit.

Density measurements were carried out by Company staff members 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 2 m). Representative density measurements were also taken for the main waste rock lithologies. The Company database contains a total of 3,303 measurements for Rönnbäcknäset, 3,416 measurements for Vinberget and 2,972 measurements for Sundsberget.

The specific gravity of the core was measured to obtain densities for use in the MRE procedure 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/cm<sup>3</sup> to 2.7 g/cm<sup>3</sup>. 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 drillhole by the supervising geologist / technician to maintain data capture protocols.

#### 9.8 Interpretation of Results

On the basis of the Company's drilling, mineralisation wireframes were digitized by SRK for Rönnbäcknäset using Datamine software.

The Rönnbäcknäset serpentenite unit measures 2.5 km along strike, 1.6 km on a  $16^{\circ}$  azimuth, in the northwest, and 1.2 km along strike on an  $85^{\circ}$  azimuth in the southeast. The southeastern portion has a maximum true thickness of roughly 350 m and dips at  $25^{\circ}$  towards the north-northwest, while the northeast portion has a maximum true thickness of roughly 60m and dips at  $40^{\circ}$  towards the west-northwest.

The Rönnbäcknäset wireframe was modelled to an elevation of -100m (ASL), and contains 212 Mm<sup>3</sup> of material.

# 10 SAMPLE PREPARATION, ANALYSES, AND SECURITY

# 10.1 Introduction

A general description of sample preparation methods, assay techniques and sample security is presented below for work completed to date on the Project as a whole. For the purposes of this report, SRK has not attempted to limit the information presented in this section to that which is relevant only to the Rönnbäcknäset deposit. Specific mention is however made to Rönnbäcknäset where appropriate.

# **10.2 Samples for Assay**

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

The core was marked for sampling by Company staff geologists or sub-contracting technicians, 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 considers that the Company has sampled the host serpentinite in an unbiased fashion using a consistent technique for all intersections.

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

SRK notes that no systematic logging of core recovery has been carried out by the Company. However, serpentinite intersections in drill core observed during the field visit to Rönnbäcken and the Company's core logging and storage facilities in Skellefteå in 2010, showed very good recovery and generally good quality core. SRK does not consider core loss to be a material issue with regards MRE in this case.

# **10.3 Thin Section Samples**

SRK understands that samples were systematically collected by the Company for thin section work at approximately 40 m intervals.

# **10.4** Samples for Metallurgical Tests

Two samples of 20 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 collected from throughout the pit.

In an early stage of the drill programme, five samples of 30 to 35 kg each were taken for new

tests at the Outokumpu Research Centre (ORC), three from Vinberget and two from Rönnbäcknäset. The three samples collected from Vinberget comprise coarse reject from the sample preparation of two drillholes, 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 Rönnbäcknäset, two samples were collected from drillhole RON53 in the same way as in VIN30. RON53 is located in the north-eastern part of the Rönnbäcknäset 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 t sample from selected holes. The 1,008 sample intervals and 1,216 m of core drilling represented intersected the mineralization at depths of between 630m to 500 MASL. At Rönnbäcknäset, the samples were selected from coarse rejects from 15 core holes drilled in the south-western part of Rönnbäcknäset.

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 comprises relatively little of the higher grade lower serpentinite zone with similarities to the Vinberget serpentinite. The sample also does not include any of the low grade mafic intrusion material or the low grade zone with almost no sulphides.

SRK has recommended to the Company that it does further work to clarify metallurgical sample provenance (hole number, interval and sample weight) for more samples to support future studies and specifically to verify metallurgical sample representivity, 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.

#### **10.5** Sample preparation

The sample preparation was conducted by a company independent of the Company, namely ALS Minerals in Piteå, Sweden.

The aim of the sampling has been to delineate mineralization that could be recovered by established metallurgical methods, i.e., flotation of sulphide minerals. The adapted assay technique was therefore a 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 also carried out by the Company and 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 conventional milling and flotation techniques.

## **10.6** Chain of Custody and Sample Preparation

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

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

ALS Minerals (ALS) in Piteå, was contracted to split the core and carry out the sample preparation. A separate room for sample preparation was set up for the Project as a precaution against the health risks associated with asbestos.

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% -2 mm (Tyler 9 mesh, US Std Nr 10). A split of up to 300 g was taken and pulverized to 85% -75  $\mu$ m (Tyler 200 mesh, US Std Nr 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). A third laboratory (ACME) was used for the 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 the Company 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 of the sample preparation process is illustrated in the flowchart in Figure 10-1. Note that the sample split was modified to up to 300 g instead of 250 g.



Figure 10-1: Sample preparation flow sheet (modified from ALS Minerals 2009)

### 10.7 Sample Analysis

Two assay laboratories were contracted for the 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 Table 10-1 below.

	Lab	Lab code	Sample digestion	Туре	Sample size (g)	Analytes	Main interest	Use
	ALS Minerals	ME-ICP61	Four-acid	Near total	0.25	33	Ni, Co, S	Normal

Table 10-1: Analytical methods for Rönnbäcknäset 2008-2009

	PGM-ICP23	Fire Assay	Total	30.00	3	Au, Pt, Pd		
Labtium	240P	H2O2+NH4 citrate	Sulphides	0.15	3	Ni, Co		
Labtium	510P	Aqua regia	Partial	0.15	14	Ni, S		
Acme	G7TD	Hot four- acid	Near total	0.50	23	Ni, S		
	8NiS	H2O2+NH4 citrate	Sulphides	1.00	1	Ni	00	
Labtium	307P	HF +HCIO4	Near total	0.20	13	Ni	QU	
	720P	Na2O2 Fusion	Total	0.20	12	NI, S		

For exploration programmes commencing during 2010, the ME-ICP61 method was replaced by a "Complete Characterisation Package" which includes the methods ME-ICP06, ME-4ACD81, ME-MS81 and ME-MS42, see Table 11-2 for full summary. The new package is intended to provide additional information on rock type to aid in the geological interpretation.

Additional method for the 2011 exploration program is the Labtium method 891G assaying for magnetite via Satmagan. The method is used on selected drill holes only.

Lab	Lab code	Sample Digest	Digest Type	Analy.	Sample size (g)	Analytes	Main interest	Use		
	ME-4ACD81	Four acid	Near total	ICP-AES	0.25	9	Ni, Cu, Co			
	ME-MS81	Lithium borate fusion	Total	ICP-MS	0.2	38	Ni, Cu, Co			
	ME-ICP06	Lithium borate fusion	Total	ICP-AES	0.2	13	Whole rock			
ALS	ME-MS42	Aqua regia	Near total	ICP-MS	0.5	6	As, Bi, Hg, Sb, Se, Te			
IVIIIIEI dis	OA-GRA05	Fusion	Total	Gravimetric	1	1		Normal/QC		
	TOT-ICP06	Calcula	ation based or	n LOI and ME-	1					
	PGM-ICP23	Fusion	Total	Fire Assay (ICP-AES)	30	3	Au, Pd, Pt			
	C-IR07	High temp evolution	Total	Leco furnace		1	С			
	S-IR08	High temp evolution	Total	Leco furnace		1	S			
Labtium	240P	H2O2 + NH4 citrate	Sulphides	ICP-AES	0.15	4	Ni-AC, S- AC			
	891G	-	-	Satmagan	>5g	1	Magnetite	Selected/QC		

Table 10-2: Analytical methods 2011

The database received by SRK from the Company, contained a total of 4 771 analyses, of which 4 262 related to primary core samples while 426, or 10%, comprised 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 10-3 below.

Period	Sample Assays	Duplicates	UM-4 (reference material)	Blank	Acme check	Coarse reject	Sub- total QC	Total assay
2008-2010	2706	94	58	66	56	28	302	3008
2011	1556	69	40	36	0	62	207	1763
Total	4262	163	98	102	56	90	509	4771

Table 10-3:Analysis Summary

SRK notes that for low grade sulphide deposits such as Rönnbäcken, the silicate nickel contribution to the nickel assay can be significant. For this reason the Company has elected to characterise the total nickel content and the nickel content in sulphide, the latter by partial leach methods, namely Labtium's 240P method (ammonium citrate and hydrogen peroxide).

#### 10.7.1 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 fulfils 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, that is, specifically to obtain accurate estimates of the metals that can be recovered by established metallurgical methods, such as flotation.

Aqua regia digestion, laboratory 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.

The Company report that for the 2008-2010 exploration programme, aqua regia digestion has been abandoned in preference for the 240P method.

### 10.7.2 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 the Company.

ALS code ME-ICP81 requires the pulp to be digested with perchloric, nitric, hydrofluoric, and hydrochloric acids (HNO3-HCIO4-HF-HCI). 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 10-4.

Analytes and Ranges (ppm)										
	ME-MS81									
Ag 1-1,000 Ga 0.1-1,000 Pb 5-10,000 Tm 0.01-1,							0.01 – 1,000			
Ва	0.5 – 10,000	Gd	0.05 - 1,000	Pr	0.03 – 1,000	U	0.05 – 1,000			
Ce	0.5 – 10,000	Hf	0.2 – 10,000	Rb	0.2 – 10,000	V	5 – 10,000			
Co	0.5 – 10,000	Ho	0.01 – 1,000	Sm	0.03 – 1,000	W	1 – 10,000			
Cr	10 - 10,000	La	0.5 – 10,000	Sn	1 – 10,000	Y	0.5 – 10,000			
Cs	0.01 – 10,000	Lu	0.01 – 1,000	Sr	0.1 – 10,000	Yb	0.03 – 1,000			
Cu	5 - 10,000	Мо	2 – 10,000	Та	0.1 – 10,000	Zn	5 – 10,000			
Dy	0.05 – 1,000	Nb	0.2 - 10,000	Tb	0.01 – 1,000	Zr	2 – 10,000			
Er	0.03 – 1,000	Nd	0.1 - 10,000	Th	0.05 – 1,000					
Eu	0.03 – 1,000	Ni	5 – 10,000	TI	0.5 - 1,000					

Table 10-4: Elements analysed and their ranges for ME-MS81

For ME-4ACD81, a prepared sample (0.25 g) is digested with perchloric, nitric, hydrofluoric and hydrochloric acids. The residue is topped up with dilute hydrochloric acid and the resulting solution is analyzed by inductively coupled plasma-atomic emission spectrometry. The results are corrected for spectral inter element interferences. For ME-MS81, a prepared sample (0.200 g) is added to lithium metaborate flux (0.90 g), mixed well and fused in a furnace at 1000°C. The resulting melt is then cooled and dissolved in 100 mL of 4% nitric acid. This solution is then analyzed by inductively coupled plasma-mass spectrometry. The elements analyzed and ranges of the procedure are shown in Table 10-5.

Analytes and Ranges (ppm)								
ME-4ACD81								
Ag	0.5 – 1,000	Со	1 – 10,000	Ni	1 – 10,000			
As	5 – 10,000	Cu	1 – 10,000	Pb	2 – 10,000			
Cd	0.5 – 500	Мо	1 – 10,000	Zn	2 – 10,000			

#### Table 10-5: Elements analysed and their ranges for ME-4ACD81

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.).

### 10.7.3 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.

# **10.8** Quality Assurance and Quality Control (QAQC)

The Company Quality Control/Quality Assurance (QA/QC) programme comprised submitting sample blanks, standard reference samples, sample duplicates, and inter-laboratory check samples. The approximate rate of sample submissions is summarized in Table 10-6 below.

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

Table 10-6: 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 the Company. The QA/QC results from the laboratory were checked as they were returned.

#### 10.8.1 Sample Blanks

For the Rönnbäcknäset deposit, the Company submitted 102 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 Minerals, Piteå).

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

### 10.8.2 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.

For Rönnbäcknäset, the Company submitted 98 UM-4 samples for analysis by the ammonium citrate method (Ni- AC) described in Section 10.7.1 above.

#### **10.8.3 Duplicate Pulp Samples**

For Rönnbäcknäset the Company renumbered and submitted 156 sample pulps to Labtium for assay as duplicates.

#### **10.8.4 Duplicate Coarse Reject Samples**

In the case of the Rönnbäcknäset deposits, 14 samples of coarse rejects were renumbered and resubmitted for assay to test if the 70% -2 mm crush size would achieve repeatable results.

#### **10.8.5 Interlaboratory Check Assays**

During the 2008-2010 assaying period for the Rönnbäcknäset deposit, a total of 56 samples originally assayed at Labtium were submitted for assay at Acme principally as a check on the accuracy of the Ni-AC results. No interlaboratory check assays were available to SRK for the 2011 MRE update.

#### **10.8.6 SRK Consulting Duplicate Samples**

During a visit to the Company's exploration office and core archive facilities in Skellefteå in 2010, SRK collected 16 sample pulps at random from the sample pulp archive originating from the Rönnbäcken project area. These sample pulps were re-bagged, assigned a new sample numbers and sent to Labtium for assay by method code 240P.

#### **10.8.7 Density Measurements**

Specific gravity dterminations were carried out at ALS Minerals (Piteå) on a total of 79 samples using the water immersion method. Of these samples, 44 were from Vinberget and 35 from Rönnbäcknäset. In addition, 3 303 dterminations split across the deposits were also undertaken by the Company at its base in Skellefteå using the water immersion method.

# 10.9 Security

#### 10.9.1 Storage of Drill Core

Drill core, coarse rejects, and pulps are stored in a locked unheated storage building inside a fenced area at the Company's core depot in Skellefteå and a second secure facility at Bastuträsk.

#### 10.9.2 Database

All project data are stored on the Company's exploration office server, with data backup. In addition, a full version of the database is managed through MRG in Perth, Western Australia, using industry standard DataShed<sup>™</sup> software.

### **10.10 Summary comments**

In SRK's opinion, the Company has developed appropriate logging and sample preparation procedures that enable the logical flow of the core from the drill rig through to sample dispatch; the core shed, logging, sampling and preparation facilities are clean, organised and appear well managed; appropriate security procedures are in place and the assaying has been carried out using appropriate techniques and by qualified laboratories.

# 11 DATA VERIFICATION

# 11.1 Introduction

The following sections present SRK's analysis of the QAQC data provided by the Company for the Rönnbäcknäset and Vinberget deposits combined for the 2008-2010 assaying, and for Rönnbäcknäset for the 2011 assaying. This includes blanks, reference material and duplicates as described above. The results of the 2008-2010 QAQC have not been split into the individual deposits, but include all data supplied to SRK for both deposits combined.

# 11.2 Reference Material (UM-4)

Figure 11-1 shows the performance of the Labtium laboratory analysis of Ni-AC in reference material UM-4 for the 2008-2010 assaying period, and Figure 11-2 shows the performance during 2011. For the years 2008-2010 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. For 2011 the majority of the results also lie within the 5% of the reference grade recommended however, 25% of the standard assays lie between 5 - 10% of the recommended reference grade. There appears to be a drift towards a negative bias in the assay grades, which then recovers to be within the 5% performance gates. This is likely to have been a machine calibration issue which was resolved.

Figure 11-3 shows the performance of the Labtium laboratory analysis during the 2008-2010 assaying of Co-AC in reference material UM-4, and Figure 11-4 shows the performance during 2011. The majority of results for 2008-2010 lie within plus 10% to minus 5% of the reference grade recommended by CANMET (0.007% Co) but the results exhibit a slight positive skew and appear to be distributed around plus 5% of the recommended grade. There does not, however, appear to be a bias over time. The majority of the results for 2011 lie within 5% of the reference grade recommended.



Figure 11-1: Labtium Ni-AC in Reference Material UM-4 for 2008-2010



Figure 11-2: Labtium Ni-AC in Reference Material UM-4 for 2011 drill campaign



Figure 11-3: Labtium Co-AC in Reference Material UM-4 for 2008-2010





### Summary - Standards

The results of the QAQC standards show that the majority of the samples fall within an acceptable range relative to the Ni and Co 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 considers that these results indicate acceptable accuracy of assays for Ni and Co in sulphides.

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

## 11.3 Blanks

Figure 11-5 shows the performance of the Labtium laboratory analysis of Ni-AC in sample blanks during the 2008-2010 assaying period. The Company replaced all results reporting at less than the detection limit to 0.5 times the detection limit, or 5 ppm Ni-AC. A total of 11 samples (8 %) had laboratory results which were at or above the detection limit of 10 ppm Ni-AC. Four samples (3%) assayed greater than twice the detection limit; that is, >20 ppm Ni-AC.

The results indicate a potential for minor contamination during sample preparation at ALS Minerals 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. An alternative explanation, though perhaps more unlikely, could be that minor silicate Ni from mafic minerals in the granite was leached in these instances.

Figure 11-6 shows the performance of the Labtium laboratory analysis of Ni-AC for blank anlyses in 2011. All blanks were reported to be below detection limit of 10 ppm Ni\_AC.



Figure 11-5: Sample Blanks Ni-AC 2008-2010



#### Figure 11-6: Sample Blanks Ni-AC 2011

Figure 11-7 shows the performance of the Labtium laboratory analysis of Co-AC in sample blanks for 2008-2010. The Company replaced all results reporting at less than the detection limit to 0.5 times the detection limit, or 5 ppm Co-AC. All samples returned values below detection limit. The same pattern is seen in the 2011 analyses, with all Co\_AC assays for blank material reporting below detection limit, as shown in Figure 11-8.







Figure 11-8: Sample Blanks Co-AC 2011

#### 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 has, however, recommended to the Company that it considers using barren quartz material for sample blanks to eliminate any potential for contamination of Ni from mafic minerals in the granite currently used as sample blank.

## 11.4 Duplicates

Figure 11-9 to Figure 11-12 show the results of the laboratory duplicates for Ni-AC and Co-AC for the 2008-2010 and 2011 assaying campaigns, respectively. The duplicate samples show a strong correlation to the original sample and in SRK's opinion, sample preparation and analysis shows an acceptable level of repeatability.



Figure 11-9: Ni-AC Duplicate Analysis 2008-2010



Figure 11-10: Ni-AC Duplicate Analysis 2011



Figure 11-11: Co-AC Duplicate Analysis 2008-2010



Figure 11-12: Co-AC Duplicate Analysis 2011

# 11.5 Duplicate Coarse Reject Samples

Figure 11-13 to Figure 11-16 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 11-13: Ni-AC Coarse Reject Duplicate Analysis 2008-2010



Figure 11-14: Ni-AC Coarse Reject Duplicate Analysis 2011



Figure 11-15: Co-AC Coarse Reject Duplicate Analysis 2008-2010



Figure 11-16: Co-AC Coarse Reject Duplicate Analysis 2011

### 11.6 Interlaboratory Check Assays

Figure 11-17 shows 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 inter-laboratory check assays performed at Acme provide good support for Ni-AC assays carried out by Labtium.

These analyses only represent the assaying conducted for the 2008-2010 assaying campaign. No results were provided for the 2011 campaign.



Figure 11-17: Control samples Ni-AC Labtium against Ni-AC Acme

# 11.7 SRK Consulting Duplicate Samples

As part of SRK's initial MRE at Rönnbäcknäset in 2010, SRK submitted a number of duplicate samples for re-assay as spot-checks. Table 11-1 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 the Company's data.

Figure 11-18 and Figure 11-19 illustrates the results of SRK's duplicate sample analysis for Ni-AC and Co-AC carried out at Labtium by method 240P, against the Company'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 duplicates and originals respectively.

The number of duplicate samples selected by SRK represents 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.

SRK Sample ID	Co-AC (SRK)	Ni-AC (SRK)	Original Analysis ID	Co-AC (Original)	Ni-AC (Original)
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

 Table 11-1:
 Details of SRK Duplicate assays for Ni-AC and Co-AC with respect to original assay results



Figure 11-18: Ni-AC SRK Duplicate Samples against Originals



Figure 11-19: Co-AC SRK Duplicate Samples against Originals

### **11.8 Density Measurements**

Figure 11-20 illustrates the specific gravity of 79 samples measured at ALS Minerals and using the water immersion method, as compared to the Company's density measurements using the same method. With the exception of a single outlier, the results from ALS Minerals provide good support for density measurements taken by the Company.



Figure 11-20: Density measurement comparison

# **11.9 Summary Comments**

SRK is of the opinion that the assay and density information available of sufficient quality to support the estimates of mineral resources presented later in this report.

# 12 MINERAL PROCESSING AND METALLURGICAL TESTING

A significant amount of metallurgical testwork has been undertaken prior to completing the PEA document in December 2011, and is commented upon in Section 16 "Recovery Methods".

# 13 MINERAL RESOURCE ESTIMATES

# 13.1 Introduction

This section of the report describes the work undertaken by SRK in updating the Mineral Resource Statement for the Rönnbäcknäset deposit, using additional drillhole data from seven holes, which was supplied to SRK by the Company.

SRK's initial MRE for Rönnbäcknäset was produced in April 2010, at which time this was restricted to mineralisation which SRK considered had reasonable prospects for eventual economic extraction by only reporting that material which fell within an optimised pit outline generated using parameters appropriate at that time. The pit optimisation parameters used by SRK in April 2010 were updated as part of the 2011 PEA. These updated pit optimisation parameters were used as a basis for the MRE report herein.

# 13.2 Statistical Analysis and Geological Domaining

#### 13.2.1 Introduction

A statistical study of the data made available for the Rönnbäcknäset deposit was undertaken to determine suitable geological domains to be used. It was clear that the dominant Ni mineralisation is limited to the serpentinite bodies and that there is a hard contact between these and the host rock metasediments. Internal mafic units also contain low levels of Ni mineralisation in addition to internal zones of non mineralised serpentinite.

The Rönnbäcknäset deposit consists of a single serpentinite body that strikes in an east-west orientation in the south-western portion of the deposit and a north-south orientation in the north-eastern portion of the deposit. Figure 13-1 shows the drillhole distribution and solid wireframe created for the serpentinite body and Figure 13-2 shows the histogram of Ni-AC assays associated with the mineralised serpentinite body. As shown in Figure 13-2, two clear populations of data exist in the Rönnbäcknäset deposit. Figure 13-3 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 Rönnbäcknäset deposit on the hanging wall side of the serpentinite body.

The Ni-AC distribution of the identified grade domains for the Rönnbäcknäset deposit are shown in Figure 13-4 to Figure 13-8. 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 13-1: Rönnbäcknäset serpentinite body and drillhole locations



Figure 13-2: Ni-AC histogram for the Rönnbäcknäset serpentinite



Figure 13-3: Probability plot for the Rönnbäcknäset serpentinite



Figure 13-4: Ni-AC distribution of the high grade serpentinite



Figure 13-5: Ni-AC distribution of the low grade serpentinite



Figure 13-6: Ni-AC distribution of the hangingwall serpentinite



Figure 13-7: Ni-AC distribution of the mafic unit



Figure 13-8: Ni-AC distribution of the internal waste domain

## **13.3 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 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 13-9, Figure 13-10, and Table 13-1)
- The empty block model created used a parent cell size of 50mN by 50mE by 10mZ, representing a division of the current drillhole spacing observed at each deposit (Table 13-2).

Table 13-1 shows the coding applied to the various geological domains in the Rönnbäcknäset geological models.

Table 13-2 shows the block model parameters used to build the empty block models for the Rönnbäcknäset deposits.



Figure 13-9: Rönnbäcknäset block model (looking east, block height = 10 m). Ni-AC assays along drillholes as text. Blockmodel and drillholes coloured by zones.



Figure 13-10: Rönnbäcknäset block model showing internal waste pods (looking east, block height = 10 m). Blockmodel coloured by zones.
Deposit	Geology	Code
Rönnbäcknäset	Waste	1
	Overburden	2
	Internal waste	141
	High Grade Serpentinite	151
	Low Grade Serpentinite	152
	Hangingwall Serpentinite	153
	Mafics	205

#### Table 13-1: Zone codes created for Rönnbäcknäset Nickel Sulphide Project

#### Table 13-2:Block model parameters

DEPOSIT	DIRECTION	ORIGIN	BLOCK SIZE	NR. OF BLOCKS
	Х	1479250	50	55
Rönnbäcknäset	Y	7267000	50	60
	Z	-100	10	85

### 13.4 Available Data

The drillholes used for the Rönnbäcknäset MRE comprise 63 diamond drillholes for a total of 10,523 drilled meters. Of this, 6 736 drilled meters have been assayed for Ni-AC. This is summarised in Table 13-3 below.

#### Table 13-3:Available data

DEPOSIT	Nr. of drillholes	Total Meters Drilled	Ni-AC Assayed Meters
Rönnbäcknäset	63	10,523	6,736

## 13.5 Data Validation

All available data was validated through the production of histograms and scatterplots and the use of the Datamine drillhole validation tools upon creation of a desurveyed drillhole file. Three drillholes intersecting the mineralisation lacked downhole survey data and were considered with caution. The surrounding drillholes show minor deviation downhole, and so these holes were deemed as acceptable to use. No other data validation issues were encountered.

SRK is satisfied that the resulting data is suitable to be used in the MRE.

### 13.6 Raw Statistic

Table 13-4 shows the raw statistics for the domains modelled at the Rönnbäcknäset deposit. The main serpentinite zone, 151, is highlighted in red. As shown, the mean Ni-AC grade of the Rönnbäcknäset high grade serpentinite is 0.108% and the mean grade of the low grade serpentinite is 0.056%.

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 domain, Table 13-4 shows that most of the CoV values are very low, indicating the low variability of the data.

ZONE	NSAMPLES	MIN	MAX	RANGE	MEAN %	VAR	SDEV	CoV
141	361	0.001	0.081	0.080	0.014	0.000	0.011	0.79
151	2406	0.001	0.192	0.191	0.108	0.001	0.029	0.27
152	353	0.001	0.160	0.159	0.056	0.000	0.018	0.33
153	53	0.001	0.129	0.128	0.077	0.001	0.023	0.29
205	218	0.001	0.139	0.139	0.018	0.000	0.019	1.09

 Table 13-4:
 Length weighted Ni-AC statistics for the Rönnbäcknäset deposit

## 13.7 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 the Rönnbäcknäset drillhole file are 2 m in length with smaller samples being present at 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 2 m as increasing the sample to a larger composite length has little impact on the variability of the database.

ZONE	NSAMPLES	MIN	МАХ	RANGE	MEAN %	VAR	SDEV	CoV
141	324	0.001	0.077	0.077	0.014	0.000	0.011	0.75
151	2264	0.001	0.182	0.181	0.107	0.001	0.029	0.27
152	312	0.002	0.150	0.148	0.056	0.000	0.017	0.30
153	37	0.026	0.115	0.089	0.075	0.001	0.023	0.30
205	192	0.001	0.139	0.139	0.018	0.000	0.017	0.98

 Table 13-5:
 2 m composite Ni-AC statistics for the Rönnbäcknäset

## 13.8 Density Analysis

A comprehensive density dataset has been generated by the Company using the methodology described in Section 9.7. In total, 3 653 density measurements are present for the Rönnbäcknäset domains.

Table 13-6 shows the breakdown of samples per domain for Rönnbäcknäset deposit. Density measurements have also been acquired for the waste domains allowing accurate tonnages to be determined for all material types.

ZONE	NSAMPLES	MIN	MAX	RANGE	MEAN (g/cm <sup>3</sup> )	VAR	SDEV
1	285	2.57	3.23	0.66	2.77	0.019	0.137
141	357	2.54	3.26	0.72	2.74	0.019	0.139
151	2402	2.48	3.25	0.77	2.73	0.006	0.079
152	353	2.59	3.24	0.65	2.72	0.008	0.092
153	39	2.48	2.92	0.44	2.68	0.005	0.069
205	217	2.65	3.38	0.73	3.04	0.025	0.159

#### Table 13-6:Density measurements

## 13.9 Geostatistical Analyses

#### 13.9.1 Variography

Given the limited quantity of additional data available for this update, SRK did nor consider it neccassary to update the geostatistical analysis undertaken and as such, the following section of the report is an extract from the April 2010 Rönnbäcknäset MRE.

The 2 m 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, using the interpreted dip and strike direction observed for the serpentinite body. This was done separately for the northeast and southwest areas in order to better model the change in strike direction of the serpentinite body.

The semi-variograms were produced using a 2 m (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 were then produced with the nugget fixed from the downhole variogram, and using a lag spacing of 100 m with a 50% tolerance being applied to the lag spacing.

The Fe estimation used the variogram parameters determined for the Ni-AC data.

Figure 13-11 shows the plane used to define the directional variography for the northeast portion of the Rönnbäcknäset deposit, using a 016° azimuth, 40° dip to the west and a 45° plunge.



Figure 13-11: Directional variography plane for Rönnbäcknäset northeast

Figure 13-12 shows the plane used to define the directional variography for the southwest portion of the Rönnbäcknäset deposit, using a 085° azimuth, 25° dip to the west and no plunge.



Figure 13-12: Directional variography plane for Rönnbäcknäset southwest

Figure 13-13 to Figure 13-18 show the Ni-AC semi-variograms for Rönnbäcknäset. 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 13-19 and Figure 13-20.

The results of the variography are shown in Table 13-7.



Figure 13-13: Ni-AC downhole semi-variogram for Rönnbäcknäset northeast



Figure 13-14: Ni-AC downhole semi-variogram for Rönnbäcknäset southwest



Figure 13-15: Ni-AC along strike semi-variogram for Rönnbäcknäset northeast (016°)



Figure 13-16: Ni-AC along strike semi-variogram for Rönnbäcknäset southwest (085°)



Figure 13-17: Ni-AC down-dip semi-variogram for Rönnbäcknäset northeast (040° west)



Figure 13-18: Ni-AC down-dip semi-variogram for Rönnbäcknäset southwest (025° north)



Figure 13-19: Density omni directional semi-variogram for Rönnbäcknäset northeast



Figure 13-20: Density omni directional semi-variogram for Rönnbäcknäset southwest

Denosit	Assav	Nuqqet	s	tructure 1 - Ranç	je	Variance	S	tructure 2 - Ranç	ge	Variance	Sill	Relative Nuccet (%)
Deposit	Assay	Nugger	Down-Dip (40°)	Along-Strike (016º)	Downhole	Variance	Down-Dip (40°)	Along-Strike (016º)	Downhole	Variance	om	Kelative Nugget (76)
	Ni-AC	0.00007	50	125	35	0.00098	250	300	35	0.00038	0.00143	5
Ronn NE (151)	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

Table 13-7:	Variography	<b>Results for</b>	Rönnbäcknäset
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Denosit	Δεεργ	Nuqqet	s	tructure 1 - Rang	ge	Variance	Structure 2 - Range			Variance	Sill	Relative Nugget (%)
Deposit	Assay	Nugget	Down-Dip (25°)	Along-Strike (085°)	Downhole	Variance	Down-Dip (25º)	Along-Strike (085°)	Downhole	Variance	511	Kelalive Nugget (70)
Bonn	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
	Density	0.0025	80	80	80	0.00163	-	-	-	-	0.00413	61

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

## 13.9.2 Summary

The directional experimental semi-variograms produced for Rönnbäcknäset northeast allowed 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 Rönnbäcknäset southwest allowed 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 two structure spherical model. Co-AC variograms were however poor in the along strike direction.

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

The results of the variography were 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<sup>rd</sup> rule to the total range of the variograms in the search ellipse dimensions forces the interpolation to use samples where covariance between samples exists. The chosen search ellipse radii are shown in Table 13-8. 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.

Deposit	Parameter	Along Strike	Down Dip	Across Strike
Dännkäslmässt	Average Total Range	338m	325m	60m
(Directional)	2/3 Average Range	225m	217m	40m
	Search Ellipse Chosen	225m	217m	20m

 Table 13-8:
 Ranges and 2/3<sup>rd</sup> ranges for Rönnbäcknäset

## 13.10 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.

## 13.10.1 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.

## 13.10.2 Interpolation Process

Updated neighbourhood tests were run on ore domains 151 and 152 for Rönnbäcknäset with the search ellipse dimensions being fixed against the optimum ranges identified in the variography and as highlighted in Table 13-7. 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 13-9 outlines the chosen parameters used in the QKNA tests.

		=					
OKNA	Search El	llipse Dimer	nsion (m)	Min		May Samplas par	
Model	Along Strike	Down Dip	Across Strike	Samples	Max Samples	Drillhole	
Ron NE	225	217	20	6	12	6	
Ron SW	225	217	20	6	12	6	

Table 13-9:	QKNA mode	I parameters
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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 13-10. 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 Rönnbäcknäset (0.6 and 0.4).

Table 13-10:	QKNA results: slope o	f regression and	percent block filled
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Deposit	Min	Max	Mean	% Filled in Run 1
Ron (151)	0.001	0.973	0.56	83
Ron (152)	0.001	0.848	0.35	93

The distribution of Ni-AC slope of regression values is shown in Figure 13-21 to Figure 13-23 for Rönnbäcknäset. 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 the closer drill spacing in the northeast portion of the deposit.



Figure 13-21: Rönnbäcknäset block model coloured by slope of regression (looking northeast)



Figure 13-22: Rönnbäcknäset block model coloured by slope of regression (looking east)



Figure 13-23: Rönnbäcknäset block model coloured by slope of regression (looking north)

## 13.11 Block Modelling

## 13.11.1 Interpolation

An empty block model was generated using the lithology wireframes with block dimensions as shown in Table 13-11. These block dimensions approximate half the drillhole spacing at Rönnbäcknäset northeast. Due to the low nugget effect observed at the Rönnbäcknäset

deposit, it is deemed appropriate to use blocks smaller than half the drillhole spacing 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 Rönnbäcknäset southwest deposit are well supported by data. A block height of 10 m was chosen, being the assumed working bench height of the operating pit. Table 13-11 summarizes the block model parameters.

DEPOSIT	DIRECTION	ORIGIN	BLOCK SIZE	NR. OF BLOCKS
	Х	1479250	50	55
Rönnbäcknäset	Y	7267000	50	60
	Z	-100	10	85

Table 13-11: Block Model Framework

Grades of Ni-AC, Co-AC and Ni-Total were interpolated into the model using OK and the kriging parameters given in Table 13-7. 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 hangingwall serpentenite, mafic units and internal waste domains at Rönnbäcknäset utilising the variography data determined for the main serpentinite domain (151).

### 13.11.2 Search Ellipse Parameters

The dip and strike of the Rönnbäcknäset 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 being an inaccurate representation of the 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 13-24 shows the search ellipse generated at various points of the Rönnbäcknäset deposit, with the dip and strike of the ellipse corresponding with the dip and strike of the orebody wireframe.



Figure 13-24: First pass search ellipses used in the interpolation of Rönnbäcknäset (looking east), search ellipse radii measures 225 m along strike)

Three different grade interpolations with specific sample criteria were run. The first run used the "optimum" parameters determined by the QKNA testwork. The second run doubled the dimensions of the search ellipse and the third run multiplied the original search ellipse by a factor of ten and required a minimum number of samples too be used. The third run was designed to estimate any blocks not estimated in runs one and two and the confidence in the resulting grades is less as the search ellipse will have encapsulated samples that are outside the geostatistical range of the samples as shown in the geostatistical analysis.

Table 13-12 shows the search ellipse parameters used for the three estimation runs.

ZONE	:	STRIKE	DIP	RUN	ALONG STRIKE	DOWN DIP	ACROSS STRIKE	MIN	MAX
-		(°)	(°)		RADII	RADII	RADII	SAMPS	SAMPS
Dänghänl		Define al lass al		1	225	217	20	6	12
näset	-   L	anisotro	ynamic py	2	450	434	40	6	12
				3	2250	2170	200	3	12

 Table 13-12:
 Search ellipse parameters

#### 13.11.3 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 13-25 to Figure 13-27 show examples of the visual validation checks between block Ni-AC grades and the input composite Ni-AC grade for the Rönnbäcknäset deposit. The

grades follow the strike and dip of the orebody showing that the search ellipse orientation has been used appropriately with Figure 13-27 showing that the grade has been interpolated through the change of strike of the serpentinite body.



Figure 13-25: Visual validation of block grades against 2 m composite sample grades for Rönnbäcknäset northeast (looking north)



Figure 13-26: Visual validation of block grades against 2 m composite sample grades for Rönnbäcknäset southwest (looking east)



# Figure 13-27: Visual validation of block grades against 2 m composite sample grades for Rönnbäcknäset (plan view, RL set at 350 m)

Table 13-13 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.

DOMAIN	FIELD	BLOCK MEAN	COMP MEAN	%DIFFERENCE
141	NI_AC	0.012	0.014	23.92
151	NI_AC	0.103	0.107	3.48
152	NI_AC	0.057	0.056	1.45
153	NI_AC	0.077	0.075	1.71
205	NI_AC	0.015	0.018	17.72
141	NI_TOT	0.159	0.155	2.35
151	NI_TOT	0.180	0.180	0.09
152	NI_TOT	0.165	0.166	0.63
153	NI_TOT	0.160	0.160	0.04
205	NI_TOT	0.046	0.055	20.40
141	CO_AC	0.001	0.001	3.58
151	CO_AC	0.004	0.003	2.68
152	CO_AC	0.003	0.003	3.09
153	CO_AC	0.004	0.004	0.34
205	CO_AC	0.001	0.001	19.15
141	FE	5.571	5.573	0.04
151	FE	5.506	5.469	0.67
152	FE	5.264	5.289	0.47
153	FE	5.038	5.006	0.64
205	FE	5.596	5.341	4.56
141	DENSITY	2.721	2.735	0.53
151	DENSITY	2.733	2.732	0.04
152	DENSITY	2.711	2.719	0.30
153	DENSITY	2.668	2.688	0.77
205	DENSITY	3.078	3.038	1.31

Table 13-13:	Comparison of block and	sample mean grades
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## **13.12 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, and comply with the requirements of National Instrument 43-101.

### 13.12.1 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.

### 13.12.2 Classification

#### Introduction

To classify the Rönnbäcknäset deposit, the following key indicators were used:

- geological complexity;
- quality of data used in the estimation:
- QAQC, density analysis
- results of the geostatistical analysis
- 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 the Rönnbäcknäset deposit with all of the mineralisation occurring within the serpentinite body. The drill spacing has allowed for the interpretation of a 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 Rönnbäcknäset data shows a very low variability in 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. 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 comprehensive dataset of density has also been generated by the Company throughout the sampling period that has enabled SRK to estimate density into the model using OK. SRK is therefore confident that the associated tonnages estimated for the Rönnbäcknäset deposit

should be reasonable.

#### Results of the Geostatistical Analysis

The data used in the geostatistical analysis resulted in robust variogram models being produced for the deposit. 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 Approach

The Rönnbäcknäset deposit has been classified as containing Indicated and Inferred Resources.

Indicated Resources at Rönnbäcknäset have been assigned where the following criteria have been met:

- very low geological complexity;
- drillhole spacing of less than the 2/3rd geostatistical range;
- most blocks were estimated in search volume one, using the optimum search parameters determined; and
- slope of regression values dominantly greater than 0.5.

Inferred Resources at Rönnbäcknäset have been extended approximately 50 m down dip of the last drillhole intersection on the section line.

The above have been used to model zones for each of the classification categories rather than to assign this on a block by block basis.

Figure 13-28 shows the block model coloured by classification.



Figure 13-28: Rönnbäcknäset classification. Blue = Indicated; Red = Inferred; Purple = Unclassified (looking east)

## 13.13 Pit Optimisation

In order to derive the final Mineral Resource Statement, and so as to comply with the requirement that the resulting Mineral Resource must have reasonable prospects of economic extraction, the resulting blocks have been subjected to a Whittle pit optimisation exercise.

The Whittle optimisation requires the input of reasonable processing and mining cost parameters in addition to appropriate pit slope angles and processing recoveries.

Table 13-14 shows the assumptions applied in the Whittle optimisation.

The Whittle optimisation has assumed that the serpentinite domains (151, 152 and 153) are to be treated as the key potential ore material types.

Revenue				
Ni Price	USD 11/lb			
Govt Royalty	0.05%			
Private Royalty	0.15%			
Discount Rate	0%			
Process and N	lining Statistics			
Overall Slope Angle	48°			
Mining Recovery	95%			
Mining Dilution	2.5%			
Process Recovery	80%			
OP Base Mining Cost	1.35 USD/tonne			
Incremental Mining Cost above surface	0.05 USD/tonne/10m			
Incremental Mining Cost below surface	0.07 USD/tonne/10m			
Processing Cost	4.96 USD / ore tonne			
Effective charges per lb Ni in smelter feed	1.14 USD / lb			
General & Administration	0.4 USD / ore tonne processed			
Rail / Road Transport Cost	0.1 USD / ore tonne processed			
Concentrate Grade	25.0%			

#### Table 13-14:Whittle parameters

## **13.14 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 USD11/lb and through the application of the parameters outlined in Section 13.13. SRK assumed a nickel price of USD11/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 0.0323% Ni-AC representing the calculated marginal cut off grade for the deposit. The USD11/lb nickel price includes a 30% premium above the consensus long-term nickel price, determined from over 30 market forecasts.

Table 13-15 shows the resulting Mineral Resource Statement for Ni, Co and Fe Total, for Rönnbäcknäset. Due to the large relative proportion of non-sulphide nickel in the Rönnbäcken mineralisation, resources are reported in terms of sulphide (AC) nickel along with the more conventional total nickel. A high proportion of the sulphide nickel is recovered in the flotation process whereas the non-sulphide nickel reports predominantly to tailings.

The statement has been classified by Qualified Person Howard Baker (MAusIMM(CP)) in accordance with the Guidelines of National Instrument 43-101 and accompanying documents 43-101.F1 and 43-101.CP. The effective date for these statements is 23 January 2012.

Mineral resources that are not mineral reserves do not have demonstrated economic viability. Notwithstanding this, neither SRK nor the Company are aware of any factors (environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant factors) that could materially affect the potential of these to be exploited.

DEPOSIT	CLASSIFICATION	TONNES (Mt)	Ni-Total %	Sulphide Ni (Ni-AC) %	Sulphide Co (Co-AC) %	Fe-Total %	Ni-Total ktonnes	Sulphide Ni ktonnes
	Measured							
Rönnbäcknäset	Indicated	319.9	0.179	0.103	0.003	5.50	573	329
	Measured + Indicated	319.9	0.179	0.103	0.003	5.50	573	329
	Inferred	12.2	0.166	0.085	0.004	5.11	20	10

Table 13-15:	Mineral Resource Statement (re	eported above a Marginal	l cut off grade of 0.0323% Ni-AC)
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In total, the Rönnbäcknäset deposit has an Indicated Mineral Resource of 319.9 Mt with mean grades of 0.179% Ni-Total, 0.103% Ni-AC, 0.003% Co-AC and 5.50% Fe-Total. In addition to the Indicated Mineral Resource, SRK has derived an Inferred Mineral Resource of some 12.2 Mt with mean grades of 0.085% Ni-AC, 0.004% Co-AC and 5.11% Fe-Total.

Figure 13-29 shows the Rönnbäcknäset Whittle pit shell generated using a metal price of USD11/Ib and through the application of the parameters outlined in Section 13.13.



Figure 13-29: Rönnbäcknäset pit shell with blockmodel coloured by classification. Blue = Indicated; Red = Inferred; Purple = Unclassified (looking eastsoutheast)

### 13.15 Grade Tonnage Curves

Grade-tonnage curve for Rönnbäcknäset is shown in Figure 13-30 for Ni-AC%. The curve shows the relationship between the modelled tonnage and grade at increasing Ni-AC% cut-offs.

The Rönnbäcknäset 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 Rönnbäcknäset northeast. Above a cut off of 0.09% Ni-AC, the tonnage drops from approximately 260 Mt with an associated sharp increase in Ni-AC%.



Figure 13-30: Rönnbäcknäset Grade Tonnage Curve – All classification categories above Whittle pit shell (green line marks 0.0323% marginal cut off grade)

## 13.16 Exploration Potential

Based on recommendations proposed by SRK as part of the April 2010 MRE for Rönnbäcknäset, the Company drilled six additional holes to test the extension of down-dip mineralisation in the southwest of the deposit. This drill programme was designed to upgrade unclassified and Inferred material at depth. As a result of this drilling campaign and the work carried out as part of this study, additional Indicated and Inferred Resources were defined.

In order to investigate whether further drilling in the down-dip area of the deposit could be justified, SRK carried out a Whittle optimisation exercise using both unclassified and classified material. The resultant Whittle shell did not extend much beyond the resource pit shell, due in principal to increasing stripping ratio with depth. Consequently, in the context of the technical and commodity price assumptions discussed above, no additional drilling in the down-dip area of the deposit is recommended at this time.

A sensitivity analysis run during the Whittle optimisation showed that a pit created using a \$22/lb Ni price could yield an additional 80 Mt of modelled mineralised material. However, the resulting pit would increase the in-pit waste by an additional 220 Mt. In the opinion of SRK, should the Ni selling price increase substantially, then additional drilling to increase down-dip confidence in the estimated block model would be warranted.

In order for the current Indicated and Inferred resources to be upgraded further to Measured Resources, it is recommended that infill drilling is conducted between current drilling section lines at a spacing of 100m.

## 13.17 Comparison to 2011 SRK MRE

The key changes between the 2011 and 2012 SRK Mineral Resource statements for the Rönnbäcknäset deposit are the result of additional drilling conducted by the Company, which have resulted in increased confidence in the resource model down-dip in the southwest part

of the deposit. The tonnage of classified material for the Rönnbäcknäset deposit as a whole has increased, which is due to an increase in the size of the Whittle pit shell, driven by the increase in down-dip classified resources. There is a decrease in Inferred material, due in principal to the upgrading of the classification of large portions of the model in the southwest and to a lesser extent, a revised, slight reduced pit slope angle.

# 14 MINERAL RESERVE ESTIMATES

Not applicable.

# **15 MINING METHODS**

The following is a summary extracted from the December 2011 PEA document prepared by SRK, based on the Rönnbäcknäset, Sundsberget and Vinberget deposits comprising the Rönnbäcken Project. This section has not been updated for the purposes of this MRE update.

SRK generated pit tonnages and grades for scheduling purposes for each of the three deposits and geotechnical assumptions as presented in the PEA. The following key parameters were used in the optimisation process.

Description	Unit	Value
Nickel Price	(USD / lb)	9
Base Mining Cost (at Reference Block - RFBK)	(USD / t)	1.35
Mining Recovery	(%)	95
Mining Dilution	(%)	2.5
Ni Processing Recovery	(%)	80
Processing Cost	(USD / t)	4.96

Table 15-1:	Pit optimisation	parameters
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It is currently envisaged that ore production will commence simultaneously at Rönnbäcknäset and Vinberget, with full production achieved in Year 2. Mining at Sundsberget will then commence in Year 5 and reach full production by the time the Vinberget deposit is depleted. The overall strip ratio is 0.72 (waste:ore).



#### Figure 15-1: Production schedule

The current study assumes contract mining using 700 t hydraulic shovels with 34 m<sup>3</sup> buckets and 225 t haul trucks.

## 16 **RECOVERY METHODS**

The following is a summary extracted from the December 2011 PEA document prepared by SRK, based on the Rönnbäcknäset, Sundsberget and Vinberget deposits comprising the Rönnbäcken Project. This section has not been updated for the purposes of this MRE update.

Metallurgical testwork has been undertaken on samples of the nickel sulphide ores from Rönnbäcken to determine the mineralogical, comminution and metallurgical properties of the various mineralised zones within the deposits.

The purpose of the test work program was to develop a process flow sheet that maximises recovery of nickel and cobalt whilst minimising the incorporation of penalty elements (e.g. magnesia) at the lowest achievable project risk.

Recent test work has established that a nickel feed grade of 0.17% total nickel or 0.1% Sulphide Ni, can produce a concentrate with a grade of 28% at an 80% recovery of Sulphide Ni.

Historical testwork was initially carried out by Boliden during the 1970s where a lab and large scale 4000t pilot program, facilitated by test pit mining, achieved 26 to 34% nickel grade and 67 to 73% sulphide nickel recovery. Typically a primary grind of  $P_{80}$  44µm was required. Autogenous grinding was used, comparing favourably to rod and ball milling.

Phases 1-3 of laboratory based test work conducted by the Company, largely at Outotec Finland's Research Center in Pori, indicated that a closed circuit recovery of 78% was possible yielding a concentrate with a grade of 28% nickel. Composites representing the first few years of production were used and ground to a  $P_{80}$  of 50µm. This was demonstrated through mini-pilot operation which produced a concentrate with a grade of 22% nickel at 80% recovery using the flowsheet in Figure 16-1.



#### Figure 16-1: Simplified flow sheet

Follow-up laboratory-scale testwork based at Outotec has indicated that concentrates with an increased grade of 28% nickel at 80% sulphide nickel recovery could be produced from the same composite samples used in the mini-pilot operation. This grade was realised by introducing a new combination of flotation variables, most significantly a new reagent regime, along with slight changes to the flowsheet and, typically, a primary grind of P<sub>80</sub> 50µm.

Based on the testwork performed, the flowsheet developed for the Rönnbäcken concentrator consists of crushing, grinding, flotation, and dewatering steps, typical of many concentrator operations elsewhere in Sweden and Finland. SRK notes that the engineering company has recently been involved in the development of a similar concentrator in the region and is familiar with the associated costs of such a project. This plant, now operational, and is similar in terms of capital expenditure and process route.

The conceptual concentrator design is derived from a conventional flowsheet, similar to that in other operations which successfully treat disseminated low-grade nickel sulphides. This design, together with capital and operating cost estimates for the concentrator, has been prepared by Outotec AB (Sweden). The mill will have a capacity of 30 million tonnes per annum (Mtpa) or 3,750 tonnes per hour (tph), and would produce approximately 95,000 tpa of nickel concentrate at 28% Ni.

The processing plant site location has been selected to be in close proximity to the Rönnbäcknäset deposit and the planned tailings management facility. The plant layout has been chosen to utilize the natural geography and topography of the area (Figure 16-2).

Further metallurgical testwork was performed by Outotec at GTK's facilities in Finland in

October 2011 to evaluate the potential for the recovery of a saleable magnetite concentrate from the nickel flotation tailings stream. Fifteen batch tests were performed on the tailings from the mini-pilot plant work performed in March 2010 to evaluate the recovery and grade of magnetite concentrate that can be produced using flowsheets comprising desliming, magnetic separation, concentrate regrinding, flotation and product classification. The testwork demonstrated that a saleable magnetite concentrate could be produced using multiple stages of low intensity magnetic separation. A magnetite recovery of 90.3% at a grade of 66.2% Fe was achieved in open circuit batch tests. The level of chrome impurity in the concentrate was acceptable at around 2.2%. This represents a mass yield of 5 to 6 % or an annual magnetite concentrate tonnage of 1.6 million tonnes from 30 million tonnes of ROM ore. The concentrate produced was very fine, nominally minus 20  $\mu$ m, and further testwork is required to optimise this parameter and to establish if it will be necessary to pelletize the product.

Adding a magnetite concentrate circuit to the current plant configuration is estimated to cost US\$87 million, which together with a US\$12 million increase in working capital, raises the start-up capital expenditure for the Project from US\$1,161 to US\$1,260 million.



Figure 16-2: Proposed Site Layout

# 17 PROJECT INFRASTRUCTURE

The following is a summary extracted from the December 2011 PEA document prepared by SRK, based on the Rönnbäcknäset, Sundsberget and Vinberget deposits comprising the Rönnbäcken Project. This section has not been updated for the purposes of this MRE update.

The key infrastructure required to support the Project as currently envisaged will comprise:

- 14 km of access road upgrading from the E12 highway to the project site. The associated costs will be negotiated with the Swedish Transport Administration;
- 4 km of 144kV power line to tie into the external grid, plus a 160 MW receiving main station 220 V (four transformers), with internal electrical grid and substations to service the process plant, tailings area and mines;
- mine roads connecting to the concentrator, waste dumps and tailings dam, including two causeways across the Gardiken reservoir;
- a 15 ha industrial pad for the process plant site;
- a 2 km coffer dam protecting the Sundsberget pit from the reservoir;
- buildings inclusive of changing rooms, offices, restaurants, mechanical and electrical workshops, truck workshops, heated and cold storage facilities; and
- a sewage treatment plant and recycling facilities.

Figure 17-1 illustrates the Project site location relative to local infrastructure with a photograph of the Ajaure hydropower plant as inlay.



# Figure 17-1: Rönnbäcken relative to existing infrastructure and a photo of the Ajaure hydropower plant.

The proposed design for the tailings management facility (TMF) is to construct a cluster of three cells that will require the construction of four dams, south of the Rönnbäcknäset pit in Lake Gardiken, a hydro-electric reservoir (Figure 17-2). Deposition of the tailings will be

achieved by spigotting the tailings over the TMF to maximise the storage capacity. Two clarification ponds will be constructed at both ends of the TMF. Tailings will be subject to a thickening process to produce a bulk dry density estimated at 1550 kg/m<sup>3</sup> and a top surface sloping of  $4^{\circ}$ , producing a tailings volume of up to 340 Mm<sup>3</sup>.



Figure 17-2: Proposed layout of the Project TMF

Preliminary investigations on the waste rock and tailings indicate that there is low potential for development of acid rock drainage, although further testwork is required to confirm this.
## **18 MARKET STUDIES AND CONTRACTS**

The following is a summary extracted from the December 2011 PEA document prepared by SRK, based on the Rönnbäcknäset, Sundsberget and Vinberget deposits comprising the Rönnbäcken Project. This section has not been updated for the purposes of this MRE update.

## 18.1 Ni Market Summary

A significant market has developed over the last 20 years for custom Ni concentrate, however, long-term nickel sulphide smelter capacity availability is expected to be less than originally anticipated as a result of a combination of the anticipated shutdown of the Vale Thompson smelter (Manitoba), and increased internal concentrate production by Xstrata Nickel and Norilsk Nickel. In addition, there are competing projects which could add to the supply of custom concentrates in the marketplace in the medium-term. Nevertheless, with its very high grade, long life and significant tonnage, Rönnbäcken concentrate should be competitive in the custom concentrate marketplace.. High grades allow a concentrate supplier to better carry extra costs of processing, if any, such as for penalty elements, while surviving periods of low prices. Returns to the supplier of the concentrate are subject to confirmation through final and binding negotiation with the smelter/refineries.

## **18.2** Price forecast for Rönnbäcken magnetite concentrate

The pricing mechanism for iron ore has changed fundamentally. From being an annual benchmark price agreement with adjustments for any penalties or premiums based on the concentrate specifications, prices are now spot prices where the premium is market-driven. The premium for higher iron content under the new pricing mechanism has been increased compared to the earlier annual agreements.

In the long-term iron ore price forecast for Nickel Mountain, it is assumed that Nickel Mountain would receive a price of US\$105-119/tonne fob Norway in 2015, declining to US\$90-104/tonne fob Norway in 2025 for the Rönnbäcken magnetite concentrate.

In spot market pricing, there was in August 2011 a direct and proportionate increase/decrease of the price paid within 58-62% Fe content, i.e. the price for a 60% Fe product was the spot price for 62% with a deduction of 2/62 of the spot price of that specific date.

The size of the range of Fe content and of the adjustment to price for each percentage point variance in grade will vary considerably over time depending on the general conditions of the steel market. In times of increasing and strong steel demand, and hence a corresponding need for increased production and productivity in the blast furnace, there may even be a premium paid for higher iron content. In such times, steel producers are willing to pay a premium for ores of high grade. On the other hand, in times of low steel demand the blast furnace operator will try to decrease production/productivity without having to close down the blast furnace - a difficult, time consuming and costly procedure. A blast furnace is a highly capital intensive unit carrying considerable capital costs which need to be covered irrespective of whether the blast furnace is operating or not. In such difficult times, the steel company will attempt to decrease its production/productivity by feeding lower grade iron-bearing materials; this not only reduces costs (which is of prime importance when steel demand, and hence, steel prices are low), but also reduces output.

Given the difficulty of forecasting the detailed cycles of steel demand and output 10-20 years ahead, RMG has presented a qualitative discussion of the market factors which will influence price, rather than to quantify the effects so far into the future. RMG has assumed that the patterns of variations in price in past cycles will be the basis for price fluctuations in the future. The iron ore price and the increase for each additional per cent unit of Fe has decreased considerably during the months of August and September but RMG believes that there is no reason to change its *long term* assumptions so far.

# 19 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

The following is a summary extracted from the December 2011 PEA document prepared by SRK, based on the Rönnbäcknäset, Sundsberget and Vinberget deposits comprising the Rönnbäcken Project. This section has not been updated for the purposes of this MRE update.

There are four types of permits necessary to develop a deposit from the exploration stage to the development stage in Sweden. These are: exploration permits, exploitation concessions, environmental permits and building permits. The Company holds exploration permits for all three deposits. Exploitation concessions have been granted over the Vinberget and Rönnbäcknäset deposits, supported by environmental impact assessment studies and an application for an exploitation concession over the Sundsberget deposit will be submitted during Q4 2011. Applications for remaining permits, environmental and building permits, will be submitted to the regulatory authorities in Q2 2013 and Q4 2014, respectively, supported by the appropriate studies in each case. SRK notes that final access to land and water areas is a process of negotiation for an environmental permit, which has to be granted before mining operations can begin.

Accepting the level of study and available information, the environmental impacts of the proposed project are not deemed significant. Following cessation of operations, the area is expected to be returned to a prior-to-intervention state except for the presence of pit lakes and new topographic highs from the storage facilities for waste rock and tailings, which shall be rehabilitated.

Social and economic impacts will largely be positive particularly through new job creation, increased economy of the region and increased tax revenue to local authorities. Potential negative impacts stem from loss of land for other uses, e.g. reindeer herding, dwellings, recreational activities, fishing, and hunting. A present, artificial hydro-electric water reservoir will partly be occupied by tailings and embankments resulting in a slight loss of storage capacity, which reduces the ability to keep water volume from summertime to wintertime, with a limited loss of power value (SEK 3M annually) for the producer as power in wintertime is priced higher than in summertime. However, the overall annual power production is not expected to be reduced. Eventual compensation measures will be negotiated with affected parties.

# 20 CAPITAL AND OPERATING COSTS

The following is a summary extracted from the December 2011 PEA document prepared by SRK, based on the Rönnbäcknäset, Sundsberget and Vinberget deposits comprising the Rönnbäcken Project. This section has not been updated for the purposes of this MRE update.

The capital and operating costs estimated as part of this study have been reviewed by SRK and adjusted where appropriate to reflect SRK's views. These costs total USD 1 668M. SRK notes the following:

- contingencies of between 20% and 25% have been applied to capital cost associated with the process plant and infrastructure (roads, buildings and electrical);
- capital costs have been profiled with roughly 75% of expenditure occurring in preproduction years and the remaining 25% occurring in the first year of production; and
- no capital costs have been assumed for mining equipment.

Figure 20-1 illustrates a breakdown of the envisaged capital expenditure over the life of mine and split between the major cost centres. The total provision for sustaining capital over the LoM is USD 280M.



### Figure 20-1: Summary of capital cost assumptions by major cost centre

Table 20-1 presents a summary of the capital cost assumptions for the Project for start-up capital over Years -2 to 1 and also sustaining and remaining infrastructure capital required over the remaining LoM.

Description	Unit	Value
Flotation Concentrator	(USDM)	962
Magnetite Concentrator	(USDM)	87
Infrastructure	(USDM)	150
Working Capital	(USDM)	59
Start-up Capital <sup>1</sup>	(USDM)	1 258
Infrastructure (Ongoing)	(USDM)	156
Sustaining	(USDM)	254
Total	(USDM)	1 668

#### Table 20-1:Capital cost assumptions

<sup>1</sup> Includes contingency of 23.5% based on 20% for quoted costs on major equipment items and 25% on general items.

Table 20-2 presents a summary of the operating cost assumptions for the Project.

	USD/t moved	USD/t milled	USD/Ib contained Ni	USD/lb payable Ni	
Mining	1.79	3.10	1.61	1.73	
Processing	2.89 5.03		2.61	2.80	
General & Administration	0.22	0.38	0.20	0.21	
On-going rehabilitation	0.07	0.07 0.13		0.07	
Operating Cost at Mine Gate <sup>1</sup>	4.97	8.64	4.48	4.82	
Concentrate Transport				0.96	
TC/RC's				1.20	
By-product Credits				-3.42	
C1 Cash Cost <sup>2</sup>				3.55	

Table 20-2: Operating cost assumptions

<sup>1</sup> Mine Gate operating costs per pound of nickel recovered to concentrate; <sup>2</sup> C1 costs include mining, processing, site admin, transportation, smelting and refining, net of by-product credits.

The total unit operating costs amount to USD4.97/t of total material mined. The total cash cost is USD3.55/lb Ni, net of both cobalt in the sulphide concentrate and the magnetite concentrate. Net C1 cash costs are illustrated below in Figure 20-2 over the life of mine.



Figure 20-2: Net C1 cash costs over the LoM

## 21 ECONOMIC ANALYSIS

The following is a summary extracted from the December 2011 PEA document prepared by SRK, based on the Rönnbäcknäset, Sundsberget and Vinberget deposits comprising the Rönnbäcken Project. This section has not been updated for the purposes of this MRE update.

SRK has constructed a pre-tax, pre-finance Technical Economic Model (TEM) to derive a Net Present Value (NPV) for the Project. The TEM is based on the technical assumptions developed from work undertaken by SRK and the Company, which SRK has reviewed and adjusted where appropriate.

The economic analysis contained in this report is partially based on Inferred Mineral Resources, and is preliminary in nature. Inferred Mineral Resources are considered too geologically speculative to have mining and economic considerations applied to them and to be categorized as Mineral Reserves. There is no certainty that the production and economic forecasts on which this Preliminary Assessment is based will be realised.

The economic analysis has been undertaken using the US Dollar (USD) as the base currency. Any Swedish Krona (SEK) or Euro (EUR) derived costs have been converted at the exchange rates indicated in Table 21-1 below, which summarises all of the key financial assumptions made. Table 20-2 to Table 21-3 similarly summarise the technical and cost assumptions made and derived by SRK.

Table 21-1:Economic assumptions. Magnetite Iron Concentrate Prices 65% Fe FOBMo i Rana (Norway).

Description	Unit	Value
SEK:USD exchange rate	(unit)	8:1
USD:EUR exchange rate	(unit)	1.125:1
Base case discount rate	(%)	8
Base case nickel price	(USD / lb)	9
Base case cobalt price	(USD / lb)	15
Fe price (Year 1)	(USD / t)	110
Fe price (Year 2 & onwards)	(USD / t)	104
LoM	(years)	19

Description	Unit	Value		
Total ore mined	(k tonnes)	528 030		
Total waste mined	(k tonnes)	379 943		
Strip ratio	(w:o)	0.72		

Description	Unit	Total	
LoM feed tonnage	('000 tonnes)	528 030	
Plant through-put per day	(tonnes/day)	90 000	
Flotation concentrate (Ni-Co)			
Ni recovery	(%)	80%	
Ni concentrate Ni grade	(%)	28%	
Co recovery	(%)	70%	
Ni concentrate Co grade	(%)	0.90%	
LoM Contained Ni	(tonnes)	462 000	
LoM Contained Ni	(M lb)	1 018	
LoM Contained Co	(tonnes)	13 000	
LoM Contained Co	(M lb)	29	
LoM Ni concentrate tonnage	(000' tonnes)	1 649	
Magnetite concentrate			
Magnetite recovery	(%)	90%	
Fe grade	(%)	66%	
LoM Magnetite concentrate tonnage	(000' tonnes)	29 000	

 Table 21-3:
 Process, smelting and refining assumptions

SRK's NPV has been derived by the application of Discounted Cash Flow (DCF) techniques to the pre-tax, pre-finance cash flow. In summary, at a Ni price of USD9/lb and an 8% discount rate the Project has an NPV of USD1 045M. A summary of the results of the cash flow modelling and valuation are presented in Table 21-4.

Table 21-4:	DCF modelling and valuation
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Description	Unit	Value	
Ni price	(USD / lb)	9	
Net pre-tax cashflow	(USDM) 3 468		
Payback period	(Production years)	4.4	
Pre-tax pre-finance NPV (8%)	(USDM)	1 045	
IRR	(%)	19.9	

Table 21-1 below presents single parameter NPV sensitivities at an 8% discount rate for commodity price, operating costs, capital costs, SEK:USD exchange rate and Ni recovery. In addition, Table 21-5 presents the sensitivity of the NPV to various nickel price assumptions.



Figure 21-1: NPV sensitivity to multiple variables

			Nickel I	Price (USD	/ lb)			
Description	Unit	7	8	9 base case	10	11	12	13
Net pre-tax cashflow	(MUSD)	1,577	2,522	3,467	4,393	5,338	6,264	7,208
NPV (@ 8% Discount Rate)	(MUSD)	195	620	1,045	1,461	1,885	2,301	2,726
IRR	(%)	10.5	15.4	19.9	24.0	27.9	31.6	35.2
Payback	(Production Years)	7.5	5.4	4.4	3.8	3.3	3.0	2.7

Table 21-5: NPV sensitivity under different nickel price scenarios

# 22 ADJACENT PROPERTIES

Not applicable.

# 23 OTHER RELEVANT DATA AND INFORMATION

There is no other relevant data available concerning the Project.

# 24 INTERPRETATION AND CONCLUSIONS

The primary aim of this report was to generate a Mineral Resource Estimate update for the Rönnbäcknäset Ni asset owned by Nickel Mountain using all available and valid data as of December 2011. Qualified Persons Howard Baker (MAusIMM(CP)) and Johan Bradley (FGS, CGeol, EurGeol) consider 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 Indicated and Inferred resources and that the Mineral Resource Statement has been classified by Howard Baker (MAusIMM(CP)), who is a Qualified Person, 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 23 January 2012.

In total, Rönnbäcknäset has an Indicated Resource of 319.9 Mt grading 0.103% Ni\_AC, 0.003% Co\_AC and 5.50% Fe. In addition, 12.2 Mt grading 0.166% Ni-AC, 0.004% Co-AC and 5.11% Fe 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 USD11/lb for Ni 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.

SRK understands that the Company is proposing to undertake a pre-feasibility study commencing in 2012, with completion expected by late Q3 2013. The budget for the study is some USD8.5M, excluding overheads.

Subject to the results of the pre-feasibility study, the Company expects to commence a full feasibility study in Q3 2013 for completion towards the end of 2014 or early 2015.

## 25 **RECOMMENDATIONS**

In the December 2011 PEA document, SRK recommended that work on the Project continue to pre-feasibility stage. Notably, SRK has recommended that the following work is undertaken as part of this study:-

- Hydrogeological drilling around the pit and around the project site generally to characterise hydrogeological regimes. Data analysis and predictive modelling, where appropriate.
- Geotechnical drilling to provide additional information for the mine rock mass models, to select locations for surface infrastructure and to characterise stability of pit walls and tailings dam locations.
- Comminution drilling to provide large diameter core for comminution domaining characterisation, variability and autogenous grinding testwork.
- Lab-scale metallurgical work to optimise nickel and magnetite by-product flowsheet development for designated ore blends and to characterise variability across the resource, including mineralogy.
- Further geometallurgical domaining of the resource, based on geochemistry, mineralogy and metallurgical testing to feed into mining and metallurgical planning activities.
- Scheduling and sequencing of construction (tailings dams, pit dams, infrastructure) relative to the mine plan to confirm availability of mobile mining equipment, material quantity/quality and appropriate costing.
- Testwork to further characterise tailings and mine waste rock.
- Laboratory scale revegetation studies on mine waste products.
- Further work to define a decommissioning and closure plan.
- Continued collection of baseline data for the project environmental permit application
- Completion of the preliminary social impact assessment.
- Addition of multiple certified standards in the sample stream to improve QA/QC protocol.
- Further development of the mine block model, pit shells, mine production plan, operations and infrastructure requirements.
- Modelling and determination of the tailings dam design options.
- Mini-piloting of nickel and by-product flowsheets.
- Lab and mini-pilot scale dewatering and handling testwork to further characterise product preparation and transport.
- Engineering and preliminary design of mine and process plant with associated site and external infrastructure.
- Assessment of environmental impact of mining and mineral processing activities on the environment, for example water and air emissions, noise, vibration and dusting
- Further development of the health and safety risk register.
- Assessment of operations development requirements, such as human resources, operations management, information management.

- Further development of major contracted activities positions, for example mining, power, transport, land ownership/water rights.
- Further work on project development and product marketing strategies.

Certainly, in SRK's opinion, the commissioning of a pre-feasibility study is justified by the potential of the Project and the timing and budgets proposed for this by the Company are reasonable given the work planned to be undertaken which includes the work listed above. Further, whilst the justification for a full feasibility study following this will be dependent upon the results of the pre-feasibility study, the preliminary budget proposed for this is of the correct order of magnitude for a Project of this nature and location.

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

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Howard Baker, Principal Geologist, SRK Consulting (UK) Limited

### CERTIFICATE

#### To Accompany the Report Entitled "Mineral Resource Estimate for the Rönnbäcknäset Nickel deposit, Sweden. January 2012." Dated 23 January 2012

I, Johan Bradley, do hereby certify that:

- 1. I reside at Mässgatan 11, Ursviken, SE-93235, Sweden.
- I am a graduate from the University of Oxford, UK, with an Honours BA. degree in Geology, awarded in 1996 and also have a Masters degree (MSc) in Mineral Deposit Evaluation, specialising in Mineral Exploration from the Royal School of Mines, Imperial College, University of London, UK, awarded in 1993. I have practised my profession continuously since 2000.
- 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 am a Senior Geologist with SRK Consulting (Sweden) AB, a firm of consulting mining engineers and also Managing Director.
- 5. I have experience with the evaluation of nickel sulphide prospects.
- 6. I am a Qualified Person for the purposes of NI 43-101. I am a co-author of the report.
- 7. I have visited the property most recently in February 2011 and once prior to this in March 2010.
- 8. I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this report.
- 9. Neither I, nor any affiliated entity of mine, is at present under an arrangement or understanding, nor expects to become, an insider, associate, affiliated entity or employee of Nickel Mountain Resources AB, or any associated or affiliated entities.
- Neither I, nor any affiliated entity of mine, own either directly or indirectly, nor expect to receive, any
  interest in the properties or securities of Nickel Mountain Resources AB, or any associated or affiliated
  companies.
- 11. Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three years from Nickel Mountain Resources AB, or associated or affiliated companies.
- 12. I have read NI 43-101 and Form 43-101F1 and have prepared the technical report in compliance with these and in conformity with generally accepted International mining industry practices.
- 13. As of the date of the certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

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Johan Bradley, MSc, FGS CGeol, EurGeol 23 January 2012

### CERTIFICATE

## To Accompany the Report Entitled "Mineral Resource Estimate for the Rönnbäcknäset Nickel deposit, Sweden. January 2012." Dated 23 January 2012

- I, Howard Baker, do hereby certify that:
- 1. I work at SRK Consulting (UK) Ltd, 5th Floor, Churchill House, Churchill Way, Cardiff CF10 3HH, UK.
- I am a graduate from the Oxford Brookes University, UK, with a degree in Applied Geology, awarded in 1994 and also a Masters degree (MSc) in Mineral Resources from Cardiff University, UK, awarded in 1995. I have practised my profession for a total of 13 years since my graduation from university.
- 3. I am a Member of the Australasian Institute of Mining and Metallurgy (AusIMM);
- 4. I am a Principal Mining Geologist with SRK Consulting (UK) Ltd, a firm of consulting mining engineers.
- 5. I have experience with the evaluation of nickel sulphide prospects inclusive of resource estimation techniques.
- 6. I am a Qualified Person for the purposes of NI 43-101, I am a co-author of the report and take overall responsibility for the Mineral Resource Estimate.
- 7. I have not visited the property.
- 8. I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this report.
- Neither I, nor any affiliated entity of mine, is at present under an arrangement or understanding, nor expects to become, an insider, associate, affiliated entity or employee of Nickel Mountain Resources AB, or any associated or affiliated entities.
- Neither I, nor any affiliated entity of mine, own either directly or indirectly, nor expect to receive, any interest in the properties or securities of Nickel Mountain Resources AB, or any associated or affiliated companies.
- 11. Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three years from Nickel Mountain Resources AB, or associated or affiliated companies.
- 12. I have read NI 43-101 and Form 43-101F1 and have prepared the technical report in compliance with these and in conformity with generally accepted International mining industry practices.
- 13. As of the date of the certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

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Howard Baker, MAusIMM(CP), Principal Mining Geologist 23 January 2012