A FEASIBILITY STUDY GAP ANALYSIS FOR THE LUDVIKA IRON ORE PROJECT, SWEDEN

Prepared For

Nordic Iron Ore AB

Report Prepared by

srk consulting

SRK Consulting (Sweden) AB

SE511/U6006

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EXECUTIVE SUMMARY
A FEASIBILITY STUDY GAP ANALYSIS FOR THE LUDVIKA IRON ORE PROJECT, SWEDEN

1 INTRODUCTION

This report has been prepared for Nordic Iron Ore AB ("NIO", or the "Company") and outlines a Feasibility Study ("FS") gap analysis completed for the Mineral Assets of the Company comprising the Blötberget deposit, located in Sweden. The Blötberget deposit is part of the Ludvika Iron Ore Project ("Ludvika", or "LIOP"), along with the Håksberg and Väsman-Finnäset deposits. SRK was requested to provide a gap analysis report and schedule for all critical aspects of Blötberget in order to highlight the additional work required to produce a FS to international reporting standards and a reasonable time frame for this.

2 WORK UNDERTAKEN BY SRK

During the week of 13 – 17 May 2014, consultants from SRK's offices in Skellefteå and Cardiff attended a 3-day site visit to review the geology first hand, inspect existing surface infrastructure, collect available data and discuss the Project in detail with the Company and key contractors and consultants previously involved with the PEA and recent studies.

Subsequent to this site visit, a desktop review of the available data was carried out in order to determine the necessary work and likely time frame to advance the Project to a feasibility level of study. This report and attached schedule (Appendix B) presents SRK's findings by discipline.

3 CONCLUSIONS AND RECOMMENDATIONS

Table ES 1 below summarises the key recommendations made by SRK for each critical aspect and their current status and estimated completion date.

Table ES 1: SRK Recommendations and current progress / status

Gap Identified	Current Status	Estimated Completion Date	Priority Level
Geology			
Infill drilling in the upper levels of Hugget and in the 'pillar' and 'wedge' areas between Hugget-Betsta and Kalvgruvan-Flygruvan. The aim is to increase Mineral Resources by identifying new mineralisation, along with upgrading currently Inferred Mineral Resources.	Planned May-September 2014	30 August 2014	Very high
Waste lithology density measurements to be taken.	Planned for May-September 2014	October 2014 following drilling	High
Database to be verified, with drilling year, core size, sample size, and quality index inserted.	On-going	October 2014 following drilling	Very high
Geological (lithological and structural) modelling to be undertaken for use in block model, and to apply to mining, metallurgical, geotechnical and hydrological studies. Additionally, the Satmagan and deleterious elements (and possibly grain size) may identify new domains for the grade interpolation; therefore new wireframes may be required.	Planned for September / October 2014	October 2014 following drilling	Very High
Updated block model (produced to international standards) for use in resource and reserve estimations, mining, metallurgical, geotechnical and hydrological studies. Include block size sensitivity, QKNA, cut-off grade analysis update. A detailed and transparent Mineral Resource estimation report must be completed to accompany the work undertaken.	Planned for September / October 2014	October 2014 following drilling	Very High
Interpolation of deleterious element grades (e.g. P, S, SiO_2, Al_2O_3, Mn, MgO, TiO_2) and Satmagan readings into block model. Magnetite:haematite ratios (calculated from Satmagan / Fe Total grades) and deleterious elements to be used to define ore type (e.g. mineral processing, mine scheduling)	Planned for September / October 2014	October 2014 following drilling	Very High
Calculation of Fe recovery to be inserted into the block model based on regression formula of Fe Total vs Fe Recovery (from DTR analysis). Fe recovery can be used in Ore Reserve estimation.	Not currently planned	October 2014 following drilling / DTR analysis	High
All historic drillholes found to be re-assayed for verification of historic data and to include sections <30% Fe. Additionally, all historic drilling added to the database and codes added to differentiate between historic, modern and re-assayed holes. Verification analysis to be undertaken. Re-assaying core is currently standard practice when found.	On-going	Date unknown. Dependent on number of drillholes found	High
Condemnation drilling to be undertaken in areas of planned surface infrastructure (e.g. process plant, tailings, rail terminal). Bedrock material characterisation - identifies any problematic lithology or potentially mineralised units.	Not currently scheduled	Late 2014	Very high

Gap Identified	Current Status	Estimated Completion Date	Priority Level
Geotechnical			
Rockmass characterisation for caving and subsidence assessment. The current Q based rockmass classification system is not suitable for the proposed longitudinal SLC mining method and caveability assessment in the opinion of SRK. The planned infill drill program requires a logging system to geotechnically log undisturbed drill core to RMR (1990) or MRMR/IRMR (2001) rockmass classification schemes.	Not currently planned	June to September 2014	High
Geotechnical model development which is also to be complimented with geological structure model in order to domain the rockmass. This is a critical input into geotechnical, mining and hydrogeological studies.	Not currently planned	October 2014 following drilling	High
Mining induced fracturing and surface subsidence numerical modelling. Three-dimensional recognised approaches (at FS level) to determine the extent and timing of mining induced fracture development is required as an input into geotechnical, mining and hydrological studies.	Not currently planned	October 2014 following drilling	High
Decline access portal site selection review in terms of rockmass and hydrogeological conditions. Portal (and boxcut) excavation design.	Being Planned	November 2014	Medium
Metallurgical / Mineral Processing			
No significant gaps have been identified that are not being investigated as part of the planned processing testwork.			
Infrastructure			
No significant gaps have been identified that are not being investigated as part of the planned work.			
Mining			
Lack of Prefeasibility Study to define the technical solutions to be refined in Feasibility Study and provide economic justification based for the technical solutions to be applied	On-going, currently scoping level	October 2014	Very High
Finalised mining method based on geotechnical inputs	On-going	October 2014	High
Finalised approach to materials handling	On-going	October 2014	High

Gap Identified	Current Status	Estimated Completion Date	Priority Level
Estimation of economic cut-off grade	Waiting on selection of mining method	October 2014	Low
Estimation of potentially mineable Resources to be based on Indicated and Measured Resources only and individual stope shapes	Waiting on final block model	October 2014	Medium
Finalised approach to use of contractors/owner operator mining	Contractor budget estimates provided but not used	September 2014	Medium
Detailed breakdown of estimated operating costs	Scoping level assessment	May 2015	Medium
Tailings			
Production of tailings profile to determine the storage methodology, wet versus dry.	Being planned	End-2014	Very High
Geotechnical site investigation.	Being planned	End-2014	Very High
Geochemical testing; no static testing to date.	Being planned	End-2014	Very High
Water balance for TSF.	Being planned	End-2014	Medium
Closure scenario.	Being planned	Start 2015	Low
Hydrology / Hydrogeology			
Hydrological characterisation of the project area: establish a groundwater level monitoring network.	To be implemented	On-going	High
Evaluate surface water/groundwater connection at Glaningen: explore further and, if necessary, investigate with field studies i.e. installation of piezometers close to the lake.	Not currently scheduled	October 2014 following drilling	Low/Moderate
Planning of the pre-development dewatering programme requires more detailed consideration.	Not currently scheduled	Late 2014	Moderate

Gap Identified	Current Status	Estimated Completion Date	Priority Level
Estimation of groundwater inflow: hydrogeological testing work is required as part of the planned 2014 drilling programme (to include spinner testing and packer testing with conversion of holes to groundwater level monitoring installations). This should be followed by analysis and development of a numerical groundwater model. The crush zone identified in The Wedge requires particular study.	Planned for September / October 2014	October 2014 following drilling	Very High
Hydrological implications of historic SLC: the geotechnical investigation into induced fracturing as a result of historic SLC should also have a hydrogeological component.	Planned for September / October 2014	October 2014 following drilling	High
The design of all storm water infrastructure requires review against design storm events to ensure these facilities are sized sufficiently.	Not currently scheduled	Late 2014	Moderate
The project water balance requires review and updating in accordance with any changes to process water requirements, life of mine consideration, TSF design etc.	Not currently scheduled	Late 2014	Moderate
Geochemistry			
Complementary phosphorus assessment for tailings, with numerical prediction of impacts;	Not currently scheduled	October 2014 following trial processing tests	Low/Moderate
Long term humidity cell testing or reassessment of certainty of the results from the short term humidity cell test;	Not currently scheduled	October 2014 following trial processing tests	Moderate
Complementary assessments about potential need of additive water treatments for nitrogen compounds	Not currently scheduled	Late 2014	High
Risk assessment related to historical contaminated soils.	Not currently scheduled	Mid 2015 following mining study	Low/Moderate
Environment and Social			
Rescaling and reviewing closure costs and potentially updating closure strategy	Not currently scheduled	Mid 2015 following mining study	High
Rescaling and reviewing air emissions and reconsideration impact prevention measures according to final alternative.	Not currently scheduled	October 2014 following processing design	Low/Moderate

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A FEASIBILITY STUDY GAP ANALYSIS FOR THE LUDVIKA IRON ORE PROJECT, SWEDEN

1 INTRODUCTION

1.1 Background

SRK Consulting (Sweden) AB ("SRK") is an associate company of the international group holding company, SRK Consulting (Global) Limited (the "SRK Group"). SRK has been requested by Nordic Iron Ore AB ("NIO", hereinafter also referred to as the "Company" or the "Client") to undertake a Feasibility Study ("FS") gap analysis for the Mineral Assets of the Company comprising the Blötberget deposit, located in Sweden. The Blötberget deposit is part of the Ludvika Iron Ore Project ("Ludvika" or "LIOP"), along with the Håksberg and Väsman-Finnäset deposits. SRK was requested to provide a gap analysis report and schedule for all critical aspects of Blötberget in order to highlight the additional work required to produce a FS to international reporting standards and a reasonable time scale for this.

Ludvika is located in Dalarna Län (County) in central Sweden, within the historic and still-active Bergslagen mining district. Blötberget, Håksberg and Finnäset were all mined historically up until 1979 using open pit and underground methods; Väsman is a greenfield deposit, located under lake Väsman in between Blötberget and Håksberg. All areas were explored significantly in historic drilling campaigns. The final production capacities achieved in 1979 at Blötberget and Håksberg were 400 Ktpa (thousand tonnes per annum) and 600 Ktpa of ore, respectively.

SRK completed a technical review of the geology and Mineral Resources of the Ludvika Project in April 2013, with an update in December 2013. The results of the commissions were a set of recommendations for NIO to improve the quality of the Mineral Resource estimate. SRK understands that NIO has implemented the recommendations where and when possible and as a result the quality of the latest Mineral Resource estimate has been improved.

1.2 Work Undertaken by SRK

During the week of 13 – 17 May 2014, consultants from SRK's offices in Skellefteå and Cardiff attended a 3-day site visit to review the geology first hand, inspect existing surface infrastructure, collect available data and discuss the Project in detail with the Company and key contractors and consultants previously involved with the PEA and subsequent studies.

Subsequent to this site visit, a desktop review of the available data was carried out in order to determine the necessary work and likely time frame to advance the Project to a Feasibility level of study. This report and attached schedule (Appendix B) presents SRK's findings by discipline. Table 1-1 below presents the SRK specialists responsibility by discipline, internal reviewer and an indication as to which of these was present during the site visit.

Table 1-1: FS Gap Analysis SRK Reviewers

Discipline	Author*	SRK Reviewer (job title)	SRK Site Visit
Geology	NIO / Geovista	Ben Lepley (Consultant Resource Geologist) Howard Baker (Principal Mining Geologist) Johan Bradley (Principal Geologist)	Ben Lepley Howard Baker
Geotechnical Engineering	NIO / Petroteam	Michael DiGiovinazzo (Senior Geotechnical Engineer)	Michael DiGiovinazzo
Mining	NIO / Ramböll / Norconsult	Ryan Freeman (Senior Mining Engineer) Chris Bray (Principal Mining Engineer)	Ryan Freeman
Processing / Metallurgy	NIO / Tata Steel	John Willis (Principal Consultant Mineral Processing / Metallurgy)	John Willis
Tailings	NIO / Ramböll / Golder	Kris Czajewski (Principal Tailings Engineer)	Kris Czajewski
Hydrology / Hydrogeology	NIO / Ramböll / Petroteam	Tony Rex (Corporate Hydrogeologist)	Tony Rex
Environment / Geochemistry / Mine Closure	NIO / Golder / Ramböll	Päivi Picken (Senior Environmental Consultant)	Päivi Picken
Infrastructure	NIO	John Willis (Principal Consultant Mineral Processing / Metallurgy)	John Willis
Technical Economic Modelling	NIO	Maxim Lesonen (Consultant Mining Engineer) Johan Bradley (Principal Geologist)	Maxim Lesonen

**Note: author of latest studies as part of FS*

1.3 Limitations and Reliance

SRK visited the project site, inspected the existing infrastructure and communicated with personnel responsible for each technical discipline. Extracts from internal and public reports, and personal communications between SRK, NIO and its external consultants have been utilised in the report for background information.

This report is based on SRK's review of information made available by the Company and is for NIO's internal use only, as an overview of the current status of the Project and to support NIO's decision making process with regards to future development of the assets. Information regarding the Company's tenure at the Project has been accepted by SRK at face value.

1.4 Definitions

SRK has reviewed the data provided with a view to assessing the current level of detail of study for every critical aspect of a FS. The definitions of FS, along with Mineral Resources and Ore Reserves in the context of this report are in accordance with the guidelines set out in the 2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves as prepared by the Joint Ore Reserves Committee ("JORC Code").

2 PROPERTY LOCATION AND DESCRIPTION

The Ludvika Iron Ore Project is located close to the town of Ludvika, 220 km west-northwest of Stockholm, which is well connected to all major towns and cities in Sweden by road, rail and air. The property location is shown in Figure 2-1.

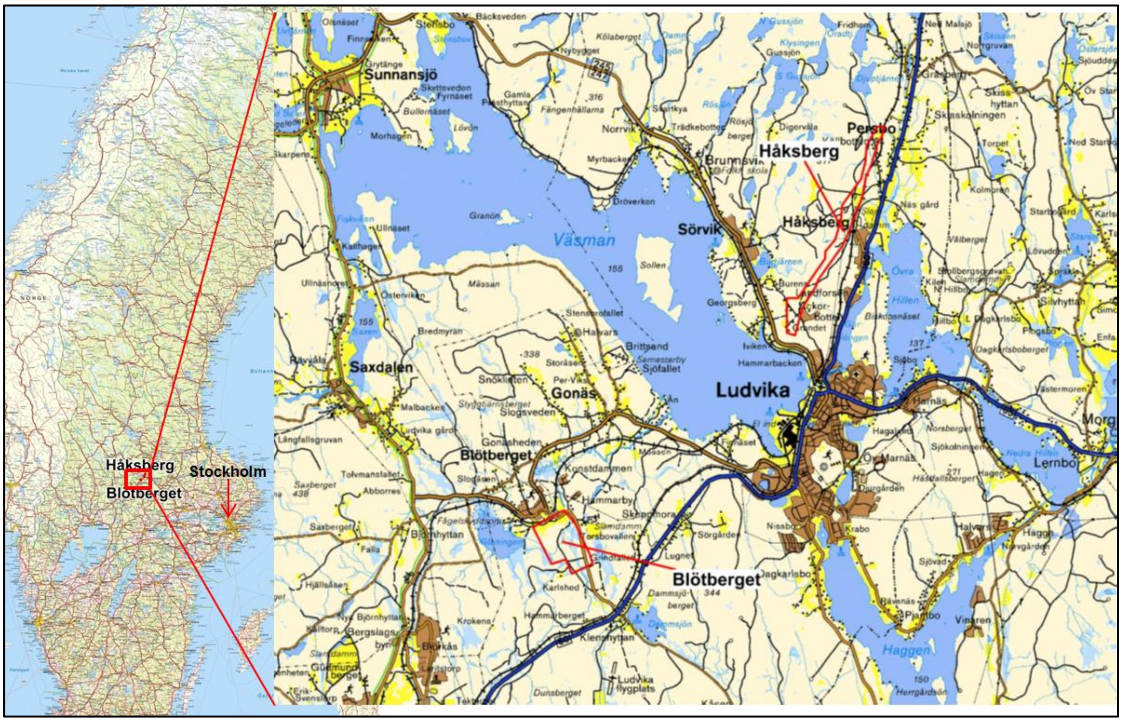

Figure 2-1: Property location showing exploitation concessions in red

2.1 Nordic Iron Ore (NIO)

NIO is a privately owned company and was founded in 2008 through a merger of twelve exploration permits from Kopparberg Mineral AB, Archelon Mineral AB and IGE Nordic AB. Further permits were acquired by the Company in 2009. The LIOP represents the Company's material mineral assets.

2.2 Ludvika Project PEA 2011

The Company completed a preliminary economic assessment ("PEA") which considered re-starting the Blötberget and Håksberg mines in December 2011. The following conclusions were made from the PEA:

- NIO has gained considerable technical expertise in the area and has assembled an experienced development team capable of implementing an iron ore mining project.
- It is favourable to implement a project in a brownfield area with existing above ground, as well as underground infrastructure and services.
- Experience from previous mining operations suggests that high quality products are feasible and that the products will be attractive to the nearby European markets.
- Operating costs to FOB (freight on board) are competitive when compared with other developments.

- Ludvika is a junction point for railway traffic on high specification Swedish mainline railway network. This provides access to advanced logistics to not only get the product to market through several Swedish ports in the East and West, but also to bring in construction and operating raw materials.
- Competitive access to European markets.
- Based on the Indicated and Inferred Mineral Resource of 61.1 Mt (August 2011, Geovista) the estimated mine project was given a life span of about 12 years at a production rate of 5.5 Mt / year.
- The proposed base case with simultaneous dewatering and mining start up in the two mines gives an investment cost of about 2,115 MSEK (excluding project costs) as pre-production costs. During this period of time the mining commences early with mining of about 1 Mt of ore in year 2 and 2.75 Mt of ore in year 3 before the full production rate of 5.5 Mt is reached early in year 4. In order to reach full production an investment level of 2,700 MSEK (excluding project costs) is required.
- The base case with simultaneous development of Blötberget and Håksberg mines is to be considered a “worst case scenario” with regard to investments and construction activities. A detailed optimisation of the proposed mining and process layout with the proposed production level is recommended with the aim of reducing the investments cost as well as plan the geological work in order to transfer the mineral resource to an up-to-date standard.
- Several options are at hand and are proposed below:
    - Geological investigations and re-essays are carried out to confirm the ore reserve prior to the mine development decision.
    - Divide the development of the two old mines; with mining commencing in Blötberget with one line in the concentration plant and then later development of a second line in the concentration plant to accommodate the Håksberg production, and conclude the development for full production of 5.5 Mtpa.
    - Mining commences initially in Blötberget and a development drift to Håksberg is made and then scaled up to a new haulage level to Håksberg. Only one hoisting installation is required adjacent Skeppmora, and may be used for both mines. Final production capacity 5.5 Mtpa.

Since producing the PEA report, NIO have included the Väsman deposit as part of the overall LIOP, which SRK understands the Company intend to consider as part of a long-term development strategy.

2.3 Licences and Permits

2.3.1 Exploration Licences and Exploitation Concessions

NIO received 13 exploration licences in 2009 through the company mergers which formed NIO in addition to three additional permits granted in 2010. These exploration licences were extended by NIO to 2014. All exploration permits in the Blötberget area have extension applications currently pending with the Swedish mining inspectorate (Bergstaten). Exploitation concessions (mining licences) were granted for the Blötberget and Håksberg areas (as shown above) in August 2011, and December 2011, respectively. The concessions are valid for 25 years. A concession covering the Våsman-Finnäset area is being prepared at present.

NIO's currently granted exploration permits and exploitation concessions and expiry dates are shown in Figure 2-2. Also shown is adjacent exploration licence 'Grängesberg nr 5' currently held by Grängesberg Iron AB.

All exploration permits cover the areas of near-future proposed drilling.

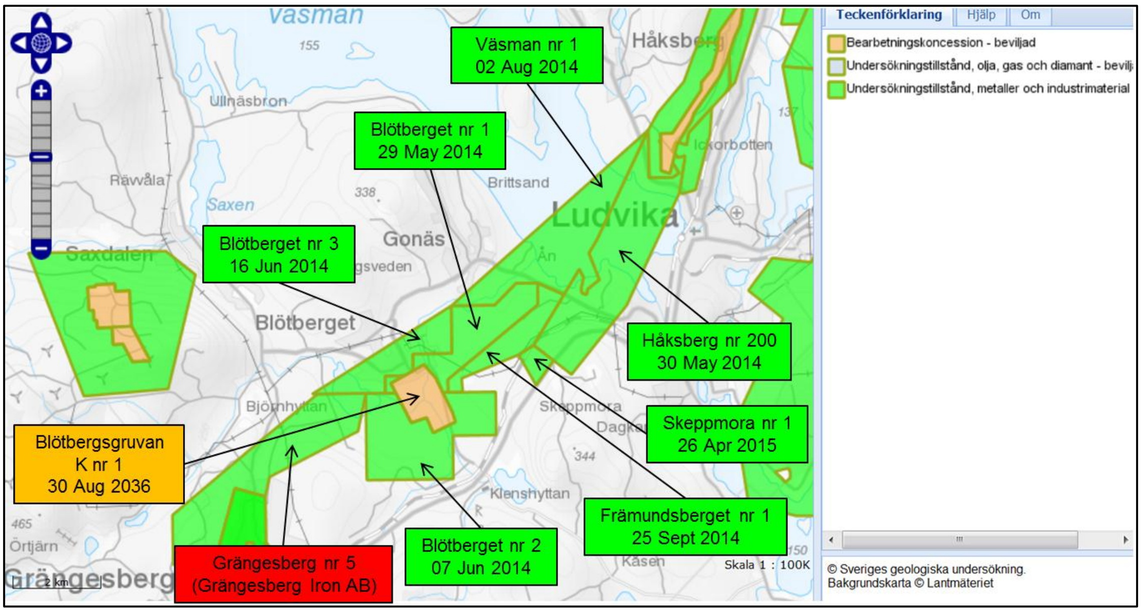

Figure 2-2: Property location showing exploration permits (green) and exploitation concessions (orange) and expiry dates (Source: SGU website 2014)

2.3.2 Environmental Permits

The environmental permits for the two historic mine sites were granted in 2014.

3 PROJECT HISTORY

Mining and exploration in the Ludvika area has been carried out in different periods since the 1600's. The majority of mining was focused on iron, except for two periods, 1701-1711 and 1885-1889, when copper was recovered at Iviken, in the most southern part of the Håksberg ore field. In the 1800's and early 1900's comparably lower quantities of ore were produced.

After the second world war the mines regained Swedish ownership and continued production with several different companies, until mine closure in 1979. When German companies took over in 1937 all the different mines within the Håksberg ore field were merged into one operating unit and a central hoisting and concentration plant was erected at Håksberg. This allowed more efficient mining with the transportation optimised and the facilities at the central shaft utilised while operating at its full capacity. At Blötberget, two mines with separate shafts were in operation simultaneously between 1950 and 1966: the Vulcanus "original" mine and the Blötberget "new" mine, which started operation in 1944 by sinking the new shaft to 300 m level and building the new central plant.

Since the mines closed in 1979, the deposits have been owned by various companies until NIO formed in 2008.

The individual project histories are shown below:

3.1 Blötberget:

- 1900 Mining Co Vulcanus started large-scale mining.
- 1944 Stora Kopparberg Bergslags AB started mining in an adjacent claim and sunk a new shaft (BS-shaft) together with complete new surface structures, head frame, concentrator, storage/loading facilities.
- 1949 Stora Kopparberg bought Vulcanus.
- 1950 to 1966 both mining areas were mined simultaneously, using both shafts. The production rate was ca 400 kt / year of ore and 220 kt of product.
- 1968 to 1975 the BS-shaft was further sunk to 570 m depth. The hoisting facility was modernized and upgraded to 600 kt/year production capacity. The new plant commenced operation in December 1975.
- 1977 Swedish Steel (SSAB) was founded and the mines (Blötberget and Håksberg) were sold to SSAB the same year.
- The operation ceased in June 1979. A total of 19 Mt of material, averaging 37% Fe Total, 0.55 – 0.8% P and <0.01% S, was reportedly extracted

3.2 Håksberg:

- 1937 a German consortium of steel making companies bought all mines in the Håksberg ore field and centralised the operations to Håksberg. The new concentrator commenced production in 1939.
- 1957 a large expansion of the concentrator in Håksberg was made. Flotation of hematite-ore was introduced.

- 1960 the new skip-loading station together with a new primary crusher at 400 m level started to operate in the Central shaft.
- 1962 the 300 m level footwall haulage drift was completed, which means that there exists a drift-connection through the whole ore field from Iviken to Källbotten.
- 1965 spiral-separation was introduced in the mill instead of flotation and a new tailings pond was built west of the central plant at Håksberg.
- 1973 the development of a decline from the surface to 300 m level was started. It was completed down to approximately 260 m level before the mine was closed.
- 1977 Swedish Steel (SSAB) was founded and the mines (Blötberget and Håksberg) were sold to SSAB the same year.
- 1979, Dec 21 the operation at Håksberg ceases.
- 1981 the pumps are stopped and the mine starts to be flooded.

In addition to the two major mining areas highlighted above, three other areas were producing simultaneously: Fredmunsberg (closed 1944), Gonäs (closed 1919) and Våghalsen – Finnäset (closed 1919). No mining has occurred at Väsman (off-shore) historically.

3.3 Väsman-Finnäset

Below Lake Väsman, magnetite mineralisation has been known since the late 1800's when the first magnetic map was established of the lake. The confirmed mineralisation on the south shore of Finnäset, as well as the nearby Våghals and Byberg mines, continues out over the lake Väsman over to the northern shore of Iviken (south Håksberg). Between the years 1954 and 1959, Ställbergsföretagen conducted a diamond drilling exploration program in which a total of 22 holes were drilled. The results from these studies led to the decision to continue the exploration in the southern part of Väsman. A shaft was lowered to 280 m depth 1960, with trial mining and bulk sampling conducted. Test mining was also conducted at Lyviksberg in the 1960s.

4 GEOLOGY AND MINERAL RESOURCES

4.1 Project Geology and Mineralisation

Ludvika is part of a 30 km long zone of known iron (±apatite) deposits within the Bergslagen district. Periodical mining has occurred along the length of the zone, mainly in the form of small open pits and shallow underground mines.

The majority of the mineralisation of Ludvika is classified as magnetite lava flows. The flows are occasionally of pure magnetite, with additional detrital magnetite units assumed to be volcaniclastic sediments. The volcanic units are unconformably deposited on older quartzitic greywacke units. The greywacke units show contact metamorphism in the form of silimanite and cordierite porphyroblasts. The mineralised units are overlain by quartz-feldspar sandstone with intercalations of volcaniclastic and argillaceous sediments. The whole package is unconformably overlain by a granitic unit.

According to mapping completed by the Geological Survey of Sweden ("SGU"), the Ludvika fields belong to the northern limb of a NE-trending synform, as shown in Figure 4-2, which may be supported by the shallowing dip of mineralisation at depth in Blötberget.

Oxidation of the primary magnetite mineralisation has produced large areas of martite (haematite formed after replacement of magnetite) mineralisation. This is more pronounced in the Blötberget field. The cause of the oxidation is debatable; one theory (put forward by consulting geologist Mats Larsson) suggests that at Blötberget early lava flows were sub-aerial and were oxidised by surface weathering processes. Whereas the later flows possibly did not breach the surface, and were prevented from reaching the surface due to the cap formed by the earlier flows. In which case, these flows were possibly in the form of dykes and sills. In the Håksberg-Väsman-Finnäset field, a sub-marine environment for erupting lava has been suggested, with limited oxidation and interlayering of marine sediments. Subsequent deformation, alteration and metamorphism may have contributed to additional oxidation due to fluid interaction.

The mine area of Blötberget extends 1.2 km, striking east-northeast at approximately 060º. The total mineralised area comprises several independent units named (from southwest to northeast) Kalvgruvan, Flygruvan, Hugget, Carlsvärdsgruvan, Sandell, Guldkannon and Fremansberg. The Kalvgruvan, Flygruvan and Hugget zones are mined down from near-surface to the 350 m level. The units dip towards the southeast at between 50 - 55º in the mined-out areas near-surface, and flatten at depth to ~25º. A geological long-section interpretation of the mineralisation and geology is shown in Figure 4-3, where Kalgruvan, Flygruvan and Hugget are interpreted as continuous zones but it currently lacks drilling. This area, known as 'the wedge' or Betsa, will be explored in 2013. An example of high-grade magnetite mineralisation from Blötberget is shown in Figure 4-1.

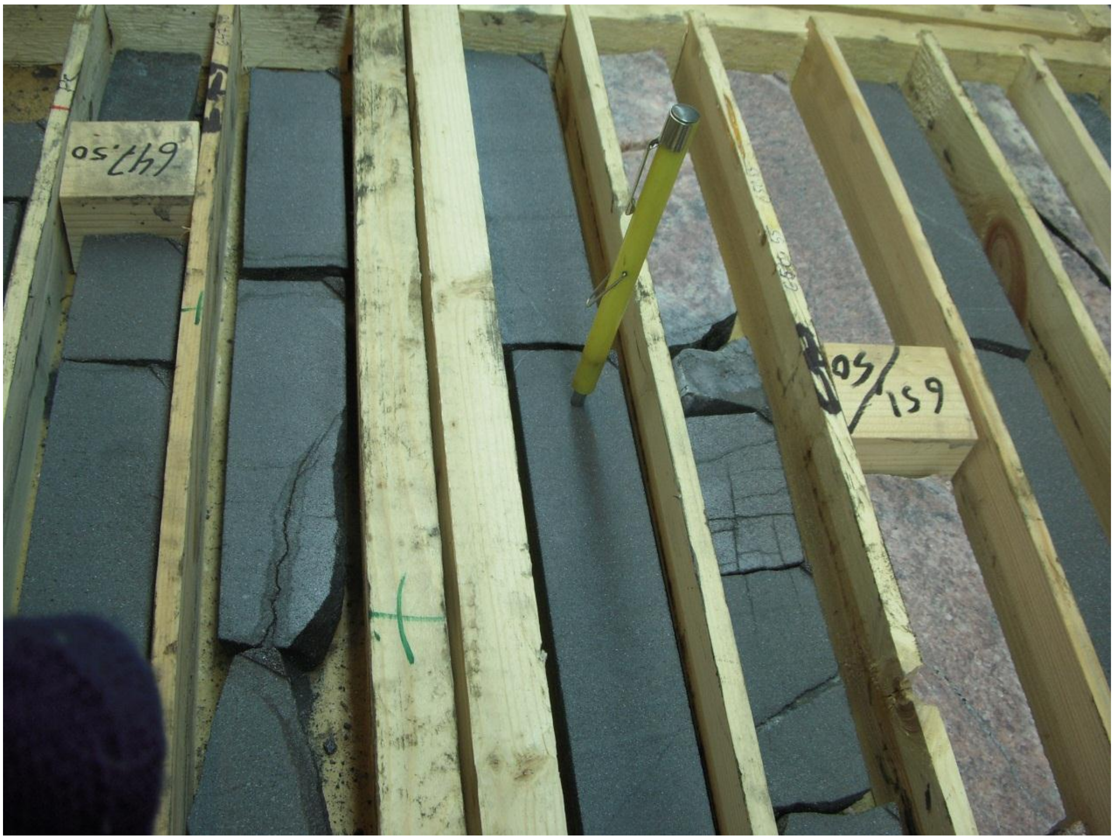

Figure 4-1: Example of mineralised (magnetite) drill core from Blötberget (BB12008)

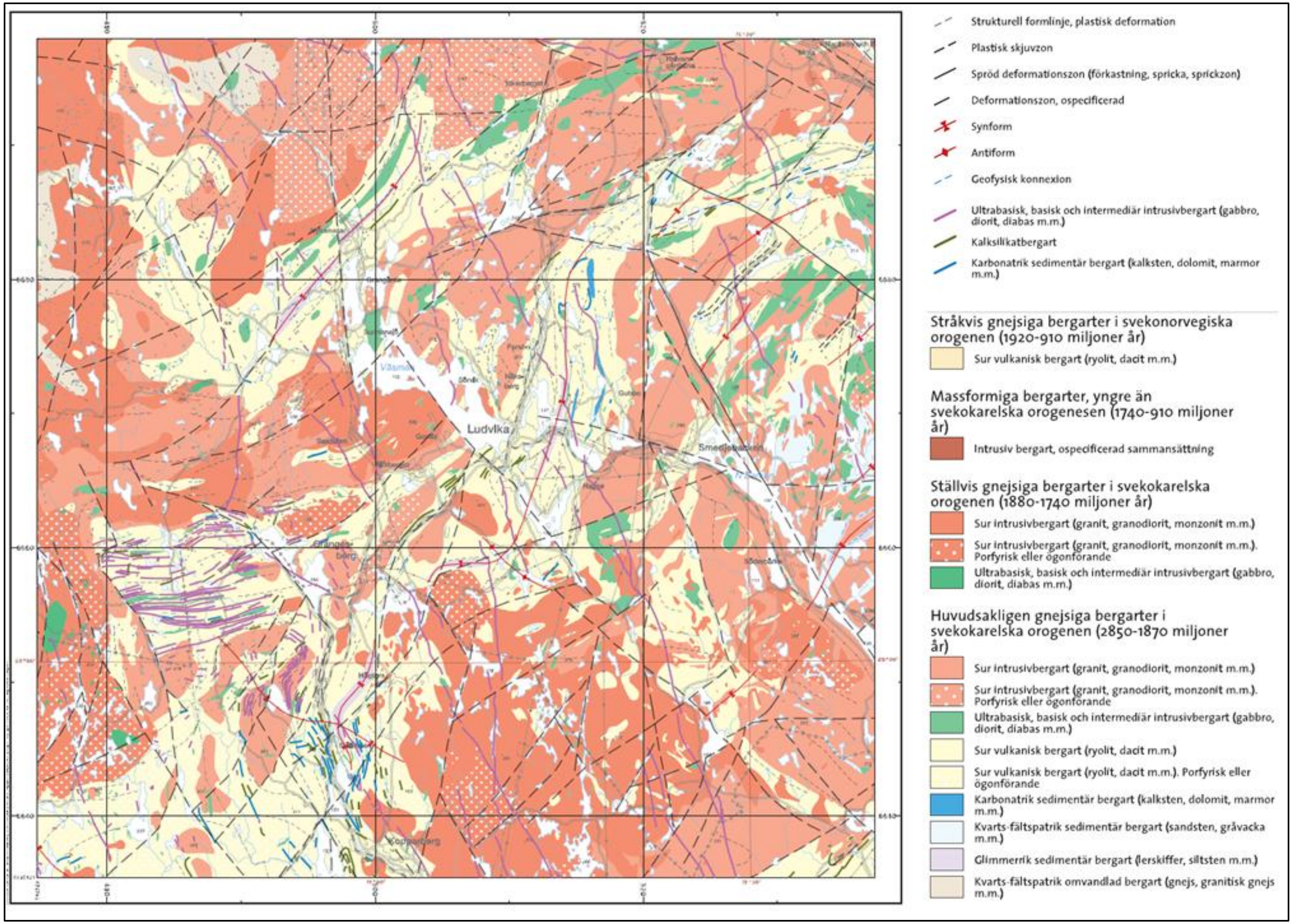

Figure 4-2: **Geological Map 1:250 000 (Source: SGU 2013)**

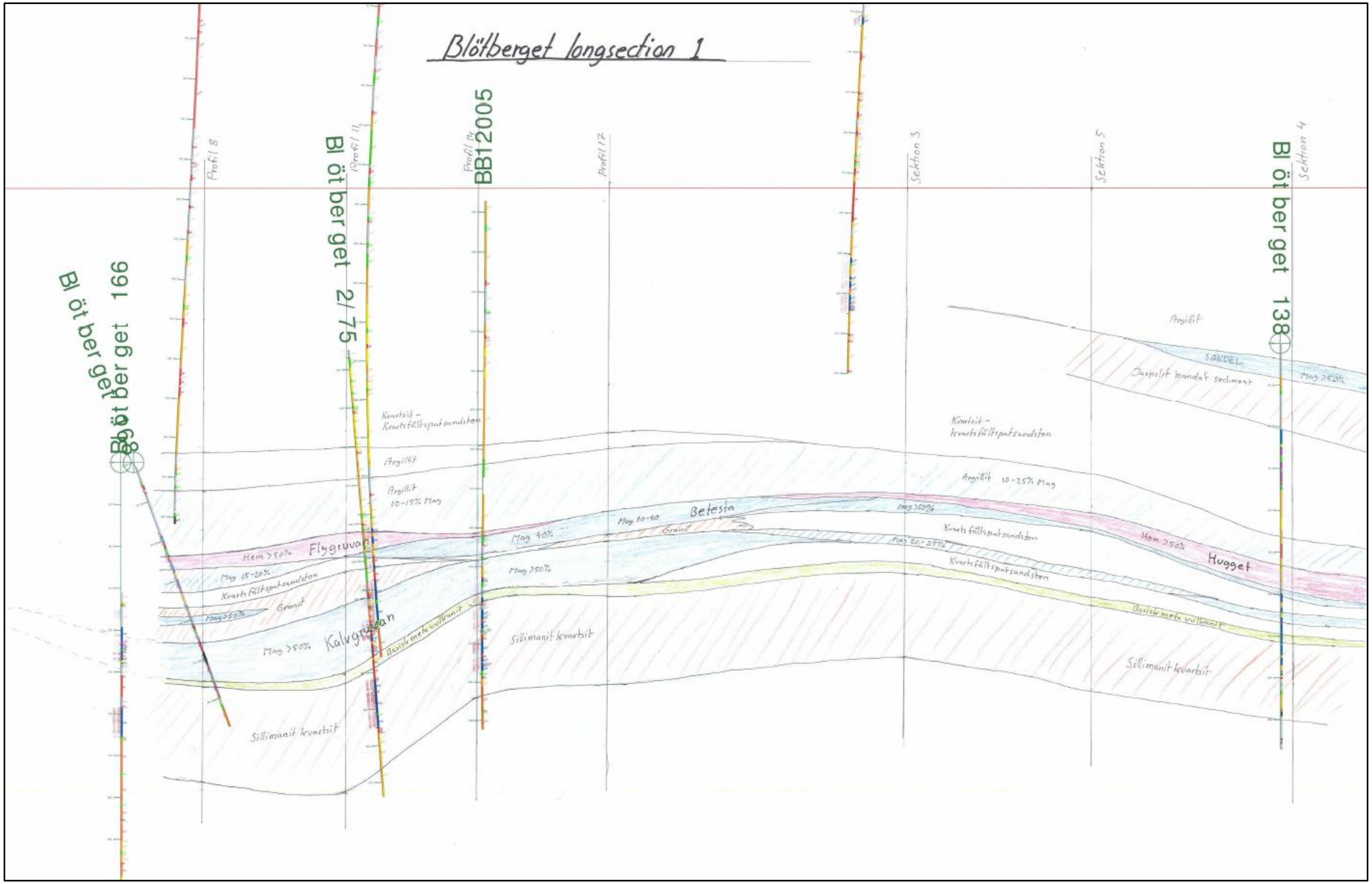

Figure 4-3: Geological long-section of the Blötberget deposit, showing Flygruvan, Kalgruvan and Hugget as one continuous unit (Source: NIO 2013)

4.2 Exploration

Throughout the history of the project, geological mapping and geophysical surveys have been conducted in the area. For the purposes of the MRE (and the FS), the most pertinent data is the diamond drilling, which is described below.

4.2.1 Historic Diamond Drilling

Historic diamond drilling was conducted from the 1940s through to the end of mining in the 1970s. Mine maps and historical drilling data were collected from various sources and digitised where possible. Drill core from historical exploration drilling has been recovered at the core storage facility at the Geological Society of Sweden (SGU) in Malå, along with additional core found in buildings on the former mine sites. In total, approximately 400 historic holes have been digitised to date.

In total, 13 drillholes from Blötberget found in Malå were re-logged, and a selection re-sampled and re-assayed prior to use in the Mineral Resource estimates (MREs) by Geovista. The database provided by NIO to SRK suggests that 66 drillholes from Blötberget alone contain core at Malå, and further sampling and re-assaying is currently on-going.

4.2.2 NIO Diamond Drilling

Diamond drilling was completed by NIO in 2012, which included twinned drilling to confirm historical drilling at Håksberg and Blötberget, and infill at Blötberget and Väsman. In total, 15 holes for 7,430 m were drilled at Blötberget.

A 12-hole (7,000 m) diamond drilling programme is planned to infill drill at Blötberget. The aim of this programme is to upgrade the middle-Hugget area from Inferred to Indicated Mineral Resources, as well as investigating the area in between Flygruvan and Kalgruvan and Hugget (known as ’the wedge’ or Betsa).

4.3 Mineral Resource Estimation

Three Mineral Resource estimates (“MREs”) have been undertaken on the LIOP since NIO was formed. These were completed by Geovista in August 2011, January 2013 and January 2014. The 2011 and 2013 MREs were reviewed in the April 2013 commission.

SRK reviewed the 2014 MRE in the December 2013 technical review (the MRE was completed in December 2013, with the report completed in January 2014).

4.4 SRK Conclusions and Recommendations for Gap Analysis

A number of recommendations were made by SRK in the December 2013 geology technical review in order to improve the quality of future MREs and in order to increase the quantity of Indicated and Measured Mineral Resources in the Project area. Following the review, NIO implemented several of the points identified above and some points are currently on-going. An update to the list is given below.

1. All historic core re-assayed should be sent including QAQC samples (blanks, standards and duplicates), as described in NIO protocol. **High priority**.
    - Status: on-going. Several new holes found, logged and sampled recently.

2. Infill drilling in the wedge and upper-middle Hugget area in order to prove continuous nature of mineralisation, therefore increasing resource tonnage and likely upgrading resource classification categories. **High priority**.
    - Status: infill drilling commencing June 2014.
3. Include the wedge and pillar areas in the resource statement. **High priority**.
    - Status: infill drilling commencing June 2014.
4. Density measurements in hangingwall and footwall lithologies should be taken to enable accurate mining and dilution tonnages during mine planning. **High priority**.
    - Status: waste lithologies will be tested for density during the 2014 drilling program.
5. A drillhole data quality index should be assigned to each drillhole, based on: source of collar coordinates and down-hole surveys (e.g. mine plan, protocol document, surveyed by NIO, estimated), age of assay information, core diameter, core size sampled (e.g. ½, ¼), and drill core recovery. **Medium priority.**
    - Status: on-going, to be completed prior to the MRE update following the summer 2014 drilling.
6. Database should be continuously validated to ensure missing data not affecting MRE. For example, missing down-hole survey information may be causing false drillhole traces. **High priority.**
    - Status: on-going, to be completed prior to the MRE update following the summer 2014 drilling.
7. Quantify the effect of core diameter and sample weight on assaying by comparing assay data populations (e.g. descriptive statistics, histograms, Q-Q plots). **High priority**.
    - Status: not currently planned, but is still highly recommended by SRK to improve confidence in the historic data.
8. Improve wireframing by snapping to all mineralisation intercepts. **High priority**.
    - Status: planned for the next MRE update.
9. A block size sensitivity study should be run, testing the effect of different block sizes on the interpolation. **Medium priority**.
    - Status: not currently planned for the next MRE update, but is still recommended.
10. Quantitative Kriging Neighbourhood Analysis (“QKNA”) undertaken to optimised estimation parameters and reduce conditional bias. **Medium priority**.
    - Status: not currently planned for the next MRE update, but is still recommended.
11. Estimation search run used should be recorded in the block model. **Low priority**.
    - Status: not currently planned for the next MRE update, but is still recommended.

12. Update COG calculation to include metal processing recovery information. Once further testwork is completed on the haematite-magnetite mixed material, potentially two COGs can be used for the different ore types, and in areas of development and no development. **High priority**.

    - Status: still highly recommended prior to the next MRE update.

13. Use COG to report Mineral Resources in compliance with JORC 2012, demonstrating 'reasonable prospects form eventual economic extraction'. **High priority**.

    - Status: still highly recommended prior to the next MRE update.

The gaps identified relating to the geology and Mineral Resources of the Project, which SRK consider essential to complete in order to ensure that there is adequate detail for the completion of a robust FS, are summarised in Table ES 1.

5 GEOTECHNICAL ENGINEERING

5.1 Introduction

Generally the available reports from PEA to December 2013 the geotechnical work completed is of reasonable standard. SRK agree with the geotechnical evaluation of the Blötberget based on limited data to PFS level. However, what is not clear is the plan to conduct the Feasibility level geotechnical assessment for Blötberget. The interaction of mining, geotechnical and hydrogeological parties in the Feasibility study ("FS") will optimise the geotechnical assessment program and will most likely optimise and expedite the process. It is recommended that the geotechnical program is defined by July 2014 to optimise this.

5.2 Rockmass Characterisation

5.2.1 Observations

Rockmass classifications systems utilised in both the 2011 PEA study and subsequent January to April 2013 investigations are reasonable for the level of study. These are a combination of Q and RMR_{1989} (Rock Mass Rating) which is a good example of characterising the rock in more than one classification system. The amount of geotechnical logging is limited to 3 drill holes in the Blötberget area. The tabulated results of this logging were reviewed.

There are, however, some limitations with using these systems for FS level rockmass classification in the current logging. This is mainly due to the likely mining method involving cavability assessment and the associated mining induced subsidence of the hangingwall. The key objective is to gain sufficient understanding of the strength of the material that is expected to cave, to satisfy the chosen mining method.

The Q system does not account for cavability, only for the stability of the span. As well as this, the current logging approach has only classified the weakest feature per logging interval. Cavability is determined by the volumetric presence of stronger features. These are currently not being logged.

There is a mis-representation of the rockmass fracturing using RQD only (which both of these systems use). Without a measure of the actual fracture frequency there is a reduced confidence of the rockmass rating. Figure 5-1 is an example of the misrepresentation of actual fracture frequency using RQD to supplement this quantification.

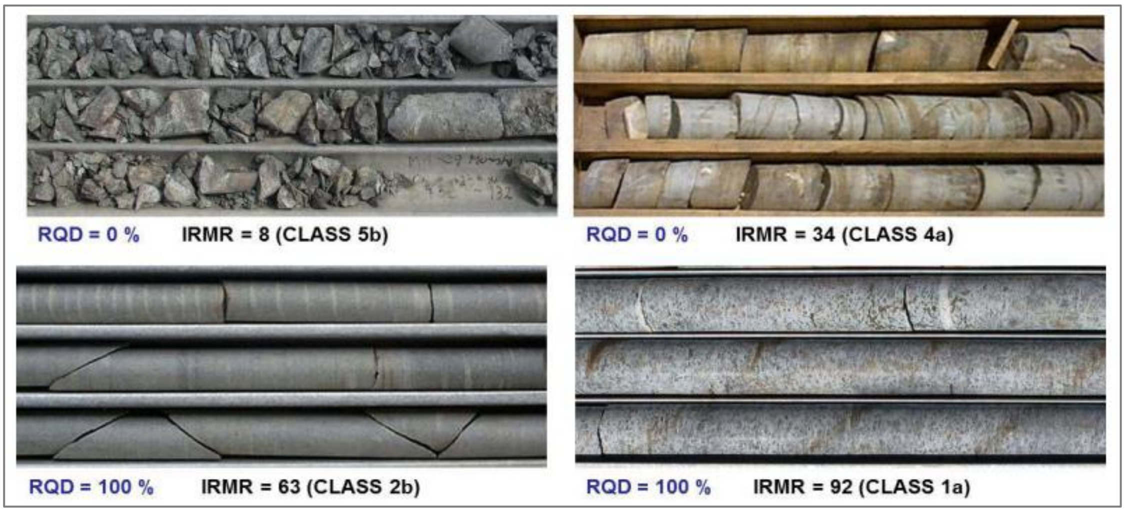

Figure 5-1: Comparison of similar RQD ratings with corresponding IRMR ratings which used actual fracture frequency. IRMR scale is 0 to 100 (Poor to excellent rock conditions)

The RQD measurements have been made on 1m core lengths which further introduces uncertainty of the measured value. This method needs to be applied at drill core run length as this is mechanical break in the rock column. As well as this, any heavily fractured zones require discrete RQD classification interval as these will further bias the results.

The rockmass classification needs to identify the frequency of cemented joints. At deeper levels, the cemented joints influence the caveability and mining induced subsidence. Without characterisation, this will be misinterpreted.

5.2.2 SRK comments

Caving assessments require an understanding of the rockmass in terms of MRMR and IRMR. The Blötberget geometry and mining method approach requires geotechnical classification in these schemes. This is deemed a requirement by SRK in order to provide suitable confidence for both caveability assessment and cave induced fracturing and subsidence

Geotechnical logging to MRMR/IRMR (2001) system of all the planned infill drilling is recommended prior to the sampling of the core. The logging team will not require much additional training to gather the required data for the MRMR/IRMR calculation.

SRK notes that the SLC operations of LKAB at both Kirunavaara and Malmberget are currently experiencing the need to blast precondition the hangingwall in order to enable caving of the competent rockmass. The preconditioning is deemed reactive as there was insufficient understanding of the competence of the hangingwall material. Correct rockmass classification at the logging stage will enable more confidence in the actual caveability potential. This is a critical input in order to model the mining costs, production rates, and to better understand operational risks.

5.3 Rock Strength Testing

5.3.1 Observations

All available data and assessment to data indicates that the rockmass is of good quality and the rock strengths are supportive of this (UCS range of 150-200MPa). These values are derived from Point Load Testing (PLT) which is a good indicator when calibrated against laboratory UCS and triaxial testing. No laboratory test results were available. There is a good approach and database of PLT testing completed to date.

There does not appear to be a great variation in the ore and hanging/footwall material strength which is positive for mine design and infrastructure placement. In terms of caveability, the rock strength will define the ability for the hangingwall to break naturally.

5.3.2 SRK comments

There is a need to continue with the PLT testing in the planned infill drilling program. As well as this a reasonable sample of the core (2-5%) is required to be laboratory tested for UCS and triaxial tests. This test work will calibrate the PLT testing, but more over provide inputs into the numerical modelling required (Section 5.6). The shear strength

5.4 Rock Stress Regime

5.4.1 Observations

No testing is available. However, there is a reference to the Grängesberg mine insitu stress testing results. This rock mass and geological setting is considered very similar and therefore it is likely that the stress regime will be similar.

5.4.2 SRK Comments

Stress testing is recommended for the later stages of the project. If the feasible mine plan considers material below the 200m level after dewatering. This will validate the assumptions and further refine the mine design. The flattening of the ore body dip with depth is an indicator that the stress orientation is likely rotated as well with depth.

5.5 Geotechnical Model

5.5.1 Observations

A 3 dimensional geotechnical model has not been produced yet and this is required for FS level assessment as a key input into geotechnical, mining and hydrogeological studies. This will likely take 3 weeks to produce after the infill drilling program and selected historical core logging is completed.

5.5.2 SRK comments

The 3 dimensional geotechnical model is a product of:

- Lithology, alteration and weathering;
- Geological structure: Both Major faulting and minor features; and
- Rockmass classification: Raw inputs as well as calculated values for MRMR/IRMR.

A detailed plan to develop a geotechnical model is required and this is best developed prior to the logging program of the June to September 2014 infill drilling program. This will guide the approach and quantity of data required to be gathered to produce FS quality models. There are multiple software tools to develop these models, however some are better developed to dynamically model the rockmass such as Leapfrog Implicit modelling code.

5.6 Mining method Geotechnical Assessment

5.6.1 Observations

The stability assessment applied to date has been only using the Mathews Stability Method (PEA Appendix 3, Attachment 3:1). The work completed is of a good standard using this method , however this approach is not deemed suitable for cavability assessment due to:

- Firstly the Q classification system (as described in Section 5.2);
- The low confidence in actual fracture orientation and frequency of the hangingwall;
- Low confidence in the stress inputs and material strength ranges; and
- Does not cater for the fragmentation potential of the hangingwall material.

5.6.2 SRK comments

The stability assessment suggested to cover SLC and open stoping mining methods is recommended to use the approach of combining:

- IRMR/MRMR method into Lauscher's Hydraulic radius cavability chart;
- Mathews stability assessment as a comparison of stable spans;
- Primary fragmentation prediction of the hangingwall material using IRMR and oriented structural logging inputs into discrete fracture network (DFN). This is more important in block cave assessments but is also essential for the prediction of oversize potential. The mining cost modelling will better cater for the oversize and secondary breakage requirements.

It is expected that a suitable level of assessment can be made in order to contribute to the mining study in the FS with approximately 6 weeks work after logging of the infill drilling and geotechnical modelling is completed. The numerical modelling process can be done in conjunction with this work and the outputs from this used to enhance the stability assessments.

5.7 Numerical Modelling

5.7.1 Observations

The PEA documentation contains numerical modelling for the predictive mine induced subsidence. This is in 2D only which is suitable for PEA level study. The software used is Phase^2 from Rocscience and is a useful tool in combination with detailed 3D numerical modelling. Used alone, it is not a suitable tool for the mine wide assessment of the mining design, extraction sequence, LOM infrastructure stability, and mine induced fracturing/subsidence prediction.

There are only two material types modelled in the PEA assessment and this will need to be increased as further knowledge of the rockmass is derived from the geotechnical logging, material testing, stress modelling, geological structure model and geotechnical model. The report does state that the extent of fracturing zone (FZ) and continuous deformation zone (CDZ) are likely over estimated due to the limitations of the modelling software and the uncertainty of the material inputs. This needs to be acknowledged and improved closely in the FS study of subsidence zone size and rate of development.

5.7.2 SRK comments

Feasibility level assessment requires detailed numerical modelling in particular with proposed SLC development and subsidence factors in this project. Mine scale 3D models are suggested to be produced for geotechnical, mine design, hydrogeological, and subsidence assessments. There are a range of industry accepted software and approaches available.

Subsidence prediction is a complex modelling process and the significance of the scale and timing of subsidence is critical to the project. Detailed assessment as well as coupled modelling with hydrogeological and mining extraction models will improve the confidence in this.

The interaction of the orebodies and their relative extraction sequence needs to be modelled in a 3D sense as well. 2D modelling only is not ideal to understand this interaction.

SRK recommend that modelling is completed using a combination of boundary element and discrete element codes (MAP3D, Flac3D). These can be used to govern the inputs into more detailed $Phase^2$ Modelling. FS level modelling (to acceptable confidence) could be completed within 1.5 months from geotechnical model development.

5.8 Subsidence Monitoring

5.8.1 Observations

No ground monitoring plan was available. The main need is the immediate surface reaction to the dewatering program. This is likely to cause the ground to relax further due to the water saturation changes in the fractured volume.

5.8.2 SRK comments

A basic ground monitoring system to compliment the suggested hydrogeological monitoring system is recommended for Blötberget. This system should be installed prior to dewatering of the existing voids. The same system will apply to the later stage subsidence monitoring. The aim is to have a baseline of data before the change occurs. SRK envisage much of the primary system will service the later needs of the system, with some enhancements.

The monitoring plan required is a regime of:

- surface glass prisms and/or GPS monitoring points distributed across the current known fractured area with routine monitoring will provide an understanding of the fracture cone subsidence; and

- It is recommended that a series of subsurface displacement monitoring instruments are planned for and installed in available drillholes. Industry experience has confirmed that it is essential to measure the sub-surface change to track the location and magnitude of displacement within the rock volume as well as any extension of the fractured volume at depth before this is expressed on the surface. The surface expression is the last phase of the change that has occurred in the rockmass volume.

This is deemed critical for the Blötberget area as the understanding of the mining induced fracturing will directly influence the hydro conductivity change.

5.9 Major Infrastructure Assessment

5.9.1 Observations

A definitive assessment for the location and amount of major infrastructure has not been completed at this stage. In terms of the major underground infrastructure, both hoisting shaft and underground crushers will form part of the expected mining layout. The geotechnical assessment of where to locate these and the stability of these excavations is not completed yet.

5.9.2 SRK comments

It is difficult to provide a detailed scope of work to provide FS level geotechnical input into the major underground infrastructure assessment prior to the mining study. However, the list below provides an outline of necessary considerations and approximate timings for the geotechnical input:

<u>Hoisting shaft</u>:

- A dedicated geotechnical drillhole will be required in line or sub-parallel to the shaft location. This will require high detailed geotechnical logging for shaft stability assessment. This assessment would take approximately 3 weeks after completion of the drillhole.
- Numerical modelling of the shaft placement relative to the mining layout will need to be incorporated

<u>Crusher station:</u>

- A dedicated geotechnical drillhole will be required through the expected crusher location. This will require high detailed geotechnical logging for to determine the rock mass quality and structural makeup in high detail for stability assessment. This assessment would take approximately 3 weeks after completion of the drillholes.
- Numerical modelling of the crusher placement relative to the mining layout will need to be incorporated.
- High detailed ground support design will need to be done along with the numerical modelling of the crusher. This will provide more confidence in the extraction sequence and development cost of the crusher excavation.

Orepass & Ventilation shafts:

- Site selection will be dictated by geotechnical and geological structure models.
- Stability assessments will be required using geotechnical model and numerical modelling.

6 MINING ENGINEERING

6.1 Underground Iron Ore Mining

Underground mining plays a minor production role amongst the top iron ore producers globally. SRK is not aware of any underground iron ore mining taking place in Australia or Brazil and it is reported that only 10 to 15% of production in China, India and the Commonwealth of Independent States (CIS) is from underground mining. The exception is Sweden where practically the entire country's iron ore production is sourced from the underground mines of Kiruna and Malmberget, which totalled 25.3 Mt in 2010 according to the Raw Materials Group ("RMG") database.

Operational information on underground iron ore mines is not typically easily accessible, however SRK has summarised the Mineral Resource and Ore Reserve information available on underground mines from the RMG database in Table 6-1.

Table 6-1: Underground iron ore mines, reported R&R (Source: RMG, 2014)

Name	Country	Status	Controlled by	Mineral Resources (Reported)		Ore Reserve (Reported)	
				(Mt)	(%Fe)	(Mt)	(%Fe)
Krivoy Rog Iron Ore Mines	Ukraine	Operating, exp/plans	Privat Group	266.0	58.7	266.0	58.7
Deh Zaman Iron Ore Mine	Iran	Operating	Barit Iran	30.4	57.5	30.4	57.5
Sierra Grande Iron Ore Mine	Argentina	Operating	MCC	250.0		201.1	54.8
Kiruna Iron Ore Mine	Sweden	Operating, exp/plans	LKAB	1,003.0	47.7	674.0	48.3
Odinochnaya Iron Ore Mine	Russia	Construction	Evraz Group	59.7	46.1	59.7	46.1
El Uvo Iron Ore Mine	Colombia	Operating	Votorantim	80.0	46.0	80.0	46.0
Yang Chong Iron Ore and Zinc Mine	China	Operating	CHNR	4.2	44.9	4.2	44.9
Malmberget Iron Ore Mine	Sweden	Operating, exp/plans	LKAB	423.0	42.7	350.0	42.9
Kazsky Iron Ore Mine	Russia	Operating	Evraz Group	59.7	41.3	59.7	41.3
Abakansky Iron Ore Mine	Russia	Operating	Evraz Group	213.0	40.9	113.4	40.9
Tashtagolsky Iron Ore Mine	Russia	Operating, exp/plans	Evraz Group	450.0	46.0	71.5	40.8
Zao Yuan Iron Ore Mine	China	Operating	CHNR	4.2	36.4	4.2	36.4
Sheregeshsky Iron Ore Mine	Russia	Operating	Evraz Group	162.0		158.7	35.8
Dannemora Iron Ore Mine	Sweden	Closed, reopen/feasib	Dannemora Min	54.0	37.9	28.5	35.2
Rana Iron Ore Mines	Norway	Operating, exp/constr	L Nilsen & S	250.0	34.0	250.0	34.0
Sokolovsky UG Iron Ore Mine	Kazakhstan	Operating	ENRC plc	1,315.0	40.2	242.2	31.7

Although not an extensive database, it does show that there are a number of underground mines operating at grades below 35% Fe, which includes the Nordic region.

6.2 The Ludvika Iron Ore Project

Figure 6-1 provides a schematic section of the LIOP indicating the existing and planned underground development for the project and location of the proposed Väsman mining area under the lake.

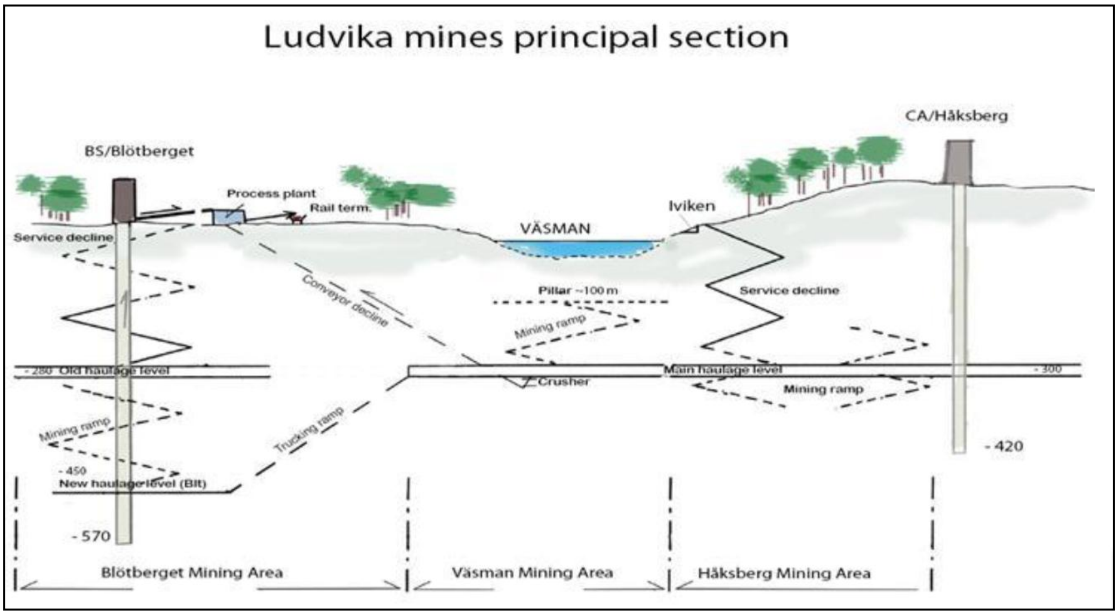

Figure 6-1: Schematic section of LIOP (Source: PEA, 2011)

6.3 Blötberget

The scope of the Phase 1 Feasibility Study ("FS") is to be confined to the Blötberget deposit as this is to be the first operation to be brought into production in the current mining strategy. The mine is perceived to be the lowest cost to establish production within a relatively short timeframe. The revenue derived from the operations in Blötberget is anticipated to fund the future development of the Väsman and Håksberg deposits.

The mineralisation at Blötberget is defined as "apatite lake ore" which includes the minerals magnetite and haematite in addition to the phosphorus mineral apatite. The Blötberget field consists mainly of five mineralised bodies. From west to east, these are:

- Kalvgruvan (apatite-rich magnetite mineralisation);
- Flygruvan (apatite-rich, haematite dominated mineralisation with minor magnetite);
- Hugget and Betsta (apatite rich magnetite-haematite mineralisation); and
- Sandell (apatite rich magnetite mineralisation).

The Kalgruven and Flygruven mineralised bodies are parallel to each other on the south-western side of the mining concession. The Hugget and Betsta deposits have been proven to be of the same vein origin and are referred to as Hugget only for the purposes of this report. The Sandell deposit is a smaller mineralised body parallel to the Hugget and both are located to the northeast of the mining concession.

Between the Flygruvan/Kalgruven and Hugget/Sandell deposits is an area known colloquially as the "wedge". This is the one of the focal points of the drilling programme to commence 30 May, 2014. The mineralised bodies are believed to be part of the same structure where there is estimated potential for the Mineral Resource to be update during the Phase 1 FS to link these mineralised bodies along strike, although the influence of a pegmatite zone between the two areas is not currently understood. For the purposes of this report, however, the deposits are assumed to remain as isolated lithologies.

The Mineral Resources at Blötberget as of January 25 2014 are estimated at 11 Mt of Measured Resources grading 34% Fe, 27 Mt of Indicated Resources grading 45% Fe, and 22 Mt of Inferred Resources grading 33% Fe. Measured Resources are confined to the Hugget mineralised body between the 280 mL and 450 mL. Below this elevation range the Hugget mineralisation is classified as Inferred Resources. Indicated Resources are confined to the Flygruven and Kalgruven mineralisation. The Sandell mineralisation is classified as Inferred Resources. All mineralisation above the upper levels for the Mineral Resource in each mineralised body represents areas of historic mining. There is additional mineralised material with potential for future extraction within these areas of historic mining, however, due to the uncertainty related to past extraction, they are not considered for the current Mineral Resource estimate and represent upside potential.

6.4 Mining History

6.4.1 Observations

The Ludvika region has a long history of mining which dates back to the 16th century however it is reported that iron ore mining in the region commenced in the 18th and 19th century. Both Blötberget and Håksberg deposits were actively mined up until 1979, when the former owner SSAB, closed the mines due to low iron ore prices and they have been flooded for over 30 years since being taken off care and maintenance.

The iron ore at Blötberget is high phosphorus and could only be exploited on a large scale after the Thomas process was introduced in steel making plants at the beginning of the 20th century. It is reported that at Blötberget, only two mines with separate shafts were in operation simultaneously between 1950 and 1966. These mines consisted of the original Vulcanus mine and the new Blötberget mine, which started operation in 1944 by sinking the new shaft to the 300 m level and building of a new central plant.

Prior to the cessation of production, mining was focussed on the Hugget mineralisation in order to bring the level of mining down to the same level achieved by historic mining in Flygruven/Kalgruven. Mining methods included shrinkage stoping, open stoping, longitudinal sublevel caving and transverse sublevel caving though there is little understanding of the location, timing and volumes mined using each method. The mine is reported to have a produced up to 400 ktpa before closure. The processing plant handled a maximum of 415 ktpa feed in 1976 when the additional shift was added and increased operational time from 5,058 to 5,824 hours. Historical production statistics are provided in Table 6-2.

Table 6-2: Blötberget Production Statistics 1973 to 1979

Year	Feed		Recovery (Fe)	Magnetite concentrate (Assay)				Hematite concentrate (Assay)			
	kt	% Fe	%	w-%	% Fe	% SiO_2	% P	w-%	% Fe	%SiO_2	% P
1973	280	37.2	85.6	23.2	68.2	2.9	0.10	25.9	60.9	6.8	0.48
1974	350	37.3	85.4	22.9	68.3	2.7	0.11	25.6	60.2	6.9	0.56
1975	345	35.7	80.4	20.4	67.5	2.4	0.11	24.4	59.9	7.5	0.57
1976	415	37.1	76.3	14.8	67.4	3.9	0.07	28.9	61.1	6.7	0.50
1977	328	37.1	83.0	22.4	67.2	3.1	0.09	25.7	61.3	5.9	0.54
1978	268	34.5	83.0	18.2	68.0	2.9	0.10	25.5	61.7	5.9	0.46
1979	113	34.5	83.0	18.5	68.5	2.9	0.06	27.4	61.7	5.9	0.35
Average	**36.2**	**36.2**	**82.4**	**20.1**	**67.9**	**3.0**	**0.09**	**26.2**	**61.0**	**6.5**	**0.49**

Mining transitioned from tracked mining methods to mechanised mining when production advanced below the 200 mL. To facilitate this, development profiles were increased from 3 m by 3 m to 4 m by 4 m to allow access for larger equipment. Construction commenced on an access decline to the surface, however, this development was not completed prior to the cessation of mining. SRK notes that despite the introduction of mechanisation in the mine, non-mechanised mining methods were still applied in some areas. The sublevel spacing remained at 10 m.

In 1978, mining in the Sandell magnetite mineralised body ceased due to a high content of phosphorus, combined with the requirements for fine grinding of this material.

6.4.2 SRK Comments

The long production history of both the Blötberget and Håksberg mines is very encouraging in proving that mining could be physically achieved for both these locations and a significant amount of development could potentially be utilised in a future underground mining operation. There also appears to be a significant amount of existing surface infrastructure which would also lower the start-up costs and risks compared to a new mine.

The historical production statistics demonstrate that production rates up to 400 ktpa are possible, given the geology and mining layout, an order of magnitude below the proposed production rates proposed for future mining. Whilst the historical mining methods appear to be relevant to the current project, historic mining with mechanised equipment does not provide support for the proposed production rate for future operations.

Mechanisation using modern equipment should provide substantial improvement in performance than observed through past operations, however, as noted by NIO, existing development will require enlarging the existing development profile to the larger planned equipment. It is not clear when mechanisation was introduced to the historical operations, however, production started to fall significantly from 1976 to the closure of the operations in 1979.

6.5 Mining Method

6.5.1 Observations

The LIOP orebodies range in dip between 45 and 60° in the upper levels and progressively flatten from 45° at the 400 mL down to around 25° at the 800 mL. Kalgruvan and Flygruvan are separated by a small waste pillar up to 30 m thick, with a greater separation distance between Hugget and Sandell.

Little geotechnical information is available from previous mining; however, feedback from previous employees suggests that ground conditions were generally good. The drill core and logging indicate the rock mass quality to be good to very good with limited major structures intersecting the orebodies.

A mining method trade-off study has been undertaken as part of the Preliminary Economic Assessment (“PEA”) by Ramböll considering the following methods:

- Sublevel stoping;
- Sublevel caving (longitudinal and transverse);
- Vertical crater retreat;
- Shrinkage stoping;
- Raise mining; and
- Avoca cut and fill.

The trade-off study incorporated a high level analysis of geometry and past mining methods applied. Consideration was also given to the existing development, while understanding the limitations and assumes mechanised mining.

The proposed mining method approach for LIOP is longitudinal sublevel caving. This method is consistent with methods applied in historic mining and is benchmarked from the Malmberget Mine, which is considered an analogous operation. The bulk of the mineralisation will be extracted from a single longitudinal drill drive. Where the mineralisation is wider, such as in sections of the Kalgruvan and Flygruvan deposits, multiple drill drifts will be established longitudinally or transverse sublevel caving will be used.

Some basic studies on selected levels have been carried out to investigate the preferred approach for the wider sections. These studies were primarily used to optimise the design for production rate and development requirements. No consideration was given to mining losses or dilution.

Where development is already in place, 10 m sublevels will be used in line with historic development. Below these areas, 20 m sublevels will be used.

6.5.2 SRK Comments

Effective mining method selection will include an analysis for each mining area including:

- Physical characteristics (depth, orebody geometry, variability of geometry, grade distribution and geotechnical characteristics);
- Production considerations (tonnage, grade of feed, dilution, mining recovery and complexity of method);
- Environmental and Social Factors (subsidence, waste production, groundwater effect and workforce skill level); and
- Economics (operating cost, cut-off grade, development requirements, infrastructure requirements and capital costs).

The approach taken to date considers many of the above elements, however, uncertainty remains in some areas. Of particular interest are the geotechnical characteristics, which are currently poorly understood. Mining losses and dilution have not been considered which will have a large influence on the success of mining this style of mineralisation.

SRK understands that sublevel caving was previously used at the mining operations, however, the limited geotechnical information suggests that the rock mass is very competent which is likely to cause problems. It is important that the most appropriate mining method(s) for each orebody are confirmed prior to undertaking any design or scheduling and SRK recommends that a full revision takes place to incorporate the latest information acquired since completion of the PEA.

SRK would question whether a sublevel caving method is going to be suitable for the deposit geometry. Mineralised widths only allow a single sublevel drift for much of the deposit, which is likely to result in large ore losses and dilution in excess of the modifying factors stated.

Draw cones in caving operations are predominately influenced by gravity and are generally limited to 72° from the extraction point. As a result, much of the ore extracted from drawpoints in a sublevel cave is derived from levels above that which is blasted. Experience from the Kiruna Mine, which uses sublevel caving on a much larger deposit, demonstrates the influence of the draw cone on metal recovery (Figure 6-2).

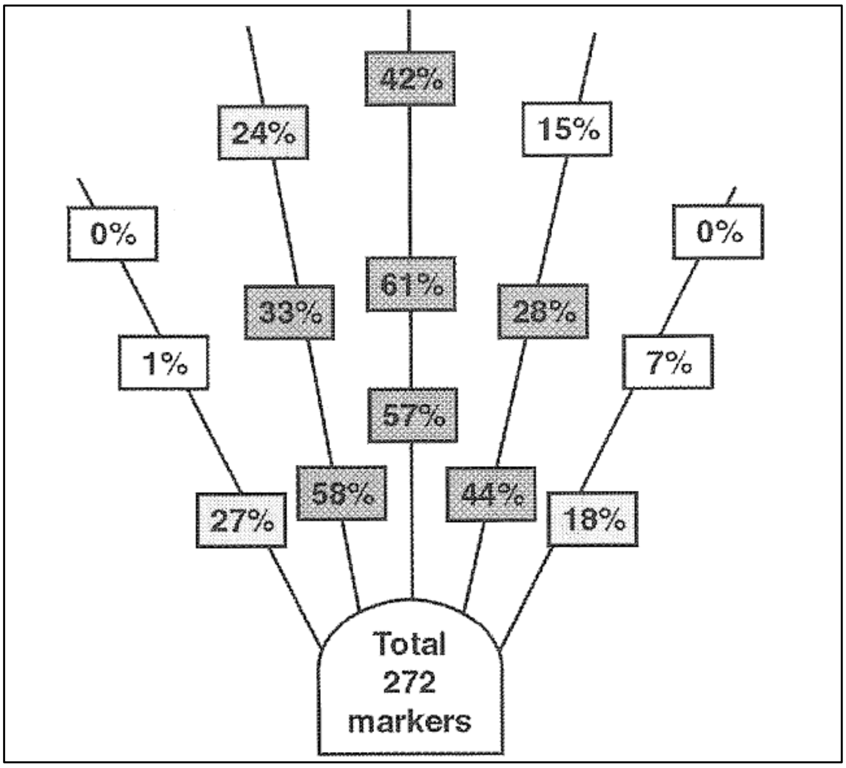

Figure 6-2: Results of marker trials at LKAB's Kirunavaara Mine, Sweden (Source: Quinteiro et al 2001)

Historic mining employed a very tight sublevel spacing which required broken ore to report to the drawpoints before the hangingwall started to cave, in order to limit dilution. Based on the feed grades to the processing plant, this appears to have been successful. The shallower dip angles at depth and the increased sublevel spacing will reduce the relevance of historic comparisons. Increased dilution with lower recovery is likely. SRK notes that head grades were progressively reducing towards the end of the mine life, which may be an indication of future trends. The variation in the geometry of the deposits also suggests that the Malmberget mine may not be the best analogy for this proposed operation.

SRK recognises that the narrow waste pillar between Kalgruvan and Flygruvan may also be an issue as it may be too narrow in some sections to allow independent mining from both veins.

SRK recommends that further trade-off studies are undertaken to confirm the mining method prior to design work being undertaken for the FS. The investigation should incorporate the following elements

- Separation of the veins into separate zones to reflect the different thickness and dip of each area;
- Incorporation of cost based analysis (including influence of mining losses and dilution);
- Basic risk assessment for the proposed methods to account for the limited technical data available in the early stages of the FS; and
- Derivation of design parameters for each zone (in conjunction with geotechnical work) including unique mining losses and dilution.

6.6 Estimation of Potentially Mineable Material

6.6.1 Observations

The FS will be restricted to a study on the Measured and Indicated Mineral Resources, in accordance with the terms and guidelines established by the JORC Code. Based on the January 2014 Mineral Resource estimate, the starting point for estimation of potentially is as follows:

- Hugget - 10.7Mt @ 34.3% Fe
- Sandell - 0.0Mt @ 0.0% Fe
- Flygruvan - 8.2Mt @ 36.5% Fe
- Kalgruvan - 19.2Mt @ 48.3% Fe

Additional exploration is to be undertaken as part of the FS by NIO who anticipate that 12 Mt of Inferred Resources will be reclassified as an Indicated Resource. Around 50 Mt of Resources are anticipated to be available for the FS as Measured or Indicated Resources which is approximately double the Mineral Resource used as a basis for the PEA (24.1 Mt).

Potentially mineable material estimated in PEA by applying a 20% mining loss and 20% dilution at zero grade to the Mineral Resource based on benchmarks of other operations using a sublevel caving method. Inferred Mineral Resources were included in PEA estimate totalling 24.1 Mt at a grade of 34.2% Fe.

There is material prepared for extraction in the upper levels that has not been included in the Mineral Resource estimate. This is considered as upside potential and is not currently being considered for the purposes of the FS.

6.6.2 SRK Comments

The approach taken for estimation of potentially mineable material appears to be reasonable for a scoping-level study, however, a more robust approach will be required for the FS. SRK notes that the following considerations have not been included in the PEA estimate of potentially mineable material:

- Optimisation of Mineral Resource;
- Cut-off grade;
- Design losses;
- Outliers;
- Overbreak/dilution skin;
- Variation in mining method; and
- Thickness of vein.

The PEA study considers Inferred Resources in the life of mine plan. Further exploration work is required to upgrade these Resources to a minimum Indicated classification to have sufficient confidence to declare a future Ore Reserve. There is no guarantee that the exploration programme will be adequate to upgrade the targets to an Indicated Resource so the initial Resource for mine planning could be as low as 38 Mt.

Additional work needs to be completed to adequately define the mining loss and dilution factors to be applied to the estimation of potentially mineable material. The benchmarks of Kiruna and Malmberget are not appropriate as these are much thicker orebodies with steeper dips. Much of the dilution from the drawpoints at Kiruna and Malmberget consists of ore from levels blasted above which will be less likely in the Blötberget Mine due to geometry. Planned and unplanned mining losses and dilution should each be accounted for separately in the estimation of potentially mineable tonnages as they will have a different source.

Economic cut-off grades and drawpoint shut-off grades should also be investigated further for future studies.

6.7 Production Rate

6.7.1 Observations

The PEA was based on the assumption of production from all three LIOP deposits, with Blötberget's contribution representing 2.5 Mtpa. This production rate was based on a hoisting study undertaken by Sweco during the PEA assuming 5,400 hours per year of available time. The study assumes that the existing shaft is rehabilitated and new hoisting infrastructure is installed. The requirement to remove waste from the mine in addition to ore through the same infrastructure has been allowed for in the study.

Based on the potentially mineable material in the PEA, this equates to a sink rate of approximately 30 m per year and requires approximately 6,000 m of development per year to sustain. The resulting mine life from this is approximately 12 years.

A subsequent internal study by NIO and Ramböll assumes a production rate of 3 Mtpa. The production rate is based on the same hoisting study, however, the available hours are assumed to increase from 5,400 to 7,560 hours per year. This is approximately 6,000 t per shift (assuming a 10hr shift).

The current environmental permit constrains the combined production from Blötberget and Håksberg to a maximum of 6 Mtpa, though no split is designated on the distribution of that limit between operations. The Phase 1 FS is intended to progress with a production rate of 3 Mtpa as a base case.

A separate study was undertaken by Atlas Copco, investigating the potential for the equipment to maintain a 3 Mtpa production rate assuming a development layout and ore-pass configuration on a selected level. This study is reported to have validated the planned 3 Mtpa production rate.

6.7.2 SRK Comments

NIO proposes to mine from Blötberget at a maximum rate of 3 Mtpa, which is over 7 times greater than the best production year from historic mining, a significant increase. Whilst the Atlas Copco study investigates the production rate against the geometry of the deposit, additional analysis should consider how dependent the results of this study are on the thicker portions of the deposit in the Flygruvan and Kalgruvan mineralised bodies. Future evaluation should consider the impact of maintaining the production rate over the life of the mine.

The materials handling method from underground to the processing plant is yet to be finalised by NIO. Though this may constrain production rates achievable, it is assumed that the ability to maintain the 3Mtpa production rate will be a minimum criteria for the selected materials handling methods so is unlikely to influence the production rate applied to the FS.

Finally, an evaluation of the required vertical sink rate should be assessed to ensure that the rate is in line with rates achieved in existing, comparable operations.

6.8 Underground Mine Design

6.8.1 Observations

The plan proposed by Ramböll is to maximise use of the existing underground development which will require stripping out the existing declines to gain access to surface and rehabilitating underground infrastructure such as ventilation and drifts to accommodate modern equipment operating at higher production rates. This plan includes completing the decline that was commenced but remained unfinished when the previous operations ceased.

The PEA did not include a detailed mine design, however, assumes the following infrastructure to be required for the mine:

- Decline from surface and associated drifts to access levels;
- Main haulage levels;
- Ventilation raise and associated drifts;
- Rehabilitation of existing BS shaft;
- Ore-passes to haulage levels; and
- Underground crusher station.

Ramböll has produced a detailed mine design in 2013 based on the constraining wireframes for the Mineral Resources outlining the development requirements to access the deposit on each level and associated infrastructure. This design proposes haulage levels to be located on the following elevations:

- 330 mL;
- 470 mL;
- 630 mL; and
- 875 mL.

The mine design includes the use of the two existing shafts from the historic Vulcanus mine and requires a new shaft for ventilation intake.

All references to levels have been changed in the Blötberget mine so that they now represent distance from a reference level at surface of Håksberg mine. This represents an offset of 40 m from the historic level nomenclature.

Limited development was designed within the mineralised boundaries as part of the Atlas Copco production rate study, however, SRK understands that this approach was not undertaken for the whole deposit.

6.8.2 SRK Comments

There appear to be few practical constraints to re-establishing underground mining at the Blötberget Mine, however, it appears that the optimal mine design and materials handling approach still requires significant additional mine planning. Plans are still conceptual rather than based on engineering but development layouts are well advanced.

The ultimate design will be constrained by the existing development. Further definition of the Resource and geotechnical parameters is required for the mine design to be finalised as well as decisions made in a number of key options assessments (i.e. haulage, mining methods, etc.)

The mine design does not include any allowance for the existence of the fault that is believed to act as a boundary between the Hugget and Flygruvan/Kalgruvan mineralisation. Whilst this fault is poorly characterised, it has been intercepted by two drill holes. The thickness of the fault zone could not be established as the holes had to be abandoned. Whilst the influence of this fault on the mine design is unknown, it will require greater understanding for the Phase 1 FS to ensure there are no surprises during mining.

6.9 Schedule

6.9.1 Observations

A construction plan for the operation was developed in the PEA and has been updated using data from the scoping-level studies undertaken, as shown in Table 6-3. The latest schedule anticipates the Phase 1 FS completing EOY 2014. Development and construction of the project would then commence in Q1 2015.

Primary activities for commencement of the construction include the diversion of the Gonäs River (which flows over the hangingwall of the mineralisation) and dewatering of the underground workings. Dewatering activities are anticipated to take a full 12 months. Commencement of mining activities begins with the decline from surface in Q2 2015. A summary of the mine construction schedule is provided below.

Table 6-3: Proposed Project Construction and Development Schedule

Activity	2015				2016				2017				2018	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Drainage diversion														
Dewatering														
Service decline														
Hoist construction														
Industrial area and roads														
Electrical rerouting														
Concentrator														
Additional buildings														
Skeppmorra rail														
Skeppmorra terminal														
Tailings construction														
Communications infrastructure														
Upgrading ramp to 240 mL														
Decline to 470 mL and haulage level														
Ventilation upgrade														
New ventilation infrastructure														
Development upgrade														
Ore development														
Production ramp up														
Full production rate														

Production is due to commence in 2017 with full production capacity achieved in mid-2018. Production scheduling is at a strategic level and is not based on a Gantt format build-up of mining activities. No breakdown of the production schedule has been provided outside of the work undertaken as part of the production rate analysis.

6.9.2 SRK Comments

The current mining schedule is considered to be to a scoping study level. No breakdown of the production schedule was provided to SRK suggesting there is significant work to connect all of the various studies into an integrated approach. SRK is not aware of any detailed scheduling being undertaken on the mine design undertaken by Ramböll.

The Phase 1 FS should include a preliminary scheduling process to capture all of the available data after the trade-off studies have been completed. This would be the basis of a preliminary economic model that would be used to validate all of the assumptions to date and confirm the economics with revised input assumptions prior to significant advancement of the Phase 1 FS. In many respects, this process would replace the Prefeasibility process that has yet to be undertaken.

The schedule for Blötberget appears to be very tight. SRK has reservations about the proposed dates. The Phase 1 FS is unlikely to be completed prior to EOY 2014 so recognition of the implication s of any delays needs to be understood by NIO. With so many unknowns still in place (i.e. materials handling systems, rehabilitation requirements of shafts sustainability of production rate, etc.), confidence in the current schedule is low. Three and a half years is considered to be a tight timeframe between commencement of construction and ramp up to full production. SRK recognises that there are some advantages with the existing infrastructure, however lead times for detailed design and commissioning of contracts is very short. There is a risk that the required contractors will not be available in the required timeframe.

For example, a 400 m deep crusher station with a conveyor to the processing plant will require a decline to be constructed. At a 1 in 7 gradient, which allows for conventional equipment and advance rates, the decline would be 2,800 m long. Assuming an advance rate of 120 m per month, 24 months will be required for the decline to be mined. Subsequent construction of the conveyor may take a similar timeframe.

The production schedule should be linked to the mine design using a modern mine design/scheduling software such as CAE Datamine 5D Planner, Deswik.CAD Scheduler or Geovia MineSched. This will allow rapid assessment of different options and their impact on the life of mine schedule. It will also allow for equipment productivities to be built into the schedule constraining it to available equipment rather than a predetermined production rate. Additional activities such as construction of infrastructure and processing activities can be built into the schedule to create a fully integrated life of mine plan for strategic decision making.

Indications of the preliminary metallurgical test work have identified a number of areas where the schedule would be enhanced by incorporating data required by the processing plant. Apart from the iron content, the schedule should include:

- % phosphorous;
- % magnetite; and
- % hematite.

Inclusion of an estimate between the coarse and fine composition of the ore would also be advantageous, however, collecting the required data for this may prove difficult.

6.10 Development

6.10.1 Observations

The historic underground mine at Blötberget was not entirely mechanised and the equipment that was used was smaller due to the technology available at the time and the production rates required. Currently, all existing underground excavations are submerged and significant stripping and rehabilitation works are required to make use of the existing underground development. No assumptions have yet been made for the stripping requirements or methods.

The current development plan is based on a mine design produced by Ramboll in 2013 and assumes a sublevel spacing of 20 m (outside of existing development) and assumes only one additional raise is required. The development plan includes completion of the decline, which requires intersecting the decline from above.

Historic development has been digitised and partially converted into wireframes with the positioning adjusted using the mapped mineralised contacts and drill core data to allow for any inaccuracies in the surveying.

The production profile for development has not been finalised, however previous work assumes a 5 m by 5 m profile is applied for all development. Very little consideration has been given to the required ground control. All previous work in this area focussed on Håksberg. Inspection of photographs from previous mining suggests that little rock-bolting was undertaken, historically.

Development costs are based on budget figures provided by two contractors, NCC and Bergteamet AB and do not include an allowance for ground control. Estimates do not include mobilisation or demobilisation costs. NIO has assumed that underground contractors will be used for the initial stages of construction with owner-operator mining after this however the PEA is based on the assumption that all development will be constructed with contractors. During owner-operator mining, lease equipment is assumed to be used.

6.10.2 SRK Comments

There are some substantial advantages for the project with the existing underground development, mostly relating to time and cost required to access the Mineral Resource. The underground development and production areas have been flooded for 30 years and will require significant work to dewater, enlarge and rehabilitate the development to allow modern, larger capacity machinery into the mine.

Intersecting the decline from above will pose a challenge given the question marks that surround the accuracy of the historic surveying. Allowance for complications will need to be added into the project schedule.

Development design and suitable ground control assumptions will be required in the FS to get better estimates on the development costs. SRK notes that the figures provided appear to be on the low side as they are in line with what can be observed in an owner-operator mine. A contract figure would include an allowance to cover the purchase and financing of equipment. Mobilisation and demobilisation will also be a significant cost that is not currently included in NIO's assumptions.

A complete redesign of the mine will be required after optimisation, haulage study and mining methods study to reflect the new requirements. Specifically the 20 m sublevel spacing may not be suitable for the mining method or allowances may be required for additional ventilation or materials handling infrastructure. The development profile will also require optimisation.

Significant stripping will be required to re-access the existing development. A strategy will need to be produced in the geotechnical investigation to provide a re-entry procedure and limitations to access for rehabilitation in line with Swedish standards. For example, slashing and firing of a 100 m length of development will require a procedure that allows entry to the historic development prior to rehabilitation. Failure to do this will limit potential stripping length to the length of the jumbo boom. The potential difference this will make to the schedule may be significant.

6.11 Drill and Blast

6.11.1 Observations

Drill and blast design for development has not been considered to date. Costs are based on budget estimates and the methodology of blasting is assumed to be at the contractor's discretion.

Production blasting assumes the use of 76 mm up-holes. Again, contractors are assumed for the PEA and no drill and blast design has been developed in any detail. For consumption estimation purposes, the following powder factors have been used:

- Development - 1.4 kg/m^3; and
- Production - 0.8 kg/m^3.

No consideration has been given to the storage or containment of explosives either on the surface or underground. The assumption has been made that explosives supply, labour and loading will be contracted out but no allowance has been made for costs or infrastructure.

6.11.2 SRK Comments

No consideration has been given to drill and blast in previous studies. Whilst from an operational context, drill and blast may be at the discretion of contractors; the FS should provide for drill and blast design so that supply and storage of consumable can be estimated. An allowance for the storage and handling of explosives will need to be incorporated into the mine design and surface infrastructure layout.

Emulsion should be considered as a primary bulk explosive for future designs to reflect the significant presence of water in the mine and potential for surface water to drain through a caving zone.

6.12 Materials Handling System

6.12.1 Observations

No finalised strategy for the materials handling has been developed for the Blötberget Mine to date, though significant work has been completed in this area. The PEA assumed hoisting of both ore and waste through the existing hoisting shaft. Ore would then be transported to the processing plant by conveyor. Investigations were undertaken by Sweco to determine the potential capacity of the shaft and an assessment undertaken on the headframe to determine whether it could still be used.

The PEA assumes loading to ore-passes and then truck haulage using 50 and 60 t capacity trucks to a central crusher station located on the 520 mL and skip loading on the 580 mL with the number of ore-passes also assumed. The hoisting concept was based on the materials handling system used at LKAB's Malmberget Mine.

Since the PEA, an internal materials options analysis has been undertaken by NIO and PROing assessing:

- Shaft hoisting;
- Conveyor;
- Truck haulage (electric); and
- Truck haulage (diesel).

The study was an integrated assessment of all three proposed deposits in the LIOP. The assessment assumed that in each case, truck haulage on the internal decline would be used to transport the ore from the drawpoint to the 300 mL. The study was based on a peak production rate of 2.5 Mtpa (excluding waste rock). The results of this study indicate that the conveying option is preferred.

In addition to the PROing study, NIO have commissioned Wehr to investigate a slurry hoisting option. This option would include a secondary crushing circuit located underground to produce a -20 mm product, which could be pumped to the surface. No results from this study have been reviewed by SRK and are assumed not to be available at the time of the gap analysis.

Additional consideration is being given to mobile crushing units being placed underground rather than a central crushing system. No formal studies have been produced for this option.

Preliminary discussions are being held with ABB regarding the hoisting option.

The processing plant is to be located to the NE of the Blötberget Mine a considerable distance from the present shaft.

6.12.2 SRK Comments

Considerable work has been undertaken on the materials handling assessment though a final decision on the strategy is yet to be made. The Phase 1 FS will need to collate the results from the individual assessments and compare their results. The basic design of the mine layout should be undertaken to assess the impact of each method on the overall schedule and production profile. The study could be undertaken early in the FS process using information already present to produce a comparative study of the methods. Finalisation of the materials handling network will be important to determine the baseline assumptions for the study.

6.13 Equipment

6.13.1 Observations

A summary of the key mining equipment requirements as proposed in the PEA is provided in Table 6-4.

Table 6-4: Summary of PEA equipment requirements

Task	Equipment	No.
Production drilling	Twin boom jumbo	3
Development drilling	Twin boom jumbo	2
Charging	Charging truck	1
Loading	Toro 1250 LHD or similar	5
Transport	30 t trucks	8
Scaling	Mechanised scaler	1
Ground support	Scissor lift,	1
Shotcreting	Transmixer Shotcreter	1 1
Road maintenance	Grader	1
Backhoe		1
Transport vehicles	Light utility vehicles	4
Total		**29**

Ramböll state that the equipment requirements have been built up from first principles.

Atlas Copco has undertaken a materials handling simulation on the deposit based on a typical level plan. The level used or the specific mineralised vein is not indicated in the presentation of results provided. The results of the simulation were:

- Electric loaders not recommended due to high risk of cable interactions;
- Outside of thicker veins, there is a high risk of interaction between equipment;
- Ventilation may restrict the amount of equipment able to be used in a level; and
- 4 loaders required to meet production.

6.13.2 SRK Comments

Equipment requirements can only be considered at a scoping level at this stage. Whilst the estimates are built up from first principles, there is no link between the equipment requirements and the production schedule. Better understanding is required of how the changes in the production profile over the life of mine plan will affect the equipment requirements. Production, hauling/tramming distances and development requirements will change over the life of the mine and will need to be incorporated into the equipment fleet estimation process. This will better enable the prediction of the purchase and replacement schedule of the equipment.

The equipment requirements will not be fully understood until additional information is finalised regarding the proposed mining operations. Finalisation of the materials handling study will have a significant impact on the trucking and loading fleet.

Currently, there are no bolters proposed for mining operations. Whilst there has been no work undertake to date on the ground support of the mine, it is reasonable to anticipate that there will be a significant amount of rockbolting required.

The equipment fleet estimation should also allow for the proposed ventilation circuit to limit the amount of diesel equipment working in any given area of the mine. Ventilation will act as a constraint to production and needs to be considered as part of the evaluation.

6.14 Contractors

6.14.1 Observations

The PEA was undertaken assuming contractors were used for all activities, both production and development, for the duration of the life of mine plan.

The scoping study work undertaken since the completion of the PEA has assumed development contractors are used for the first two years of the schedule with an owner-operator arrangement following. Production activities are assumed to be owner-operator. All equipment in the owner-operator scenarios is assumed to be leased to reduce capital costs.

The preference for contractors in the work to date is a baseline assumption to simplify cost estimation rather than a preferred company strategy.

6.14.2 SRK Comments

The Phase 1 FS should incorporate a trade-off study for the use of owner-operator versus contractor equipment and labour. Contractors will result in a higher operating cost but lower capital cost. The risk of contractors in a marginal mine will be the impact of the operating cost on the cut-off grade. Where the cut-off grade sits in the steeper parts of the grade-tonnage curve for the deposit, increases in operating costs can have a significant impact on the amount of resources that are economic to mine. Cut-off grade sensitivity should therefore be included in the evaluation of contractors.

6.15 Labour

6.15.1 Observations

The PEA assumed that all production and development activities were undertaken by contractors and that labour was to be supplied as part of the contracts. No section regarding labour has been included in the PEA.

Ludvika and the surrounding areas have a combined population of around 25,000. The community has a history of mining so local skills and engineering services are available. Ludvika is located approximately 3 hours drive from Stockholm and the surrounding area supports many recreational activities. NIO does not consider the recruitment of suitable skills to be an issue.

6.15.2 SRK Comments

The current work has very little consideration for labour. The Phase FS should include a build-up of labour requirements based on the scheduled production, development and construction activities. Even if contractors are to be used for mining activities, suitable infrastructure to support the required labour (offices, change rooms, lunch rooms, etc.) will need to be included into the site layout. The build-up of labour should reflect the proposed shift structure and legislative constraints on work rosters.

6.16 Ventilation and Mine Heating

6.16.1 Observations

A basic ventilation study was undertaken as part of the PEA. The total ventilation demand assumed in the PEA is estimated to be a maximum of 600 m^3/s. The identified threshold limits for ventilation are identified as:

- Carbon monoxide - 20 ppm (10 ppm during loading);
- Nitrogen dioxide - 1 ppm;
- Organic dust - 10 mg/m^3; and
- Quartz dust - 5 mg/m^3.

The ventilation concept is for preheated air to be blown into the mine through two fresh air intakes. A propane heater will be used to heat the air, when required, to a minimum temperature of +2°C. A 2m by 2m existing shaft within the Vulcanus mine will be used for intake air and a new intake raise will be constructed nearby with a diameter of 5 m to provide an additional fresh air intake. The Vulcanus intake will support a single fan capable of supplying 80 m^3/s. The new shaft will support three fans, each able to supply 173 m^3/s. The entire heating infrastructure will require 19 MW of power.

Exhaust ventilation capacity for the mine will also be provided by two shafts. An existing shaft in the Vulcanus mine will be used with dimensions of 3 m by 5 m. Two fans will be located at the base of this shaft, each able to supply 100 m^3/s to create a push-pull ventilation network. The second exhaust will be located near the Hugget vein with a diameter of 4.5 m. Two fans will each provide 160 m^3/s flow through this exhaust.

An update of the ventilation requirements was undertaken at the end of 2012 to reflect the increase in production rate and other changes made to the assumptions. The study is said to be to a Prefeasibility level. Detailed capital cost estimates of individual equipment are undertaken as part of this study though little additional data is available.

6.16.2 SRK Comments

Ventilation has been extensively investigated with a detailed cost estimation. There is no evidence, however, of a link between the production equipment requirements and the ventilation network. Only details of the ventilation equipment are provided. The study also lacks the inclusion of the mine design undertaken by Ramböll.

The Phase 1 FS should take the investigation further by using a VentSim style ventilation software to simulate the required ventilation at various stages of the mine's development to ensure a suitable airflow to support the production for the duration of the life of the mine. The simulation will need to include the proposed heating infrastructure, three-dimensional modelling of the mine development at the various stages of development being simulated and the required equipment that may introduce contaminants into the ventilation circuit (i.e. diesel engines).

6.17 Dewatering

6.17.1 Observations

All historic workings, including the open pit are currently filled with groundwater to the surface. The pit lake is connected to the underground workings. Dewatering of the underground workings will be a primary activity for the development of the proposed operations to commence at the start of construction of the mine.

The dewatering process has been benchmarked against similar activities for the Dannemora Project. The dewatering process is to commence at the start of 2015 and will take 12 months. At least 3 months will be required before the upper levels of the existing development become accessible.

To assist with the dewatering, the Gonäs River (currently carrying approximately 700 l/s) is to be diverted away from the hangingwall of the deposit. The mine is expected to have a groundwater inflow of approximately 40 l/s.

Little consideration has been given to dewatering operations during mining operations.

6.17.2 SRK Comments

Planning of the dewatering phase of the mine is a difficult task due to the limited work on hydrogeology aspects completed so far. The timeframe required to completely dewater the mine could vary significantly depending on the groundwater flow into the mine. The critical aspect of the dewatering programme will be to ensure that the water level remains below the active level required for the production-related activities. Early stage activities will be the decline from surface which is decoupled from the underground workings. The risk is when breakthrough into the old decline development occurs. For this reason, an attempt should be made to provide an estimate of the water level in the existing mine over the construction period to act as an input to the scheduling process.

The estimate of 40 l/s for inflow into the mine seems low when the amount of water present at surface is considered. Previous sublevel caving is likely to have formed tension cracks that extend to the surface meaning the overlying rock effectively has no ability to attenuate any water from surface. For this reason, the mine will likely be particularly susceptible to precipitation and spring melt. Considerable additional work will be required to design a dewatering network for the mine during operations.

6.18 Power

6.18.1 Observations

Electrical power is to be provided to the operations from a 50 kV transmission line adjacent to the proposed processing plant location. Work on the power supply has focussed on the connection of this line to the mine power infrastructure.

The mine is to be powered with a 12 kV network from a transformer with 40 MW of capacity. A conceptual power layout for the mine has been considered with transformers to be located on:

- Decline;
- BS hoist (x2);
- Ventilation intake;
- 330 mL;
- 360 mL;
- 480 mL; and
- 530 mL.

Basic power diagrams have been produced for the mining infrastructure.

6.18.2 SRK Comments

The planning for distribution of power appears to be advanced compared to other areas of planning. An update of the power requirements will be produced as part of the FS and detailed distribution plans should be developed. The location and size of all electrical infrastructure should be considered and reflect the final mine design.

6.19 Services Reticulation

6.19.1 Observations

No consideration has been given to the reticulation or provision of services has been considered in the studies to date.

6.19.2 SRK Comments

The Phase 1 FS will need to include a detailed design of the required infrastructure and reticulation of the following services:

- Compressed air;
- Service water;

- Communications; and
- Remote blasting (i.e. PED).

Service water will require surface dams and pressure reducers to manage the volume and pressure of the flow. Air compressors will be requiring at surface with regular water traps to reduce equipment wear. Piping for the distribution of compressed air and service water to the headings needs to be estimated and included into the cost estimates. Estimation of the volume of peak supply requirements need to be built into the schedule to ensure the distribution network is adequate. The cost of these requirements can be built into the development costs if a standardised approach is taken for each heading.

Many forms of mine communications are available for consideration. The infrastructure should be compatible with emergency procedure and allow contact to be maintained for the entire mine layout. In many instances, the communications network will be used for remote blasting and personnel monitoring as well.

6.20 Backfill

6.20.1 Observations

No backfill is required for the mine plan using the currently envisaged mining methods.

6.20.2 SRK Comments

Currently, there is no requirement for backfill to be considered in the Phase 1 FS. SRK notes that this may change depending on the outcome of the mining methods trade-off study.

6.21 Waste Disposal

6.21.1 Observations

Waste production at Blötberget Mine is envisaged to be in the order of 250 ktpa.

All waste is to be transported to the surface, either by truck or using campaigned hoisting. Waste rock is to be crushed and screened as a by-product that can be supplied to the local aggregates market and for internal use.

There is some potential for underground waste disposal in the historic Hugget mining areas.

6.21.2 SRK Comments

Using the ore hoisting infrastructure for transportation of waste introduces two issues to the materials handling network:

- Campaigned hoisting of ore and waste; and
- Underground storage near crusher for both ore and waste.

Neither of these considerations have been discussed in the material provided to SRK and should be considered as part of the FS.

Additional consideration should be given to surface stockpiling of waste. Underground mining generally produces low volumes of waste and much of the waste produced can be recycled as aggregate for road base or surface infrastructure, however, there will be a lag between mining and use of the waste for productive purposes and it is unlikely that all waste will be used for productive purposes. Permanent stockpiles will therefore need to be designed for the surface and included in any acid rock drainage considerations.

Opportunities for permanent disposal of the mine waste in depleted underground mining areas should also be investigated. However, additional stripping may be required to provide access to the historic areas.

6.22 Site Layout and Mine Site Infrastructure

6.22.1 Observations

The existing underground infrastructure and proposed works as outlined in the PEA and subsequent studies is detailed below:

- A new decline will be developed from surface and connected to the existing decline at the 160 mL;
- The existing decline from 160 mL will be stripped and rehabilitated as well as existing ventilation raises;
- A conveyor belt will be routed to the hoisting chamber and then connected to the processing plant by a separate conveyor decline (if conveying used for transportation to surface);
- The BS shaft will be reused for hoisting the ore from an underground (if shaft hoisting is used for transportation from the surface;
- Installation of a rush crusher station and associated infrastructure at the 520 mL;
- Transport levels will be made at vertical with an independent ore-pass network for each level such that they have a productive life of about 3 years;
- Approximately four levels of sublevel caving development was excavated mainly in the Hugget vein ore prior to the halt in production and mining is planned to commence in this area as soon as connection to the ramp from surface is made to the 160 mL and access to these areas is enlarged and rehabilitated to allow for the modern equipment;
- Decline ramp development will provide access to future mining areas at depth and access crusher installations; and
- New ventilation infrastructure, including new shafts, is planned in line with production increases.

The previous headframe use for historic mining of the Blötberget Mine is still in place as is the encompassing building (historic processing plant facility). Investigations have been undertaken on the state of the headframe and indications suggest that the headframe could be used for future hoisting. Both the land and buildings for the headframe are not owned by NIO however, the mining licence allows NIO to access the infrastructure with compensation for the current owner. A framework agreement for this is in place.

Irrespective of the use of the BS shaft for hoisting, the BS shaft is planned to be used for services, dewatering and ventilation infrastructure.

Consideration has been given to the use of mobile crushing stations rather than a permanent crushing station though no studies have been completed for this.

6.22.2 SRK Comments

The processing plant building that hosts the BS headframe is in a poor state of repair. Whilst the headframe may be structurally sound, there are question marks over the building as a whole. Considerable work is likely to be required prior to use of the building for any purpose. The environmental permit suggests that repair of the building will be the responsibility of NIO though there is some uncertainty of this. The associated costs for the repair and upgrading of the building will need to be incorporated into the economic model for the FS.

Surface layouts for the surface infrastructure for mining are conceptual and limited in their scope. Surface infrastructure will be located in the following areas:

- Vulcanus Mine;
- BS shaft and surrounds;
- Decline portal; and
- Processing plant (assuming conveyor constructed).

Further work on layouts are required when infrastructure final requirements known. The actual requirements will be dependent on the production rate and materials handling trade-off studies.

Consideration should be given to the design of a boxcut portal required for the portal of the decline. SRK understands that no work has been undertaken in this area.

Also missing from the previous evaluations is consideration for workshop requirements, both surface and underground, for the maintenance of both fixed infrastructure and mobile fleet. This should include refuelling and servicing facilities underground.

6.23 Stores and Procurement

6.23.1 Observations

No consideration has been given to the stores and procurement requirements for the mine to date.

6.23.2 SRK Comments

Consideration of storage requirements for the mining operations will be required to evaluate the associated infrastructure required, including:

- Magazine (both surface and underground);
- Warehouse for stores (both surface and underground);
- Diesel storage; and

- Laydown yards.

Storage levels will be an important consideration when considering appropriate levels of working capital for economic modelling.

6.24 Operating Costs

6.24.1 Observations

A summary of the PEA estimate of operating costs is provided below in Table 6-5 which covers mining through to delivering the saleable product to the ship (FOB) at a designated port on the east coast of Sweden. The operating costs are based on an ore production rate of 5.5 Mtpa to produce 2.35 Mtpa of iron concentrate products (approx. 8% moisture content). SRK has used an exchange rate of SEK 7 to USD 1.

Table 6-5: PEA Operating Costs

OPEX Breakdown	SEK/t_{ore}	USD/t_{ore}	SEK/$t_{product}$	USD/$t_{product}$
Mining	80.0	11.4	202.3	28.9
Rail/ROM Haulage	3.9	0.6	9.9	1.4
Crushing/Hoisting	6.6	0.9	16.7	2.4
Ore Beneficiation	26.8	3.8	67.8	9.7
Rail Transport	16.0	2.3	40.5	5.8
Harbour Fee (Gavle)	8.0	1.1	20.2	2.9
Contingency (2.5%)	3.5	0.5	8.9	1.3
Total	**144.8**	**20.7**	**366.3**	**52.3**

The mining operating cost of SEK 80/t_{ore} can be further broken down into the following components:

- Direct mining cost - SEK 68/t_{ore};
- Related geology costs - SEK 2/t_{ore}; and
- Machine depreciation - SEK 10/t_{ore}.

The direct mining costs are based on the assumption that 80% of the ore will be mined by sublevel caving and 20% from development mining. A breakdown of these costs is shown in Table 6-6. Note that the assumed density of the ore is 3.8 t/m^3.

Table 6-6: PEA Direct Mining Costs

OPEX Breakdown	Sublevel Caving		Development		
	SEK/t_{ore}	USD/t_{ore}	SEK/t_{ore}	USD/t_{ore}	USD/m
Drilling	4.3	0.6	12.4	1.8	162
Explosives	10.8	1.5	18.8	2.7	245
Ventilation	7.8	1.1	7.8	1.1	101
Scaling	0.8	0.1	0.8	0.1	10
Loading	22.7	3.2	22.7	3.2	296
Hauling	16.0	2.3	16.0	2.3	208
Miscellaneous	3.0	0.4	3.0	0.4	39
Total Owner Costs	**65.3**	**9.3**	**81.5**	**11.6**	**1,061**
Contractor	88.0	12.6	152.0	21.7	1,980

The operating costs are based on an owner-operator scenario. The PEA states that the contractor costs provided in Table 6-6 are NIO estimates.

Budget estimates for contractor costs were provided to NIO by Bergteamet AB in 2011. A summary of these estimates are provided in Table 6-7. These estimates do not include ground support.

Table 6-7: Contractor Operating Costs

OPEX Breakdown	SEK/t_{ore}	USD/t_{ore}	SEK/m	USD/m
30m^2 Decline Development			17,000	2,429
40m^2 Decline Development			20,000	2,857
24m^2 Development			14,000	2,000
76mm Blasthole Drilling			300	42.9
76mm Blasthole Charging			140	20.0
Loading (0-200m)	19.5	2.9		
Hauling (0-3km)	41	5.9		

SRK is not aware of any updates to the operating cost estimates since the PEA.

6.24.2 SRK Comments

SRK considers the cost estimation to be at an appropriate level for a PEA, however, substantial additional work will be required to bring the operating cost estimates up to FS standard. A dynamic breakdown of costs should be undertaken to allow the fixed and variable elements of the individual activities to be estimated from first principles. These costs can then be estimates on a dynamic basis in line with the activities planned for a particular period in the schedule.

The assumption is that the costs are based on owner-operator mining, however the assumption stated elsewhere is that contractors will be used for mining. There is a SEK 10/t_{ore} allowance in the operating costs for depreciation. Normally SRK would not recommend including the depreciation in a cost model as it is not an actual expense but rather reflects money that is already spent. However, in this instance it is assumed to reflect a leasing cost for the equipment as no capital has been allowed for the mining equipment in the economic model.

The operating costs used by NIO for the PEA appear to be on the low side. Mining operating costs of less than USD12/t would be anticipated for an operation such as LKAB's Kiruna Mine, which operates a modern mine with high production rates and near ideal geology for sublevel caving. Blötberget Mine has narrow veined geology with relatively shallow dips and smaller production rates. Under these conditions, SRK would anticipate mining costs more in the range of USD 18 to 25/t, even with owner-operator mining.

The operating costs for development seem more reasonable. USD 1,000/m before ground control would be a reasonable cost for owner-operator development of a 24 m^2 profile. SRK notes that the costs are provided 'per tonne' but the actual costs will be incurred 'per metre'. There will be minimal cost savings from developing in waste, which will have a significantly lower density.

Comparing with the Bergteamet budget prices, the loading and hauling alone would be equivalent to near USD 9/t, 75% of the contractor mining costs allowed for in the PEA. Estimated costs appear reasonable for level development, however, SRK expects that decline costs will be substantially higher.

Considerable detail will be required to develop the cost estimates to a FS level. There are significant gaps in the current estimates (i.e. ground control) and the estimates are much lower than would be anticipated for such an operation. These anomalies will have created a false impression of the economics of the project and an understanding of the potential impact of these changes should be well understood before advancing too far into the FS.

6.25 Capital Costs

6.25.1 Observations

Capital cost estimates are stated in the PEA as being derived from NIO's experience and budget figures provided by two contractors. Capital cost estimates assume the mine decline is developed down to the 875 mL. The costs for capitalised development were estimated considering development unit costs derived from both NIO's experience and projected contractor unit rates. The development costs, using unit costs from both sources, were estimated with the figure applied to the PEA being approximately midway between the two figures (Table 6-8).

Table 6-8: Capitalised Development Costs

Item	NIO Experience		Contractor		PEA Estimate	
	MSEK	MUSD	MSEK	MUSD	MSEK	MUSD
Mine Access and Ramps	369	52.7	406	58.0	381	54.4
Mine Vent Drifts and Shafts	43	6.1	92	13.1	76	10.9
Total Owner Costs	412	58.9	498	71.1	457	65.3

The mining-related capital cost estimate from the PEA for the life of the mine shown in Table 6-9.

Table 6-9: Capital Costs (Mining only) for the Life of Mine

Capital Costs	MSEK	MUSD
Mine Pumping	22	3.1
Mine Access and Ramps	381	54.4
Mine Ventilation Shafts and Drifts	76	10.9
Mining Equipment*	120	17.1
Ventilation and Control	69	9.9
Electrical Installations	22	3.1
Crushing/Hoisting	300	42.9
Total Capital Costs	**990**	**141.4**
Capital Cost excluding Equipment	870	124.3

The economic model assumes that no mining equipment capital is included in the capital costs as this is covered in the operating costs.

A development plan has been produced reflecting the key activities required to bring the mine from the commencement of construction to full production. The breakdown of itemised activities is identical to those listed in the schedule shown above.

There has been some update to the capital cost estimate since the PEA in the scoping study to reflect the higher production rates, though they have not been integrated into a revised economic model. Ventilation costs have been revised to reflect the updated production rate and high level materials handling costs have been revised as part of the trade-off study.

6.25.2 SRK Comments

The process used for the capitalisation of development is flawed. The economic model assumes contract mining so no capital costs are applied for the mining equipment. Capitalised development should therefore be estimated using the projected contractor costs alone. By using a figure approximately midway between NIO's projected owner-operator unit rates and the projected contractor unit rates for development, the margin built into the contractor costs for the purchase of equipment is diminished and partially unaccounted for. The impact of this approach using the numbers provided is approximately 5% of the overall mining capital costs.

The capital cost estimation is limited in its scope. No contingency has been applied and whilst the breakdown does aim to estimate the large-scale contributors to the economic model, it is not considered to be sufficiently comprehensive. Considerable detail needs to be added to the breakdown of capital costs to bring it up to FS. Costs should, where possible, be calculated from first principles and reflect the purchase and replacement schedules.

6.26 Study Level

6.26.1 Observations

The PEA was conducted in 2011 and was undertaken to a scoping study standard. Additional studies have been undertaken to varying degrees of accuracy since then. Much of the additional work has focussed on assessment of various mining options and updating the baseline assumptions in line with the proposed increase in production rate of 3 Mtpa of RoM. The level of detail in the mine planning has advanced greatly since the PEA as a result. The impact of these changes has been a reduction in the projected operating costs for the project. SRK has not been provided with an updated technical-economic model that ties together the revised data, nor has there been any consideration for the parallel advancement of the drilling and Mineral Resource estimations.

The Phase 1 FS is intended to be the follow-up study to the PEA and no interim studies are envisaged. The results of the Phase 1 FS will provide the basis for the investment decision on the project to be made by the NIO's Board of Directors.

The environmental permit and mining concession for the Blötberget and Håksberg mines were approved in 2014 limiting the permitting requirements to bring the project into operation.

6.26.2 SRK Comments

The PEA is a conceptual study and SRK considers that it would be worthwhile undertaking a detailed Prefeasibility-level study (PFS) to provide assurance that the project will be economically viable before progressing to a Feasibility level of study. SRK expects that this project may be marginal and a PFS-level study will identify areas where the optimal approach to mining and materials handling can be identified as well as the major areas of risk.

The technical work undertaken to date, including the scoping-level assessments undertaken since the PEA, is based on a Resource base that includes Inferred Resources. In addition, there are significant gaps in other areas of the study, discussed separately in this report, including (but not limited to) geotechnical, hydrogeology and metallurgy. As a result, the technical work undertaken to date could not be used as a basis of an Ore Reserve estimate. The entire study would need to be brought up to a PFS-level study and based solely on the Indicated and Measured portions of the Minerals Resource estimate.

In recognition of the fact that NIO do not intend on undertaking a full PFS study prior to the commencement of the Phase 1 FS, SRK recommend that all trade-off studies and options analysis is completed whilst the field work is being undertaken for the other disciplines. Whilst the baseline data required for these studies may be suboptimal, a single approach to mining can be decided upon prior to the FS-level design work taking place. These studies should be undertaken based on the currently available information and an increased tolerance be applied to the results to account for the uncertainty in baseline data. Once the final approach to mining is decided, an updated technical-economic model should be compiled to collate the most up to date information available from all disciplines with production based solely on Indicated and Measured Resources. This will provide a better assessment of the project economics and will act as a proxy PFS in the absence of a formal study. This will enable additional confidence in the project to be gained before significant outlay of capital for the FS.

6.27 SRK Conclusions and Recommendations for Gap Analysis

SRK consider the Blötberget Mine to be a project of merit which needs to be studied in further detail to understand the potential. The project is currently considered to be investigated to a scoping study level of detail with a considerable variation in the quality of input data and detail of the technical work.

The major strengths of the LIOP from a mining perspective are as follows:

- Robust history of mining and performance records;
- Proven underground mining methods;
- Close to good infrastructure;
- Skilled and well educated workforce; and
- Stable country with high level of technology for underground iron ore mines.

The major weaknesses of the LIOP observed by SRK are as follows:

- The underground workings have been flooded for 30 years and it will take considerable effort to dewater, strip and rehabilitate these areas for the proposed production plan.
- The geotechnical properties of the orebody and rock mass (hanging wall in particular) may be too competent and not be suitable for caving operations. A better understanding of the rock conditions is required and geotechnical modelling to support the future mine design and sequence of extraction.
- The current mine plan appears to be very conceptual and SRK recommends more work is completed on the mining method selection, materials handling, definition of production rate over the life of mine, optimisation and design, scheduling and cost estimation before proceeding to a FS-level design.
- Groundwater inflows need to be understood in order to estimate dewatering requirements of the life of the mine and whether the water needs to be treated before release back into the environment.
- Mining costs are considered optimistic and may be presenting an over-optimistic impression of the project economics.

- The work to date includes Inferred Resources in the Resource base used for the study, which do not have the geological confidence to be considered suitable to be used as a basis of an Ore Reserve estimate.
- There was no technical-economic model available considering the Blötberget Mine on its own merits. All previous economic assessments have combined the Blötberget Mine with activities in the Håksberg Mine.

Overall, SRK recommends that preliminary studies be finalised to confirm a single approach to mining for the FS and allow a revision of the technical-economic model to incorporate all of the new information available. This step should be undertaken prior to the commencement of the FS level mining study and could coincide with the drilling and metallurgical test work programme.

The recommendations for the mining engineering sections of the Phase 1 FS have been incorporated into the scope of work and schedule for the FS.

The gaps identified relating to the mining and Ore Reserves of the Project, which SRK consider essential to complete in order to ensure that there is adequate detail for the completion of a robust FS, are summarised in Table ES 1.

7 PROCESSING

7.1 Historic Operation

The historical operations at Blötberget and Håksberg employed a combination of magnetic separation and gravity separation to produce magnetite and hematite concentrates. Following grinding of the ore to approximately -0.5 mm, the magnetite concentrate was produced using wet Low Intensity Magnetic Separation ("LIMS"), following which the LIMS tailings were subjected to gravity separation using spirals to produce the hematite concentrate.

Based on the very limited amount of historic production data available, the magnetite concentrates produced were of an acceptable grade (high in Fe and with acceptable levels of P), however the hematite concentrate, particularly from the higher P Blötberget deposit, were both low in Fe (~61%) and high in P (~0.5%).

The beneficiation plant building from the historic operation at Blötberget still stands, however NIO does not plan to re-use this facility for processing.

7.2 2011 PEA

The PEA published in late 2011 developed flowsheets for both Blötberget and Håksberg based on a limited amount of bench scale testwork undertaken at the time. The testwork consisted of Davis Tube ("DT") Tests to test the amenability of producing both magnetite and hematite concentrates. Dry LIMS testwork was also undertaken on material crushed to -5 mm, to test the potential for the production of a "Sinter Fines" product.

The use of a DT to simulate hematite recovery is unusual; in this case the initial (i.e. magnetite) separation tailings were roasted under reducing conditions, with the aim of converting the hematite to magnetite. The roasted material was then re-processed using the DT, after which the "hematite" concentrate was roasted under oxidising conditions, to covert the magnetite back to hematite, before the final hematite concentrate was assayed.

The flowsheets were essentially identical, with a staged grinding and LIMS circuit producing a magnetite concentrate, the tailings from which were to be subjected to Wet High Intensity Magnetic Separation ("WHIMS"), with the WHIMS concentrate subjected to gravity separation using spirals to remove contaminant mica. The LIMS and WHIMS/spiral concentrates, from both deposits, were then to be combined and subjected to reverse flotation for apatite (phosphorous) removal.

A dry LIMS circuit was incorporated into the crushing circuit for the Håksberg flowsheet, as this material had demonstrated potential for the production of a Sinter Fines concentrate.

7.3 2014 Testwork

Metallurgical testwork in support of the FS has to date consisted of testwork conducted on a single sample of ore from the Blötberget deposit. The testwork was conducted at the GTK facility in Outokumpu, Finland, under the auspices of Tata Steel Consulting ("TSC") acting on behalf of NIO.

The sample tested was taken from a single diamond drillhole drilled specifically to provide material for metallurgical testwork. The drillhole intersected both the Flygruvan and Kalvgruvan deposits, although the drillhole intervals chosen to make the composite sample were taken from the Flygruvan intercepts only.

The composite was formed on the basis of matching the orebody average in terms of:

- Fe grade;
- Magnetite : hematite ratio; and
- P grade.

The testwork conducted was as follows:

- Head grade and mineralogy;
- Selected comminution testwork;
- Coarse (-20 mm and -6.7 mm) dry LIMS testwork;
- Wet LIMS, Medium Intensity Magnetic Separation (“MIMS”) and WHIMS testwork;
- Gravity separation testwork using shaking tables; and
- Reverse flotation for apatite removal.

The aim of the dry LIMS testwork was to test the potential to produce a heavy construction aggregate as a potential early value product; the aim was to produce material with a specific gravity in excess of 4.2.

7.4 Proposed Flowsheet

On the basis of the testwork conducted, TSC proposed the flowsheet shown in Figure 7-1. The flowsheet consist of the following key elements:

- The option of producing a heavy aggregate product using dry LIMS after crushing;
- An initial spiral circuit to recover coarse magnetite and hematite;
- LIMS processing of the spiral product to produce a coarse magnetite concentrate and a hematite “tailing”;
- Reverse flotation of the hematite stream for phosphate removal following grinding, producing a fine hematite concentrate; and
- Staged grinding and LIMS, producing a fine magnetite concentrate.

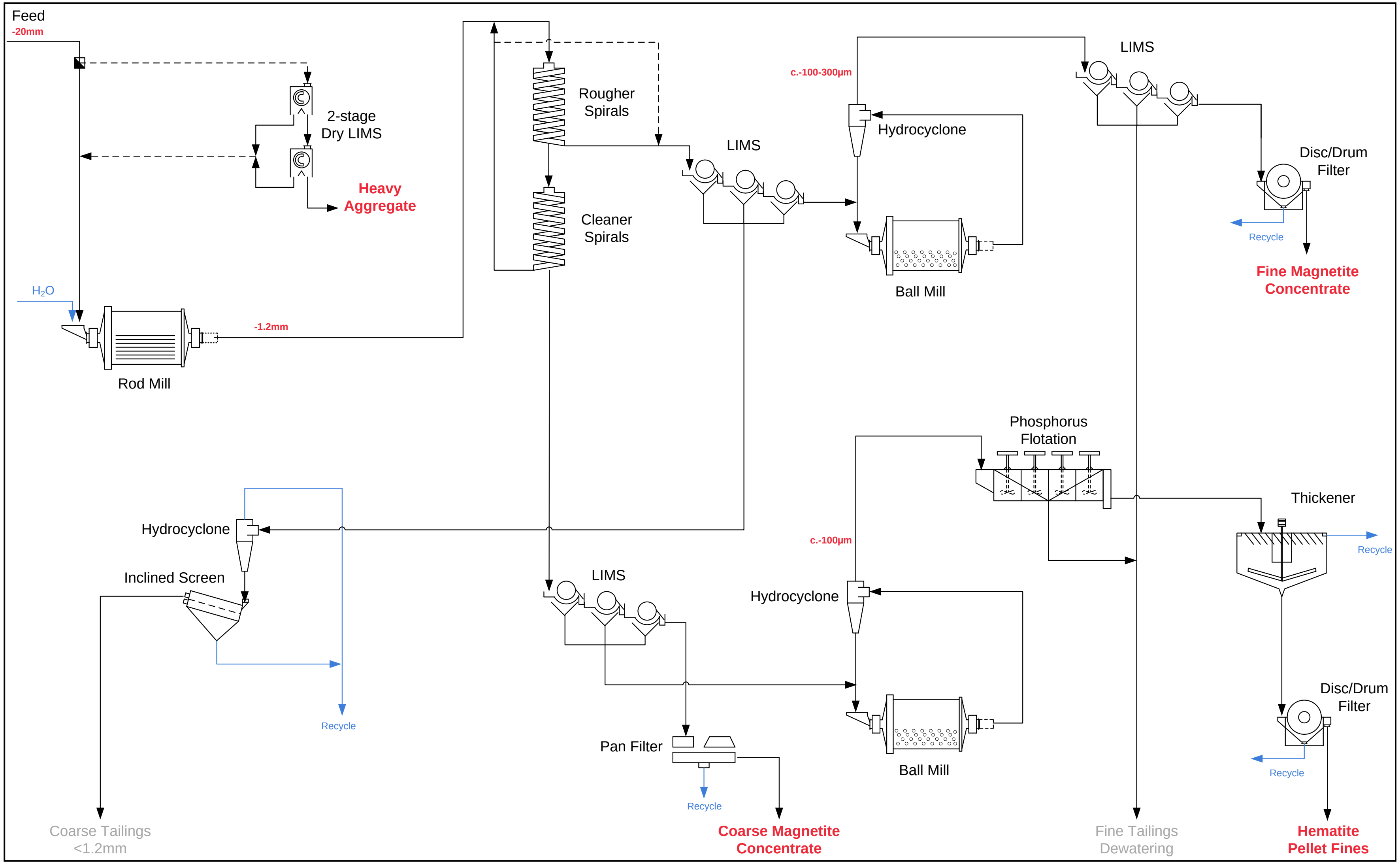

Figure 7-1: Proposed Flowsheet (Source: Tata Steel, 2014)

Based on the testwork results, TSC estimated a mass balance for the flowsheet (excluding heavy aggregate production) as shown in Table 7-1.

Table 7-1: Estimated Mass Balance

Stream	Fe (%)	SiO_2 (%)	Al_2O_3 (%)	P_2O_5 (%)	Fe Dist. (%)	Mass Dist. (%)
Feed	37.4	36.2	5.27	0.71	100	100
Coarse Magnetite	70.6	1.55	0.45	0.15	49.1	26.0
Fine Magnetite	69.8	2.84	0.63	0.04	16.5	8.9
Hematite	67.8	2.17	0.49	0.06	23.2	12.8
Total	69.7	1.96	0.49	0.11	88.8	47.6

7.5 SRK Conclusions and Recommendations for Gap Analysis

7.5.1 Testwork and Proposed Flowsheet

The proposed flowsheet is both supported by the testwork conducted on the sample on which it was conducted, and, based on the results shown in Table 7-1, represents a significant improvement over the historical operation, at least based on the limited amount of historical data reviewed, particularly with respect to the quality of the hematite concentrate. In addition, the reversal of the magnetic and gravity separation stages, with the spirals ahead of magnetic separation, is likely to improve the flexibility of the circuit to handle differing proportions of magnetite to hematite in the ore, as the gravity separation stage does not discriminate between magnetite and hematite.

Significantly, the testwork on which this flowsheet concept is based was conducted on a single composite sample. While this sample was generated in order to simulate the “average orebody”, the actual plant feed is likely to vary from this precise combination of head grade, magnetite : hematite ratio and P content on short, medium and long term bases.

It will therefore be critically important to test the response of this flowsheet to variations in the orebody, in terms of the properties listed above, as well as lateral and vertical extent within the orebody.

SRK understands that a further five samples have been identified for testwork to determine the response of these samples, which vary in magnetite : hematite ratio, P content and orebody location, to the proposed flowsheet. However, SRK believes that a significantly greater variability testwork program is necessary to best define the range of expected responses, and to provide the range of data required in order to optimise the eventual plant design. Specifically, the variation in magnetite: hematite ratio will have impacts on different parts of the circuit, e.g. a high proportion of hematite will result in a greater flow of material to the reverse flotation section, whereas a greater proportion of magnetite will result in a greater flow of material to the spiral tails LIMS circuit. An optimum point will therefore need to be reached between oversizing these parts of the circuit and ore stockpiling and blending requirements.

With regard to the hematite mineralisation within the ore, the flowsheet as proposed will not recover fine hematite. While the amount of fine hematite in the sample tested was negligible, the presence and distribution of fine hematite in the orebody is not well known at this stage.

Fine hematite will not be recovered in the spiral stage, and so will report to the LIMS circuit. However, it will also not be recovered in this stage, and so will be lost to the tailings of the two LIMS stages.

SRK therefore recommends that a MIMS or WHIMS stage is tested on the tailings from these two LIMS stages, in order to test the potential to recover fine hematite that may occur in other sample that are tested as the FS progresses.

Given the presence of coarse, specular hematite observed during the site visit, it is perhaps unfortunate that the proposed flowsheet only produces hematite a fine concentrate, particularly given that a coarser product (~1 mm) will be potentially more desirable as it will fit a sinter feed blend more readily than a concentrate ground to ~100 μm.

The historical data indicates, albeit on the basis of one set of data, that the P in the hematite concentrate was more concentrated in the finer size fractions than in the coarse size fractions. On that basis, SRK recommends that the coarse LIMS tails is investigated for the potential to produce at least some of the hematite at that relatively coarse size. Size-by-size assays should be undertaken, as well as flotation of the coarse size fractions for apatite removal if necessary. Assuming that such a flotation stage would remove composite hematite / apatite particles, these could still be directed to the regrind circuit and the fine flotation stage.

7.5.2 Other FS Activities Related to Processing

Given that the engineering design activities of the FS have not yet commenced, there are no “gaps” that can be identified in these activities, insofar as the entire engineering design and cost estimation exercise is currently a “gap”.

SRK would expect NIO to undertake the FS in a manner that will address the necessary engineering plant design and cost estimation elements to an appropriate level, such that all key elements of the discipline study are covered.

8 INFRASTRUCTURE

8.1 Site Access and Plant Site

Given the “brownfield” nature of the project and the nearby historical operational sites at Blötberget and Grängesberg, SRK does not envisage any that significant problems should arise with regard to opening up the site for the proposed operation.

SRK believes that the currently proposed plant site, which is based on the site infrastructure developed for the 2011 PEA, is not ideal, particularly in that it straddles a watercourse. However, SRK believes that there should be suitable plant sites either to the north or to the north-west of the currently proposed location.

There is no particular need to site the beneficiation plant immediately adjacent to the rail loadout area; these two pieces of infrastructure can be readily connected by a conveyor.

8.2 Power

A 50 kV power line crosses the project site, and the PEA assumed that the site would be connected to this line via a sub-station to be located on the project site.

This appears to be a reasonable assumption, and SRK understands that there is sufficient spare capacity in this line for the project’s requirements. However, should this option not prove feasible, other options are available; there is a large sub-station to the east of Ludvika, and there is also likely to be a suitable facility in the vicinity of Grängesberg.

8.3 Product Transportation

The PEA identified three potential product transportation routes, i.e. rail corridors to existing ports:

- Oxelösund, a rail distance of approximately 300 km to the south;
- Gävle; a rail distance of approximately 180 km to the south-west; and
- Lysekil, a rail distance of approximately 400 km to the north-east.

SRK understands that NIO currently favours the Oxelösund option. This port facility was visited during the SRK site visit.

Given that Oxelösund is the port previously used for the Grängesberg operation, this would appear to be the logical choice – while the rail transport distance is longer than Gävle, the rail line between Blötberget and Oxelösund is appropriately designed and configured for heavy bulk haulage, and the port, while now not dedicated to iron ore exportation, has sufficient loading capacity and storage capacity for the project’s needs.

Again, SRK would expect that the capacities of the Oxelösund port and the rail corridor to be further investigated and developed as an integrated part of the execution of the FS.

9 TAILINGS STORAGE FACILITY

9.1 Introduction

The tailings waste production will be a by-product of processing operation to produce the iron ore concentrate. It has been predicted that approximately 30 Mt of tailings will be produced and stored on the current mining lease. Based on the information received from the Client, the preferred site for tailings storage facility (“TSF”) has been selected and partly permitted in the Gravgruvan area which is located east of road 611. The area 2 shown in Figure 9-1 is the extension of the previous TSF (area 1) which has been decommissioned in the 1970s. A new TSF has been selected south of area 1 with the proposed clarification pond between two areas.

Picture .1 Overview area 2 (Gravgruvan) east of road 611 and former tailings dam.

Figure 9-1: Location of the proposed TSF (Source: PEA, 2011).

9.2 Deposition scenario

The previous studies have considered initial wet slurry deposition of the tailings waste behind the starter dam, following further tailings storage using the upstream method. The proposed TSF represent all side paddock type of containment.

The first step in the construction of the TSF will be construction of a starter dam to elevation +190 m (10 m high). The dam cross-section will have a typical arrangement including the impervious clay core with both upstream and downstream shoulders made of waste rock material. The waste tailings will be spiggoted of the starter dam and further storage will be accomplished in the upstream direction using coarser fraction of the segregated tailings waste. No compaction has been stipulated in the PEA design. The ultimate dam height has been predicted up to elevation 210 m.

Water from the tailings pond will be pumped via a floating barge to the clarification pond located between areas 1 and 2 and then either pumped back to the plant or released to the environment.

In addition to area 2, the plan predicts raise of the existing TSF (area 1) to elevation 210 m.

Table 9-1 below summarizes the tailings disposal plan. Some additional options for storage could be available to achieve 20 Mm^3 of the volume required to meet the waste storage requirements.

Table 9-1: Tailings storage facility

Tailings area	Capacity (Mm^3)
Area 2 to elevation +210 m	12.0
Area 2 with crowning of the final surface utilizing thickened tailings	3.5
Area 1 to elevation +210 m	4.9

9.3 Geotechnical conditions of proposed TSF

Although the site investigation has not been performed as a part of the PEA it is predicted that ground condition are generally good with moraine sediments predominantly underlying the subject area. The in situ moraine soil unit is predicted to be strong with low permeability and as such minimizing the ground preparation effort.

However any ground preparation for embankment construction would include removal of the peat deposits as well as construction of the cut off trenches for any fluvial channels encountered.

The site investigation should be performed as soon as it is practical to meet the timetable milestone for the project.

9.4 SRK Conclusions and Recommendations for Gap Analysis

Proposed TSF deposition method of wet slurry deposition may not be adequate for the anticipated plant processing flow stream resulting in a coarse and dry tailings. The coarse and dry tailings could create up to 90% of the waste mass depending on the final processing scheme and as such virtually eliminating a need for the wet tailings storage facility. The dry storage facility could be designed to accommodate additional small quantities of wet fine tailings without a need to construct a tailings retention dam.

Geotechnical data to support the proposed design of the TSF including borrow material searches needs to be augmented by new site investigation as soon as possible.

Water balance for the TSF needs to be also developed to eliminate potential need for tailings clarification pond which could be replaced by the surface water collection system.

Geochemical analysis of tailings and other wastes need to be confirmed to determine the NPAG nature of these materials.

Final closure scenario needs to be developed and approved by all stakeholders.

10 WATER

10.1 Meteorology, Hydrology and Surface Water Management

10.1.1 Meteorology

The Ludvika Iron Ore Project ("LIOP") is situated in the Kolbäckens regional catchment area measuring 3,118 km^2. Measured annual precipitation averaged 642 mm during the period 1961 to 1990 with 700 – 800 mm on average recorded between 1991 and 2000. The discrepancy and range in values is not explained.

The Swedish Meteorological Institute's ("SMHI") nearby weather station situated in Rönnhyttan (approx. 21 km away) recorded July as the warmest month (14.4°C) and January as the coldest (-6.9°C) months on average for the 1961-1990 period. Estimated average evaporation ranges between 400 – 500 mm per year and average run-off between 300 to 400 mm per year. The wind direction is predominantly in a south-west direction in the area.

10.1.2 Surface Water Hydrology (Glaningen and Gonäsån)

Lake Glaningen is located approximately 300 m from the mining concession area at its nearest point. The lake has an average elevation of 190 m above sea level and an area of 0.7 km^2 with a lake catchment area of 35 km^2 and average outlet discharge of 0.4 m^3/s. Glaningen is surrounded by wetlands and the northern areas is declared protected bird habitat.

Gonäsån River flows from west to east through the sub-catchment area and passes through the northern part of the mining concession area where is merges with contributory streams and flows into the largest nearby lake Väsman. Gonäsån is 15 km long with a sub-catchment area of 78km2. The flow rate of the Gonäsån River ranges between less than 20 l/s (0.017 cumecs) in summer and 5,250 l/s (5.25 cumecs) in spring (based on a 15-year record).

10.1.3 Re-routing of the Gonäsån River

The Gonäsån River flows between Lake Glaningen and Lake Väsman following a course that runs through the Blötberget mining area. The river will be diverted along part of this route to prevent surface water from draining into the mine workings. A diversion system was established prior to the last period of mining (1950 to 1979) and this system will be re-used for the planned operation. Figure 10-1 includes a photograph taken at the time the diversion system was being constructed (left), an image of the lake (top right) and one of the weir discharge from the lake into the Gonäsån River (bottom right).

The diversion system comprised two new watercourses, each including a section of tunnel and connecting channels. Figure 10-2 shows the alignment of the diversions (thick blue lines are channel sections and purple dashed lines are tunnel sections). The northern diversion (Blötberget tunnel) was the main outlet with the southern diversion (Främundsberget tunnel) acting as an emergency outlet when the lake level was particularly high. According to the PEA the existing northern diversion will be cleared and re-commissioned and a new emergency outlet for the southern channel constructed.

Figure 10-1: Historic water re-routing tunnel under construction in 1950s and recent images of Lake Glaningen

10.1.4 Mine Catchment Runoff

Runoff from the mine catchment area (red dotted line area in Figure 10-2) will be captured and pumped to the channel leading to the Främundsberget tunnel. A new pumping station will be constructed with a 300 l/s capacity which has been based on runoff during a 1 in 2 year rainfall event.

10.1.5 Run-off from Plant Site and Other Industrial Areas

Passive run-off from the main plant site and other industrial areas will be achieved through a gentle gradient on the pad. Run-off from closed areas or near potentially contaminating activities (e.g. the gasoline filling station) will be collected, treated as appropriate, and discharged to local surface watercourses.

Figure 10-2: Natural Drainage Showing Flow Directions; the Two Tunnels Associated with the Diversion of the Gonäsån River shown (Source: PEA, 2011)

10.2 Hydrogeology

The shallow geology of the study area consists predominantly of moraine soils with eskers trending northwest to southeast through the mining concession area. These eskers consist mainly of coarse silt to fine sand. Larger areas of peat exist around the concession and the soil layer becomes patchy with outcropping bedrock at higher elevations at nearby hills. These unconsolidated deposits are likely to support local aquifers.

The bedrock comprises greywacke units, overlain by mineralised volcanic units and volcaniclastics which in turn are overlain by sandstones, the whole package (which is all metamorphosed) being overlain by a granitic unit. The hydraulic properties of this package are discussed in the modelling summary section below.

Large deformation zones are present in the bedrock in the Blötberget area striking northwest/northeast. A previous study has identified one of these zones as a 15 m width crush zone with a system of permeable sub-vertical fractures.

One such crush zone has been intercepted by an exploration hole (BB12003) in the area referred to as The Wedge. Figure 10-3 shows the nature of the competent rock mass before the crush zone is intercepted at approximately 399.85 m below collar (this being an underground hole). The hole ended within the crush zone.

Groundwater levels have not been monitored across the project area. The water level in the historic workings has recovered to a natural condition and the pit lake reflects a shallow water table (Figure 10-4).

Figure 10-3: Core Log from BB12003 showing typical Core (left) Entering Crush Zone (right) (Source: SRK, 2014)

Figure 10-4: Pit Lake at Blötberget (Source: SRK, 2014)

10.2.1 Numerical model

A numeric groundwater model was developed by Ramböll in 2011[1] as part of the PFS with the purpose of estimating groundwater inflows to the underground mine when fully developed. The model was created as a steady state 3D model in Visual Modflow.

The model grid was developed with a discretization of 600 x 600 m in the periphery and gradually increased in resolution towards the mine area (10 x 10 m). The hydraulic conductivity values used in the model were estimated based on:

- short term pumping tests in geothermal and water wells
- a fracture frequency method from core logging of one hole (to derive a hydraulic conductivity of the hanging wall)
- values compiled by SKB for analogous mine settings

On this basis the hydraulic conductivity of the hanging wall was estimated at 10^{-10} m/s whilst the footwall was deemed less competent with the hydraulic conductivity one to two orders of magnitude higher (0 to 150 m bgl: $7x10^{-8}$ m/s and greater than 150 m: $1x10^{-8}$ m/s).

Groundwater recharge estimates varied spatially as follows:

- 25 to 90 mm per year in areas unaffected by mining
- 100 to 400 mm per year within the anticipated deformation zone due to historic mining

The model was mainly calibrated by varying hydraulic conductivity in order to replicate historic mine inflow rates. Some limited sensitivity analysis work was then undertaken.

10.3 Mine Dewatering

10.3.1 Historical mine inflow

Historically the average water inflow to the underground mine is estimated to be approximately 40 l/s. However, the inflow rate is understood to have varied considerably. The rate appears to include surface water ingress as well as groundwater inflow. In 1977, for example, the mine was threatened with flooding following heavy rainfall. This suggests poor surface water management at the time and surface water runoff entering the shaft.

10.3.2 Pre-development dewatering plan

All historic workings, including the open pit are currently filled with groundwater to the surface. The pit lake is connected to the underground workings. Dewatering of the underground workings will be a primary activity for the development of the proposed operations to commence at the start of construction of the mine.

In order to dewater the workings prior to mine development submersible pumps will be employed. Pumping will take place from the BS-shaft with pumps installed at 150 m vertical lifts. The shaft is 570 m deep but most of the workings are in the upper 280 m. Total void space is estimated to be 5 Mm^3.

[1] This model pre-dates the analytical modelling undertaken by Golder which is described below. Normally numerical groundwater modelling would follow on from preliminary analytical calculations.

The dewatering process has been benchmarked against similar activities for the Dannemora Project. The dewatering process is to commence at the start of 2015 and the intention is to dewater the void space in 12 months. At least 3 months will be required before the upper levels of the existing development become accessible.

An average flow rate of 150 l/s is anticipated with a maximum rate capped at 300 l/s. Discharge water will be directed to the Gonäsån stream via sedimentation ponds. The maximum discharge rate equals approximately 40% of Gonäsån's average flow rate pre-mining (6% average peak flow and 6% average minimum flow).

10.3.3 Operational dewatering

Water inflow to the planned underground operation has been assumed to be 40 l/s based on historical inflows. Some 50% of this water will be re-used for drilling and the remainder pumped to surface for discharge via sedimentation ponds.

The dewatering system will use pumps and pipes, where possible, from the pre-development dewatering programme. A main pumping station will be developed at 570 level from where water will be lifted to surface.

10.3.4 SLC implications

Sublevel caving has been employed as part of the historic mining operation. The extent of induced fracturing (and subsidence?) as a result of this mining method has not been established through investigation and monitoring. Fracture connection linking the underground working with the surface have implications for surface water infiltration to the planned underground mine.

10.4 Environmental Aspects of Water Resource Management

A hydrogeological impact assessment was undertaken by Golder Associates to support the EIA (Swedish MKB) and permit application process. Two analytical models were developed to estimate the impact of mining on groundwater levels in surrounding areas.

All input data is desktop-based; hydraulic conductivity in the shallow bedrock was estimated using data from water wells and geothermal energy wells. Hydraulic conductivity estimates from SGU's well registry shows little spatial variation and the shallow bedrock was assumed to act as one homogeneous hydrogeological unit with an equally elevated hydraulic conductivity in deformation zones. In the absence of any groundwater level monitoring, static groundwater level was assumed to equal the top of bedrock (or bottom of casing in cases where soil depth was unknown).

Recharge is recognized as a highly uncertain parameter in the absence of site-specific studies and a range of recharge values (35 to 130 mm/year) were therefore applied based on Swedish studies in similar settings.

Results: the models estimated the drawdown influence distance as 2,100 m from the planned underground mine (Figure 10-5). Blötberget has an historical exploration drift extending northeast and the influence distance from this feature was determined to be 1,000 m.

The estimated drawdown influence distance was corrected with respect to Lake Glaningen and the protected bird habitat area wetland north of Glaningen. This implies that lake water and groundwater are in hydraulic continuity which has implications for water inflow to the planned underground operation (see Section 10.6 below).

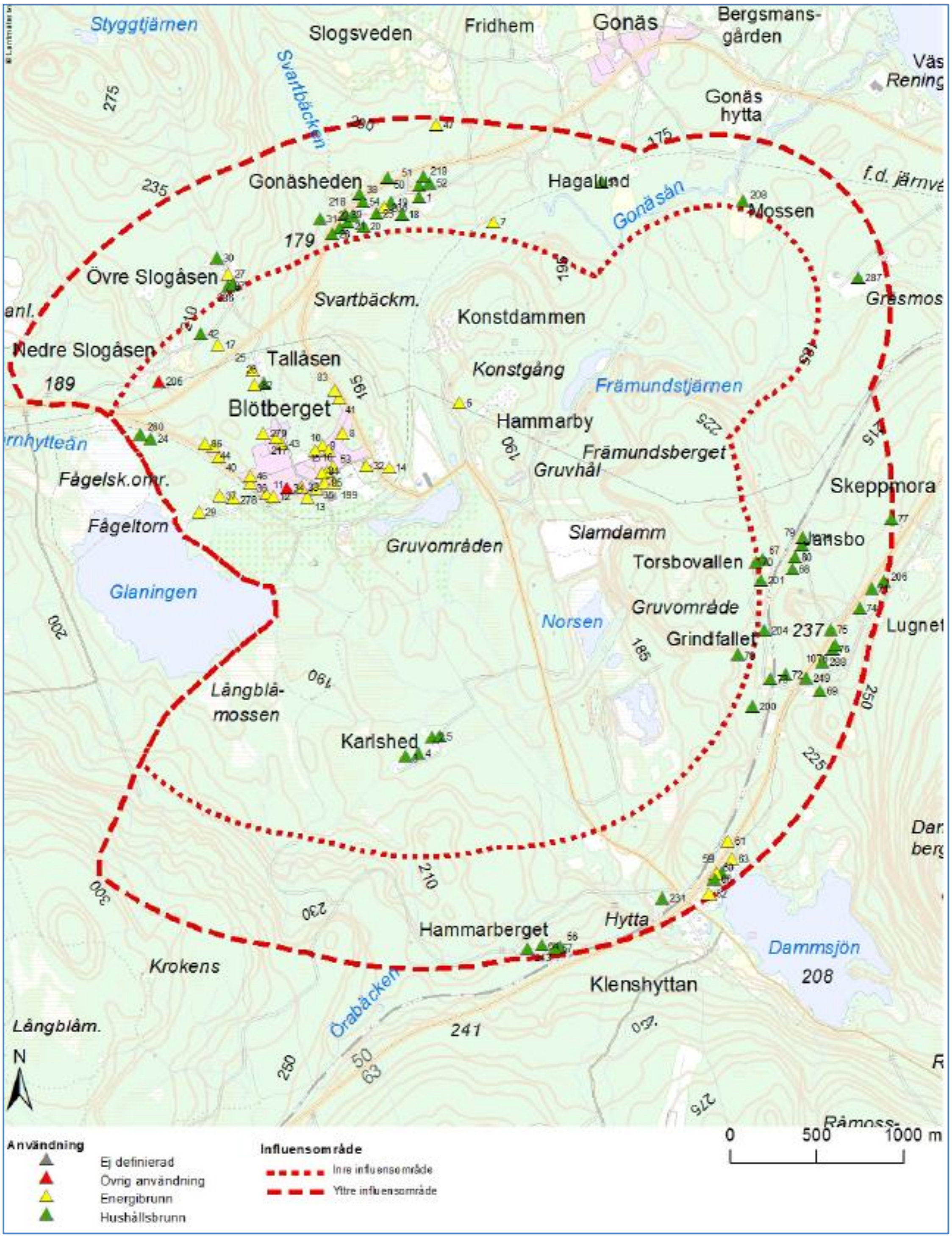

Figure 10-5: Extent of Groundwater Level Drawdown showing the influence of the Historic Drift (NE) and Lake Glaningen (SW) (Source: PEA, 2011)

10.5 Water Balance

The mine site water balance is a conventional circuit whereby water collected from the TSF clarification ponds will be returned to the process plant.

During period of deficit, either summer dry periods or in winter when slurry may freeze and precipitation falls as snow, make up water can also be supplied via a planned pipeline from Lake Vasman. The peak makeup water flow rate from Väsman is estimated to be 100 l/s (0.1 cumecs) which comprises approximately 1% of Lake Väsman's average outlet discharge during the wet period and 2-3% in dry periods.

During periods of excess water when the net water balance is positive the surplus will be discharged into the southern diversion channel upstream of Främundsberget tunnel.

10.6 SRK Conclusions and Recommendations for Gap Analysis

The overall hydrological characterisation of the project area requires further development supported by fieldwork and observational data. This is particularly relevant to the hydrogeological characterisation of the project which SRK considers is currently weakly developed. Such characterisation work feeds into specific studies including; mine water inflow estimation, hydrogeological impact assessment, storm water infrastructure design etc.

Establishing a groundwater level monitoring network is easy to implement and monitoring can begin with immediate effect using existing exploration boreholes in particular, but also levels in the flooded pit lakes and any local wells and ground source heat pump boreholes that are not in active use. Monthly, or bi-monthly, monitoring data can be developed with time to enable seasonal hydrographs to be constructed which will provide important information in terms of natural groundwater level variation and responses to rainfall events.

The HIA study implies there is surface water/groundwater connection at Glaningen and this should be explored further and, if necessary, investigated with field studies e.g. lake sediment sampling, installation of piezometers close to the lake. If there is hydraulic connectivity between this feature and local groundwater this could have implications for groundwater inflow rates to the planned underground mine.

Characterisation of hydraulic properties, in particular hydraulic conductivity and storativity, is also motivated for by SRK through hydrogeological site investigation. This is covered in the discussion below on mine inflow characterisation.

Planning of the pre-development dewatering requires more detailed consideration. There are several factors to take into consideration including:

- The Gonäsån River re-routing works should be carried out prior to dewatering as, if not, the current watercourse effectively represents a recharge source to the flooded workings and river water will need to be pumped out in addition to the stored water in the workings.
- The open pits and underground workings are connected and therefore the water volume to be dewatered must take into account the volume of water in the pits.
- The current estimate of underground void space is put at 5 Mm^3. This volume estimate needs confirming as accurately as possible.

The estimation of groundwater inflow has been based on historic inflow rates. This is a reasonable basis for prediction but assumes that no fundamental changes in rock mass characteristics are encountered during future mining. In particular, large, interconnected fractures or fault zones can have a significant effect in terms of increased groundwater inflow. In this respect the crush zone feature in The Wedge is potentially significant. Targeted hydrogeological investigation (see below) is required followed by further analysis, conceptual model development and construction of a numerical groundwater model to accurately predict inflows during mine development.

As part of the planned geotechnical drilling investigation SRK recommends that hydrogeological testing is conducted at 4 drillhole locations as follows: hole BB13a in the Wedge; two holes in Hugget; one hole in the southwest area. The following hydrogeological testing is proposed at these locations:

- Monitoring of fluid loss during drilling
- Measurement of groundwater level during drilling (start and end of shifts etc)
- Down-hole impeller flow meter logging ('spinner' testing)
- Double packer testing across selected intervals of interest i.e. potential flow horizons associated with fractures/faults

Also, at these and other selected hole locations (both existing and other holes planned in the 2014 geotechnical/resource programme):

- Slug testing
- Conversion of holes to groundwater level monitoring boreholes (with vibrating wire piezometers installed at selected locations).

The geotechnical investigation into induced fracturing as a result of historic SLC should also have a hydrogeological component because such processes are important in terms of water implications for the mining operation.

The design of all storm water infrastructure requires review against design storm events to ensure these facilities are sized sufficiently. Finally, the project water balance requires review and updating in accordance with any changes to process water requirements, life of mine consideration, TSF design etc.

The gaps identified relating to the hydrology and hydrogeology of the Project, which SRK consider essential to complete in order to ensure that there is adequate detail for the completion of a robust FS, are summarised in Table ES 1.

11 GEOCHEMISTRY

11.1 Mining waste and water treatments

11.1.1 Observations

Geochemical assessments consist mainly of metal and nitrogen analysis and related predictions. Nitrogen assessments include a lot of assumptions and utilisation of data from another iron mine. Acid rock drainage and metal leaching assessments were based on total concentrations, ABA tests and a short 7 –week humidity cell test. No significant metal leaching is expected in the assessments made for environmental permitting

Environmental permit gives a two year trail period for the water quality, with preliminary terms. The preliminary limits are 1 mg/l of ammonium and100 mg/l solids. Permit requires filing a measure plan within a month from exceeding the limit values. Trial period lasts two years from the start of the actual mining.

11.1.2 SRK Comments

- Barium and cobalt total concentrations in Blötberget tailings exceeded Swedish limits for less sensitive land-use and cobalt is part of the inert waste classification criteria. Vanadium was slightly elevated. Therefore further assessments were needed even if net neutralising potential in the waste is proven be good. Humidity cell tests were done, but only for a 7 week period. Håksberget and Blötberget tailings (on average) were interpreted having stabile status after the 7 week period. Result was stated to have some uncertainties due to the short exposure period. Looking at Blötberget tailings alone, iron and chrome were still increasingly getting released in the end of 7 week period. It is not recommended to carry out FS with this uncertainty. Longer humidity cell exposure time for Blötberget tailings, followed by numeric predictions on water quality and watercourse is recommended to decrease uncertainty concerning tailings facility and water treatment design and costs. Based on the current information status this can be identified a risks of water impacts.
- Current water treatment scheme is completely sedimentation based. Impact of apatite in tailings may become more significant to water quality when only Blötberg material is utilised. Actual assessments of potential phosphor pollution and potential need of mitigation measures are not included in a ESIA report, appendixes or complementary studies for permitting. A geochemical assessment for apatite impacts should be planned and potential requirement of mitigation measures should be identified (or closed out with reasonable probability) during the FS. Receptor also has already a recorded nutrition pollution status according to VISS (water authority information system).

- Potential need of improved N-compound removal may be needed during the operation. This issue is left open in permit handling: measures are required if satisfactory level of ammonium is not achieved. Sedimentation pools are not generally very effective in nitrogen compound removal unless N is bound to solids. Nitrification potential is likely to be limited during the winter season, especially if clearing pond will be ice covered. Oxygen feed is discussed in reports, but artificial air feed is generally challenging in pools meant for sedimentation, due to physical disturbance these systems cause to both sediment and ongoing sedimentation. At this stage freezing probability (from flow perspective) is though unknown in the clearing pond. Additive nitrogen removal is at least a risk assessment issue in the FS and may require some supporting studies.

- Environmental permitting has taken place quite early in the project and FS is needed to either confirm the preliminary choices to be technically and economically feasible or lead to other alternatives. These potential changes could cause reassessment requirements also form geochemical perspective. These potential reassessments are listed in the Gap analysis chapter as potential information gaps.

11.2 Historical mining and liabilities

11.2.1 Observations

There are 5 MIFO 1 classifies objects within a potential impact area. MIFO 1 is the Swedish contaminated soil first stage (preliminary) assessment. SRK understanding is that all these objects are related to historical mining. All objects are in the lower risk classes at the moment.

11.2.2 SRK Comments

- A preliminary assessment of potential liabilities related to contaminated soil from historical mining should be carried out. Especially risks of changing the circumstances at or around contaminated soil areas are important. At least if new mining activities would change these contaminated objects so, that impacts would be negative, this could be likely to add to the company liabilities in some extent.

11.3 Summary of Gaps

11.3.1 Identified gaps

- Complementary phosphorus assessment for tailings, with numerical prediction of impacts;

- Long term humidity cell testing or reassessment of certainty of the results from the short term humidity cell test;

- Complementary assessments about potential need of additive water treatments for nitrogen compounds; and

- Risk assessment related to historical contaminated soils.

11.3.2 Potential information gaps

New information coming from other disciplines during the FS may cause additive work load also to the geochemistry segment.

Consequences from the completion of geology studies, process planning and trial processing:

- Potential re-characterisation of mining waste (at least static test and interpretation of results) and
- Potential reassessment of mitigation measures concerning impacts related to mining waste water quality and air quality impacts.

If any significant changes in the operation plan compared to ESIA stage will take place, it is possible that complementary impact assessments and mitigation measure design will be required. An example of potential larger change could be technical alternative evaluation leading to consideration of dry depositing of tailings, instead of wet tailings. New water quality predictions and mitigation measures like redesign of water collection and treatment would then become necessary.

12 ENVIRONMENT AND SOCIAL

12.1 Short summary of environmental and social setting

Blötberget mine is an existing closed mine in Ludvika municipality, approximately 5 km sout-west from the town centre. Nearest community is Blötberget village.

There are no protected objects (like Natura 2000 areas, nature reserves or water protection areas) in the planned operation area or within immediate range of impact areas. Some higher nature values have been recognised within the area, which will be disturbed by tailings storage and clearing facilities. Cultural heritage in the area is primarily related to historical mining and objects and impacts are recognised in ESIA and permitting processes.

Primary impacted watercourse is Gonäsån, which leads water from Lake Glaningen via Blötberget området to Lake Väsman.

What comes to area´s land-use planning status, whole Ludvika municipality has a general plan and certain objects like Lake Glaningen and the Blötberget built mining environment are mentioned in the plan. What comes to municipality detail plans, mining does not conflict with current detail plans.

12.2 Status of ESIA, permitting and stakeholder engagement

12.2.1 Observations

There is an existing mining concession for both Blötberget and Håksberget projects, as one permit for the two sites and their shared facilities. Currently only Blötberget mine is planned to be opened. This change is likely to cause some information updating work.

12.2.2 SRK Comments

- Downscaling and of information concerning environmental impacts and closure costs needs to be carried out due to continuing only with Blötberget project without Håksberget.
- Environmental permitting has taken place very early in the project, partially based on relatively preliminary data and assumptions. It is possible, that some earlier investigations must be updated or completed according to potential new information coming from FS. These issues are listed in the gap summary as potential information gaps.
- As ESIA and permitting processes are already carried out, official general framework for stakeholder engagement is partly and temporarily missing, excluding some special issues like ownership of potentially impacted wells. It is recommended to continue informing different interest groups of project´s proceeding also between now and mining start up. Potential changes due to progress of technical studies in the planned operations may even require new formal consultations in the future.

12.3 Environmental and social studies and management of impacts

12.3.1 Observations

Majority of environmental information required for the FS is already available at least at conceptual level, because of the completed environmental permitting procedure.

Most important environmental issues recognised in ESIA are following:

- Sinking of groundwater level, with impact on wells and geothermal heat wells*;
- Leading water to watercourses, especially during the initial dewatering the existing mine, but also during the operation time dewatering;
- Diversion of Gonäsån (ecological impacts);
- Dust form roads and tailings;
- Noise, especially from transports and loading;
- Vibrations, especially from blasting; and
- Landscape impacts and impacts on outdooring.

*) Groundwater issues are discussed in the Hydrogeology segment of the report.

Ecological compensations are part of the permit terms due to diversion of Gonäsån. This issue is already recognised in the EIA and permitting studies. There is an on-going investigation about compensation measures, which will be finished in the end of the year 2014.

Cultural heritage objects and impacts were recognised in ESIA in an archaeological investigation. Company has taken on a duty to have on-going communication with the Province Administrative Board about any potential disturbance at the cultural heritage objects. Company must be prepared to document mining related historical buildings (specified in the permit) and avoid depositing soil or rock materials on cultural heritage objects.

The noise impacts of new railroad and loading station are still partly insecure. If noise levels are not acceptable for housing, relocation of few households is likely to become necessary. SRK understanding is, that real estate specialists are assessing the real estate values to create an understanding of the related costs due to NIO request.

Groundwater changes are probably going to cause compensation issues for private well and geothermal heat well owners (ca 300 potentially impacted wells/heat pumps). Compensation duty is defined in the permit, but extent of compensation is left open to be recognised when the actual ground water changes take place. More information of groundwater issues is in the Hydrogeology chapter of this document.

Court decision of other compensations for land/real estate owners was postponed. to the time after the primary permit decision. These compensation issues are related to landowner statements of impacts on real estate values, potential needs of sound walls etc. SRK understanding is that this new decision has not taken place yet.

12.3.2 SRK Comments

- Even if environmental information largely exists, detail level needed for permitting does not necessarily give enough support for project's economical assessments within all topic areas. These additive information needs are most likely appear within geochemistry and water treatment, but for example air quality and dust issues related to processing will need more attention, when process planning gets to the final stages. When final plans are available, can also impact prevention be assessed with better certainty. If final selected functions do not significantly differ from permitted functions, quantity of required additive studies is limited and majority of the environmental and social FS work is just review work.
- Emissions to air are calculated according to operating both Blötberget and Håksberget mines. These calculations must be updated according to current plan to operate just Blötberget.
- Outcome of the ecological compensation investigation is needed for the FS. Assumption is that the on-going investigation will provide all necessary data for economical assessments of these measures.
- Noise levels follow general guidelines, but may be critical to processing and railway loading station. Limit for noise at residential area are for daytime (07.00-18.00) 50 dB, for night time (22.00-07.00) 40 dB and fir other times 45 dB. Momentarily noise limit is 55 dB. These levels are easily exceeded at and near the loading station. Potential costs of relocation of some households should be taken to consideration in FS. Assumption is that ongoing real estate specialist work provided required information to FS.
- Groundwater change –related compensations are handled in the Hydrogeology chapter.
- Economic impacts of still undecided other compensations must be assessed in the FS stage. Assumption is that court decision itself will include key figures for compensation costs.
- Special attention should be paid to safety of the mining area and measures related to any potential stability risks at the ground surface. Community is relatively near to all

planned operations and there is traditionally lot of outdooring activity in the area. Permit requires some fencing as minimum procedure. Total measures with cost should be recognised in the FS when more information from geotechnical assessments is available.

- For reliable material impact and risk assessments a final plan for mining and processing is required. Potential new permitting requirements must be identified as early as possible and permit process with impact assessments and stakeholder communication must be initiated. This is obviously needed for avoiding project delays, but it is also needed for being able to complete FS. In addition, for FS it is essential to have as developed picture as possible concerning the risks related to permitting.

12.4 Mine closure

12.4.1 Observations

Environmental permit includes SEK 53 414 600 financial guarantee for closure. SEK 15 762 000 must be paid forehand and SEK 3 150 000 must be paid annually until the full guarantee is paid. Monitoring authority is authorised to accept changes in the size of the guarantee.

12.4.2 SRK Comments

- Closure costs must be reassessed in the FS. This is due to the downscaling the production since the permitting (including only Blötberget to the plan and leaving Håksberget out). Naturally the whole cost structure for closure needs to be reviewed as a standard part of FS , but also all potential new information coming from geochemical and hydrogeological assessments (gaps mentioned in the report) need to be taken to consideration. Closure strategy must be reviewed and potentially updated in terms of latest information.
- Any potential new information of the mass balance of till in the end of the mine life should be taken to consideration in closure cost assessments in form of risk assessment. If for example majority of overburden resources near tailings area are likely to be utilised before closure, transportation distance may have significant impact on unit costs.
- Special attention should be paid to area safety and especially for physical maintenance of the safety after closure.

12.5 Summary of Gaps

12.5.1 Identified gaps

Downscaling project since environmental permitting is the primary reason for following reassessment requirements:

- Rescaling and reviewing closure costs and potentially updating closure strategy and
- Rescaling and reviewing air emissions and reconsideration impact prevention measures according to final alternative.

12.5.2 Potential information gaps

New information coming from other disciplines during the FS may cause additive work load also to the geochemistry segment.

- If any significant changes in the operation plan compared to ESIA stage will take place, it is possible that complementary impact assessments and permitting will be required. Minor changes are possible within the framework of current permit and some decisions are even delegated to the monitoring authority. An example of potential larger change could be technical alternative evaluation leading to consideration of dry depositing of tailings, instead of wet tailings. A situation like this could potentially require a new court decision.
- Completion of process planning and trial processing may require for example reassessment of mitigation measures concerning air quality impacts.

13 REFERENCES

The references below relate to the main sources of information. The list of documents and information provided is shown in Appendix A.

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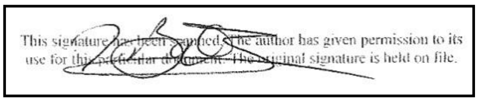
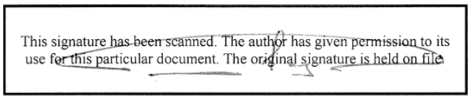
For and behalf of SRK Consulting (Sweden) AB





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Glossary

Al_2O_3	Aluminium oxide (Alumina) %
CaO	Calcium oxide %
Fe Total	Total Iron %
Mn	Manganese %
Mo	Molybdenum %
P	Phosphorous %
S	Sulphur %
SiO_2	Silicon dioxide (Silica) %
W	Tungsten %

Abbreviations

JORC	JORC Australian Reserves Committee
PEA	Preliminary Economic Assessment
FS	Feasibility study
PFS	Pre-Feasibility study

Units

Mt	Million metric tonnes
Ktpa	Thousand tonnes per annum
Mtpa	Million tonnes per annum
SEK	Swedish Kronor
MSEK	Million Swedish Kronor
USD	US Dollars ($)
MUSD	Million US Dollars ($)
%	Percentage
ppm	Parts per million
m	Metres
cm	Centimetres
mm	Milimetres
bgl	Below ground level
m/s	Metres per second
l/s	Litres per second

APPENDIX A

A FEASIBILITY STUDY SCHEDULE

ID	Task name	FS report resp	Duration	Start	Finish
0	Ludvika FS schedule		450 days?	01/01/2014	22/09/2015
1	1 FS study proposed start date		1 day?	01/07/2014	01/07/2014
2					
3	2 Geology and Resources	SRK	127 days?	13/05/2014	05/11/2014
24					
25	3 Geotechnical	SRK	161 days	02/07/2014	11/02/2015
71					
72	4 Mine Development, mining engineering and mine planning	SRK	247 days	02/07/2014	11/06/2015
108					
109	5 Mineralogy	Mats	14 days	16/06/2014	03/07/2014
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116	6 Metallurgical testwork and Process Plant	Tata/GTK/Pr	303 days?	01/01/2014	27/02/2015
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199	9 Site Services and Infrastructure	Ramböll	265 days	13/05/2014	18/05/2015
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221	10 Local Infrastructure and Amenities	NIO	1 day	13/05/2014	13/05/2014
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252	12 Environmental	SRK	356 days?	13/05/2014	22/09/2015
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306	13 Closure design and costs	SRK	5 days	15/05/2015	21/05/2015
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317	14 Economic Evaluation	SRK	25 days	18/05/2015	19/06/2015
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346	16 Final FS report	SRK	40 days	19/06/2015	13/08/2015

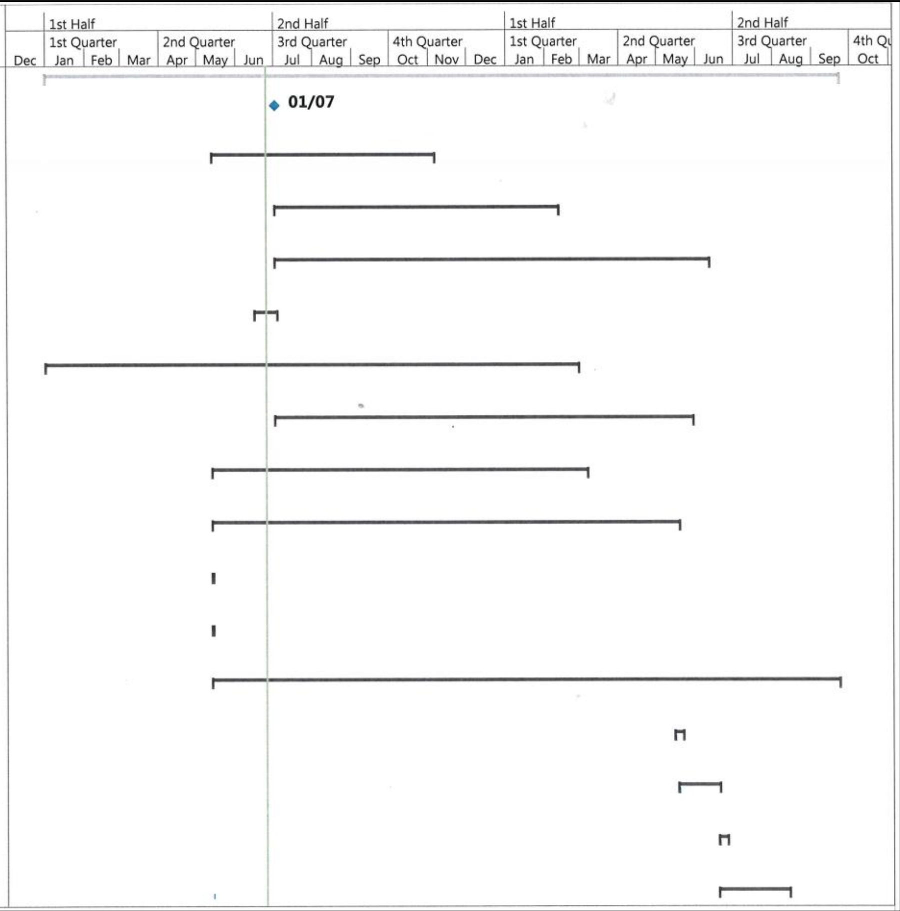

Figure A-1: Ludvika Feasibility Study schedule

APPENDIX B

B DOCUMENTS PROVIDED BY NIO

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