

**National Instrument 43-101 Technical Report**

**Updated Reserve and Resource Estimate of the  
Hitura Nickel Mine  
in  
Central Finland**



**Prepared for:**      **Belvedere Resources Ltd**  
**Suite 404, World Trade Centre**  
**999 Canada Place**  
**Vancouver, BC V6C 3E2**  
**Canada**

**October 13, 2010**

**Prepared by:**      **Markku Meriläinen - Outotec Oyj, Qualified Person**  
**Pekka Lovén - Outotec Oyj**  
**Technical Services Department - Belvedere Mining Oy**  
**Toby Strauss – Belvedere Resources Ltd**

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## 1. SUMMARY

### 1.1 Overview

The Hitura nickel mine is located in central Finland some 450 kilometres north from Helsinki. The mine has been in production since 1970 and some 15 Mt of ore has been hoisted from the open pit, and since the late 1980's, from the underground mine.

Since the year 2000 the mine produced about 600,000 tonnes Run of Mine per annum up until 2008. Annual nickel tonnage in concentrate varied between 2,000 – 3,000 tonnes. Towards the end of 2008 the Nickel price dropped below 5 US\$ per pound and production was suspended in December of that year. After having been mothballed for 1½ years the mine was recommissioned in July 2010

Belvedere Resources Ltd (through its 100% owned subsidiary Finn Nickel Oy) acquired The Hitura Mine from Outokumpu Mining Oy on the 25<sup>th</sup> June 2007. Outokumpu had decided to close the mine in June 2008 when the existing off-take agreement with OMG Harjavalta Metals Oy expired and the known mining reserve exhausted. Due to increased investment, new reserves and resources were delineated, and Finn Nickel intended to extend the life of mine. When, however, the nickel price dropped to a 5 year low Finn Nickel Oy declared force majeure and filed for voluntary bankruptcy in July 2009.

After having conducted an assessment of economic potential with positive outcome, Belvedere Resources decided to buy back the Hitura mine from the bankruptcy estate in January 2010. Belvedere Mining Oy was established (100% owned by Belvedere Resources Ltd) and an 18 months offtake agreement was negotiated with the Jinchuan Group Ltd.

Thanks to dedicated employees and contractors the mine and processing plant were recommissioned in a very short period of time (July 2010). The mine had been under care and maintenance for 1½ years.

The Qualified Person responsible for the Independent Technical Report has determined that the Hitura Mine has NI 43-101 compliant Resources and Reserves as follows:

Mineral Reserve Estimate 31.5.2010	Tonnes	Ni %	Cu %	S %
Proven reserve	972 000	0.69	0.24	2.12
Probable reserve	350 000	0.62	0.23	2.33
<b>Total Mineral Reserve</b>	<b>1 322 000</b>	<b>0.67</b>	<b>0.24</b>	<b>2.17</b>

Mineral Resource Estimate 31.5.2010	Tonnes	Ni %	Cu %	S %
Measured resource	1 336 000	0.71	0.23	2.48
Indicated resource	1 086 000	0.60	0.20	3.84
<b>Total Mineral Resource</b>	<b>2 422 000</b>	<b>0.66</b>	<b>0.22</b>	<b>3.09</b>

	Tonnes	Ni %	Cu %	S %
Inferred Mineral Resource	615 000	0.67	0.27	3.88

*Mineral resources are additional to Mineral Reserves.*

*Mineral resources have been calculated using 0.47% Ni cut off.*

**Table 1.1 Mineral Reserves and Resources 2010**

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Hitura mine production to date has been entirely from the North Hitura part of the Hitura massif, and this is where the bulk of the remaining reserves and resources are located. Production is currently from stopes down to ca 525 metres below surface. The Middle and South Hitura areas have been (relative to North Hitura) virtually unexplored although the original discovery hole was drilled in South Hitura.

In addition to very good potential for extending the reserves and resources at depth in North Hitura, there exists reasonably good potential for new additional resources in Middle and South Hitura. Many of these targets can, and must be, explored from the underground, as open pit waste rock dumps cover much of these areas.

As the underground mining has progressed in North Hitura to greater depths the mine production has suffered. Ground condition difficulties are expected to continue if new reserves from the shallow depths cannot be located. The development of the VT3 ramp in country rock has reduced the risks of production stoppages caused by poor ground conditions. Currently the budget has been based on a monthly production rate of 45,000 tonnes Run Of Mine (ROM). One of the main opportunities to improve the production rate is to identify a 3<sup>rd</sup> production area. Currently most ore comes from two stoping districts (North and East). If a third area can be identified there will be much more scope to meet the full plant capacity (of about 60,000 tonnes per month). Exploring for a third production area is crucial to reducing operating costs.

Hitura mine has an offtake agreement in place with Jinchuan Group Ltd for an 18-month supply of concentrate. The current Life of Mine plan is based solely on 18 months of production.

The economic result of the production plan is summarised in the Table 1.2:

<b>Mine Plan Economic result</b>	
	18 month contract Jul. 2010 - Dec. 2011
Mine life in months	18
Total ROM Production Mt	725 000
Ni-grade	0.67%
Total Ni production tonnes	3 219
Ni-price USD/tonne	20 925
CAPEX and Opening costs €	1 260 000
OPEX €/tonne	37.32
Non-discounted Value €	5 900 000

**Table 1.2 Economic results**

It should be noted that, if both Belvedere Mining Oy and Jinchuan Group Ltd agree, the offtake agreement could be extended. In this case the total current reserves of 1,322,000 ROM tonnes could extend the Life of Mine up until January 2013.

The economic success of the mine depends on meeting the budgeted production requirements and keeping the operating costs down. Due to the fixed nickel price the economic risk has been reduced significantly.

A new environmental permit for the Hitura Mine came into force on 13<sup>th</sup> September, 2010. This new permit allows the raising of the existing Tailings Storage Facility (TSF) and to construct two new TSF areas, thereby extending the possible life of the Hitura mine site for mineral processing.

## 1.2 Risk assessment

The following

Table 1.3 summarises the relative rating of various risks associated with the Hitura Mine.

<b>Item</b>	<b>Rating</b>	<b>Comments</b>
Exploration potential	Moderate risk	Hitura production has concentrated in North Hitura area. With a suitable budget the exploration potential remains good for further resources to be delineated within North Hitura as well as South and Middle Hitura. South and Middle Hitura can easily be accessed from existing mine workings.
Reserves and Resources	Low risk	Existing reserves and resources are well defined. Additional reserves beyond the current 18-month offtake agreement are available.
Mine Plan and Schedule	Moderate risk	Due to difficult ground conditions there exist a risk for cavings in the stopes/and or development areas. This might cause production disturbances.
Processing Plant and Equipment	Low risk	The processing plant and associated equipment is old but in fair condition. A new on-stream analyser has been installed in September 2010.
Capital and Operating Cost Estimates	Low risk	Only capital for the 18-month mineplan has been budgeted for. If the mine life can be extended further, new capital projects will have to be approved. Operating cost estimates are deemed conservative.
Marketing and Offtake agreement	Low risk	Hitura Mine has an offtake agreement with Jinchuan Group Ltd of China. The agreement is valid for 18-months of deliveries.
Tailings Management and Environmental	Low Risk	A new permit came into force on the 13 <sup>th</sup> of September, 2010. Some historical environmental problems exist around the TSF.
Safety	Moderate	Safety statistics have been poor in the past – however better than Finnish industry average. The health and safety of our employees, contractors and visitors are held as a core value of the company. In order to re-iterate the importance of safety the mine will drive various safety awareness campaigns on ongoing basis.

**Table 1.3 Hitura Mine risk summary tabulation**

## **2. INTRODUCTION AND TERMS OF REFERENCE**

### **2.1 Terms of Reference**

Outotec Oyj (“Outotec”) was commissioned by Belvedere Resources Limited (“Belvedere”) to complete a Technical Report under Canadian National Instrument 43-101 Standards of Disclosure for Mineral Project (NI 43-101), Companion Policy 43-101CP and Form 43-101F.

The report was to include evaluation of the current status and future perspectives of Hitura Nickel mine, central Finland, including reserve and resource estimates, exploration potential and evaluation of production facilities.

Hitura Mine has provided a geological database, which included all relevant drilling information regarding Hitura Mine. The database included also all open pit and underground excavation data.

### **2.2 Purpose for which the report was prepared**

Hitura nickel mine has been in production since 1970. Until acquired by Belvedere / Finn Nickel in June 2007, the mine was owned and operated by Outokumpu Oy (or its fully owned subsidiaries). When, however, the Nickel price dropped to a 5 year low Finn Nickel Oy declared force majeure and filed for voluntary bankruptcy in July 2009. In January 2010 Belvedere Mining Oy (100% owned by Belvedere Resources Ltd) bought back the mine from the bankruptcy estate.

The mine originally started as an open pit mine. Underground production started in 1988 and the open pit reserves were depleted in 1990. Totally, nearly 15 Mt of ore has been hoisted with an average grade of 0.60% Ni.

The objectives of this report are:

- Provide an update on the current status of Hitura Mine including exploration potential, resources, reserves and mining operation, since the previous Technical Report (3<sup>rd</sup> March, 2008).
- Evaluate the future of mining operation and associated risks for Hitura Mine

### **2.3 Responsibility for the Qualified Persons Report**

This Technical Report has been prepared by competent persons under the supervision of Markku Meriläinen MSc (Geology), MAusIMM of Outotec Minerals Oy acting as the “Qualified Person”.

Toby Strauss PhD (Geology), FGS was responsible for the initial compilation of this report.

Resource estimates have been prepared by Markku Meriläinen, MSc (Geology), MAusIMM and Pekka Lovén MSc (Mining Engineering), MAusIMM and reserve estimations have been prepared by the technical services department of the Hitura Mine and audited by Markku Meriläinen and Pekka Lovén.

Evaluation of the processing plant equipment condition and plant metallurgical performance have been prepared in December 2006 by Mr Pertti Koivisto, MSc (Metallurgy) Koivis Oy. Tailings area and environmental evaluation has been prepared in January 2007 by Ms Jaana Hakola, MSc (Construction), WSP Environmental Oy.

Markku Meriläinen, as Qualified Person, takes responsibility for the full contents of this report.

### **3. CERTIFICATE OF QUALIFIED PERSON**

Markku Meriläinen  
Riihitontuntie 7 E, Po Box 86  
FI-02201 ESPOO, FINLAND  
Telephone: +358 40 5400407  
Fax: +358 (0)20 529 2549  
Email: markku.merilainen@outotec.com

- 1.** I am Senior geologist of:  
Outotec Minerals Oy  
Riihitontuntie 7 E  
PO Box 84 FI-02201 Espoo, Finland
- 2.** I graduated from the University of Helsinki with a Master of Science (Geology and Petrology) in 1979.
- 3.** I am a member of the Australian Institute Of Mining and Metallurgy (AusIMM).
- 4.** I have worked as a geologist for a total of 30 years since my graduation from the university. I have been involved in: base metal exploration in Finland and mining geological roles at open pit and underground copper-zinc-cobalt, iron-vanadium, iron, zinc-lead, nickel-cobalt, copper and chromium mines in Finland, Sweden and Chile.
- 5.** I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purpose of NI 43-101.
- 6.** I am responsible for the NI 43-101 Technical Report titled “Updated reserve and resource estimate of the Hitura nickel mine in central Finland” dated 13<sup>th</sup> October 2010. Sections on Mineral Reserves and Resources were completed together with Pekka Lovén (AusIMM) of Outotec. The remainder of the Technical Report was prepared under my supervision by Toby Strauss of Belvedere Resources Ltd.
- 7.** I have visited the property twice during January and March 2008 and once during June 2010, (each time for one day),
- 8.** I was involved with the preparation of the NI 43-101 Technical Report “Hitura Ni-mine in Central Finland” April 3<sup>rd</sup> 2008, as the “Qualified Person” and with the preparation of the NI 43-101 Technical Report “Hitura Ni-mine in Central Finland” January 10<sup>th</sup> 2007, but not as the “Qualified Person”. Prior to that, I have had no other involvement with the property.

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9. I am not aware of any material fact or material change with respect to the subject matter of this Technical Report that is not reflected in this report, the omission to disclose which makes the Technical Report misleading.
10. I am independent of Belvedere Resources applying all of the tests in section 1.4 of National Instrument 43-101.
11. I have read National Instrument 43-101 and Form 43-101FI and the Technical Report has been prepared in compliance with that instrument and form.
12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 13<sup>th</sup> Day of October, 2010



Markku Meriläinen

## **4. RELIANCE ON OTHER EXPERTS**

This report was prepared as a National Instrument 43-101 Technical Report in accordance with Form 43-101F1 for Belvedere Resources Ltd.

The data for this report has been provided by Belvedere Resources and the Technical Department of the Hitura Mine, with additional information being provided by other sources identified in Section 2.3. The quality of information, conclusions and estimates contained herein is consistent with the level of accuracy as well as the circumstances and constraints under which the work was performed, data generated and provided by third party sources identified herein and, while it is believed that such information is reliable under the conditions and subjects to the limitations set forth herein, the Qualified Person has not verified this information and accordingly does not take any responsibility for the accuracy or completeness of such information.

The Qualified Person is of the belief that no material information has been withheld, and that the information provided is accurate and reliable, and is thus suitable for the purpose of Resource and Reserve estimation.

## **5. ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY**

### **5.1 Introduction to Finland**

Finland is one of the northernmost densely populated countries in the world. The total land area is 338,000 km<sup>2</sup> making Finland the seventh largest country in Europe. Forests, lakes and peatlands dominate the Finnish landscape and only nine percent has been classified as cropland. The growing season is short, limiting agricultural production.

The climate in Finland is cold, although several degrees warmer than similar latitudes in Russia and Canada, due to the Gulf Stream.

The population of Finland is some 5.2 million and population density is one of the sparsest in Europe. The population is rapidly ageing and population growth is very low. The population is concentrated in the southwestern part of Finland, although the whole country is inhabited and has excellent infrastructure.

Finland has a highly industrialised economy, which is rapidly integrating with Europe and the rest of the world. The key economic sector is manufacturing, principally the wood, metals, engineering, telecommunications and electronic industries. The flagship telecommunication and electronic industry is Nokia.

Trade is important and accounts for some 40% of gross domestic product (GDP). The majority of Finland's export goes to the European Union. Russia, United States and China are other important export countries.

According to the CIA "World Fact Book" Finnish gross domestic product figures for 2009 were as follows:

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GDP (purchasing power parity)	US\$ 178.8 billion
GDP – per capita (PPP)	US\$ 34,100
GDP - composition by sector:	
○ Agriculture:	3.6 %
○ Industry:	30.3 %
○ Services:	66.1 %

## **5.2 Mining legislation in Finland**

In Finland land tenure, mining legislation and mining regulations are covered by the Mining Act (Kaivoslaki 503/65) and the Mining Decree (Kaivosasetus 663/65) and various amendments.

Under the Finnish Mining Law prospecting is considered to be a part of the so called “everyman’s right” giving as a general rule public access to all land, public or private. The landowner or the local registry office must be informed beforehand about sampling. Possible damage shall be compensated. Prospecting may not be carried without consent of the authorities or owner within certain limited areas nor in claim areas and mining concessions owned by another person or company.

Under the Finnish mining law, only Finnish citizens or companies registered in any European Union member state can own title for mineral rights in Finland. However, Ministry of Trade and Industry can confer these rights to individuals and companies from outside European Union.

The three main types of land tenure are claim reservation, claim and mining concession. Reservation is valid for one year and grants to the owner the exclusive right to stake a claim to the mineral deposits located in the reservation area. Claims allow the holder to carry out exploration activities without the consent of the landowner. There are no annual expenditure commitments, but claims have a limited tenure and must be converted to mining concession for the holder to proceed with mining activities.

Mining concessions will only be granted where a resources which is deemed to be technically and economically exploitable has been defined.

## **5.3 Mining in Finland**

Finland has a long history of mining dating back to 1540 when iron ore mining commenced in the southern part of the country. Since then some 240 metal mines have been exploited and the total tonnage of ore extracted is around 250 Mt.

The famous Outokumpu copper deposit was discovered in 1910 and ore production from there continued until 1989. The first modern nickel mining commenced at Makola in 1941 and since then nine nickel mines have produced more than 41 Mt at an average grade of 0.67% nickel and 0.28% copper.

The Finnish metallic mining industry reached its peak in 1970’s with 17 active metal mines. Currently there are 8 active metallic mines operating in Finland: Pyhäsalmi Cu-Zn- mine, Outokumpu’s Kemi chromite mine, Dragon Mining’s Orivesi Au- mine, Kittila Au- mine, Talvivaara Ni- mine, the Pahtavaara Au-mine in Lapland, Pampalo Au- mine, and Hitura Ni- mine.

Despite the reduction in metallic mine production in Finland, the total mining volume in Finland has increased continuously since 1995. The main reason for this is the steady growth of industrial mineral mining and dimension stone quarrying. In total 39 mines and quarries covered by the Finnish Mining Act were in production in 2004 and the mines produced a total of 19.4 Mt of ore.

## **5.4 Hitura Mine general information**

The Hitura Mine is centred on latitude 63.85N and longitude 25.05E. The area is very flat farmland with scattered birch, pine and spruce forests.

Hitura is located some 450 km north from Helsinki in central Finland (Figure 5.1).

A sealed road provides all weather access, and the nearest railway station is located in Nivala town some 15 km's away.

The area belongs to the temperate coniferous-mixed forest zone with cold, wet winters, where the mean temperature of the warmest month is no lower than 10°C and that of the coldest month no higher than -3°C, and where the rainfall is, on average, moderate in all seasons.

The annual changes in temperature are of crucial importance for Finland's climate. It is natural to distinguish between seasons using thermal criteria, with seasons defined by the daily mean temperatures of 0°C and 10°C. However, with this method the limits and lengths of seasons can vary greatly from year to year.

Processing water is sourced from the underground mine, the nearby Kalajoki river and as tailings storage recirculation water. The mine is connected to a 110kV power line.

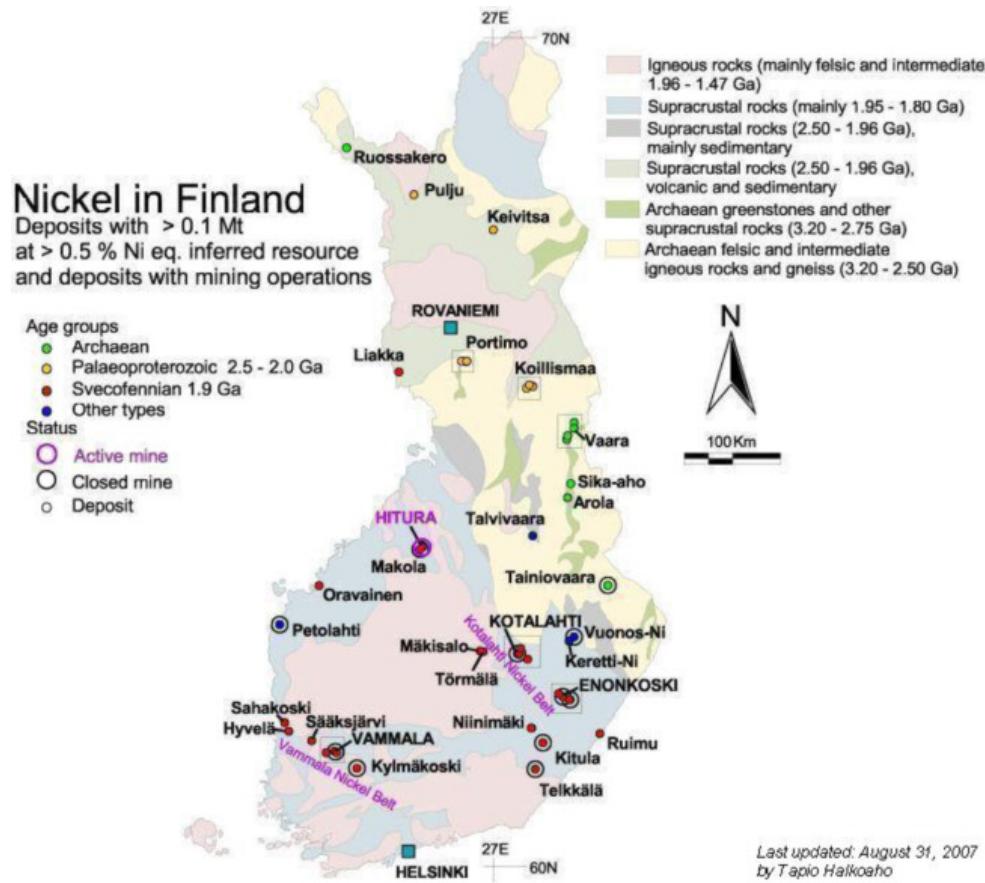
Communication services are excellent with fibre optic cables to the mine and conventional and mobile phone services.

The nearest airports with scheduled flights are Oulu, Kuopio and Kokkola, distances 160km, 200km and 115 km respectively. Oulu airport has also international flight connections to Stockholm. Helsinki airport with regular international flights is some 450 km's to the south.

Local resources in the area include contract mechanical workshops, diamond drilling, loading and hauling contractors, bookkeeping, cleaning, catering and health services. Nivala town, 15 km from the mine site, is a small country town with 11,000 inhabitants and all services typical for that size of town.

The mining area is situated in the agricultural and cattle farming area which dominate the Kalajoki river valley. Farming is the biggest source of livelihood in Nivala and the surrounding areas.

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**Figure 5.1 Hitura Nickel Mine location (map from GTK nickel database).**

## 6. PROPERTY DESCRIPTION AND LOCATION

### 6.1 Hitura tenements

The mine is owned and operated by Belvedere Mining Oy, a 100 % owned subsidiary of Belvedere Resources Ltd, a public company incorporated in British Columbia, Canada and listed on the Toronto Venture exchange.

The property comprises of one mining concession 1517/1c (Table 6.1). Most of the mining concession area is owned by Belvedere Mining Oy, but also some areas outside the concession area are owned by Belvedere Mining Oy.

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Mining Concession Number	Concession Name	Application Date	Grant Date	Expiry Date	Area h
Conc. 1517/1a	Hitura 1	13.7.1965	26.10.1965	5.11.1969	
Conc. 1517/1b	Hitura	9.5.1969	5.11.1969	22.2.1974	61.973
<b>Conc. 1517/1c</b>	<b>Hitura</b>	<b>12.7.1973</b>	<b>22.2.1974</b>		<b>180.281</b>
Conc 1517/2a	Hitura 2	13.7.1965	26.10.1965	5.11.1969	
Conc 1517/3a	Hitura 3	13.7.1965	26.10.1965	5.11.1969	
Conc.1517/4a	Hitura 4	13.7.1965	26.10.1965	5.11.1969	
Conc.1517/5a	Hitura 5	13.7.1965	26.10.1965	5.11.1969	
Conc.1517/6a	Hitura 6	13.7.1965	26.10.1965	5.11.1969	
Conc. 1517/7a	Hitura 7	13.7.1965	26.10.1965	5.11.1969	
Claim 5058/1	South-Hitura 1		12.11.1992	12.11.2000	22.4
Claim 5058/2	South-Hitura 2		12.11.1992	12.11.1997	
Claim 5058/2	South-Hitura 3		12.11.1992	12.11.1997	

**Table 6.1 Details of Hitura mining concession and claims history**

The original mining concession areas have been combined into one mining concession area named Hitura 1517/1c, which together with the auxiliary operational areas have a total area of 180.281 hectares (

Table 6.2). According to the Finnish mining law, a 1 km exclusion zone exists around mining concessions. The mining concession and associated auxiliary areas are valid as long as the owner of the mineral rights has production ongoing and reports annually to Ministry of Trade and Industry.

All of the North-, Middle- and South-Hitura intrusions are covered by the mining concession, except the SW-end of South-Hitura. An application has been submitted for extending the mining concession, covering this area (Figure 6.1, Table 6.3). A decision on this application is pending. Figure 6.1 shows Belvedere Mining Oy mining concessions in light purple, mining concession applications in dark purple and claim applications in green. (Magnus Minerals Oy claims are also shown in red). The Hitura ore is shown in solid red.

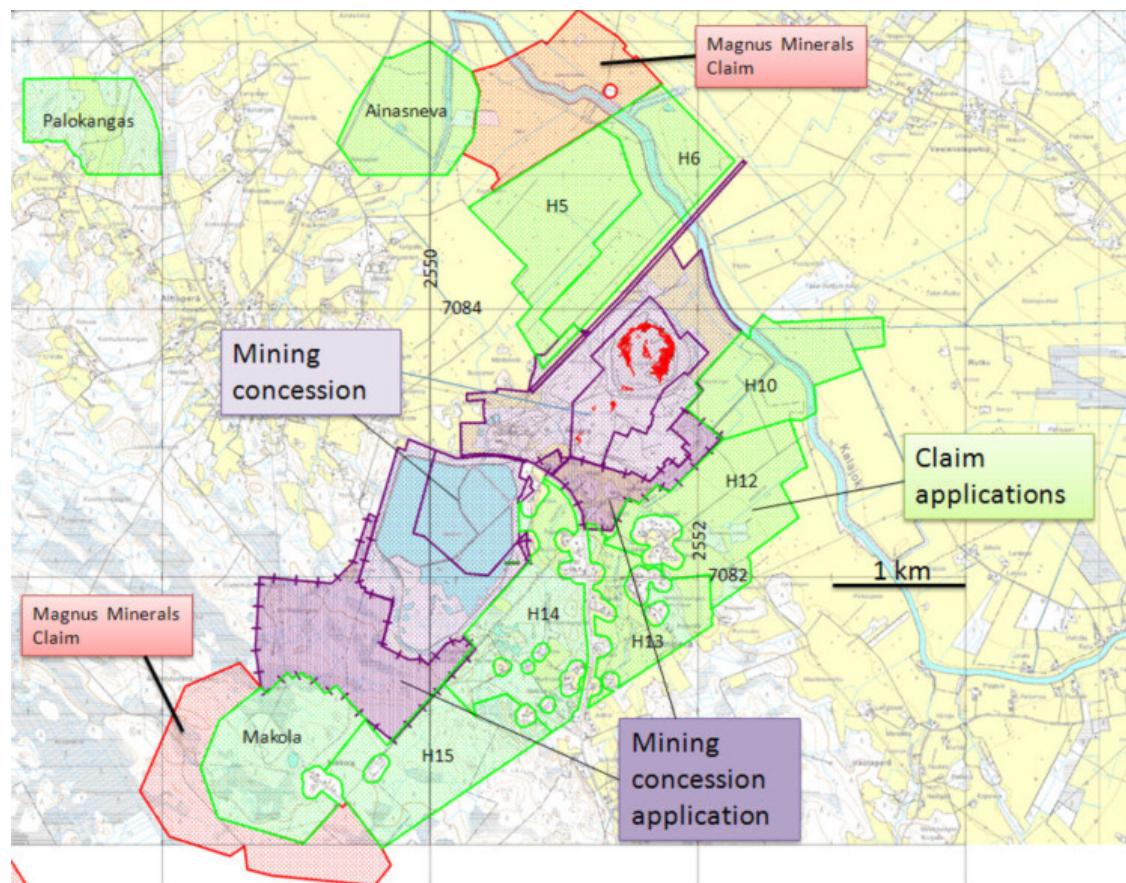
Mining concession Hitura 1517/1c	180.281 hectares (Operation area 176.093 hectares)
Auxiliary area B – roads	0.198 hectares
Auxiliary area C – road	0.495 hectares
Auxiliary area G – road	4.4385 hectares
Auxiliary area H – TSF	143.383 hectares

**Table 6.2 Valid mining concession**

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<b>Area</b>	<b>Name of the area</b>	<b>Register Number</b>	<b>ha</b>	<b>Application date</b>
Mining concession extension	Hitura laajennus		35.6	9.10.2007
Mining concession auxiliary area extension (new tailings area)	Hitura laajennus		109	9.10.2007
Claim application	Hitura 5	8645/5	97.23	19.6.2008
Claim application	Hitura 6	8645/6	88.78	19.6.2008
Claim application	Hitura 10	8645/10	78.17	19.6.2008
Claim application	Hitura 12	8645/12	94.19	19.6.2008
Claim application	Hitura 13	8645/13	50.11	19.6.2008
Claim application	Hitura 14	8645/14	90	19.6.2008
Claim application	Hitura 15	8645/15	93.87	19.6.2008
Claim application	Palokangas	8651/1	59.4	4.7.2008
Claim application	Ainasneva	8651/2	76.3	4.7.2008
Claim application	Makola	8972/1	95.4	11.5.2010

**Table 6.3 Valid mining concession and claim applications.**

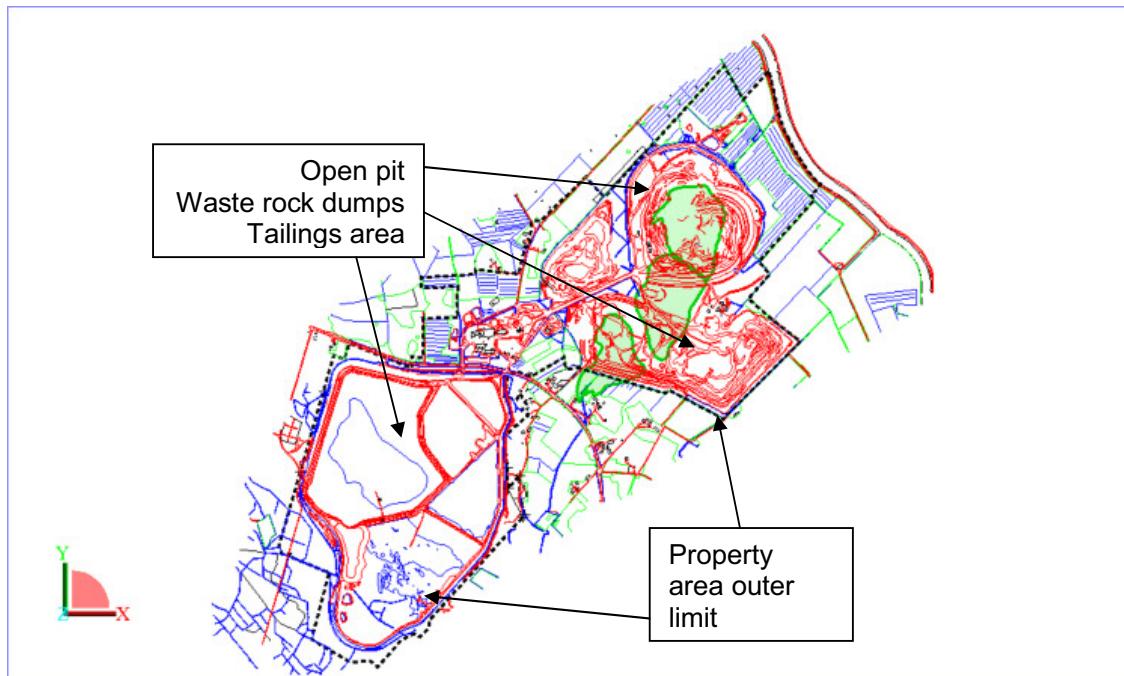


**Figure 6.1 Concessions and claims.**

The historical claim areas South-Hitura 1-3 have expired. Applications have been submitted for 7 new claims surrounding the mining concession area. Decisions on these claim applications are also pending (Fig. 6.1, Table 6.3).

## 6.2 Hitura properties

The total property area at Hitura owned by Belvedere Resources Ltd (through its 100% owned subsidiary Belvedere Mining Oy) is 360.71 hectares. The list of land property is illustrated in the Figure 6.2.



**Figure 6.2 Hitura Mine open pit, waste rock dumps and Tailings Storage Facility.**

## 7. HISTORY

### 7.1 Makola Mine

The Nivala area has a long nickel production history.

The first Ni-ore boulders were discovered in the area in 1936 by the Geological Survey of Finland. Boulder tracing, geological investigations and diamond drilling led to the discovery of the Makola nickel deposit located some 3.5 km southwest from Hitura in 1937. In the summer of 1940, the mineral rights were transferred to Outokumpu Oy and production at the Makola Mine started up

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rapidly due to high wartime demand for nickel. The Makola Mine was in production during the wartime years 1941-1946 and again in 1951-1954 due to the Korean War.

Production at the Makola Mine ended in the 1954 when the ore reserves were exhausted. A total 424,000 tonnes of ore was hoisted and 44,000 tonnes of nickel concentrate was produced. The concentrate was transported to Germany for smelting.

## **7.2 Discovery of Hitura ore and production start-up**

The Geological Survey of Finland restarted exploration work in the Hitura area in 1960. After a large program of diamond drilling, the nickel mineralisation was intersected in the area, which is nowadays known as South Hitura. A few holes were drilled into South Hitura but soon geophysical investigations directed exploration to North Hitura, where strong geophysical anomalies were detected.

According to the recollections of mine personnel, the most obvious reason for the anomalies were graphite- and sulphide bearing schists surrounding the North Hitura intrusion. However, drilling intersected the North Hitura mineralisation and since then the main target for exploration and geological investigations in the area has remained in the North Hitura intrusion.

Outokumpu Oy acquired the rights from the Finnish government and sunk a vertical shaft to the depth of 200m. An underground test mine was also developed and test production was carried out between 1964 -1967. The hoisted ore was milled in a mobile pilot plant and comprehensive processing tests were carried out.

The successful test production period led to the decision to build a full-scale mine and adjacent processing plant. The decision was made in 1969 when necessary support was received from the government. The name, Hitura, came from a nearby farm of the same name.

Production started on February 19<sup>th</sup> 1970 as an open pit mine and was planned to continue for four years.

Very soon it became obvious that the capacity of the mine was too low for economically viable production. Once again the government provided financial support for the investments, and capacity was increased, first to 300,000 t/a between 1974 -1977 and later in 1981 to 450,000 t/a. Despite all efforts, profitability was poor, and due to weak nickel prices, production was stopped in the autumn of 1982. The mine was left in care and maintenance.

In the spring of 1984 the nickel price soared and the mine was reopened for 15 months. In the autumn of 1985 when the remnants of high-grade ore in the bottom of open pit were mined the production was halted once again.

At the end of 1987 the nickel price soared rapidly once again and production at the mine started in June 1988, when the price of nickel was at its all-time high.

The primary intention was to mine the remaining part of the open pit ore reserves down to the level +150 (14 months production) and then close the mine permanently.

### **7.3 Underground production since 1988**

The continuing high price of nickel made it possible to continue production by moving operations partly underground. The project included drifting of sublevels directly from the open pit walls at levels +130 and +150 towards the high-grade ore located near the open pit. The first test stopes showed that underground mining was possible despite the challenging ground conditions.

The inventory drilling program ensured the necessary reserves and allowed production for several years.

Since 1991 all mine production has derived from the underground mine. The production rate varied between 600 – 650,000 t/a and nickel in concentrate production has varied between 2,500 – 3,000 t/a. For 2010 the mine intends to produce 185,000 tonnes ROM containing 719 tonnes of nickel in concentrate and during 2011 540,000 tonnes of ROM containing 2,500 tonnes of nickel.

### **7.4 Concentrate leaching period**

At the beginning of 1990 Outokumpu initiated laboratory and pilot plant studies for autoclave leaching process using Hitura concentrate as the raw material. The pilot tests were encouraging and led to the decision to construct a new cobalt-nickel leaching plant at Kokkola.

During the period 1992-1996 Hitura Mine stabilised its production as an underground nickel mine. The concentrate sales agreement with Kokkola leaching plant secured the financial position and an investment program to further develop and secure the production was carried out.

## **8. GEOLOGY**

### **8.1 Geological setting**

The Svecofennian nickel province in Finland is characterised by a number of ultramafic - mafic intrusive bodies in a roughly circular area of supracrustal rocks around the central Finland granitoid complex. The Hitura ultramafic body at Nivala area lies in the northern segment of this supracrustal ring (see Figure 5.1 and Figure 8.1).

The stratigraphy of the supracrustal rocks in the Hitura region is from oldest to youngest:

1. Gneissic granitoids.
2. Migmatitic mica gneisses with intercalations of graphite and sulphide bearing gneisses and minor amphibolites;
3. Metagreywackes with intercalations of intermediate and felsic tuffites, mafic, intermediate and felsic metavolcanics; and
4. Intermediate and felsic metavolcanics.

The nickel bearing ultramafic and mafic intrusions are located in the second stratigraphic unit. Veined gneisses, schollen migmatites, and breccia migmatites often surround the intrusions.

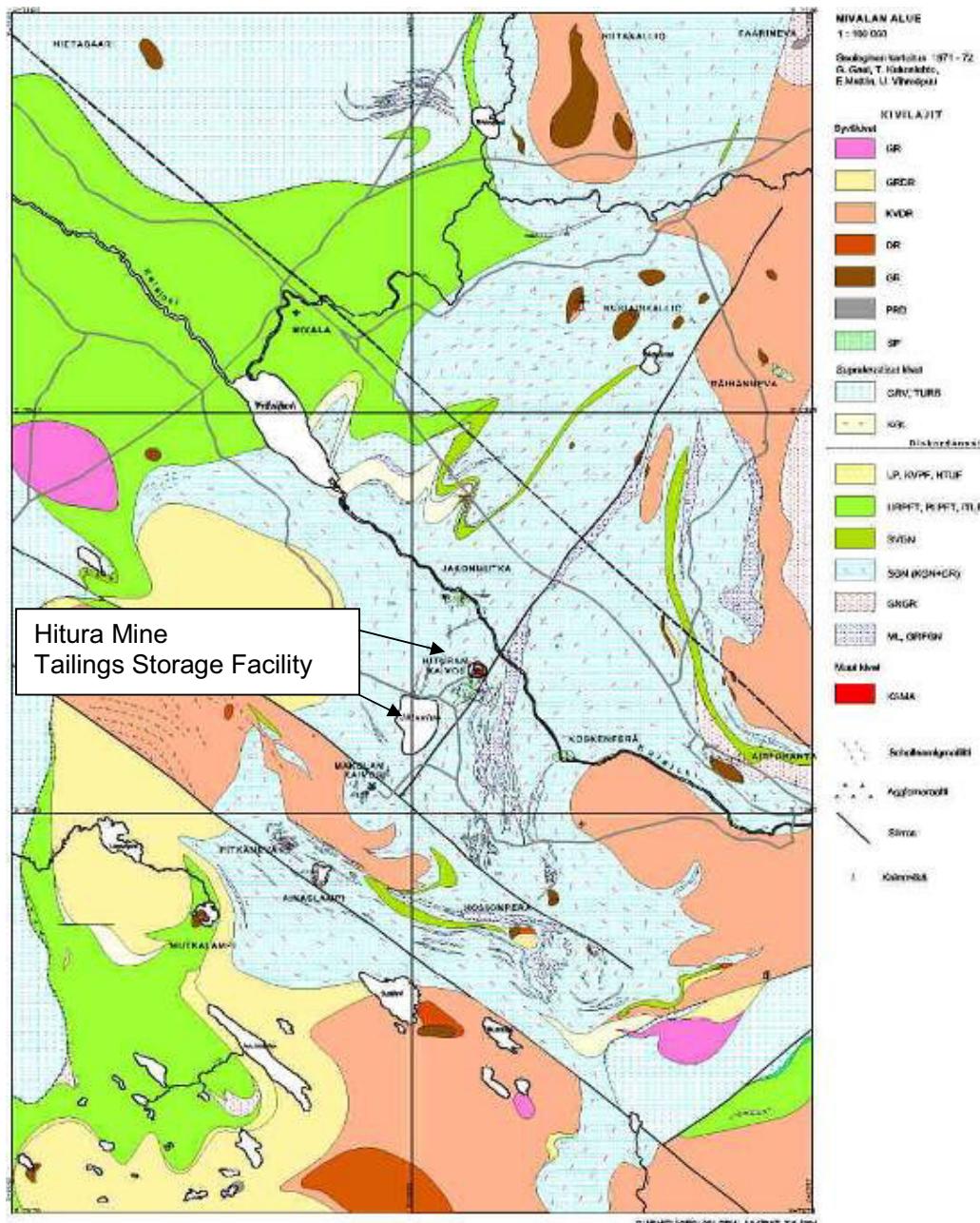
The Nivala area includes a number of ultramafic bodies, and the Makola nickel deposit lies only about 3.5 km from Hitura deposit. In addition to migmatised gneisses, a belt of sulphide and graphite bearing schists and mylonitic rocks not far from the Hitura body characterises the immediate environment. Because the area is largely covered by glacial and glaciofluvial deposits, there are few

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outcrops. Consequently geophysics, geochemical sampling, and diamond drilling have all contributed to the geological picture.

A number of mafic and ultramafic intrusions have been explored in the Nivala area, but mineable nickel grades have so far been detected only in the Hitura and nearby Makola intrusions. The South and Middle Hitura intrusions have been the target of limited exploration and have a good potential for additional resources at the Hitura area.

The U-Pb zircon age of a felsic dyke intersecting the Hitura massif is  $1877 \pm 2$  Ma. This age can be regarded as the minimum age of the Hitura massif.



**Figure 8.1 Geology of the Nivala area and location of Hitura Mine**

## **8.2 The Hitura ultramafic complex**

The Hitura ultramafic complex consists of three separate closely spaced serpentinite massifs in migmatised mica gneiss, North Hitura, Middle Hitura and South Hitura. The dimensions of the complex are some 0.3 x 1.3 km. The extension in depth has not been established. The deepest diamond drill hole has reached the 725 m level, and intersected mineralisation. The core of the complex is serpentinite (metadunites) and the contact zones are amphibole rich ultramafics (metaperidotites and metapyroxenites). Pegmatitic dykes with chloritic joints are not uncommon.

The contacts of the Hitura complex against gneissic wall rocks are often tectonic. The contact zone is characterised by dislocated mafic blocks, erratic wall-rock inclusions and sometimes by massive sulphide lumps in soft talcose matrix, indicating late tectonic movements and faults. The gneiss near the contact (“contact gneiss”) is often homogenised and contains small garnet crystals and large light dots of feldspars and quartz.

Pyrrhotite disseminations in gneisses are common near the serpentinite body. Some small serpentinite tongues in mica gneisses partly nickel mineralised are found in the western side of the Hitura massive.

Shear zones with narrow mica gneiss tongues separate the three different massifs.

Several nickel ore bodies are situated in the contact zones and in the core of the North Hitura serpentinite massif. From west to east the ore bodies in the contacts are Western Ore (Länsimalmi), Northern Arc (Pohjoiskaari), the Northeast Arc (Koilliskaari), and Eastern Ore (Itämalmi). In the center of North Hitura lies the Central Core (Keskitappi) ore body. In the massif between the core and contacts there are low-grade nickel mineralisations.

The Middle and South Hitura massifs are less well known and they are the main exploration targets outside of North Hitura.

## **8.3 Mineralisation**

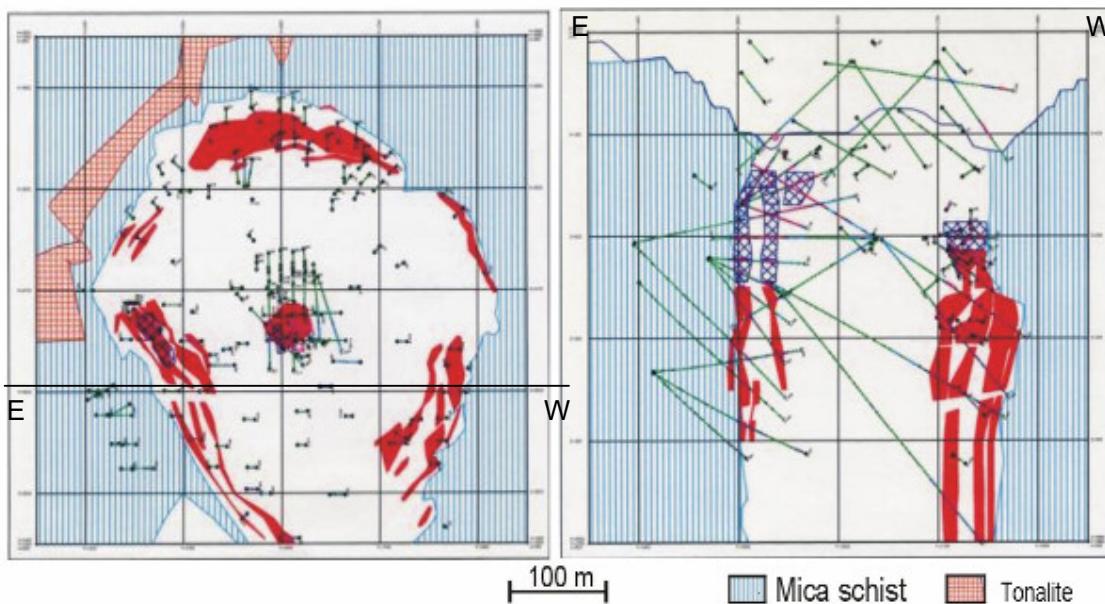
Five areas of nickel mineralisation are situated in the contact zones and in the core of the North Hitura serpentinite massif. The mineralisation zones form a ring-type mineralisation and there exist also a Centre Plug mineralisation, which is most probably dislocated from the outer ring mineralisation. Figure 8.2 shows a simplified geological map of North Hitura, in plan view and E-W cross-section. Nickel mineralisation is shown in red to indicate the distribution. In the southern part of the North Hitura the serpentinite intrusions are also mineralised with low grades. These low-grade areas have been mined as open pit ore.

Deepest intersections are at about the 725 m level. Geophysical surveys indicate that the intrusion continues to at least 1000 m.

The Hitura ore can be divided into four different types:

1. Scattered fine-grained sulphides disseminated in the serpentinite core (Central Core (Keskitappi) ore body).
2. Medium to coarse-grained moderate dissemination in the marginal serpentinite and amphibole rock (Western Ore, Northeast Arc and East Ore ore bodies).
3. High grade interstitial disseminated sulphides and massive accumulations in the amphibole rock of the contact zones (Western Ore, Northern Arc, Northeast Arc and East Ore ore bodies).
4. Sulphide disseminations and veinlets in mica gneisses outside the ultramafic body (mainly in the western side of the Hitura massive).

## NORTH HITURA



**Figure 8.2 Simplified plan view and E-W cross section of North Hitura intrusion.**

In the contact ores the nickel grade in the sulphide phase is low (ca 5%) while in the serpentinite it is higher (7-9%). The core has the highest nickel grade in the sulphide phase (10-14%).

The main ore minerals are pentlandite and chalcopyrite but in places mackinawite, cubanite and valleriite are abundant. Pentlandite is the main nickel bearing mineral but mackinawite containing up to 6% Ni can also be important. Copper is in chalcopyrite but also in cubanite and valleriite.

Many accessory minerals have been identified like pyrrhotite, violarite, maucherite, nikkolite, gersdorffite and millerite. Pyrite occurs only in joints with carbonates. Platinum minerals such as sperrylite, michenerite, irarsite, iridarsenite and hollingworthite have also been detected.

### 8.4 Exploration

During the last few years, mine geological investigations have concentrated on infill drilling and areas of known mineralisation extensions.

Some exploration holes have been drilled into the Middle and South Hitura massifs in 2007 - 2008, but the exploration programme was terminated as nickel prices collapsed. A full systematic exploration programme has not been completed.

## **9. MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES**

### **9.1 Geological investigation methods**

Hitura Mine utilises both diamond drilling and sludge drilling for exploration and ore delineation. Systematic underground geological mapping is not in use due to difficult ground conditions demanding immediate ground support with shotcreting.

Diamond drilling has been contracted out to a local company (Nivalan Timanttikairaus Oy) since the beginning of 2006. The company was established by previous Hitura employees who purchased the equipment from the mine. The drilling is done with a Craelius Diamec 264 APC using AGM-equipment with a hole diameter of 48 mm and a core diameter of 30 mm.

The collar coordinates and drilling direction is surveyed systematically by the mine organisation. Inclinations within the hole are surveyed every 10 metres but azimuths within the hole are not surveyed.

Hole lengths vary between 50 and 300 metres and the annual capacity is 12 000 metres.

For the sludge drilling, the mine utilises standard Tamrock Solo long-hole production drill rigs. The sample length is one extension rod (6 feet = 1.83 metres) and only upward holes are drilled to avoid contamination between samples. The maximum hole length is 20 rods i.e. 36 metres.

Collar coordinates, inclination and azimuth are surveyed.

### **9.2 Sampling method, preparation and analysis**

Diamond drill cores are logged using standard procedures. Logging is done using a laptop-computer. Logging intervals varies between 1-3 metres and are based on lithological or mineralogical contacts.

Only drill cores from the holes located every 100 meter section are split using hydraulic core splitter – all other holes are crushed as whole core. Split cores are stored. The crushing reject is destroyed.

Sludge drilling samples are collected in the mine by the driller using buckets from which the mixed sample is collected to a filtering bag.

Crushed diamond core samples and dried sludge samples are grinded and forwarded for normal AAS-assaying. Dissolving is done using 5 grams sample and nitric acid. Part of the silicate nickel (ca 200 ppm = 0.02%Ni) is thus also included in the reported nickel assay.

The samples are routinely assayed for nickel, copper and sulphur.

### **9.3 Database for resource and reserve estimates**

The database used in this resource estimation process is the same MS Access database that was used in 1.1.2008 resource audit but the new (2008) drilling results were added to the database. A total of 113 drill holes were added.

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The whole Hitura database contains information on 1960 drill holes with a total length of 247881 m. The number of assayed intervals is 100436. The assay file contains the assays of the following elements: Ni, Cu, Co, and S. Furthermore the assay file contains 42 different lithological and 9 overburden codes. The database does not include density measurements.

Autotec Oyj has not independently validated the database against the original drill logs but is of the opinion that the database is suitable for the purpose of resource and reserve estimation.

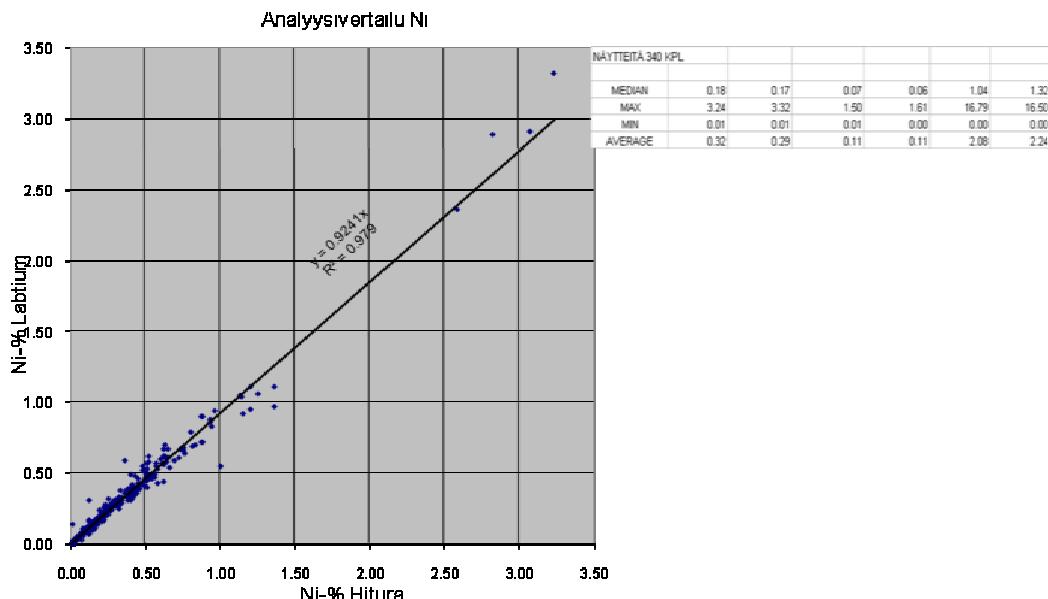
## 9.4 Data verification

Hitura Mine utilises a systematic Quality Control procedure for exploration work. The system has been implemented since the mine was acquired in the summer of 2007. Before that, only sporadic checks were done. Historically, the only method to control the assay quality was by a reconciliation of the achieved production results against the planned results. There do not appear to have been any major problem with this approach.

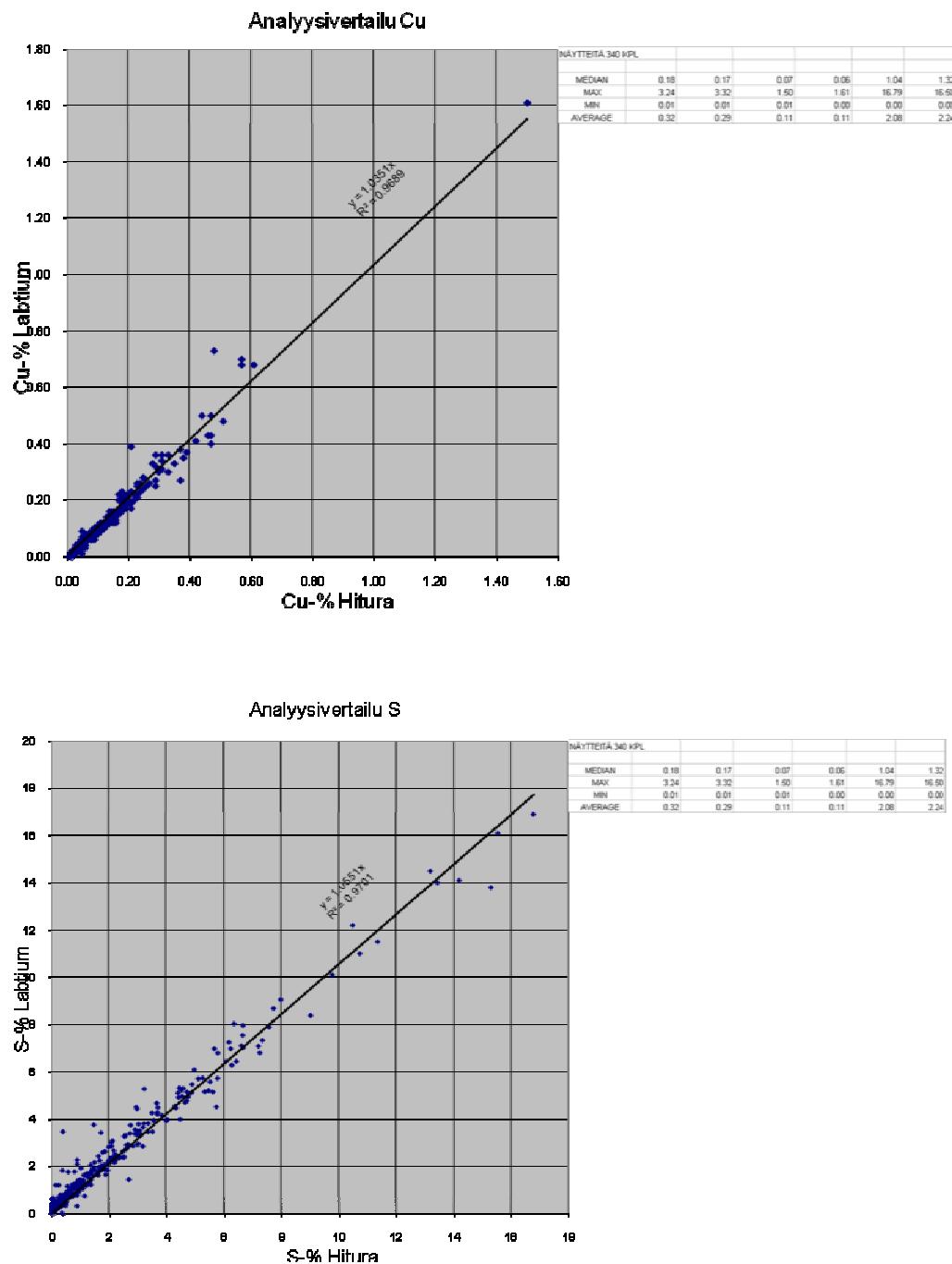
Belvedere's newly implemented Quality Control procedure is that approximately 5% of all diamond drill core samples (from definition and exploration drilling) are sent to the independent Labtium Oy Laboratory (ex Geological Survey of Finland) in Kuopio, and assayed for Ni, Cu and S.

The Labtium laboratory has been accredited since 1994 according to the SFS-EN ISO/IEC 17025 standard to perform chemical analyses of geological samples. The quality system of the laboratory complies with the requirements of the Standards Council of Canada (CAN-P-1579) "Guidelines for Accreditation of Mineral Analysis Testing Laboratories". The quality assurance-quality control (QAQC) program of Labtium Oy inserts into every batch of 50 samples, two standards, one blank and three laboratory duplicates.

The results of these check assays are presented in Figure 9.1 for Ni, Cu and S respectively. It is apparent that there is some minor bias with higher Ni grades (>1%). The Labtium grades tend to be higher than the Hitura grades where Ni>2.5% and lower than Hitura when Ni grades are in the 1 – 1.5 % Ni range. However, the assays from the two laboratories generally show a good correlation.



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**Figure 9.1 Graphs comparing assays from the Hitura laboratory (x-axis) to the Labtium assays (y-axis) for Ni, Cu and S**

As much of the drill and assay database at Hitura predates the new Quality Control system, and yet continues to be used for resource and reserve estimates, some checks were needed to determine the confidence in the data. To this end, and to determine if there is any systematic error in the Hitura laboratory results versus certified laboratory results, a small resampling program was organised in 2007 prior to Belvedere purchasing the Hitura Mine.

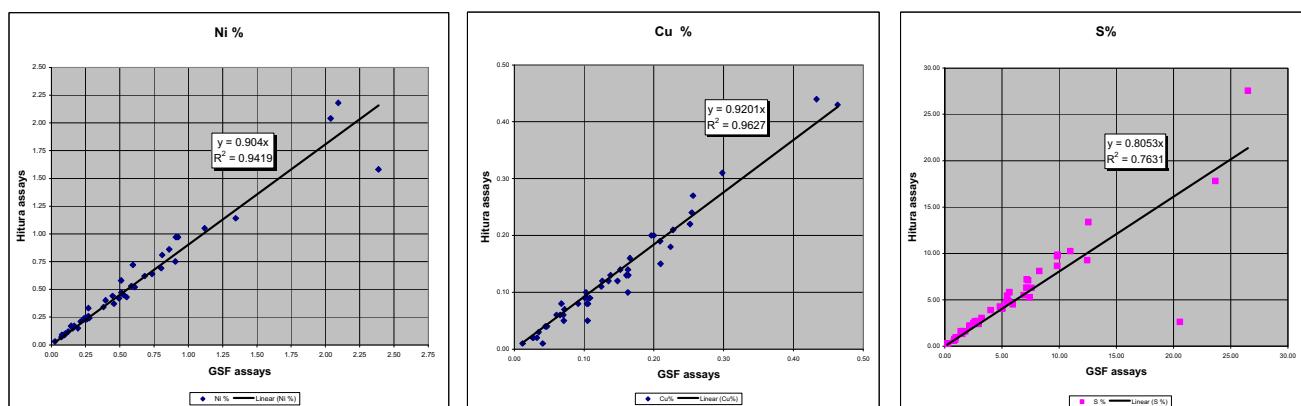
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In total, 45 drill core samples were selected from remaining half-core, and submitted for assaying to the Labtium Oy laboratory. The samples were from two holes R-1205 and R-1208, which had been drilled as part of the Middle Hitura drilling campaign in 2001.

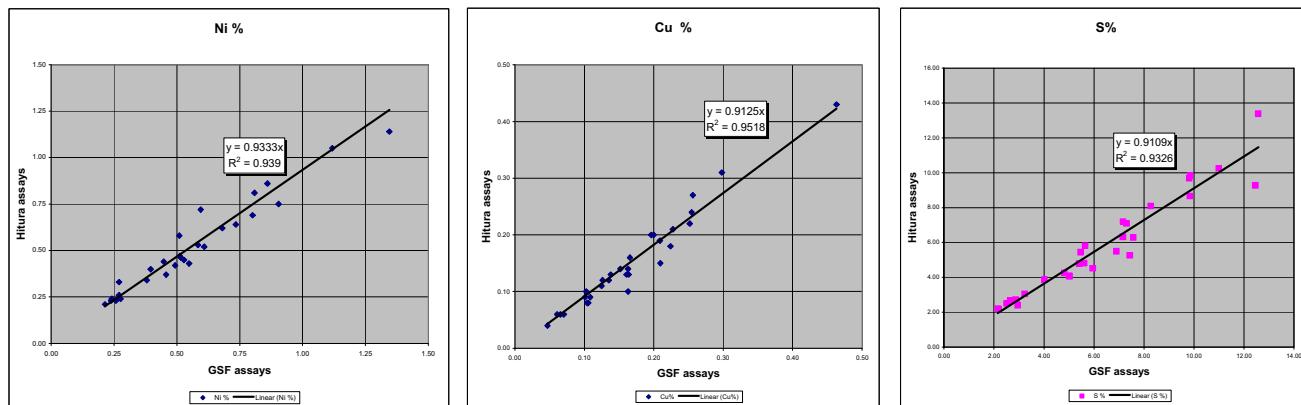
The results of the control assaying are presented in Figure 9.2, Figure 9.3 and Table 9.1.

Assaying methods in both the laboratories were similar, using a nitric acid dissolution and then assaying with AAS-technique.

As can be seen from the results, the correlation between the laboratories is generally very good. In general, the Hitura assays are slightly lower than Labtium laboratory results, which improves the confidence of the estimated resources and reserves nickel tonnes.



**Figure 9.2 Graphs about all 45 samples submitted to control assay**



**Figure 9.3 Graphs about samples with Ni-grade 0.2 - 2 % submitted to control assay, number of samples 30.**

	Samples	Ni% average	Cu% average	S% average
LABTIUM	30	0.581	0.168	6.192
HITURA	30	0.546	0.151	5.632
diff		0.036	0.017	0.560

**Table 9.1 Averages of samples with Ni-grade 0.2 - 2 % submitted to control assay, number of samples 30.**

However, there is some bias in the high-grade (>2%) nickel assays and also with sulphur assays. There is obviously one outlier with sulphur-assays, where Hitura assay is 2.62% and Labtium result 20.56%. This result is most probably a typographic error within the Hitura assay lists as they are manually typed from the laboratory result lists to the mine geological database.

## **9.5 Statistics**

Compositing of drill hole samples is carried out in order to standardize the database for further statistical evaluation. This step eliminates any effect relating to the sample length, which may exist in the data.

The average sample length of assays where Ni is higher than 0.47% is 1.9 m.

The assay data of Ni, Cu and S was composited into 2 m fixed length composites honouring the 0.47 % Ni grade envelopes of the resource areas. The composite was accepted if 75% of the length was assayed.

The basic statistics of the composites used in the grade interpolations of the resource areas are summarized in the table below.

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<b>Norh Hitura</b>				<b>Middle Hitura</b>			
Variable	ni	cu	s	Variable	ni	cu	s
Number of samples	6425	6425	6425	Number of samples	232	232	232
Minimum value	0.00	0.00	0.00	Minimum value	0.00	0.00	0.00
Maximum value	3.44	1.63	24.92	Maximum value	1.37	0.50	15.11
Mean	0.66	0.23	2.90	Mean	0.59	0.17	2.07
Variance	0.10	0.02	4.84	Variance	0.04	0.01	2.10
Standard Deviation	0.32	0.15	2.20	Standard Deviation	0.21	0.08	1.45
Coefficient of variation	0.49	0.65	0.76	Coefficient of variation	0.36	0.47	0.70
Skewness	2.13	2.68	2.54	Skewness	-0.14	0.99	4.19
Kurtosis	12.44	15.26	13.11	Kurtosis	4.58	5.75	32.90
25.0 Percentile	0.49	0.14	1.62	25.0 Percentile	0.50	0.13	1.39
50.0 Percentile (median)	0.59	0.19	2.27	50.0 Percentile (median)	0.59	0.17	1.85
75.0 Percentile	0.76	0.27	3.51	75.0 Percentile	0.70	0.20	2.36

<b>South Hitura</b>			
Variable	ni	cu	s
Number of samples	120	120	120
Minimum value	0.03	0.02	0.00
Maximum value	1.68	2.20	17.63
Mean	0.71	0.31	5.81
Variance	0.08	0.10	20.31
Standard Deviation	0.28	0.31	4.51
Coefficient of variation	0.40	1.00	0.78
Skewness	0.73	4.06	0.23
Kurtosis	4.65	23.30	2.22
25.0 Percentile	0.50	0.15	0.24
50.0 Percentile (median)	0.69	0.25	6.00
75.0 Percentile	0.84	0.33	9.31

**Table 9.2 Basic statistics of the composites used in the grade interpolations**

## **9.6 Resource modelling**

### **9.6.1 ORE BODY MODELING**

Mineral resources in North Hitura are mainly situated directly below the present ore production levels and are drilled with closely based drilling profiles. The majority of the drill holes are drilled from nearby production tunnels. The mineral resources of Middle and South Hitura are drilled from the exploration tunnel and from the surface.

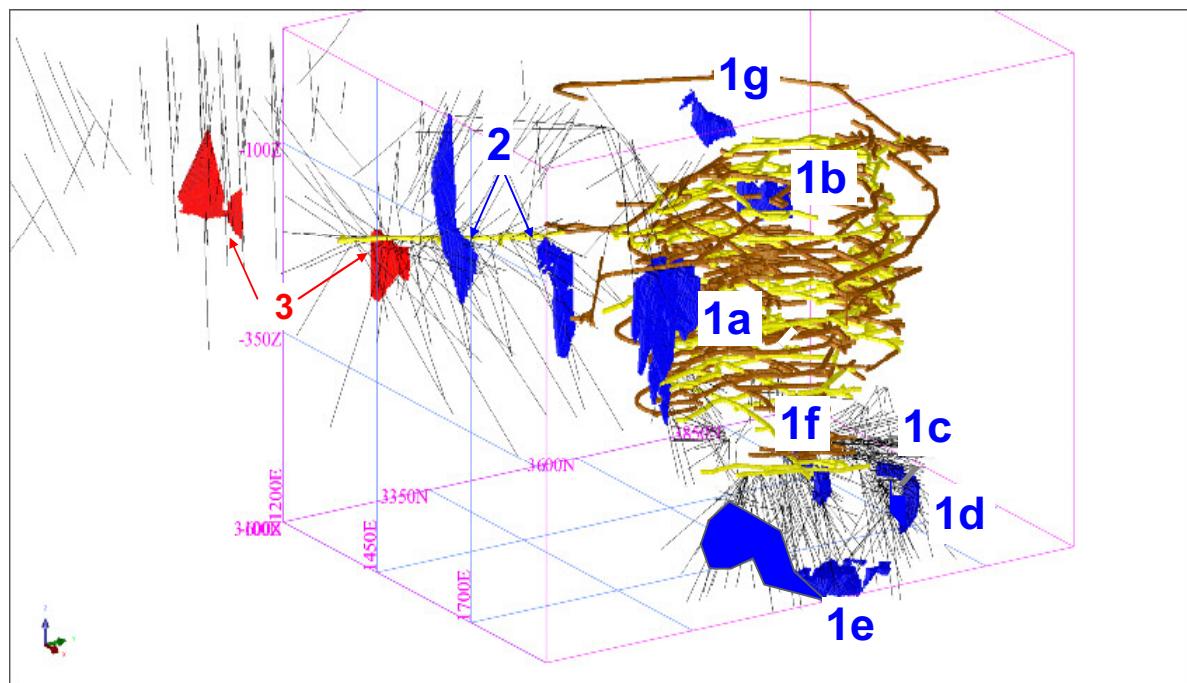
The geological model defining the remaining resource is based on the 0.47 % Ni<sub>Tot</sub> cut-off grade of which the portion of non-recoverable nickel bound into silicate minerals is estimated to be 0.02% Ni and varies throughout the mine.

The resource model was constructed using Surpac Vision software. The resources were outlined in vertical sections using the same cut-off of 0.47% Ni<sub>Tot</sub> for all the resource areas. The distance between the drilling profiles varies from 6 m to 25 m but the most frequent one is 12.5 m. The direction of drilling profiles varies according to the location of the ore and in some cases two or three profile systems overlap with each other. Because of overlapping drillhole profile systems quite a few extra vertical sections were created to facilitate the 3D-digitisation in which the points of resource string were fixed exactly to the correct assay intervals.

From these 3D-strings 3D-digital solid models were created separately for each resource area.

The resource areas include the following areas (Figure 9.4):

1. North Hitura
  - a. W ore: between the levels +250 - +515
  - b. N arch: between the levels +175 - +225
  - c. NE Arch: below the mining level +500, small part +475
  - d. NEK Arch: below the mining level +515
  - e. E ore: X=3550 – X=3700 below the mining level +520
  - f. Central Core Ore: below the mining level +500
  - g. W Offset: between the levels +50 - +150
2. Middle Hitura: the whole presently known area
3. South Hitura: the whole presently known area



**Figure 9.4 Resource areas and current development**

### Block modeling

The block model in the Surpac modelling system was setup with the dimensions and parameters shown in the Table 9.3. The block size was selected partly based on the data density and partly based on geometric constraints.

Block Model Summary hitura2008_all.mdl			
Type	Y	X	Z
Minimum Coordinates	2950	1050	-700
Maximum Coordinates	3900	1850	0
User Block Size	5	5	5
Min. Block Size	2.5	2.5	2.5
Rotation	0	0	0
Total Blocks	180376		
Storage Efficiency %	99.47		
Attribute Name	Type	Decimals	Background
avgdst	Float	2	-999
cu	Float	2	0
dst2ns	Float	2	-999
kvar	Float	2	-999
ni	Float	2	0
ns	Integer	-	0
resource_class	Integer	-	1
s	Float	2	0

**Table 9.3 Blockmodel summary**

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### 9.6.2 GRADE INTERPOLATION

The blocks inside the 0.47% Ni grade envelopes were estimated using either the Ordinary Kriging or the Inverse Distance squared method. The ordinary Kriging was used only for nickel in the E ore, NE arch, NEK arch and Central Core ore -areas because the variogram analysis of the other areas failed to provide good quality variograms.

Variogram parameters, which were used in Ordinary Kriging estimations are based on the analysis done by the personnel of the Hitura mine

Resource area	Type	Nugget	Sill1	Sill2	Range1	Range2	Bearing	Plunge	Dip	Major/Semi	Major/Minor
NE-Arch	Spherical	0.02	0.077		100		95	0	90	2.5	4.4
NEK	Spherical	0.07	0.109		60		300	0	90	1.2	3
Central core	Spherical	0	0.021		15		35	0	0	1.15	1.36
East-ore	Nested	0	0.053	0.027	9	75	35	0	85	1	2

**Table 9.4 Variogram parameters**

The other elements (Cu, S) and other areas (West ore, W-offset, N-arch, Middle Hitura and South Hitura) were estimated using Inverse Distance method. Resource areas were estimated with the composites inside the resource wireframe. The maximum search distance was 200m for all estimations. The minimum of 3 and maximum of 15 composites were used to estimate the block grade.

Density measurements at Hitura vary between 2.55 and 2.82 g/cm<sup>3</sup>. However, as density (S.G) measurements are not systematically and routinely measured throughout the mine, for the purposes of tonnage calculations, a universal specific gravity of 2.7 g/cm<sup>3</sup> has been applied for all ore blocks. This is in line with historical practice at Hitura.

### Blockmodel validation

The block model validation includes visual inspection and comparing the mean between the composited and estimated data. The visual inspection did not show any unusual problem when compared with drill hole grade across sections and statistical comparisons of global block grades and composite grades showed good correlation.

## 9.7 Mineral Resource Classification

The Remaining mineralisation below the present mining areas in North Hitura as of 31st May 2010 is classified as Measured, Indicated and Inferred Mineral Resources. The mineral resources of Middle Hitura are classified as Indicated and Inferred Mineral Resources. All the resources of South Hitura are classified as Inferred Mineral Resource.

Classification is based on drilling density and on all available information, which the operating mine has from the geological features (lithology, ore type structures etc.) controlling the grade continuity. Furthermore, mined out stopes and other underground workings are located in many cases directly above the resource area in North Hitura, in which ore limits, grade and processing results are known. The drill density below the present underground working areas is usually less than 10 m. In Middle Hitura, South Hitura and in the North Hitura “Off-Set” area the drill density is usually more than 10 m but less than 25 m.

## **North Hitura**

### **W ore (+250 - +515m):**

Two parallel mineralised zones are classified as Indicated Mineral Resources. The main drilling is completed on E-W profiles that were spaced 12.5m apart. On each profile the spacing between the holes is usually less than 20m. Two less coherent profile systems are completed in NW-SE and SW-NE directions. In total the drilling density is very high in this area. The main reason why this area is only classified as an Indicated Resource is the complicated profile system together with unsurveyed drill holes, which cause slight uncertainty for the volume estimation. As a result of high drilling density it can be said, that the Ni grade on this area is known with a very high level of confidence.

The distribution and continuity of the nickel grades correlates well with the distribution and continuity of the lithologies. The dimensions and continuities of some disturbing pegmatite veins are known.

These W ore resources are mainly situated near the main access tunnel and partly below the portal to mine tunnel. The resources will be utilized at the end of mine life or the access tunnel must be relocated.

### **N arch (+175-+225m):**

The remaining mineralisation in this area is classified as Indicated Resources. The N arch is located near the old workings and is sufficiently densely drilled for this classification utilizing mainly N-S profile system.

### **NE arch (below the mining level +550):**

This whole zone of continuous mineralisation is classified as Indicated Resources. It has been densely drilled with systematic S-N profiles and some sporadic SW-NE profiles. Longer drilling distance and unsurveyed holes are causing some uncertainty in volume estimation. It is situated directly below the old production area.

The distribution and continuity of the nickel grades correlates well with the distribution and continuity along the contact zone with the surrounding waste rock.

### **NEK arch (below the mining level +515) and NEK Deep:**

This whole zone of continuous mineralisation is classified as Measured Resources. Densely drilled with systematic SW-NE profiles and some W-E profiles.

The direct downward continuation of the mineralisation below the production drifts is classified as Inferred Resources.

The distribution and continuity of the nickel grades correlates well with the distribution and continuity along the contact zone with the surrounding waste rock.

### **E ore (X=3550 – X=3700 below the mining level +520m) and E Deep:**

Two parallel mineralised zones are classified as Measured and Indicated Mineral Resource. The main drilling is completed on E-W profiles that were spaced 12.5m apart with some extra oblique profiles, which were drilled at an angle of 30 – 60° to the ore plane. The portion classified as an Indicated

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Resource consists of mineralisation which is directly below the production drifts, but which was drilled only with the oblique profiles.

E Deep is the downward continuation of the E ore to the level of +675. This whole zone of mineralisation is classified as Inferred. Some sub-horizontal pegmatite veins can cause small-scale dislocations in the lowermost part of this mineralisation. The possible sub-horizontal fault zone with pegmatite veins cuts the mineralised body below the level +750.

The distribution and continuity of the nickel grades correlates well with the distribution and continuity on the E ore area.

**SE extension (the southernmost continuation of E ore):**

This area is not included in the resource calculation and is classified only as “Exploration Potential”.

**W –offset (between the mining level +75 - +150m):**

An unmined serpentinite tongue from the main intrusion into the mica gneiss country rock near the W ore. It contains some mineralisation between the main ramp and the open pit. This small mineralised body is classified as Indicated Resources. The body is drilled with an E-W profile system. The drilling density is slightly less than on the area of the main intrusion. The Ni grade continuity in this separate and dislocated body is assumed.

**Middle Hitura**

One elongated pipe like mineralised body between the levels of +50 – 300m is classified as Indicated Resource and two smaller ones are classified as Inferred Resource. Drilling is completed on E-W profiles that were spaced out 12.5m apart and some extra oblique profiles. Lithology and Ni grade continuities are known sufficiently well.

**South Hitura**

Three small lenses situated between the levels of +100 – 325m. All the lenses are classified as Inferred Resource. Drilling is less dense than on the other parts of the main intrusion.

## 9.8 Resource and Reserve Statement

### 9.8.1 MINERAL RESOURCES

The mineral resources calculated by Outotec Minerals Oy are shown in Table 9.5. In Table 9.6 the resources are split by area.

Mineral Resource Estimate 31.5.2010	Tonnes	Ni %	Cu %	S %
Measured resource	1 336 000	0.71	0.23	2.48
Indicated resource	1 086 000	0.60	0.20	3.84
<b>Total Mineral Resource</b>	<b>2 422 000</b>	<b>0.66</b>	<b>0.22</b>	<b>3.09</b>
	Tonnes	Ni %	Cu %	S %
Inferred Mineral Resource	615 000	0.67	0.27	3.88

*Mineral resources are additional to Mineral Reserves.*

*Mineral resources have been calculated using 0.47% Ni cut off.*

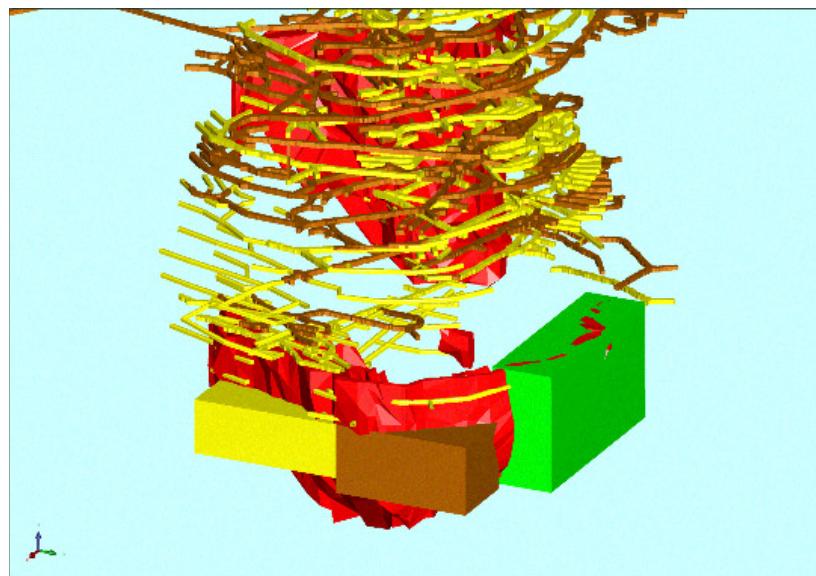
**Table 9.5 Resource estimate**

<b>Hitura Mineral Resource, excluding the planned stopes, Outotec Oy, 31.5. and 1.7.2010</b>					
		tonnes	Ni %	Cu %	S %
Measured and Indicated Mineral Resource					
North Hitura	Cut off 0.47% Ni	2 227 000	0.66	0.23	3.16
Middle Hitura	Cut off 0.47% Ni	195 000	0.66	0.21	2.31
South Hitura		0	0.00	0.00	0.00
<b>Total Measured and Indicated Resource</b>		<b>2 422 000</b>	<b>0.66</b>	<b>0.23</b>	<b>3.09</b>
Inferred Mineral Resource		tonnes	Ni %	Cu %	S %
North Hitura	Cut off 0.47% Ni	252 000	0.67	0.24	2.53
Middle Hitura	Cut off 0.47% Ni	89 000	0.55	0.16	1.70
South Hitura	Cut off 0.47% Ni	274 000	0.72	0.33	5.82
<b>Total Inferred Resource</b>		<b>615 000</b>	<b>0.67</b>	<b>0.27</b>	<b>3.88</b>

**Table 9.6 Hitura Mineral Resource estimate**

### 9.8.2 MINERAL RESERVES

The mineral reserve consists of materials from three mining blocks: E ore, NEK ore and NE-arch. Figure 9.5 defines the extent of the mining blocks (yellow = E-ore, brown=NEK-ore, green=NE-arch-ore).



**Figure 9.5 The location of the mining blocks**

The summary of the Mineral Reserve Estimate is shown in Table 9.7 below:

Mineral Reserve Estimate 31.5.2010	Tonnes	Ni %	Cu %	S %
Proven reserve	972 000	0.69	0.24	2.12
Probable reserve	350 000	0.62	0.23	2.33
<b>Total Mineral Reserve</b>	<b>1 322 000</b>	<b>0.67</b>	<b>0.24</b>	<b>2.17</b>

**Table 9.7 Hitura Mineral Reserve estimate.**

Outotec Minerals Oy have not carried out detailed stope designs but have estimated the mineral reserves based on the properties of the selected mining method(s) and past experience of the realized conversion factors. The resource for mining was calculated from the resource block model by Outotec Minerals Oy, 31.5.2010 using the mining block extents as constraints.

The selected mining method is either longitudinal or transversal sublevel caving using a sublevel interval of 15m to 20 m. The sublevel caving method is suitable for bad ground conditions, which are typical at Hitura mine. The mining loss and waste rock dilution are typically high and dependent on each other. The typical dilution (waste in feed) percentage is in excess of 25%.

Historically, the waste rock dilution at Hitura at the stope scale has varied considerably, with a large range from 0% to over 50% dilution. The estimated dilution (decrease in grade) for the 7 months production in 2008 was as follows: E-area=18%, NE-arch-area=13%, NEK-area=34%. The high dilution in NEK was probably caused by the need for feed and poor draw control. E and NE-arch values are typical.

The Outotec Minerals Oy Mineral Reserve Calculation is shown in Table 9.8 below.

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Resource for Mining					
	Tonnes	Ni %	Cu %	S %	
NE-arch	227 391	0.73	0.27	2.73	
NEK	398 166	0.79	0.27	2.8	
E ore	891 422	0.76	0.26	2.24	
Total	1 516 979	0.76	0.26	2.46	
Mining Recovery		Recovered Resource			
	Rec%	Tonnes	Ni %	Cu %	S %
NE-arch	65 %	147 804	0.73	0.27	2.73
NEK	65 %	258 808	0.79	0.27	2.80
E ore	70 %	623 995	0.76	0.26	2.24
Total	68 %	1 030 607	0.76	0.26	2.45
Dilution		Diluting Material			
	Dilution %	Dil Tonnes	Dil Ni %	Dil Cu %	Dil S %
NE-arch	30.0 %	44 341	0.15	0.10	0.50
NEK	35.0 %	90 583	0.15	0.10	1.00
E ore	25.0 %	155 999	0.50	0.20	1.50
Total	28.9 %	290 923	0.34	0.15	1.19
Proven+Probable Mineral Reserve 1.7.2010					
	Tonnes	Ni %	Cu %	S %	
NE-arch	192 145	0.60	0.23	2.22	
NEK	349 391	0.62	0.23	2.33	
E ore	779 994	0.71	0.25	2.09	
<b>Total</b>	<b>1 322 000</b>	<b>0.67</b>	<b>0.24</b>	<b>2.17</b>	

**Table 9.8 Mineral Reserve calculation, Outotec Minerals Oy, 1.7.2010**

The mining conditions are challenging and to achieve the reserve head grades requires careful planning and precise draw control especially in the NE-arch and NEK areas.

## 9.9 Comparison to previous estimates

In 2008 a total of 599,233 tonnes of Feed To Plant was processed at Hitura. 526,967 Run of Mine tonnes came from Hitura underground, and 72,266 tonnes came from the underground satellite mine Särkinenemi. Although the Hitura mine would have been able to produce more it was a strategic decision to feed the plant with Särkinenemi ore as well because contractually the nickel price realisation for Hitura ore was lower than that of the Särkinenemi ore. The production data for 2008 was as follows (Table 9.9):

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Year	2008				
	tonnes	Ni %	Cu %	Co %	Dilution %
Production					
Hitura underground	526 967	0.59	0.21	0.03	29
Särkiniemi	72 266	0.89	0.47	0.06	13
<b>Total Feed To Plant</b>	<b>599 233</b>	<b>0.63</b>	<b>0.24</b>	<b>0.04</b>	<b>27</b>

**Table 9.9: 2008 production data**

The previous technical report (3<sup>rd</sup> April, 2008) containing an NI 43-101 compliant resource and reserve estimate was dated 3<sup>rd</sup> April, 2008 and contained resource and reserve estimates as of 31<sup>st</sup> December, 2007. The current resource and reserve estimates are valid for 31<sup>st</sup> June 2010. A comparison of these estimates is presented Table 9.10.

<b>Category</b>	<b>Jun 31st 2010</b>		<b>Dec 31st 2007</b>		<b>Tonnes Change</b>
	<b>Tonnes</b>	<b>Ni%</b>	<b>Tonnes</b>	<b>Ni%</b>	
Proven Reserves	972,000	0.69	365,000	0.61	+607,000
Probable Reserves	350,000	0.62	1,985,000	0.62	-1,635,000
<b>Total Mineral Reserves</b>	<b>1,322,000</b>	<b>0.67</b>	<b>2,350,000</b>	<b>0.62</b>	<b>-1,028,000</b>
<b>Measured &amp; Indicated Resources</b>	<b>2,422,000</b>	<b>0.66</b>	<b>1,372,000</b>	<b>0.64</b>	<b>+1,050,000</b>
<b>Inferred Resources</b>	<b>615,000</b>	<b>0.67</b>	<b>430,000</b>	<b>0.70</b>	<b>+185,000</b>

**Table 9.10 Comparison to previous reserve and resource estimate**

Compared to the 2007 figures the Proven Reserves have increased by 266%. This is primarily as a result of more infill drilling, and the use of a lower cut-off grade in this current estimate. Notwithstanding the use of a lower cut-off grade, the overall grade of the Proven Reserves is higher than in 2007 due to much of the infill drilling having focussed on higher grade zones of mineralisation.

Total Mineral Reserves have been reduced by 44% since December 31<sup>st</sup> 2007. This is due to a combination of depletion through mining (2008 production was 527,000 tonnes of ore) and by the reclassification of some of the reserves back into resources. This reclassification is because the current production plan has less provision for underground development than in 2007.

## **10. EXPLORATION POTENTIAL**

Hitura mine organisation has prepared an exploration plan for North, South and Middle Hitura area and also to investigate geophysical anomalies in the mining concession area and outside.

These exploration targets include:

- North Hitura below the level +525 (extension of the current production areas)
- Middle Hitura, levels between +50 -+500
- South Hitura, levels between +50 -+500
- Extension of North Hitura W-ore outside the intrusion, levels between +50-+300
- Magnetic anomaly north from North Hitura, levels between +50 -+500
- Other geophysical anomalies in the mining concession area

The targets are ranked in the order of possibility to find mineable ore. However, mining technical or rock mechanical reasons might change the order especially in the case of North Hitura extension at depth. All targets except other geophysical anomalies can most efficiently be investigated from the underground mine. Surface drilling requires long holes that must be at least in some extent drilled outside the mining concession area with consent from the landowners. Some exploration drifts are needed especially for investigations of South and Middle Hitura.

## **10.1 North Hitura – current production area and its extensions**

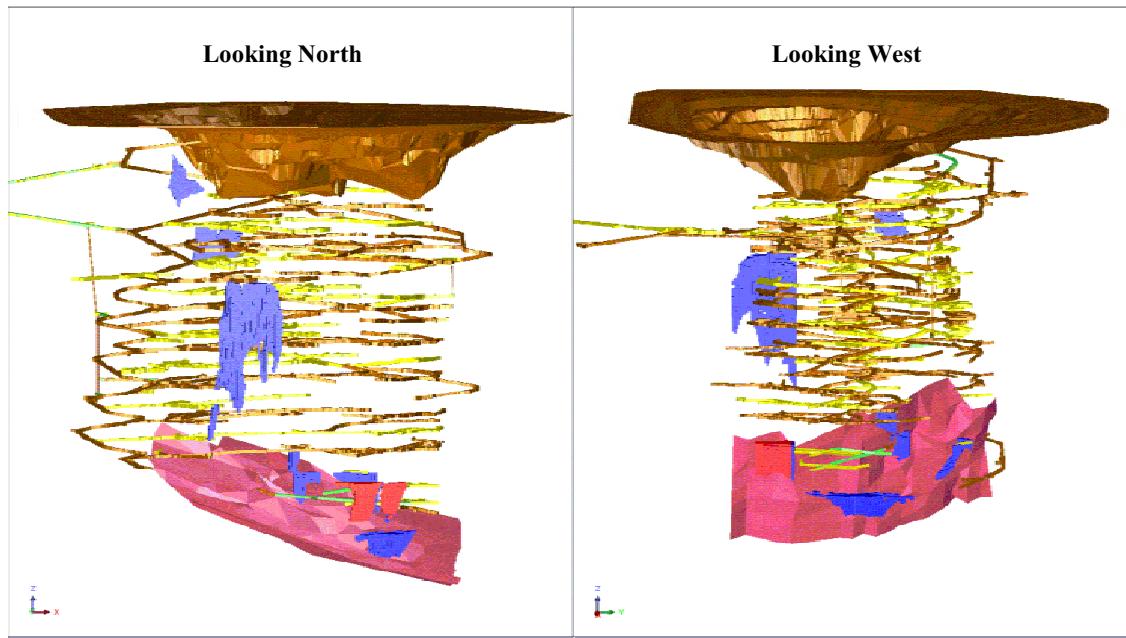
Mineral Resources have almost exhaustively been mined to the level +475-525. Some minor unmineable resources exist in the old stoping areas as vertical or horizontal pillars or in the areas of high caving risk. The tonnage of mineralised serpentinite with low grades (~0.4%) in the southern part of North Hitura has not been estimated nor included in any mining plan.

Consequently any potential for further ore at North Hitura must come from depth. Deep extensions of North Hitura can be drilled from the existing underground workings. However, diamond drilling is quite inefficient due to production disturbances, and so the development of dedicated drilling bays will be required for any major drill programme.

A large inclined fault at the pegmatite zone (Figure 10.1) has been interpreted to move the depth extents of the W-ore and E-ore of North Hitura eastwards. If this is the case the W-ore could be located underneath the Central Core-ore and E-ore could continue further east below the level +650, where the deepest intersections (+725 metres) are at the moment. Limited drilling below the pegmatite/fault zone has indeed intersected mineralisation.

It is the opinion of the Qualified Person that there is no reason to believe that mineralisation should not continue below the pegmatite zone, and that further drilling has very good potential of identifying further resources and reserves.

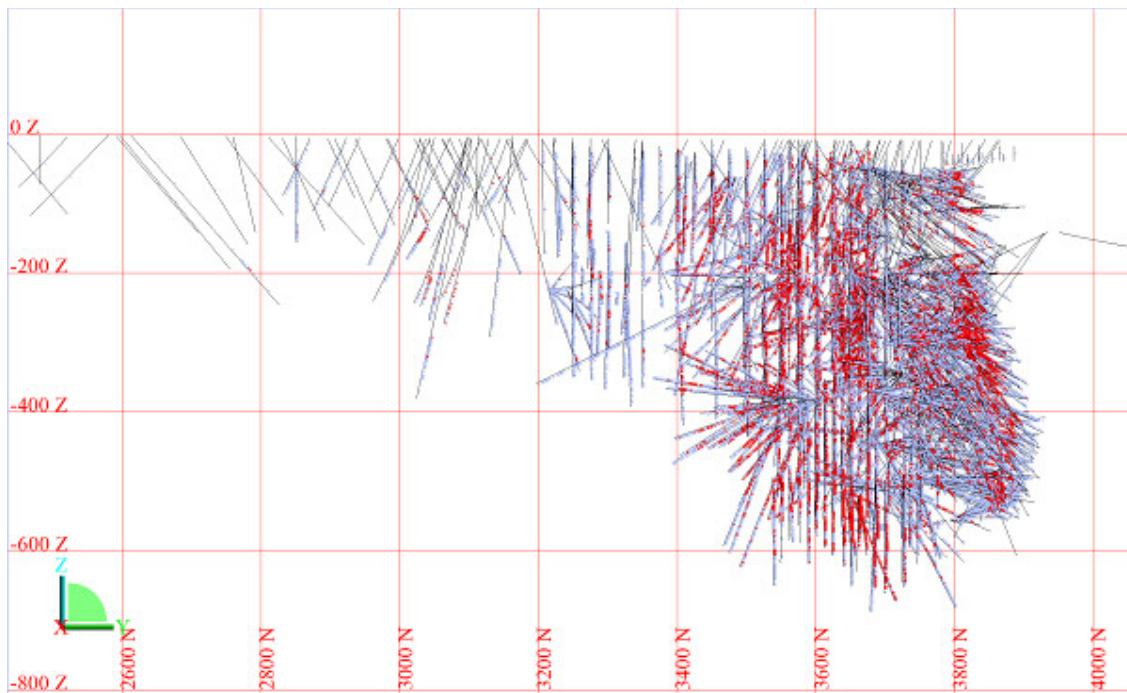
Rock mechanical reasons and long distance to the surface if utilising the same mining methods, will increase mining costs below the level +550 and thus the potential to locate large economical viable mining reserves from the deep extension of the North Hitura is deemed to decrease with increasing depth. However, should sufficient resources be delineated at depth, and mining capacity increased utilising a shaft, and the nickel price remains above historical averages, the economic viability of depth extensions remains good.



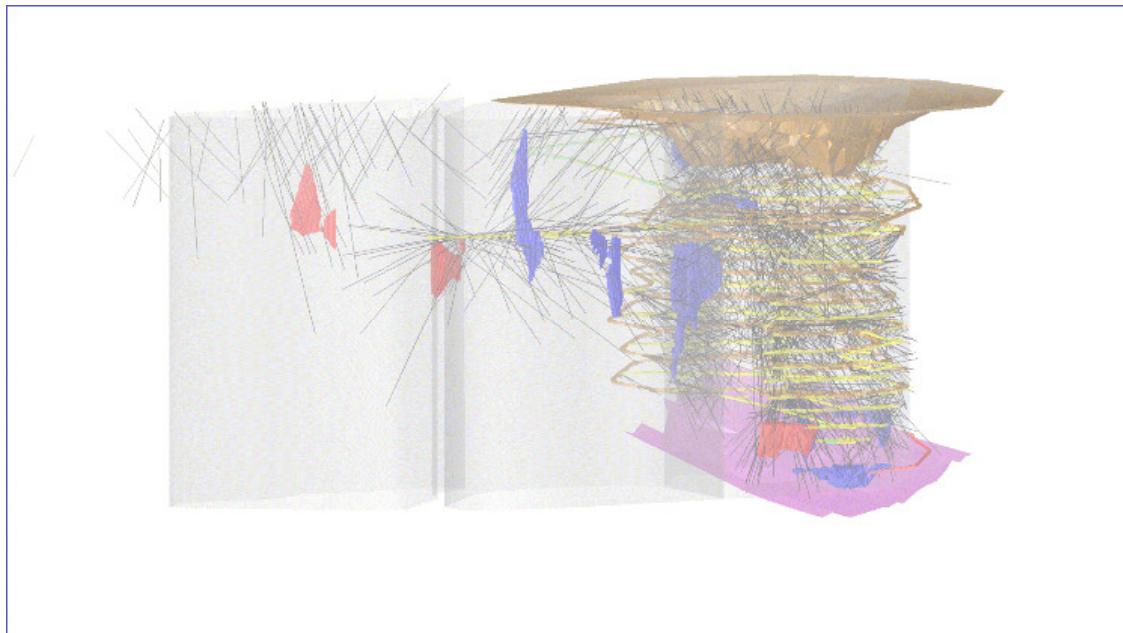
**Figure 10.1 3d model of North Hitura, with resources and pegmatite zone.**

## 10.2 Middle Hitura and South Hitura

Although the first exploration target in the Hitura area was the area known currently as South Hitura the area is practically unexplored. Due to geophysical anomalies surrounding North Hitura exploration activities were soon transferred to North Hitura and have since remained there. Location of the drill holes and ore grades intersections (in red) (as of December 2006) can be seen from Figure 10.2. Figure 10.3 shows North, Middle and South Hitura intrusions (grey), drill holes (black) and remaining resources (red and blue solids).



**Figure 10.2 Longitudinal projection of Hitura intrusion**



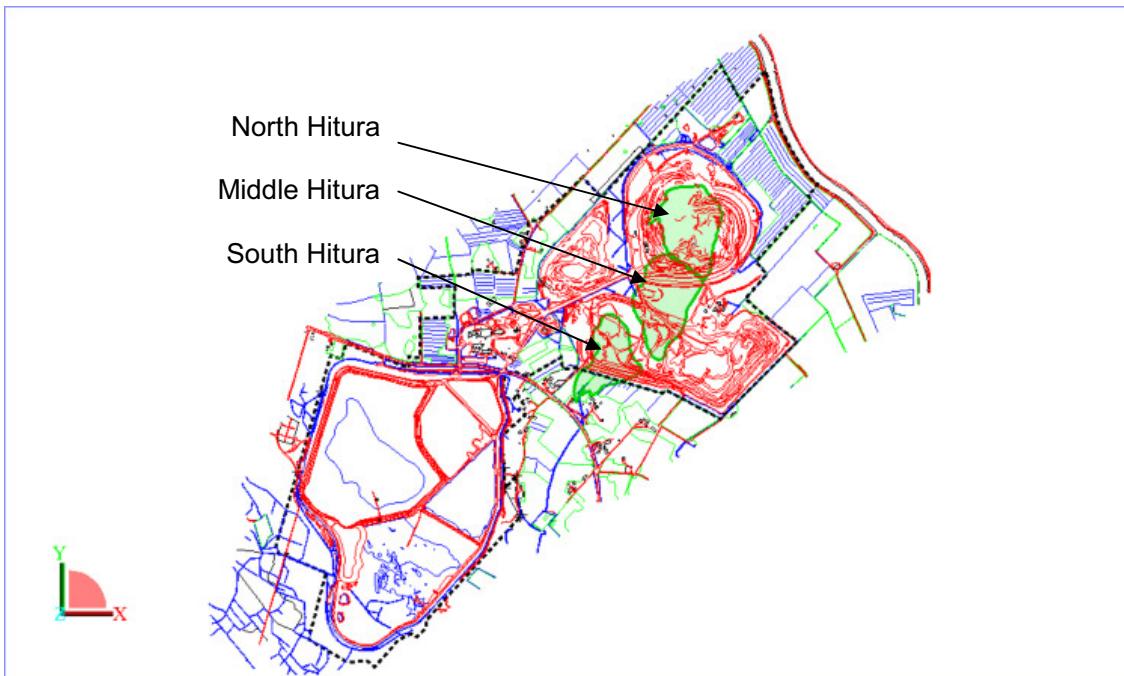
**Figure 10.3 North, Middle and South Hitura.**

In 2007, drilling was done from the drift located on the level +230. At Middle Hitura 195,000 tonnes of indicated resources at 0.66 % Ni have been defined and 274,000 tonnes of inferred resources at 0.72% Ni at South Hitura.

Middle Hitura exploration can be done from the existing drift at the level +230. The drift is located west from the Middle Hitura intrusion in the gneissic country rocks. The drift has been used as a settling pond for mine dewatering and it must be cleaned, inspected and supported before any activities. Some drilling can also be done from the surface – see Figure 10.4. The Middle Hitura intrusion including the eastern contact can be explored from this drift. It has been estimated that 3-4 profiles containing 3-4 holes with a length of 300 to 600 metres, totalling 5,000 m is needed to get a preliminary idea of the Middle Hitura potential. The deeper part of the Middle Hitura intrusion must be explored by extending the drift at the level +330 ca 300 metres and drilling ca 5,000 metres.

South Hitura can efficiently be explored by extending the drift at the level +230 ca 300 metres. It has been estimated that 3-4 profiles containing 3-4 holes with a length of 300 to 600 metres, totalling 5,000 metres is needed to get a preliminary idea of the South Hitura potential. The deeper parts of the South Hitura intrusion must be explored by extending the drift at the level +330 further ca 300 metres and with diamond drilling ca 5,000 metres.

Total amount of drifting and diamond drilling metres to explore Middle and South Hitura would require 900 metres drifting and 20,000 metres diamond drilling.



**Figure 10.4 Location of Hitura intrusions related to the mine surface infrastructure**

## **11. MINING OPERATIONS**

### **11.1 Overview of mine plan and operation**

Mining has all the time progressed downwards and currently the major part of the production is derived from the levels +400 - +550 below surface. The mining methods applied require that reasonable large horizontal pillars are needed to support earlier production areas.

The benching-with-backfill mining method was applied successfully in upper levels but as mining has progressed downwards, all the horizontal and induced stress is progressively concentrated in the present stoping areas and is causing increasing problems and demands for ground support.

Currently almost all production is done by using the sublevel-caving-with-upward-drilling mining method.

Mucking is done by normal underground loaders and ore is hoisted to the surface by 3-axle highway-type trucks.

### **11.2 Development**

Development is done by two twin-boom Tamrock Minimatic units. In the past average development rates varied between 2,900 m – 4,200 m per annum. During the current 18-month contract the mine has planned to develop at least 1,350 m.

Historically the development unit cost has fluctuated a lot due to large variations in underground conditions. Pohjolan Kallityö Oy has been contracted to conduct all the underground development.

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The cost of development with all necessary ground support has been budgeted at a conservative number of 1,880 €/m.

Ground support cost in drifting has been ca 50% of the total actual unit cost. This reflects the difficult ground conditions and heavy support, which is described in the next paragraph.

### **11.3 Ground support**

Hitura mine utilises a variety of ground support methods due to very difficult ground conditions. Systematic ground support strategy has developed as underground mining has progressed deeper.

In drifting all drifts are supported after each round. The normal strategy is to install 3-4 cable bolts from the drift face even before the next round is drilled and blasted. These cables will form a preventive support so that after blasting scaling can be done safely.

After mechanical scaling, the round is either bolted with split-set bolts or shotcreted depending on the judgment made by the shift boss. The next step is to install cable bolts and mesh and the final support is done by shotcreting. Detailed description of the methods is presented in Figure 11.1 and Figure 11.2.

The mine currently has one unit for mechanical scaling, three shotcreting rigs, and two units for meshing. The mine used to own three cable bolt rigs but one was scrapped in 2010.

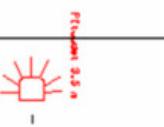
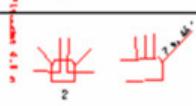
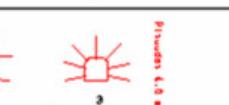
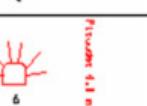
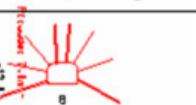
Typically, some 25,000 split set bolts and 130km of cable bolts have been installed per annum.

This extremely heavy ground support is needed due to very weak rocks and increasing horizontal and secondary, induced stress.



**Figure 11.1 Drilling underground at Hitura Mine**

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Method id	Areas	Description
1	Outside the massif, host rock gneiss or tonalite	Cable bolting, shotcrete 
2	Horizontal development, draw points	Cable bolting, fiber shotcrete 
3	Horizontal development close to stoping areas	Cable bolting, mesh, shotcrete 
4	Horizontal development in sublevel stoping, top drift in bench stopes	Cable bolting with double wire, mesh, shotcrete 
5	Stage 1 development in stoping area	Cable bolting, Shotcrete 
6	Bench stope wide top drift	Cable bolting, mesh, shotcrete double wires for steep holes 
7	Stage 1 development in stoping area	Split-set bolts, shotcrete 

**Figure 11.2 Ground support methodology**

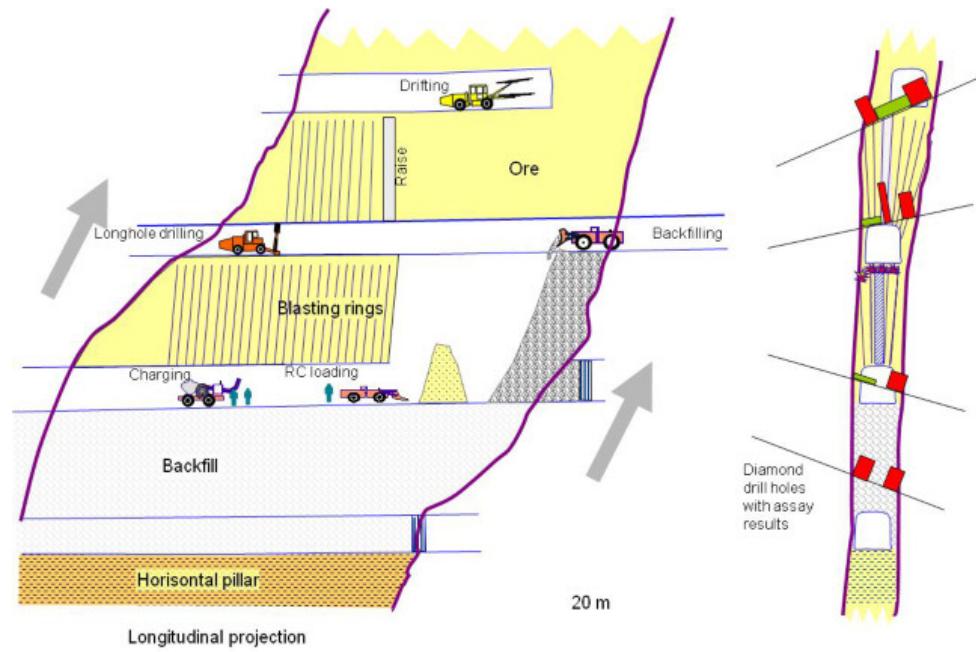
## 11.4 Mining methods

The normal mining method applied is sublevel caving. For the 18-month contract the mine will produce 59,000 tonnes ROM from drifting (8%) and 666,000 tonnes from stoping (92%). A total of 21 stopes will be in production during this period.

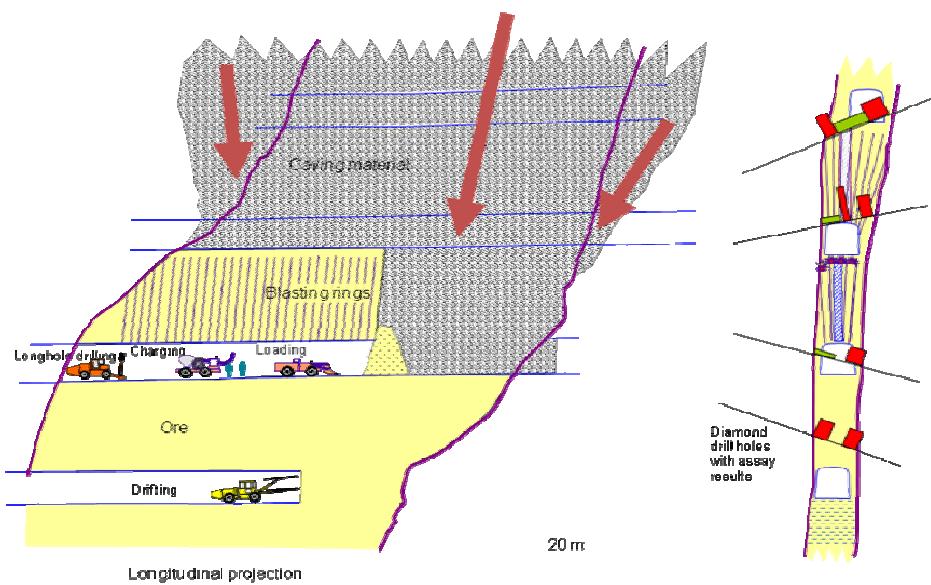
The benching-with-backfill mining method is not applied anymore because of rock mechanical difficulties. Benching used to be done with downward drilling and heavy ground support of stope sidewalls and roof with cable bolting. The stope used to be kept very small, with the average being 10 – 15,000 tonnes for open bench stopes. Distance between levels used to vary between 15-25 metres. A cross section of a benching stope is presented in Figure 11.3.

Currently nearly all production comes from the sublevel caving-with-upward-drilling mining method. Drilling can be done from one to three drifts simultaneously depending on the ore width. Production drilling for sublevel caving in Hitura is always done only from one level. Principles of sublevel caving are presented in Figure 11.4 and Figure 11.5. Sublevel caving stopes can be reasonably large, up to 100,000 tonnes.

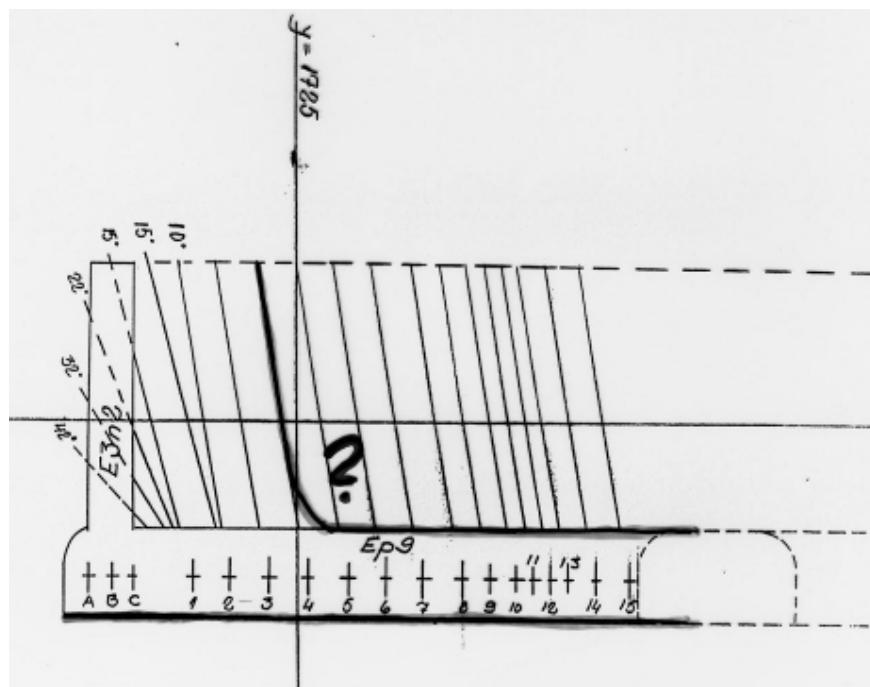
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**Figure 11.3 Benching stope principle at Hitura Mine**



**Figure 11.4 Sublevel caving principle**



**Figure 11.5 Sublevel caving long section**

## 11.5 Mining schedule

Mining is scheduled so that most of the development and production works are concentrated in a few working areas. The reason for this is to have a possibility to permanently close mining areas and avoid large secondary ground support. On the other hand sufficient working areas must be available to have operational flexibility.

The mine has also tried other approaches to increase flexibility and to avoid production disturbances in case problems occur in some areas. However, this has resulted in long lead times for stopes and increased stability problems.

The 18-month mineplan has been prepared using Surpac3D software and Microsoft© Excel. Table 11.1 shows the production and costs summary of the 18-month production plan.

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Production Hitura	2010	2011
Mill feed tonnes	185 000	540 000
Ni-concentrate, tonnes	8 768	30 490
Ni-produced, tonnes	719	2 500
Mine development	980	352
Ni grade ore %	0.59	0.70
Rec%, ore	66.0	66.0
<b>Production costs Hitura: EU</b>		
Mining	-6 062 000	-11 545 000
Mill	-2 296 000	-5 400 000
Freights (conc. deliveries)	-289 000	-1 006 000
Administration	-370 000	-1 350 000
<b>Total production costs</b>	<b>-9 017 000</b>	<b>-19 301 000</b>

**Table 11.1 18-month production plan**

## 11.6 Mining equipment availability and condition

Hitura Mine has a large underground mobile equipment fleet. The fleet comprises of 15 large underground drilling, ground support or work platform type units. Most of the equipment has been manufactured by Tamrock or Normet. The mine has also 12 small vehicles (mainly Toyota) and a relatively new rescue vehicle (VW). Production equipment fleet is large but is needed due to difficult ground conditions and large amount of ground support annually.

The Hitura owned equipment is in working condition but is quite old and a significant programme of new capital equipment purchase and replacement is needed if production continues beyond 2011. Summary of the mine owned equipment and its conditions are given the Table 11.2. Cable bolter number 3 has been taken out of service and will be modified as an additional drilling rig.

In addition to the underground equipment owned by Hitura mine, the contractors Jarkko Ralli Oy owns and operates a fleet of mucking and trucking equipment. This fleet is comprised of four Tamrock Toro loaders (2 x 501 and 2 x 0010), two Caterpillar wheel loaders and 10 Mercedes-Benz trucks for transporting and some additional equipment for road maintenance.

Material (including shotcrete) transport is contracted to H Suihkonen Oy. The company has a diverse truck, lorry and loader fleet, which totally comprises of 13 units.



**Figure 11.6 Underground workshop and cable bolting rig in service**



**Figure 11.7 Underground lunchroom**

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**KAIVOSEN TYÖKONEET**

<b>Machine</b>	<b>Machine nr.</b>	<b>Type</b>	<b>Year of Purchase</b>	<b>Running Hours</b>			<b>Condition</b>
				<b>Drilling</b>	<b>Compressor</b>	<b>Engine</b>	
1 MINIMATIC	1	H 205 D	1996	9 687	16 269	6 744	4
2 MINIMATIC	2	H 205 D	1994	9 213	18 947	1 221	4
3 SOLO	2	H 506 RTS	1991	9 989	740		4
4 SOLO	4	H 606 RA	1995	7 662			4
5 SOLO	5	510 RTS	2001	5 121	11 262	788	4
6 CABOLT	1	H 618 data	1997		5 605	5 139	3
7 CABOLT	2	H	1997				3
8 CABOLT	3	H 618 data	1986		1 828	3 417	3
9 ROBOLT	2	320-22S	2000	3 504	18 163	2 062	4
10 MICROMATIC		DH 102 Z	1990		8 242		3
11 SCALER		BM4500/SB500	1994		443		4
12 SPRAYMEC	1	6050 WP	1994		698		3
13 SPRAYMEC	2	1050 WP	2006		1 606		5
14 DIAMEC	1	264 APC	1996		4		3
15 UTIMEC		1500	1994		10 147		4
16 CHARMEC		1407 X nostolava	2001		866	2 189	4
17 PK-5000		Nostolava			7 950		3
18 PK-4000	2	Koripuomi	1975		10 089		3
19 PK-4000	1	Nostolava	1974		9 304		3
20 PK-4000	3	Nostolava	1976		6 293		3
21 PK-3000		Nostolava			4 680		3

1 =not in use  
2= secondary use  
3 =daily use, must be replaced in near future  
4 =normal use,  
5 = condition as new

Table 11.2 Hitura mobile mining equipment list

## **11.7 Mining risk assessment**

A large scale caving in the decline or portal area is the biggest risk, which might lead to serious production disturbances or even to mine closure. This risk exists, but the possibility is deemed to be low (– to moderate).

The risk of cavings in the development and stoping areas in North Hitura is increasing as production is progressing to the deeper levels. Primary and secondary stresses increase as the vertical depth increases, and ore from the upper levels has been mined out. These problems caused 2005 production being lower in tonnage and grade than previous years. The development and recent commissioning of the VT3 ramp in the country rock will reduce the risk of potential production stoppages due to poor ground conditions.

Equipment is old but there exist no critical mining equipment that can cause serious production problems.

Underground fire is always a serious risk for personnel, but Hitura mine has adequate procedures for personnel protection including underground refuge chambers and self-rescuers for all personnel.

## **11.8 Operating cost estimate**

The 2010 – 2011 budget has been based on the latest agreements with contractors, the new labour structure, consumable costs, and a new electricity pricing agreement. The operating costs in the 18-month financial model however have been more conservative by using mostly historic costs.

The average mining unit cost is estimated to be 21.38 Euro/tonne.

# **12. MINERAL PROCESSING AND METALLURGY**

## **12.1 Metallurgical performance and recoverability**

Hitura ore is challenging to concentrate. The ore belongs to serpentinitic nickel ores and even in that group it is an especially fine grained material and has a high tendency to flocculate.

The general characteristics of the Hitura ore are fine or super-fine grain size, large variations and mainly serpentinitic rock type. The main ore minerals are pentlandite, chalcopyrite, pyrrhotite, mackinawite and valleriite. The ore minerals are mainly in serpentinite rock, although in the contact ores they are in amphibolite rock.

The grain size of the sulphides is already generally quite fine, but in some areas it is smaller than one micrometre. The large specific area of ore sets a special task: The fine grain size of sulphides needs fine grinding, but increase of fineness increases flocculation as well.

There are large variations in metal contents, in the degree of alteration and in the grindability of the ore. In the contact ores the nickel grade in the sulphide phase is around 5% only, but it can rise in the core of the ore formation up to as high as 14%. The fact that part of the nickel content is in mackinawite, lowers the nickel grade and increases the magnesium content of the concentrate.

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The nickel recovery at Hitura is typically low (~ 65%) and becomes lower if higher nickel grade concentrates are produced. The magnesium content of concentrate is also relatively high. In addition, the high usage of reagents causes high reagent costs (Section 12.2.3).

In practice it is not worth producing a separate copper concentrate due to the low copper content of the ore.

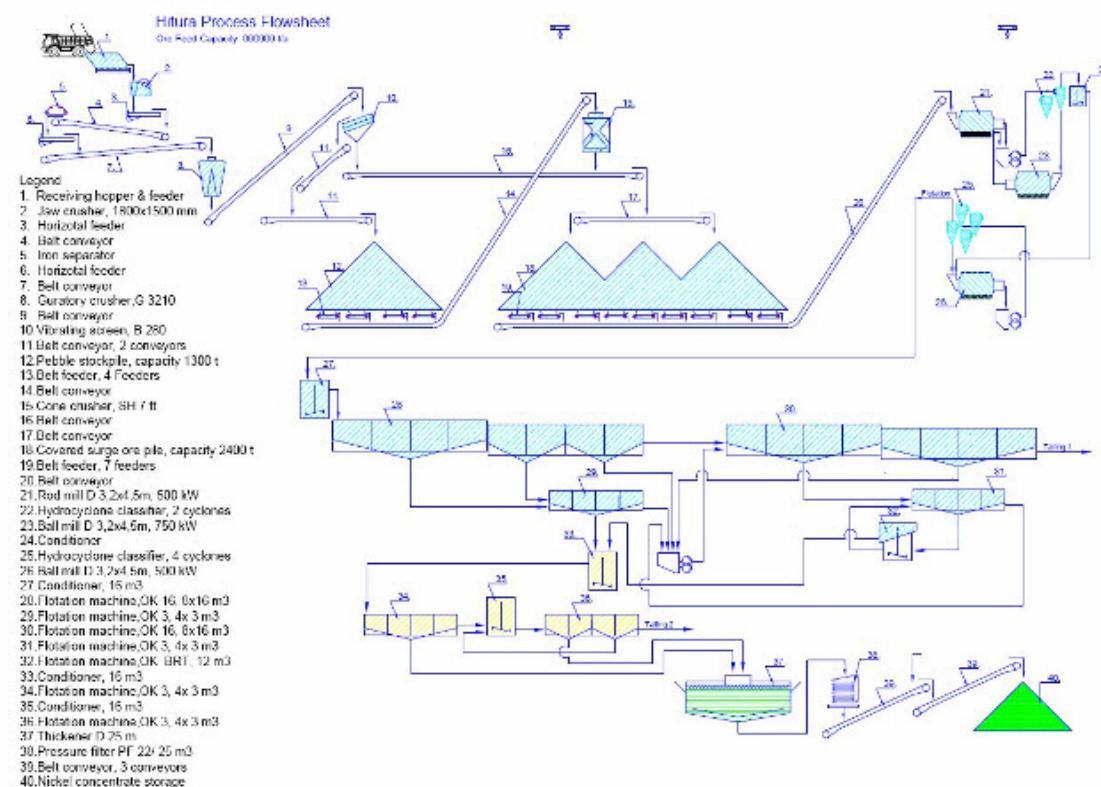
Technically it is possible to produce two qualities of nickel-copper bulk concentrates if needed. The high-grade concentrate would have higher than 10% nickel content, but recovery to those products would be less than 50%. If there is a favourable situation in the nickel concentrate market, an opportunity is to produce simultaneously a high grade and a low-grade concentrate and still have an acceptable total recovery. This has been done periodically in the 1990's when a high grade (>10%) Ni-concentrate was produced and sold to Harjavalta smelter and lower grade (~ 5% Ni) sold to Montshegorsk-smelter in Russia.

Regardless of the relatively low nickel content and relatively high MgO content, there have not been any historical difficulties selling the concentrate, in which the favourable Fe/MgO ratio has an important role.

Due to the softness of ore, comminution is easy and can be done with rod and ball mills with low or moderate grinding media consumption.

## 12.2 Processing plant general description

Processing plant general flowsheet is presented in Figure 12.1



**Figure 12.1 Processing plant flowsheet**

### **12.2.1 CRUSHING**

Ore is transported by trucks to the reciprocating feeder ahead of a jaw crusher ROXON L150 (1500 x 1200 mm). After primary crushing and metal detection by METOR the ore is crushed in a LOKOMO 3210 gyratory crusher, screened by a vibration screen and the oversize material is then crushed once again in a Symons SH 7 cone crusher. The cone crusher product can be reported directly to the crushed ore storage heaps or returned back to the vibrating screen. In this last mentioned closed circuit crushing the fineness of the product is 100% -16 mm, and in the partially open circuit crushing it is a little coarser. The crushing plant is remote controlled from the central control room of the concentrator and utilises Proscon 210 sequence logic.

### **12.2.2 GRINDING**

Hitura mine has tested several grinding methods including AG, SAG and single stage ball mill grinding since the 1970 start up. Since 1994 grinding has been carried out by a rod mill, ball mill, ball mill grinding with two hydro cycloning stages.

The throughput capacity of the concentrator has for the last few years been around 86 t/h and 650,000 t/a. The maximum capability of the existing machinery would be about 720,000 t/a and 92 t/h.

The grinding energy consumption is around 17 kWh per milled tonne and the fineness of the grind is around 60 % minus 0.074 mm. The consumption of rods is 100 – 150 g/t and that of balls is 300 – 400 g/t. The balls in the first ball mill have a diameter 35 mm and diameter 50 mm and those of the second ball mill have a diameter 30 mm.

### **12.2.3 FLOTATION**

Due to the difficult nature of the ore, over the years a lot of research and testing activities have been conducted both at laboratory and pilot plant scales, and also at the concentrator leading to a fairly well fine-tuned solution. Therefore, the probability of finding a more favourable flowsheet solution than the existing one cannot be especially high. On the other hand, the concentrator has had several expansion phases, which has caused a variety of different sizes and types of equipments.

The basic idea in flotation is to prepare first a rougher concentrate with some recleaning in acid pulp and then make the final recleaning in alkaline pulp.

Rougher and scavenger circuits consist of four banks of OK 16 flotation machines (one bank = four flotation machines, each having four 16 m<sup>3</sup> cells). The rougher concentrate is cleaned once and the scavenger concentrate is cleaned twice. The concentrates of these two stages form the bulk sulphide concentrate, which is further processed in pyrrhotite separation circuit. This circuit is the tool to control the final nickel grade of the concentrate (- and nickel recovery!) and also the Fe:MgO ratio. It also enables the concentrator to produce simultaneously two qualities of nickel-copper concentrates for certain market conditions.

The bulk flotation takes place at pH 5 – 6 by sulphuric acid, which besides pH modification (natural pH of ore is 9.5) has also a dispersing effect on the slurry. The pH of the pyrrhotite separation circuit is 10 – 11, which is controlled by the addition of lime.

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The usage of reagents:

Sulphuric acid	5 – 10 kg/t
Sodium ethyl xanthate	200 – 400 g/t
Raw Pine oil	0 – 350 g/t
Lime	200 – 500 g/t
Depressant ( starch )	10 – 200 g/t
Copper sulphate	10 – 30 g/t

#### **12.2.4 DEWATERING**

There are two thickeners available for concentrate thickening; the thickeners are situated outside the concentrator building and are covered. Just now, when one concentrate only is produced, the bigger one (25 m in diameter) only is in use. The thickened pulp is pumped into a LAROX PF 22/25 pressure filter. The filter cake has a moisture content of 8 – 12 %. The capacity of the concentrate storage is 2500 tonnes.

#### **12.2.5 INSTRUMENTATION AND PROCESS CONTROL**

Before the recommissioning of the mine the concentrator had normal basic instrumentation with in addition two Courier 30 on-stream analysers. The process was controlled by a Proscon 210 and a Proscon 2100 NT system.

The Courier 30 analysers were identified as items of high economic risk. This equipment was old and Outotec does not guarantee the availability of critical spares anymore. As part of the recommissioning capital a Courier 5i SL on-stream analyser was ordered from Outotec. After a 3-month delivery period the analyser was installed in September 2010. Due to more accurate analysis, chemical consumption in the plant is expected to decrease and recoveries to improve. The equipment has been bought on a “rent to buy” basis.

#### **12.2.6 PERSONNEL AND ORGANIZATION**

The crushing plant works on two shifts during weekdays and one shift on weekends. The crushing is controlled from the central control room of the concentrator. The ore transportation contractor is responsible for the operation of the crushing plant; there is also a man from the concentrator organisation in day shift work on weekdays.

The concentrator and the laboratory employ a total of 26 persons. The concentrator is in continuous operation with two men per shift. There is a metallurgist as the mill superintendent, a general foreman for process, 11 process workers, a maintenance foreman, 9 maintenance workers and 3 laboratory assistants.

#### **12.2.7 PROCESS PERFORMANCE**

Production data and process performance for the years 2003-2008 have been presented in Table 12.1 and Table 12.2

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	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Feed t/h	85,9	86,0	86,4	84,9	84,9	88,7
Opex €/t	5,35	5,56	5,89	5,89	7,62	9,02
Energy kWh/t	36,7	36,6	36,5	39,9	37,5	36,6
% -0,074 mm	59,8	57,7	57,3	58,0	58,9	55,6
Rods g/t	144	148	135	178	142	171
Balls g/t	330	307	331	361	331	381

**Table 12.1 Processing plant production data 2003- 2008.**

	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Ni % Ore	0,63	0,63	0,59	0,54	0,64	0,63
Ni % Conc	8,56	8,52	8,53	7,54	7,56	7,89
Cu % Conc	2,24	1,89	2,06	1,70	1,82	2,11
MgO% Conc	7,61	7,12	7,60	7,57	7,10	5,27
Fe % Conc	35,8	36,8	38,2	38,0	39,3	40,59
Ni Rec	65,4	66,5	64,0	63,7	66,9	64,1
Cu Rec	49,6	42,3	41,9	39,6	42,2	44,3

**Table 12.2 Processing plant performance 2003-2008**

### **12.3 Processing plant equipment condition**

The machinery of the concentrator is mainly in good condition. It is probable that most of the equipment will need nothing but the normal routine maintenance for the oncoming years of production. The most expensive individual object will be the renovation of the dust protection system at the crushing plant, which is planned for year 2011.

### **12.4 Tailings management**

Hitura tailings belong to the easiest ore tailings in Finland. One of the negative characteristics of Hitura ore for flotation, the strong ability to flocculate, is a positive characteristic for tailings deposition. Hitura concentrator tailings easily form strong solid layers and thus enable the use of tailings itself as the dam material. The ore does not contain any particularly hazardous components, and the reagents used are not especially poisonous. The tailings water clarifies easily, and there have not been any problems caused by the Hitura tailings waters in the surrounding water system (e.g. Kalajoki River).

Hitura mine has used the down stream method to deposit its process tailings. The tailings are spread via spigots inside the dams and when the solids level is high enough, the dams are upraised by the settled solids.

## **12.5 Processing operating cost estimate**

The Hitura concentrator has run already for almost four decades, which means, that on one hand the behaviour of the ore is quite “well known” and on the other hand there is a necessary concern over the age and state of the machinery. Keeping the equipment running requires continuous maintenance but at the moment no major replacements or overhauls are needed (other than the previously installed on-stream analyser). The mill operating cost has been estimated to be 10.0 €/ton.

## **12.6 Process risk assessment**

The probability for production stoppages or serious process disturbances in general is quite low at Hitura concentrator.

At the crushing plant the worst case would be the total breakage of one of the crushers and even in that case the production can be managed back to normal level in less than in 2 to 4 weeks’ time by hiring a mobile crushing station.

At the grinding the worst possible case would be the total breakage of one of the mills. If the breakage concerns one of the ball mills, the production can be continued with the rod mill and one ball mill in one to three days at some 60 – 70 % of the normal throughput. If the breakage concerns the rod mill, the production stoppage would take some three to five days and then continue at the 60 – 70 % level of the normal throughput. – The delay to return back to the 100 % normal grinding would not take more than one to three months. The mine has an agreement with the neighbouring Pyhäsalmi Mine of Inmet concerning the spare mill motor of 500 kW.

In the flotation section the longest possible production stoppages would be some days at most, for example due to the large number of the same size machine units.

In thickening the total failure of the rake mechanism could stop thickening in that thickener for some weeks, but on one hand there is a spear thickener at the concentrator and on the other hand the total failure of rake mechanisms in small thickeners is a really very rear incident.

Failures in the pressure filter cannot create long production stoppages, because there are spare parts and filters available from the factory of the manufacturer in Lappeenranta in Finland.

The probability for such a tailings dam breakage, which could lead to the stoppage of production, is deemed to be low.

The main transformer station was out of service when the mine was under care and maintenance. The transformer was repaired ahead of recommissioning the mine and at the same time the transformer was serviced.

## **13. ECONOMIC ANALYSIS**

### **13.1 Markets and Off-take agreement**

Hitura Mine has periodically produced two different type of nickel bulk concentrate – a low grade concentrate marketed to CIS (Montshegorsk smelter) and a higher grade concentrate which was sold to the Harjavalta Ni-smelter, then owned by Outokumpu Oyj and from 2002 by New Boliden AB.

For the last few years, the Harjavalta smelter has been operating as a toll smelter and OMG Harjavalta Nickel Oy has been responsible for concentrate purchasing from Hitura. The Harjavalta nickel-smelter has delivered all nickel-matte to the nickel refinery owned by OMG Harjavalta Nickel Oy. In December 2006, OM Group Inc of USA sold Harjavalta Nickel refinery to MMC Norilsk Nickel, which also owns and operates the Montshegorsk-smelter.

The concentrate off-take agreement between Hitura Mine and OMG Harjavalta Nickel expired in June 2008.

Currently the mine has an 18-month offtake agreement in place with Jinchuan Group Ltd. This is denominated at a fixed floor price for nickel in euros, with a provision for upside nickel price participation. The contract can be extended by mutual consent of both parties.

### **13.2 Contracts**

Hitura Mine has a long history of using contractors for some of the underground mine and also for surface works. The mine has used contractors to have extra capacity for the deepening of the underground mine or on more permanent basis with loading and hauling.

Contracts are in place with the following companies:

<b>Contract</b>	<b>Company</b>
Loading and transport agreements of waste and ore	Kiviralli Oy
Drifting and bolting	Pohjolan Kalliotyö Oy
Transportation of supplies	H Suihkonen Oy
Mixing and transportation of the shotcrete	H Suihkonen Oy
Repairs and maintenance of the LDV fleet	Nivalan Autopaja Oy
Transportation of concentrate	H Suihkonen Oy
Canteen catering	K Antell Oy
Occupational health and safety care	Jokilaaksojen Työterveys Oy
Phone connections, mobile phones and data connections	PPO Oy
Bookkeeping and payment of invoices	J.Castren Oy
Housekeeping of the offices and buildings	Lapuan Konepalvelu KTK

**Table 13.1 Contracts**

Agreements have been negotiated for the supply of utilities and consumables such as:

- Water supply, Nivalan Vesi Oy, Töllinperä water consumer co-operation
- Purchase of fuels and lubricants
- Purchase of production consumables
- Process chemicals
- Sulphuric acid
- Grinding media, rods and balls
- Explosives, cords and caps
- Purchasing of the drill bits and rods
- Cement

Power is delivered to the mine site with 110kV line, which is owned by the mine.

Mine heating energy (oil) used to be supplied by Fortum Power. Possibilities to reduce the cost of mine heating are currently under investigations.

Because there is such a good potential to increase the resources and reserves at Hitura mine it is worth mentioning that Nivalan Timanttikairaus Oy has shown interest to be considered again as the preferred supplier for underground exploration works.

### **13.3 Taxes**

Taxes have been excluded from this evaluation.

### **13.4 Mine Life and Economical Summary**

Hitura mine has an offtake agreement in place with Jinchuan Group Ltd for an 18-month supply of concentrate. The current Life of Mine plan is therefore based solely on 18 months of production.

The economic result of the mineplan is summarised in the Table 1.2:

<b>Mine Plan Economic result</b>	
	18 month contract Jul. 2010 - Dec. 2011
Mine life in months	18
Total ROM Production Mt	725 000
Ni-grade	0.67%
Total Ni production tonnes	3 219
Ni-price USD/tonne	20 925
CAPEX and Opening costs €	1 260 000
OPEX €/tonne	37.32
Non-discounted Value €	5 900 000

**Table 13.2 Economic results**

It should be noted that, if both Belvedere Mining Oy and Jinchuan Group Ltd agree, the offtake agreement could be extended. In this case the total current reserves of 1,322,000 ROM tonnes could extend the Life of Mine up until January 2013.

It is most likely that significantly more reserves can be identified by infill drilling of resources. The life of the mine therefore can be extended further as long as 150m of underground development is

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done per month. An annual capital expenditure of 500 000 euros is required for an overhaul programme of the aging equipment if production continues beyond the current 18 month plan. The break-even Nickel price at which the mine will be able to remain in operation therefore has been calculated to be 8.05 US\$ per tonne lb.

Extended life break even price calculation	
ROM / annum	540 000 tonnes
Ni grade	0.67 %
Development	150 metres per month
Continuous exploration	3.00 €/t
Stay in business capital	500 000 € / annum
<b>Break even price</b>	<b>8.05 US\$ / lb</b>

**Table 13.3 Break-even price calculation**

The economic success of the mine depends on meeting the budgeted production requirements and keeping the operating costs down. Due to the fixed Nickel price the economic risk has been reduced significantly.

## **14. ENVIRONMENTAL CONSIDERATIONS**

### **14.1 Tailings Storage Facility capacity and expansion**

Hitura Mine has three tailings storage facilities (TSF) with a total area of ca 95 hectares. The total amount of tailings deposited to the TSF to date is about 7.5 million m<sup>3</sup>. The capacity of the settling ponds and final recirculation water clarification basins is about 0.5 million m<sup>3</sup>. The whole area, inclusive of settling ponds, recirculation water basin and circumference ditches is about 117 hectares.

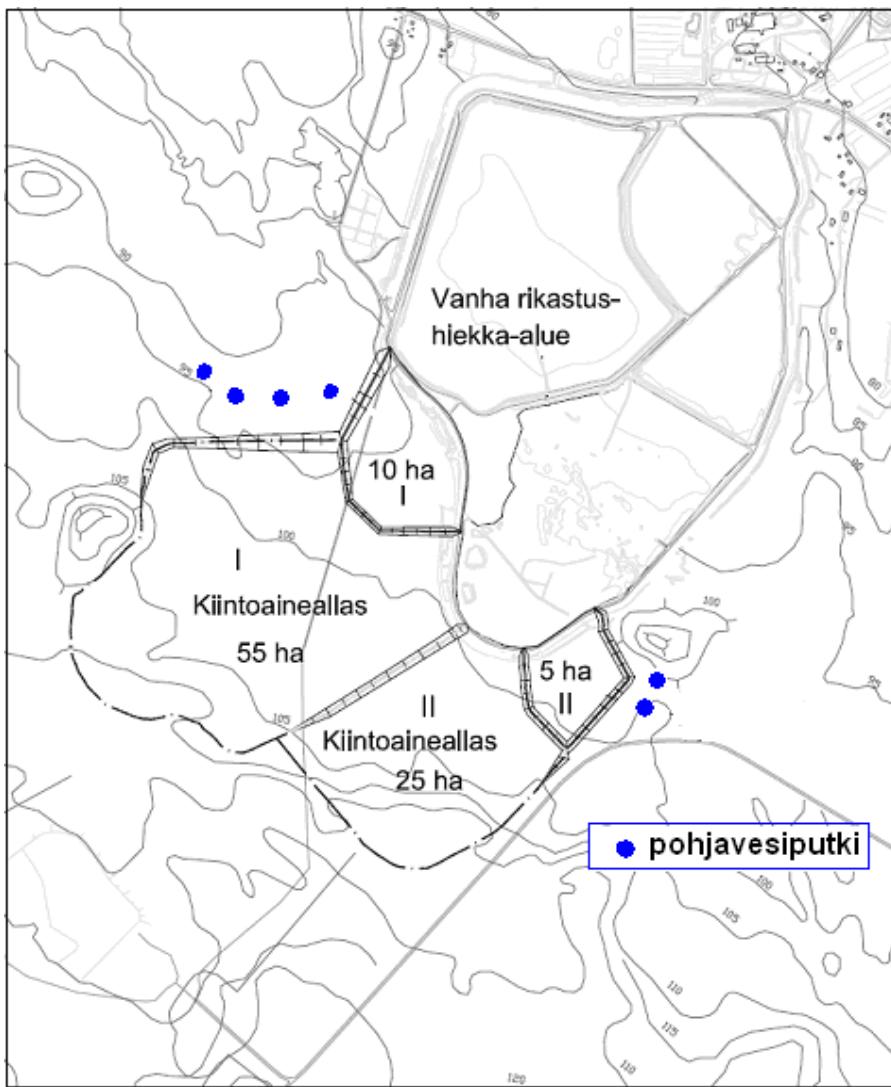
The tailings storage facilities are located partially over a buried esker with good hydraulic conductivity, so sulphate and metal contaminated water has polluted the surrounding ground water to some extent.

A new environmental permit for the Hitura Mine was issued on 13<sup>th</sup> August 2010, and came into force on 13<sup>th</sup> September, 2010. This permit replaced the existing permit which was valid until November, 2010. The environmental permit covers all environmental aspects of the Hitura Mine site, including the deposition of tailings in the TSF and the ultimate rehabilitation of the site on closure.

Under the terms of the new environmental permit, the height of the old TSF can be raised by approximately 1.5 metres (N60 +108), this will extend the life of the old TSF to 4 years (2014) at current production levels. The permit also allows the construction of two new TSF areas of 65 hectares and 30 hectares. Rehabilitation of the old TSF has to start within 1 year after the new TSF has been put in place. The construction of the new TSF requires the approval of the new mining concession application, which is currently pending.

Part of the new TSF extensions are designated for different ore types with the aim of processing gold ores, such as from the nearby Kopsa deposit. Application for the final environmental approvals for processing gold ores can only be made once the metallurgical characteristics of the ore and tailings and the processing methods have themselves been finalised; a process which is currently underway. If the ongoing studies support the processing of Kopsa gold ore at Hitura, a permit addendum will be required.

Total cost of the capacity increase for both the 65 ha and 30 ha new TSF areas has been estimated to be ca 4.5 M€ excluding dam heightening and final closure and landscaping.



**Figure 14.1 Location of the new TSF areas**

The new Environmental Permit has increased the environmental bond by an initial €475,000 to €2.0 million. Additional bonds totalling €1.5 million are required in €500,000 stages, starting with the onset of construction and prior to use of each of the new TSF areas.

## **14.2 Environmental problem areas**

A couple of years ago TSF seepage water polluted ground water to some extent. Polluting elements have been Ni and SO<sub>4</sub>. This is due to inadequate ground survey and construction methods of the tailings area as it has been partially constructed over the hidden esker.

During the last few years the mine has made rectifying construction works by digging a deep ditch to the bedrock and filling this with clay. The construction work seems to have been successful as the polluted ground water area is diminishing.

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However, the mine has the obligation to deliver drinking water to Töllinperä water cooperative and ultimately to replace a polluted ground water well owned by Töllinperä water cooperative.

Dusting around the crushing station is a problem, which must be rectified. This is planned for 2011. Improved dust control will also reduce local noise level, which has been the subject of some complaints over the years.

### 14.3 Closure plan and cost estimate

The estimate of the work and costs needed for the “final closure” plan as stipulated in the currently active environmental permit are presented in Table 14.1

With re-opening of the mine in 2010, and as required by the new environmental permit, a new closure plan is to be developed by the end of 2011, and these works and cost estimates will have to be audited by an independent consultant and approved by the environmental authorities.

For now the total rehabilitation cost as shown in the closure plan, previously developed by Outokumpu, is considered to be a “best guess” estimate.

IN CASE OF THE MINE WILL BE CLOSED DOWN IN THE END OF JUNE 2008													
ESTIMATED REHABILITATION COSTS AND RESERVES (1000 Euro)													
YEAR	actual	actual	actual	actual	actual	plan	plan	plan	plan	plan	plan	plan	Total
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011		
<b>EXPENSES</b>													
Covering and seeding of tailings dam area								-300	-800	-800	-20	-1920	
Shaping of waste rock piles								-100				-100	
Ground water and seepage flow control, treatment and monitor	-72	-168	-93	-38	0	-50	-50	-50	-30	-20	-20	-571	
Open pit and underground mine (sales return of mobile equipment fleet is included)							-180	-150				-330	
Demolition works in underground								-150				-150	
Removal of the mill plant (a scrap value is taken into account)								-200	-100			-300	
Soil reconditioning in the mill areas								-150	-50			-200	
Service buildings, warehouse and concentrate stores removal								-80				-80	
<b>TOTAL</b>	0	-72	-168	-93	-38	0	-50	-1210	-1150	-830	-40	-3651	
Costs index 2.5 %								1.000	1.025	1.051	1.077	1.104	1.126
Indexed costs	0	-72	-168	-93	-38	0	-50	-1240	-1208	-894	-44	-3807	
<b>RESERVES IN THE BALANCE SHEET</b>													
Increase in reserves	342	1412	0	0	38	50	50	0	0	0	0	0	
Actual and estimated rehabilitation costs	0	-72	-168	-93	-38	0	-50	-1240	-1208	-894	-44	-3807	
Reserves in the beginning of the year	2038	2380	3720	3552	3459	3459	3509	3509	2269	1061	167		
Reserves in the end of the year	2380	3720	3552	3459	3459	3509	3509	2269	1061	167	123		
<b>PRODUCTION 1000 TONNES ORE</b>	457	606	648	658	646	610	610	300	0	0	0	4535	
<b>Rehabilitation cost payments</b>	0	-72	-168	-93	-38	0	-50	-1240	-1208	-894		-3763	

**Table 14.1 Closure plan and cost estimate as previously developed by Outokumpu**

## **15. ADJACENT PROPERTIES**

### **15.1 Land ownership**

The land property and mining concession with auxiliary areas owned by Belvedere / Belvedere Mining Oy is surrounded by several hundreds of small plots of land. This is due to general parcelling out of land in Finland, which took place in the late 1800's. In the general parcelling local farmers were given long and narrow lots of land, which included the shore of Kalajoki-river, adjacent farmlands, and forest further away from the river. Lots were typically 200-400 metres wide and up to 5 -10 km long. Afterwards these narrow pieces of land have been cut to shorter sections as the original owners have died and successors inherited the land property.

This complicated landowner structure can potentially lead to a difficult and timely process if new land property is needed to be purchased for the operations. However, the current land ownership is deemed to be adequate for the operations whilst using the existing TSF, and after it has been raised.

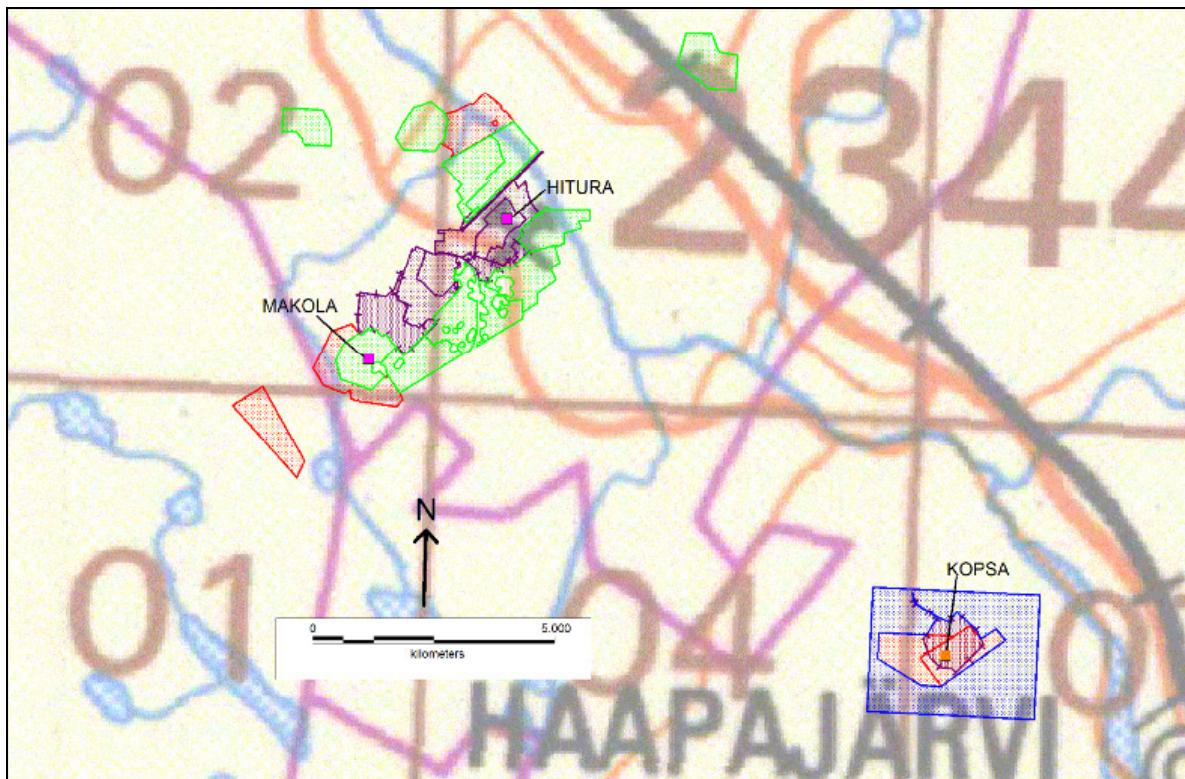
Raising the existing TSF area will extend its life to four years of production, and will allow Hitura mine to complete any land purchases and construction of the new TSF areas. Land owners within the mining concession receive annual compensation, determined by independent parties and based on normal land and forest prices.

### **15.2 Mineral rights**

Belvedere Mining Oy and Hitura Mine have exclusive mineral rights for the major part of the Hitura massif. Only the southwestern corner of South Hitura falls out of the mining concession, which is owned by Belvedere Mining Oy (see Figure 6.1). An application to extend the mining concession over this area has been submitted, and a decision by the Ministry is pending.

Belvedere Mining Oy has applied for a further 7 claims surrounding the Hitura mine. Also three other claim applications near the Hitura mine has been made by Belvedere Mining Oy. A decision by the Ministry for all these applications is pending. Magnus Minerals Oy has two claims near Hitura (Fig. 6.1 and 16.1).

Belvedere Mining Oy has a mining concession application, 2 claims and one claim reservation over the Kopsa Au-mineralisation some 13 km South-East from the Hitura mine (Figure 15.1). The mining concession is shown in light purple, the mining concession application is in dark purple, claims are in red, and blue are claim reservations. The base map is shown in the Finnish KKJ zone 2 coordinate system.



**Figure 15.1 Hitura area tenements and Kopsa Au tenements as of 13.8.2010.**

## 16. PERSONNEL

Re-commisioning of the mine has created a total of 128 jobs. The Hitura mine employs 68 workers, 21 staff members, and has 39 contractors.

The main contractors have the following numbers of employees:

<b>Contractor</b>	<b>Duty</b>	<b>Number of employees</b>
Jarkko Ralli Oy	Mucking and trucking services	15
Hannu Suihkonen Oy	Concrete and concentrate transport	12
Mitta Oy	Mine surveying	2
Pohjolan Kallityö Oy	Drifting and bolting	10

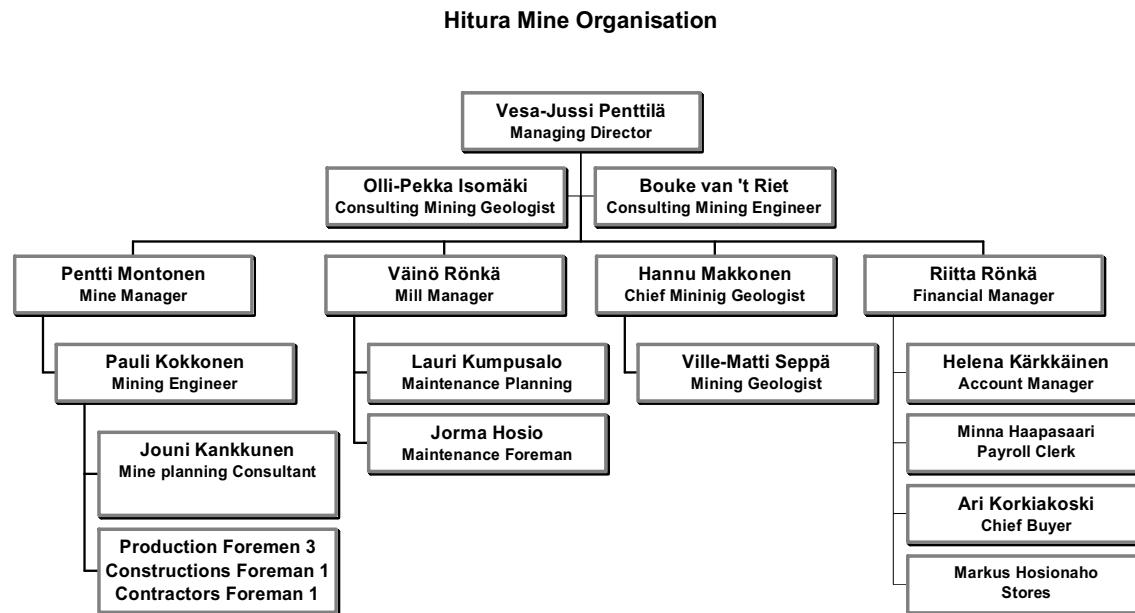
**Table 16.1 Contractor employees**

Streamlining job responsibilities and the suspension of the apprenticeship scheme has resulted in a 15% saving in labour costs.

Shortage of qualified miners, mine- geologists and engineers, and metallurgists in Finland might be a problem for Hitura mine if production continues. If the mine is able to extend its life beyond the 18-month contract an apprenticeship scheme is to be set up and there should be a strong focus on on-the-job training of operators. Vesa-Jussi Penttilä has been Managing Director since April 2010

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The Hitura mine organization is presented in Figure 16.1



**Figure 16.1 Hitura organisation**

## **17. OCCUPATIONAL HEALTH AND SAFETY**

### **17.1 Organization**

Consenting the Finnish law, Hitura Mine has its own health and safety committee, which is lead by the mine General Manager. Other members are Health and Safety officer and delegates from the different employee groups. The committee has meetings four times annually.

In general health and safety responsibility has been delegated to different line organizations, where the overall responsibility lies with the line manager.

There is a qualified nurse visiting the mine every week.

The mine is in compliance with all Finnish regulation regarding health and safety.

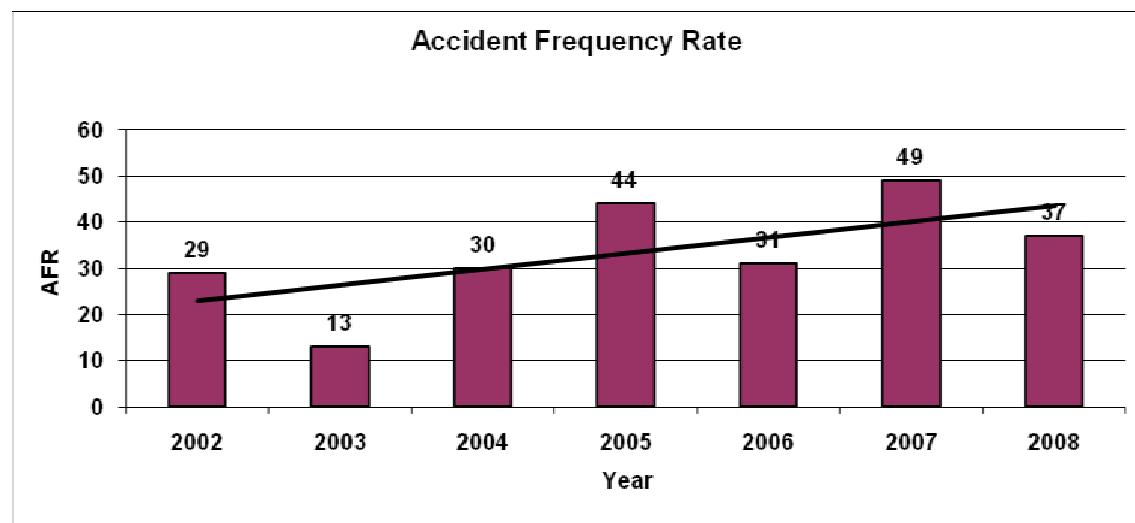
## 17.2 Safety

Accident and close call statistics are collected regularly and records are in good order. Overall accident frequency is presented in Table 17.1. All figures include contractors hours and accidents.

In 2009 the mine was under care and maintenance and the staff consisted of one financial controller, a plant- foreman and electrician, a mine electrician and a mine mechanic. No accidents occurred during this period.

	2002	2003	2004	2005	2006	2007	2008	2009
Working hours	240 316	227 807	235 946	229 313	224 755	242 567	243 611	N/A
Accident number	7	3	7	10	7	12	9	N/A
Accident frequency rate	29	13	30	44	31	49	37	N/A

**Table 17.1 Accident statistics 2002-2009**



**Figure 17.1 Historic accident frequency rates**

Over the past 8 years the accident frequency rate has been high when compared to international standards although it is lower than average for all industrial work in Finland. There were two fatalities during the 1990's in the Hitura underground mine.

Figure 17.1 shows that in the period between 2002 and 2008, there was an upward trend in accident frequency rates. Belvedere Resources holds the health and safety of employees, contractors and visitors as a core value of the company and is committed to continuous improvement with regards to safety. In order to re-iterate the importance of safety all employees and contractors have signed a safety pledge, and the mine will drive various safety awareness campaigns on an ongoing basis. All employees have had “Occupational Safety Card” training. The mine is in compliance with all Finnish regulation regarding health and safety.

## **18. INTERPRETATION AND CONCLUSIONS**

The Hitura mine is an ageing low-grade nickel mine that has been in operation for almost 40 years.

Before Belvedere / Finn Nickel bought the mine from Outokumpu in 2007 there had been very limited interest to develop and secure mine production further. Finn Nickel invested heavily in increasing the reserves and resources (and hence life of mine) in North Hitura but due to low Nickel prices the company went into voluntary bankruptcy in 2009. In 2010 Belvedere Mining Oy bought the mine from the bankruptcy estate and an 18-month offtake agreement with Jinchuan group Ltd. was secured at a fixed Nickel price.

Because of this agreement the current life of the mine is secured up until December 2011. The current offtake agreement can be extended (if agreed by both parties) and current proven and probable reserves would extend the life of the mine up until January 2013. In addition, further infill drilling would have a very high likelihood of converting the 2.4 Mt of Measured and Indicated Resources into Reserves, thereby extending the life of the mine by a further 4 years

Furthermore, there still exists a good potential for additional mineral resources at depth in North Hitura, and in the South-, and Middle Hitura intrusions. The ongoing viability of the Hitura Mine is most sensitive to the nickel price and operating costs.

## **19. RELEVANT DATA AND INFORMATION**

The Qualified person is not aware of any other relevant information regarding the Hitura mine.

## **20. RECOMMENDATIONS**

Exploration should continue at depth, in Middle, and South Hitura to potentially provide a 3<sup>rd</sup> production area. This would reduce operating costs and would enable the mine to produce at full plant capacity.

## **21. REFERENCES**

Hitura kaivoksen vuosikertomus 2004 (Hitura Mine annual report 2004, in Finnish)

Hitura kaivoksen vuosikertomus 2005 (Hitura Mine annual report 2005, in Finnish)

Hitura Mine Geological Database

Hitura Mine PowerPoint presentations

Hitura Mine brochure

NI 43-101 Technical report “Updated Reserve and Resource Estimate of the Hitura Nickel Mine In Central Finland” April 3<sup>rd</sup> 2008.