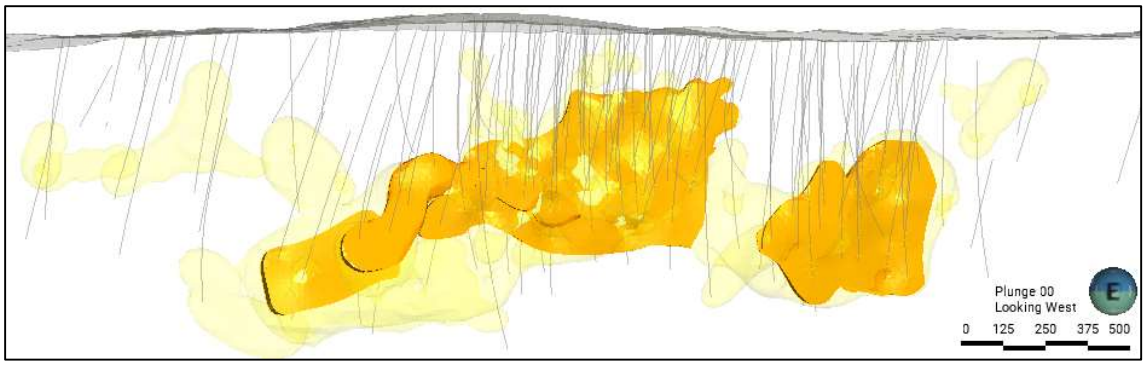
Boliden Summary Report

Mineral Resources and Mineral Reserves | 2023

Nautanen



Prepared by
Ian McGimpsey, David Drejing-Carroll, Nils Eriksson,
Mats Lindblom, and Gunnar Agmalm

Table of contents

1 SUMMARY

Mineral Resources in Nautanen as of 2023-12-31 are summarized below. An updated Mineral Resource estimate was carried out in 2023. Previously the Mineral Resource has been estimated in 2020 and the maiden Resource estimate was in 2016. Tonnage increases were due to new drilling over the intervening three years. In total, 16,721 meters drilled since the 2020 Resource estimate have been included in the update. Eleven drillholes totaling 7,572 meters were drilled in 2023, targeting the southern and down-dip extensions of the known mineralization. These holes are yet to be included in a Mineral Resource estimate.

Table 1. Mineral resources in Nautanen as of 2023-12-31

Mineral Resource Classification	**2023**					2020				
	kt	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**	**Mo (g/t)**	kt	Cu (%)	Au (g/t)	Ag (g/t)	Mo (g/t)
Indicated	**13,800**	**1.56**	**0.78**	**6**	**109**	12,700	1.54	0.9	6	100
Inferred	**11,700**	**1.42**	**0.79**	**5**	**101**	8,700	1.37	0.6	6	98

1.1 Competence

This report is a summary of several internal reports on Nautanen. Contributors and responsible Competent Persons are listed in Table 2.

Table 2. Contributors and responsible competent persons for this report

Description	**Contributors**	**Responsible CP**
Lead Competent Person		**Ian McGimpsey**
Geology and exploration	David Drejing-Carroll	Ian McGimpsey
Resource estimations	Gunnar Agmalm	Ian McGimpsey
Environmental, social and governance (ESG)	Mats Lindblom	Nils Eriksson

Ian McGimpsey works for Boliden as a Principal Resource Geologist at Ore Reserves and Project Evaluation and is a member FAMMP[1]. Ian McGimpsey has over 15 years of experience in the Exploration and Mining industry.

Nils Eriksson works for Boliden as Head of Section for Permitting and Environmental support. Nils is a member of FAMMP and has more than 25 years of experience in the mining industry.

[1] Fennoscandian Association for Metals and Minerals Professionals

2 GENERAL INTRODUCTION

This report is issued annually to inform the public (shareholders and potential investors) of the mineral assets in Nautanen held by Boliden. The report is a summary of internal / Competent Persons' Reports for Nautanen. The Boliden method of reporting Mineral Resources and Mineral Reserves intends to comply with the Pan-European Reserves and Resources Reporting Committee (PERC) "PERC Reporting Standard 2021".

The PERC Reporting Standard is an international reporting standard that has been adopted by the mining associations in Sweden (SveMin), Finland (FinnMin) and Norway (Norsk Bergindustri), to be used for exploration and mining companies within the Nordic countries.

Boliden is reporting Mineral Resources exclusive of Mineral Reserves.

2.1 Pan-European Standard for Reporting of Exploration Results, Mineral Resources and Mineral Reserves – The PERC Reporting Standard

PERC is the organisation responsible for setting standards for public reporting of Exploration Results, Mineral Resources and Mineral Reserves by companies listed on markets in Europe. PERC is a member of CRIRSCO, the Committee for Mineral Reserves International Reporting Standards, and the PERC Reporting Standard is fully aligned with the CRIRSCO Reporting Template.

The PERC standard sets out minimum standards, recommendations and guidelines for Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves in Europe.

2.2 Definitions

Public Reports on Exploration Results, Mineral Resources and/or Mineral Reserves must only use terms set out in the PERC standard.

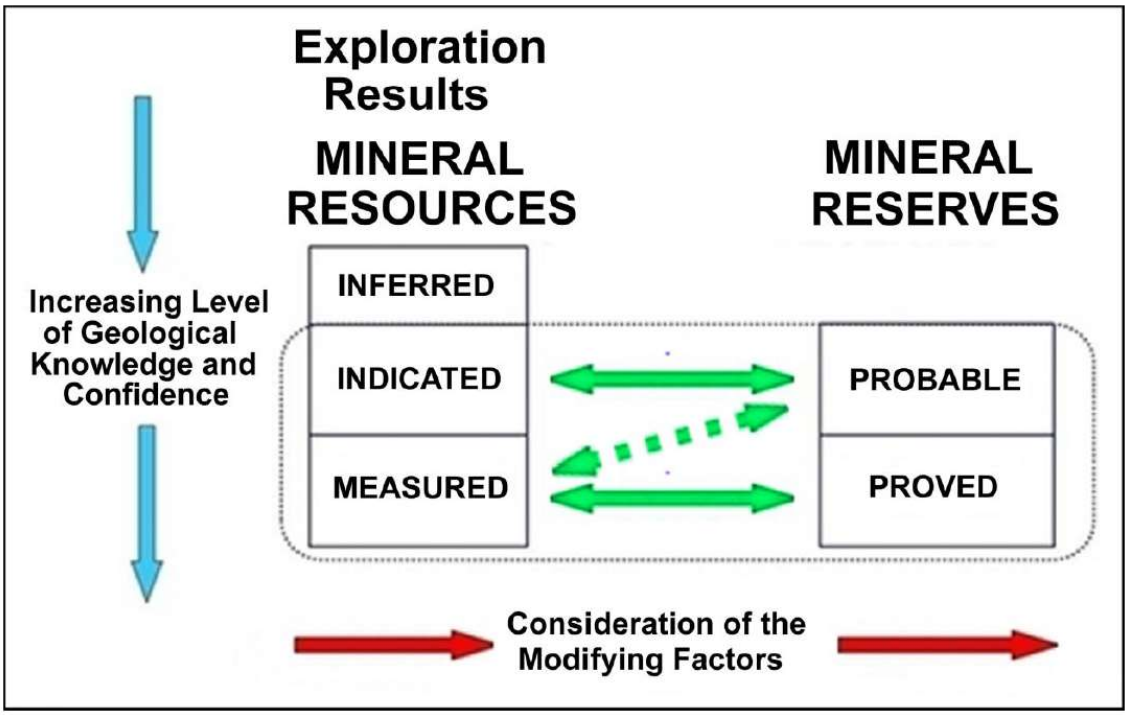


Figure 1. General relationship between Exploration Results, Mineral Resources and Mineral Reserves (PERC 2021)

2.2.1 Mineral Resource

A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

2.2.2 Mineral Reserve

A Mineral Reserve is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.

3 NAUTANEN

3.1 Project Outline

The Nautanen Cu-Au project is located in central Norrbotten, about 15 km northwest of the Aitik copper mine and 7 km east of the Fe-oxide mine in Malmberget. Small-scale mining (open pits and underground workings) took place in the area between 1902 and 1907 by Nautanens Kopparfält AB. A total of 71 835 tonnes of ore was mined and processed in Nautanen of which 5 746 tonnes of copper concentrate and 4 635 tonnes of iron concentrate was produced.

Exploration by a number of companies has occurred periodically since 1950's and onwards. Boliden received its first exploration permit in 2009 and subsequently conducted ground geophysics, field mapping, sampling and kax-till drilling over the area, prior to commencing diamond drilling in 2011. Since 2011 Boliden has completed 123,900 meters of drilling in 207 drillholes.

3.2 Major changes

In May of 2022, Boliden submitted an application for an exploitation concession, Nautanen K nr 1. A decision by the Swedish Mining Inspectorate is currently pending.

During 2023, Boliden completed an updated Mineral Resource estimate, incorporating drilling since 2020 when the previous estimate was performed. As a result of continued exploration, the total Mineral Resource has grown by 4.1 Mt.

3.2.1 Technical Studies

Boliden has been performing a Pre-Feasibility Study throughout 2023. The results of the study are expected during 2024.

3.3 Location

The Nautanen Cu-Au project is located in central Norrbotten, about 15 km northwest of the Aitik copper mine (100% owned by Boliden), and 7 km east of the Malmberget iron oxide mine (100% owned by LKAB) (Figure 2). Due to the proximity of Gällivare and the current mining operations in Aitik and Malmberget, the area provides excellent infrastructure and labour force The deposit is situated on the eastern slope of a north-north-west linear topographic high which reaches 545m but remains below the tree line. To the south, an east-west gully marks the boundary between the hills of Nautanen and Liikavaara, to the north flat swamps and the stream of Nietsajoki occupy the area between Nautanen and the hill of Hirvasåive.

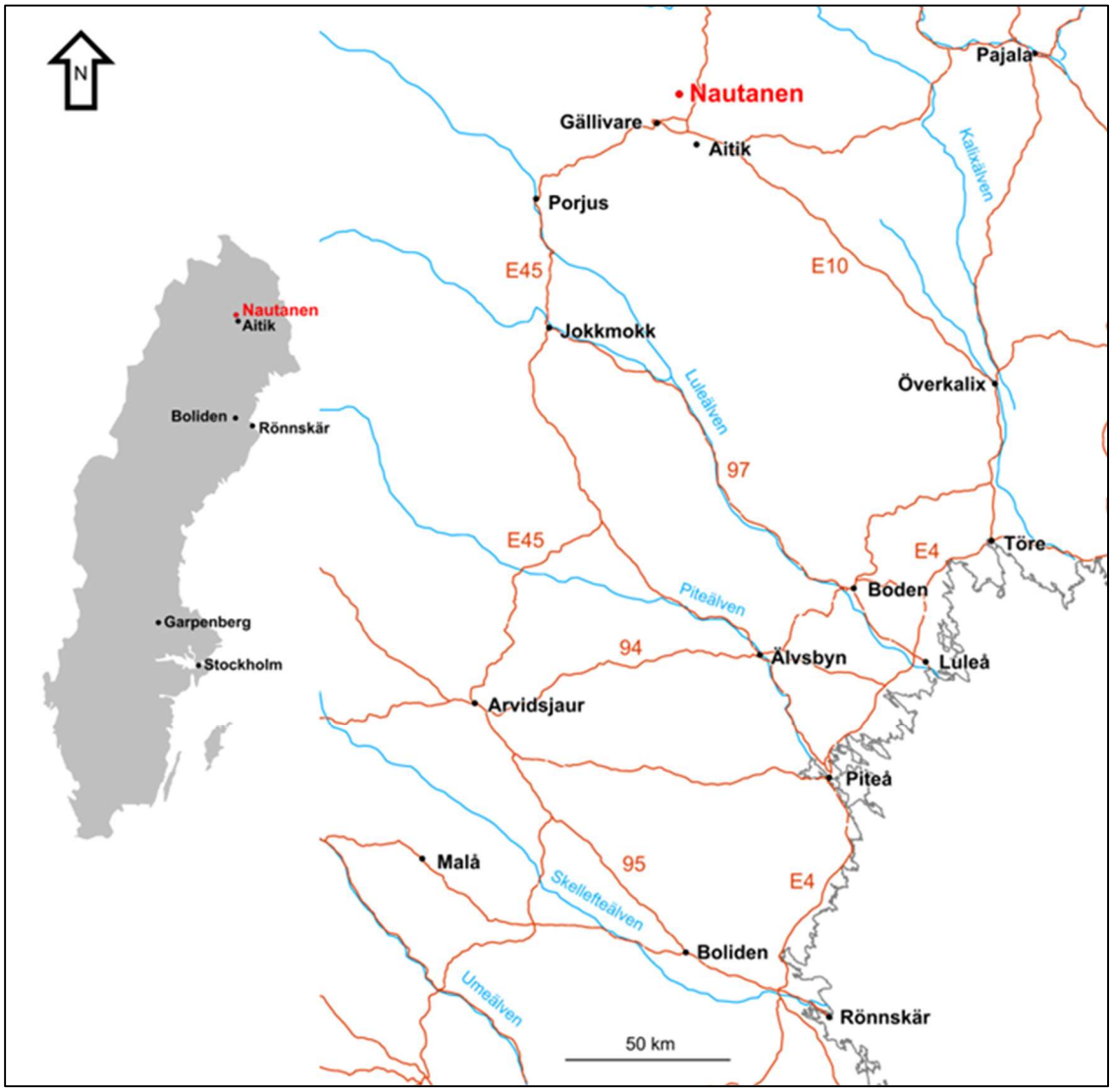


Figure 1. Map showing location of Nautanen in northern Sweden, close to the Aitik mine and Gällivare

3.4 History

Exploration at Nautanen started in 1898 when the deposit was discovered in outcrop. Nautanen was initially worked as a series of small-scale mines between 1902 and 1907 by Nautanens Kopparfält AB. The company adopted a very progressive approach to the establishment of the company and the community at Nautanen, with the provision of planned housing, school, shop, brewery and other facilities.

A concentrator was established on site to process the ore, with concentrate loaded and hoisted to Koskullskulle on a cable car. By 1907 test work was underway to construct a new "English-style" concentrator. However, this coincided with strike action and a lower grade material production within the existing mines. Despite exploration drilling and trenching, consolidation of the mines with those in the Liikavaara field and the acquisition of an additional mine in northern Norway, the company went bankrupt (Geijer, 1917).

The historic mines at Nautanen extracted a total of 71,835 t of ore producing 5,746 t of copper concentrate and 4,635 t of iron concentrate, the amount of gold produced remains unknown (Geijer, 1917). The mining took the form of underground drifting and levels connected via winzes as well as steep sided open pits and trenches. A map compiled by Boliden in 2012 showing historical mine workings is presented in Figure 3, below.

Further exploration was conducted by SGAB (Sveriges Geologiska AB) from 1951 – 1985. Drilling focused on shallow targets in Nautanen and culminated in an estimate on the areas around the historic mines (Table 3). They determined Nautanen to consist of at least two zones of mineralisation, an A-Zone (rich in chalcopyrite-magnetite) and a C-Zone which had characteristics more common to Aitik deposit (Danielsson, 1985). The mineralised zones defined in the historic study were complicated and often truncated by faulting. Boliden does not treat these historic estimates as a current or relevant Mineral Resource estimate.

Table 3. Results from SGAB Malmberäkning at Nautanen (Danielsson, 1985)

Zone	Tonnage (Mt)	Cu (%)	Au (g/t)	Ag (g/t)
A	0.63	2.36	1.3	11
C	2.3	0.34	0.3	-

Exploration work resumed in the late 1990's with North Atlantic Resources (NAN) acquiring the project. Boliden has limited knowledge of the work conducted and no company reports are available. However, drillhole information (collar, survey, geology, and assay) has been acquired by Boliden. The focus appears to have been testing a geophysical anomaly (magnetic) that is present at Nautanen with the aim of delineating a near surface copper-gold resource.

In early 2000 Phelps Dodge conducted field mapping, geophysical surveys, soil sampling and drilling in the Nautanen area. Boliden was contracted as consultants to Phelps Dodge to conduct a ground electromagnetic (EM) survey over the target which resulted in the identification of an EM anomaly coincident with the historical mining area at Nautanen. Phelps Dodge drilled a total of 3 071 m at Nautanen and Liikavaara in 2003 and 2004, with a further 524 m drilled in 2005 when Teck Cominco joined them in a Joint Venture.

Boliden acquired the target in 2009 and subsequently conducted ground geophysics, field mapping, sampling and kax-till drilling over the area, prior to commencing diamond drilling in 2011. Copper mineralization was intersected shortly thereafter approximately 1 km north of the historic mining area. Boliden has continued with exploration and internal technical-, environmental- and economical studies of Nautanen since then.

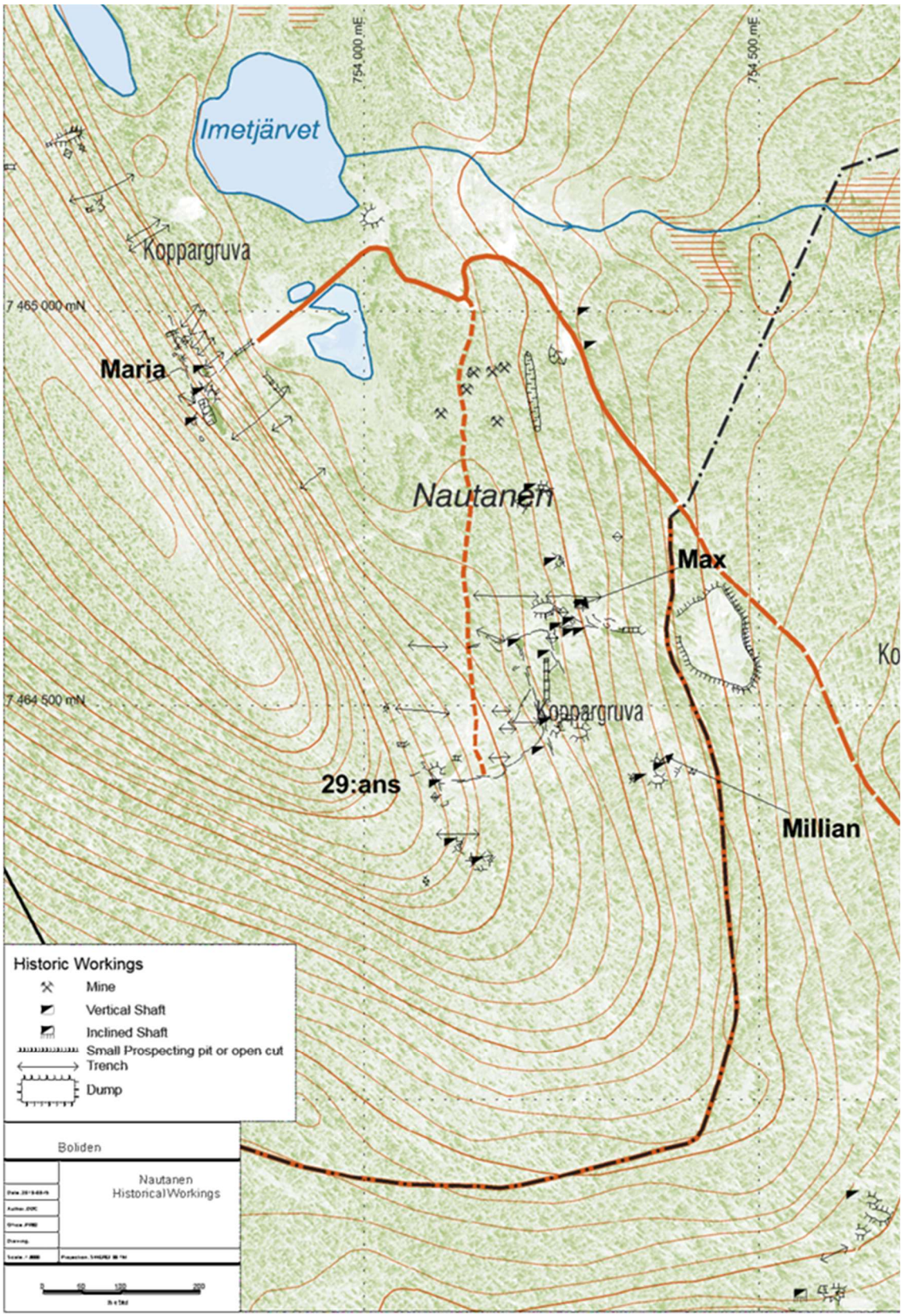


Figure 3. Nautanen historical mine workings

3.5 Ownership and Royalties

Boliden owns 100% of the exploration permit covering the project. The primary landowner in the area is Sveaskog AB.

Should the project progress to production there is a royalty on 0.2% of the annual value of metal recovered after mineral processing. Calculation and other details of this royalty is governed by the Swedish Mineral Law (Minerallag (1991:45)). According to this law the royalty payment is to be distributed at a rate of ¾ to the surface owner and ¼ to the Swedish state.

3.6 Environmental, Social and Governance (ESG)

3.6.1 Existing permits

The Nautanen resource lies entirely within Boliden's exploration permit, Nautanen nr 1001. The permit is valid until 2026.

Table 1. Exploration permit in Nautanen

Name	Active from	Expires
Nautanen nr 1001	2009-08-18	2026-08-18

3.6.2 Necessary permits

Boliden applied for exploitation concession, Nautanen K nr 1, in May 2022. A decision on this by the authorities is pending. If granted, an environmental permit will then be applied for.

3.6.3 Environmental, Social and Governance considerations

3.6.3.1 ESG Commitments

Our business model set our ESG priorities, and take into consideration the risks and opportunities identified by business intelligence and risk mapping, as well as applicable requirements and expectations such as:

- Stakeholder expectations
- Current and potential legislative trends
- ISO 9001, 45001, 14001 and 50001 standards and Forest Stewardship Council (FSC® COC-000122)
- OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-affected and High-risk Areas
- GRI Standards (Global Reporting Initiative)
- UN Sustainable Development Goals (SDGs)
- UN Global Compact
- ICMM Mining principles

We regularly consult prioritized stakeholder groups on our sustainability performance from a broader perspective. These stakeholders are asked to comment on Boliden's performance to drive further improvement.

Boliden is a member of ICMM and the national mining associations in the countries where Boliden Mines operates. These commitments imply implementing relevant international and national Environmental Management System (EMS) standards and guidelines, such as, e.g.,

the Global Industry Standard on Tailings Management on an international level and Mining RIDAS on a national level. In addition to this, Boliden Mines is certified according to a series of standards, such as:

- ISO 14001:2015 - Environmental management systems.
- ISO 45001:2018 - Occupational health and safety management systems.
- ISO 50001:2018 - Energy management systems.

Boliden has implemented an integrated management system (Boliden Management System, BMS) which sets a common base for all activities developed within the company. Boliden strive to run a responsible business and expect it´s business partners to do the same. Good business ethics is essential for sustainable and successful business. Boliden has an ethics and compliance department to boost its compliance work. The department is responsible for the strategic development and coordination of Boliden's work regarding anti-money laundering, anti-corruption, competition law, sanctions, human rights, data protection, whistleblowing and Boliden's employees and management work together to create a compliance culture in which everyone knows what is expected of them - Boliden's codes of conduct. Regular risk assessments, trainings, audits and effective controls are important parts of Boliden's compliance efforts. The Group's whistleblower channel enables all employees and external stakeholders to report suspected and actual misconduct confidentially and anonymously. If misconduct is proven, disciplinary actions must be taken. Reprisals against anyone reporting misconduct in good faith will not be tolerated. Group management and the Board of Directors receive regular reports on risks, non-compliance and the status of initiatives in progress.

Boliden's Code of Conduct provides a framework for corporate responsibility based on the company's values and ethical principles. All employees and members of the Board are subject to the Code, which is based on international standards and relevant legislation. As a complement to the Code, there are internal policies that all employees are expected to comply with. Boliden strives for a sustainable value chain and therefore applies an overarching business ethics and risk management strategy when selecting business partners. The Business Partner Code of Conduct reflects the requirements placed on Boliden's own organization and sets the lowest standard of ethical conduct required of all parties in the value chain, whether Boliden is the buyer or seller. As with the internal Code of Conduct, this code is based on international standards such as the UN's Global Compact, the ILO's standard core conventions and guidance from the OECD. Compliance and sustainability risks are assessed when selecting business partners. If there is a risk of non-compliance by a business partner, a more detailed review is made. Depending on the outcome, an action plan may be developed and agreed upon, or the business relation may be terminated or rejected.

Boliden is a member of the United Nations Global Compact and works constantly to implement its ten principles, including preventing and limiting negative impact in the own operations and those of its external business partners. Boliden runs operations in countries where the risk of human rights violations is considered low. No operations are conducted anywhere in UNESCO's World Heritage List. Boliden supports the right of indigenous peoples to consultations under Svemin's interpretation of Free, Prior and Informed Consent (FPIC). Other important aspects are fair working conditions and the position Boliden has adopted against any form of harassment, discrimination and other behavior that may be considered as victimization by colleagues or related parties. In addition to this, aspects such as child and forced labor as well as the freedom to form and join trade unions are taken into account when evaluating business partners.

Anti-corruption forms a central part of the ethics and compliance work, and Boliden has a zero tolerance policy regarding all types of bribery and corruption. Boliden has an anti-

money laundering policy for identifying and managing risks in various parts of the business and to strengthen its anti-money laundering efforts.

3.6.3.1.1 Socio-economical impact

To date, no socio-economical study has been conducted on the Nautanen project.

3.6.3.1.2 Communities and land-owners

The Nautanen resource lies five kilometers northeast of the town of Koskullskulle and ten kilometers northeast of the towns Gällivare and Malmberget. The Gällivare municipality has a population of approximately 18,000 inhabitants, many of which are employed directly or indirectly by Boliden's Aitik mine or LKAB's Malmberget mine.

The resource lies wholly within land owned by Sveaskog. Some areas of privately owned land around the village of Muorjevaara, lie immediately to the east and southeast.

3.6.3.1.3 Indigenous people

Nautanen is located within the mountain Sámi village of Baste Cearru. Regular consultation meetings have been made during the year, and each year since Boliden has been working on the project. The Sámi village has been given the opportunity to comment and discuss the various alternatives considered for the planned mining operations early on and is involved in the project's challenges and schedule for exploration work. On occasions when exploration work restricts access to feeding grounds or increases the risk of reindeer venturing onto major public roads, Boliden compensates Baste Cearru with pelletized reindeer food.

3.6.3.1.4 Historical Legacy

The historical Nautanen mines area lies one kilometer south of the current resource. This area contains the remains of the mines Maria, Max, 29:ans and Millian, along with a copper smelter and numerous house foundations. It is a protected site of cultural heritage where the ground cannot be impacted by off-road driving.

Historical ore stockpiles, concentrate and slag remain in the area and leachate has negatively affected the Imetjoki stream system.

3.7 Geology

3.7.1 Regional

The Nautanen North project is located within the Norrbotten craton of northern Sweden (Figure 5), which forms part of the broader Fennoscandian shield. The craton constitutes a basement of Archaean aged gneisses and granitoids, with a minimum age of 2.8-2.7 Ga derived from dating of late granitic components (Skiöld, 1979; Skiöld and Page, 1998; Bergman and Weihed, 2020). Overlying the basement are greenstone rocks of the Kovo and Kiruna Greenstone Groups, which are of Siderian and Rhyacian age (2.5-2.05 Ga; Martinsson, 1997; Bergman and Weihed, 2020). These rocks record a phase of extension and rifting of the craton, with deposition occurring within marine basins undergoing cyclical periods of desiccation (Martinsson, 1997; Kumpulainen, 2000; Bergman and Weihed, 2020). Overlying the greenstone rocks is a supracrustal sequence of Orosirian age (ca. 1.9-1.88 Ga), termed the Porphyrite and Kiirunavaara groups (Offerberg, 1967; Martinsson, 2004). These rocks represent a phase of continental arc and subduction related magmatism (Lahtinen et al., 2009). This coincided with the formation of porphyry-style (i.e., Aitik and Laver) (Wanhainen, 2005), iron oxide-apatite (i.e., Kiruna, Malmberget, etc.) (Westhues et al., 2016; Bauer et al., 2018) and an early phase of iron oxide-copper-gold (i.e., Rakkurijarvi) (Smith et al., 2007) deposits within the region.

An initial phase of deformation and metamorphism is interpreted to have occurred ca. 1.88-1.86 Ga (M1), resulting from accretionary processes to the south. The entire sequence experienced up to middle-amphibolite facies conditions, and basin inversion and subsequent deformation of the supracrustal and plutonic sequence (Bergman et al., 2001; Weihed et al., 2002; Lahtinen et al., 2009; Bauer et al., 2011; Skytta et al., 2012; Andersson et al., 2020, 2021). A second phase of metamorphism and deformation occurred from ca. 1.81-1.77 Ga, with deformation confined to major deformation zones and margins of co-magmatic batholiths of the Lina and Edefors suites (Sarlus et al., 2018, 2020; Bergman and Weihed, 2020). A second phase of IOCG-style deposit formation is coincident with this younger metamorphic and deformation event, producing deposits such as the historic Nautanen Mine (Smith et al., 2009), Nautanen North (Drejing-Carroll et al., 2023; Drejing-Carroll, 2023), Tjårrojåkka (Edfelt, 2006) and the overprinting and remobilization of the Aitik deposit (Wanhainen et al., 2005; Drejing-Carroll et al., 2015) and overprinting of the Malmberget deposit (Bauer et al., 2018).

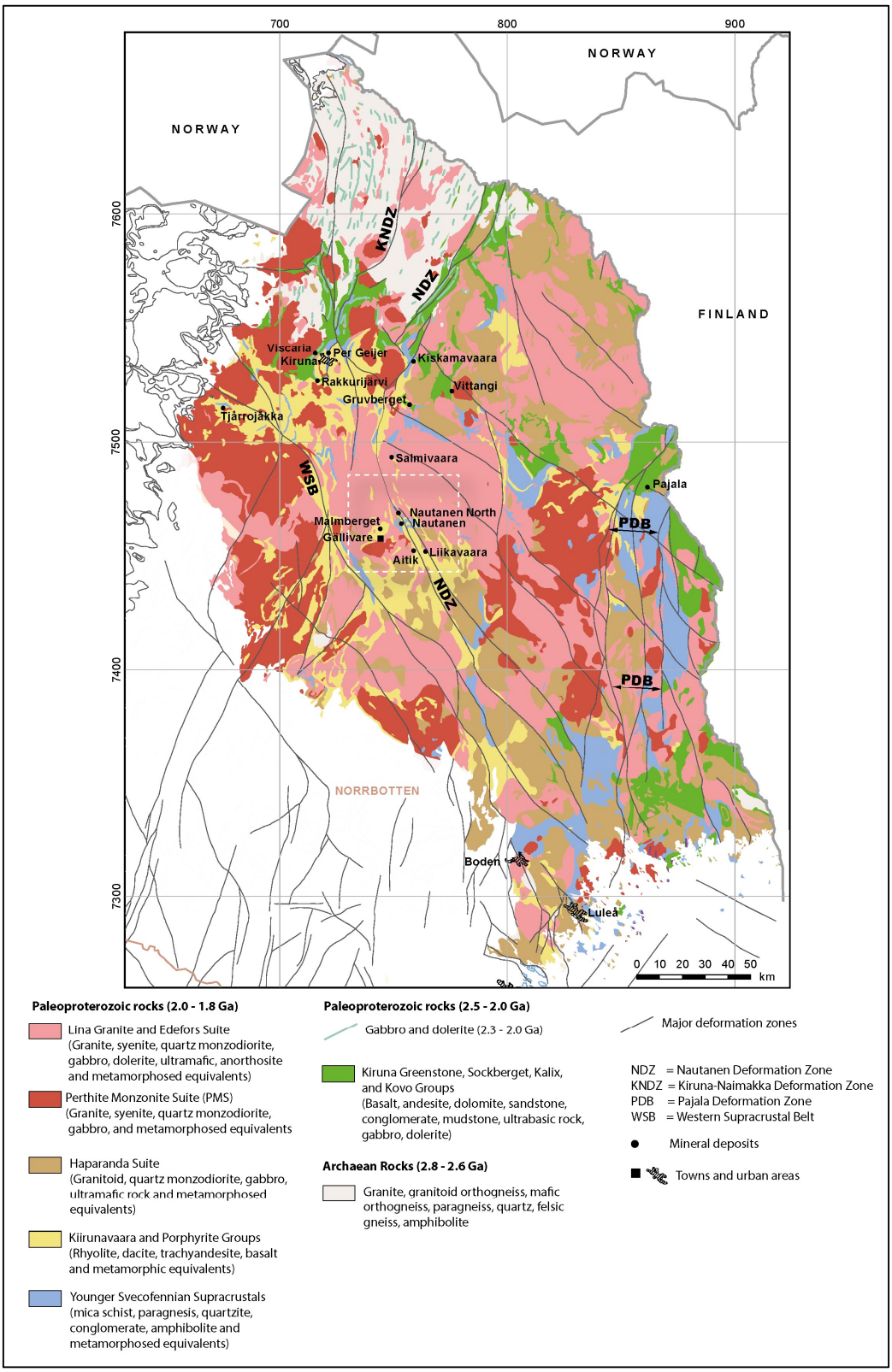


Figure 4: Generalized geology of northern portions of Norrbotten (modified from Bergman and Weihed, 2020; Andersson et al., 2020; Drejing-Carroll, 2023) with key mineral deposits and localities highlighted. Dashed white box shows the location of the Gällivare-Malmberget area (Figure 5).

3.7.2 Local

The Nautanen North deposit itself occurs within the Gällivare-Malmberget area of Norrbotten. The geology of the area is dominated by volcanic, volcaniclastic and sedimentary units of the Porphyrite and Kiirunavaara groups, which are surround and intruded by younger batholithic intrusions and apophyses (Figure 5) (Drejing-Carroll et al., in press). In the east of the area the Porphyrite group dominates, where it occurs as mafic to intermediate volcanics, extrusives and associated sediments. In the west of the area the Kiirunavaara group is dominant, occurring as intermediate to felsic volcanics, extrusives and associated sedimentary rocks. Surrounding and intruding into the supracrustal sequence are batholith-like intrusions of the Haparanda (ca. 1.89-1.86 Ga), the Perthite Monzonite Suite (ca. 1.89-1.86 Ga), Granite Pegmatite association (Lina ca. 1.81-1.77 Ga) and Transscandinavian Igneous Belt rocks (1.81-1.77 Ga).

The boundary between the Porphyrite and Kiirunavaara groups is marked by the Nautanen Deformation Zone (NDZ). The NDZ is a major, NNW-SSE–striking, composite shear zone, which varies in width from 1 to 2.5 km and extends along strike north and south for over 150 km (Lynch, 2015). Internally within the NDZ subvertical to moderately west dipping, NNW-SSE striking first order shear zones occur, with related N-NW to S-SE striking second order shear zones (Bauer et al., 2022). The NDZ is the host structure to many Cu-Au deposits and prospects in the Gällivare area (i.e., Aitik, Nautanen, Nautanen North, Liikavaara Berget, etc.) and the rocks hosted by the NDZ show intense hydrothermal alteration and deformation (Lynch et al., 2018; Bauer et al., 2022; Drejing-Carroll et al., in press).

The M1 metamorphic and deformation event in the Gällivare area occurred as upper greenschist in the east to lower amphibolite facies conditions in the west (Bergman et al., 2001). This M1 phase produced a variable penetrative foliation in those rocks effected by greenschist conditions (Lynch et al., 2015). Within those rocks experiencing lower amphibolite facies a strong penetrative foliation was developed (Bauer et al., 2018). The M2 event within the area occurred as high-temperature, low pressure metamorphism and deformation, resulting from E-W crustal shortening (Sarlus et al., 2020; Bauer et al., 2022). Deformation associated with the event was largely confined to major deformation zones, and within the NDZ it produced an NNE-striking, subvertical dipping crenulation cleavage (Lynch et al., 2015) and at Malmberget and areas to the east of the NDZ resulted in large scale folding of the sequence (Lynch et al., 2015; Bauer et al., 2018; Bauer et al., 2022).

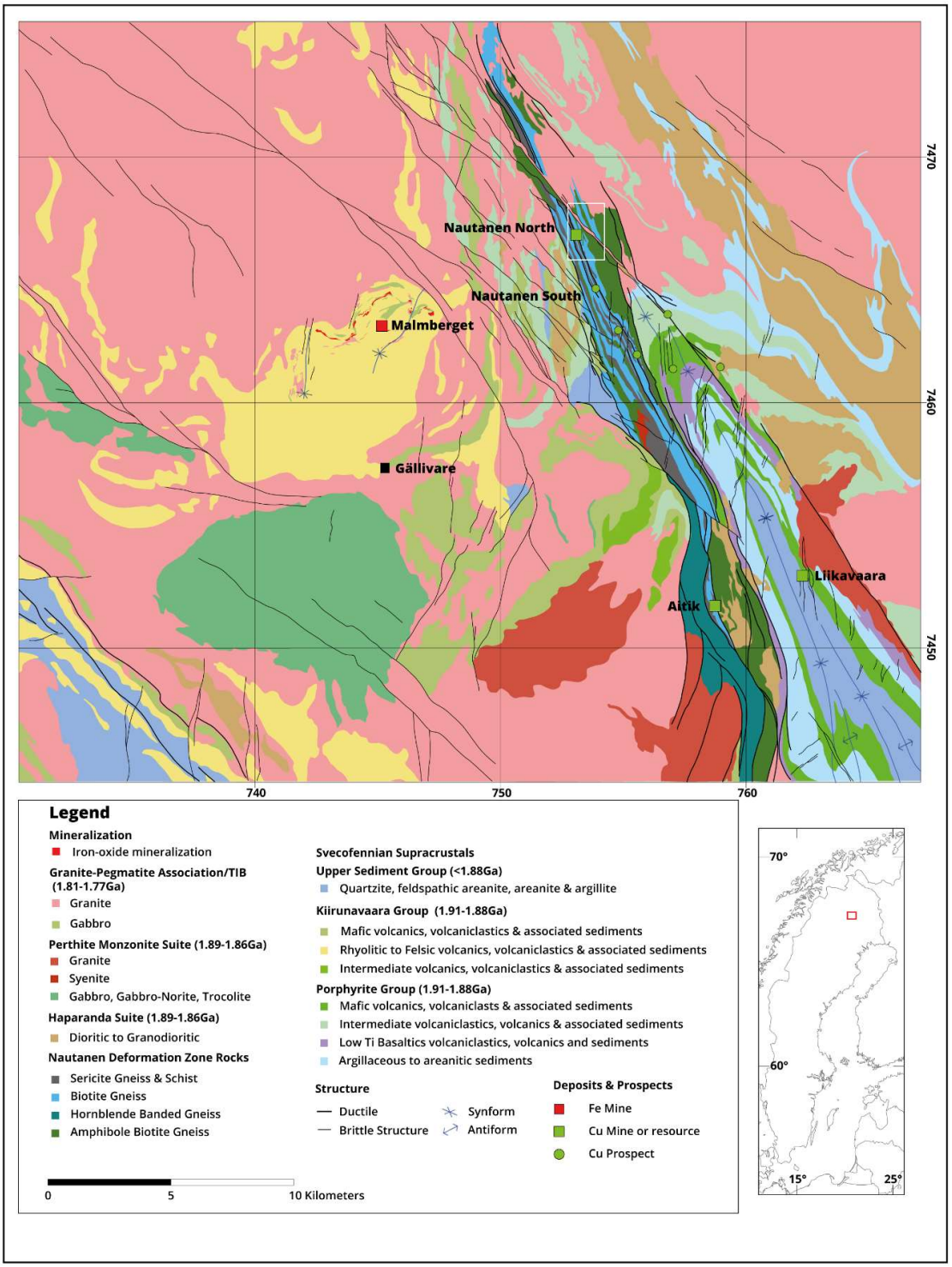


Figure 5: Geologic map of the Gällivare area (Drejing-Carroll et al., in press., after Witschard, 1996; Bergman et al., 2001; Geijer, 1930; Lynch et al., 2018; and internal Boliden Exploration data sets) (insert map: location of the Gällivare area within Sweden).

3.7.3 Property

The Nautanen North deposit is hosted by highly deformed and hydrothermally altered rocks of the Porphyrite Group (Drejing-Carroll et al., in press). These rocks have a mafic to intermediate composition, corresponding geochemical analysis and magnetic interpretation indicates the likely protoliths to these rocks occur within the volcano-sedimentary sequence to the east of the NDZ (Drejing-Carroll, 2023). The high degree of hydrothermal alteration and metasomatism has largely removed primary textures (Drejing-Carroll et al., in press). At depth in the north of the deposit dykes and apophyses of granite and pegmatite occur, which have been interpreted to belong to the Lina granite suite (Drejing-Carroll et al., in press) (Figure 6a & b).

The host rocks exhibit evidence of intense hydrothermal alteration and metasomatism (Figure 6c & d). The earliest phase of alteration occurs as sodic (Na) facies alteration, which is subsequently overprinted by sodic-calcic-iron (Na-Ca-Fe) and high-temperature calcic-iron (HT Ca-Fe), calcic-potassic-iron (HT Ca-K-Fe), potassic-iron (HT K-Fe) and low temperature potassic-iron (LT K-Fe) (Drejing-Carroll et al., in press). These alteration assemblages broadly correlate to the described and mapped amphibole-biotite, biotite, sericite-garnet gneisses and schists that constitute the deposit and broader NDZ. The silicate alteration minerals observed within the deposit are amphibole, biotite, sericite, k-feldspar, garnet, tourmaline, scapolite, albite and epidote. The deposit is localized between shears internal to the NDZ, with high-grade Cu zones occurring as veining, breccias and mineralized shear-bands. (Drejing-Carroll et al., in press).

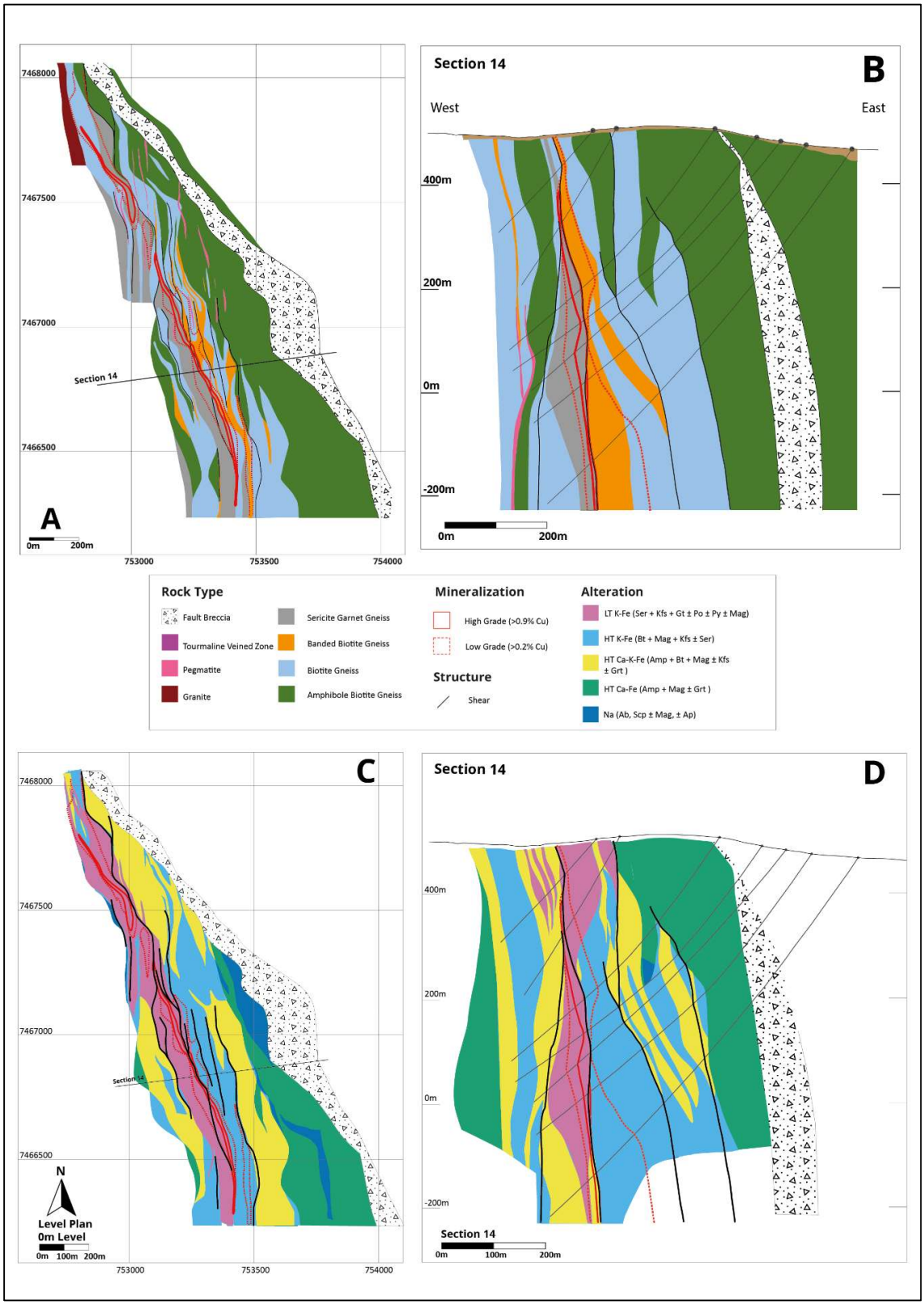


Figure 6: Geological and alteration type level plans and cross sections at the Nautanen North deposit. A) Geological level plan at 0m level highlighting high-grade Cu zone coincident with sericite garnet gneiss and controlling shears. B) Geological cross section through the southern portion of the deposit. C) Alteration level plan at the 0m level highlighting the dominance of Na and Na-Ca-Fe alteration zones on the peripheries of the deposit and HT and LT K-Fe alteration zones within central zones (modified from Drejing-Carroll et al., in press)

3.7.4 Mineralization

Copper occurs primarily within chalcopyrite at Nautanen North, with only rare bornite and chalcocite reported (Drejing-Carroll et al., in press). No other minerals with significant copper are noted. Chalcopyrite occurs as disseminations (Figure 8a), veins, stockworks (Figure 8b), within shear-bands and as clast and matrix components in breccias (Figure 8c). Chalcopyrite occurs in association with pyrite, pyrrhotite and magnetite but chalcopyrite constitutes the dominant sulfide. Minor molybdenite occurs, commonly in association with chalcopyrite, or pyrite. Gold occurs with copper in a an approximately 1:2 ratio (1 g/t Au : 2 % Cu) (Drejing-Carroll, 2023).

Magnetite precipitation is interpreted to have occurred in at least two phases, the first associated with Na, Na-Ca-Fe alteration and is associated with apatite as disseminations, veins, and massive magnetite. A second phase of magnetite is associated with HT Ca-Fe to K-Fe facies alteration, occurring predominantly as veins and within breccias. This later phase transitioned to be dominated by Fe- and Cu-sulfide rich, with pyrite, pyrrhotite and chalcopyrite replacing magnetite in high-grade Cu zones that constitute the core of the deposit (Drejing-Carroll et al., in press).

The highest grades of copper and gold (>2% Cu) within the deposit as spatially and temporally associated with narrow sulfide-rich breccias which occur as vertically stacked relays between vertical to sub-vertical dipping shears that control the overall trend of high-grade copper (>1% Cu) (Drejing-Carroll et al., in press). Sulfide bearing, widely spaced shears branch off these controlling shears to produce a lower grade (>0.1 % Cu) halo to the deposit (Drejing-Carroll et al., in press).

Based upon extensive research at the deposit, and the context provided by the surrounding region the Nautanen North deposit has been classified as an iron oxide-copper-gold mineral deposit (Drejing-Carroll et al., in press).

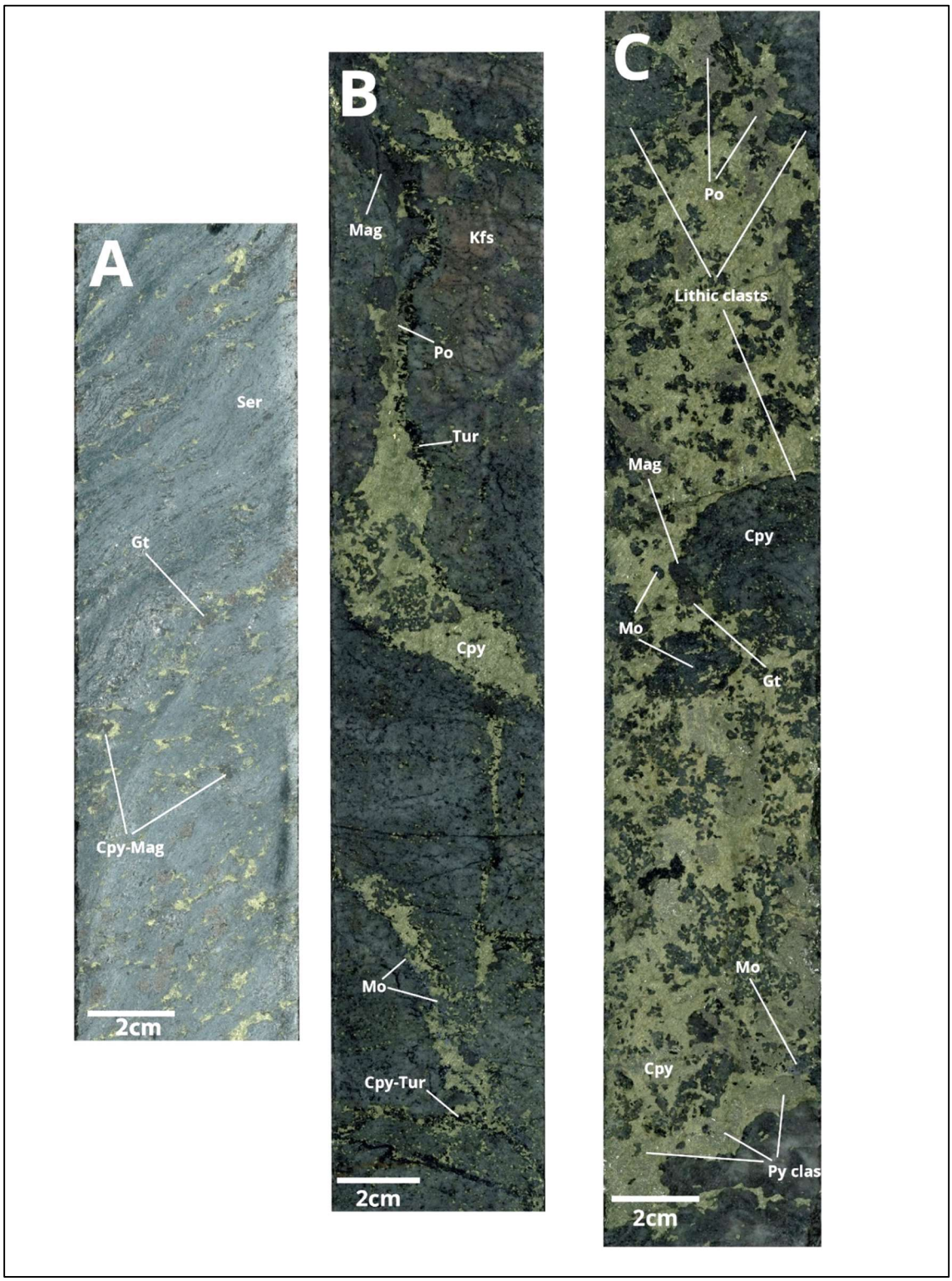


Figure 7: Mineralization examples from Nautanen North. A) Sericite-garnet gneiss with LT K-Fe facies alteration showing S0/S1 compositional banding/fabric with magnetite and chalcopyrite occurring as both foliation parallel disseminations and within a foliation transgressive mesh network. B) Sericite-garnet gneiss with high-temperature (HT) K-Fe alteration hosting a branched pull-apart vein containing chalcopyrite-pyrrhotite-magnetite-tourmaline-molybdenite. Disseminated molybdenite also occurs within the host rock as very fine grains (not distinguishable in image). C) Subangular to rounded lithic, quartz vein, and pyrite clasts as well as tourmaline grains in a chalcopyrite-pyrite-pyrrhotite matrix cement with minor magnetite

3.8 Exploration procedures and data

Diamond drilling assay data is used for Mineral Resource estimation. NQ2 diameter drilling has been performed by drilling contractors. This has been supervised by Boliden personnel. The current practice is to measure all drillholes for deviation with north seeking gyro, however this tool is often unavailable due to difficulties operating in northern latitudes. In these cases, a non-north seeking reflex DeviGyro is used, and a start azimuth is measured from the side of the drill rig with a DGPS, or with a downhole probe after the rig has moved. Recent drilling has also utilized the DeviAligner for rig set-up and start azimuth. A compass cannot be used at Nautanen due to the high magnetite content.

The drill core is logged by Boliden geologists primarily at core logging facilities on the Aitik mine site, and samples are prepared by ALS laboratories personnel at Malå and Piteå. Standard samples, blanks and duplicates are inserted into every sample batch to ensure that the quality of the assay results are satisfactory. Sample assaying is carried out by ALS laboratories in Ireland and Canada, and duplicate check assays performed by ACTLABS/MS Analytical/ACME. QAQC (Quality Assurance Quality Control) protocol is implemented all the way through from drilling to assaying. In Boliden's opinion, the QAQC results demonstrate that the Nautanen deposit assay database is sufficiently accurate and precise for Mineral Resource estimate.

Density data has been collected from multipycnometer measurements on sample pulps from within the zones of mineralization. Additional physical specific gravity measurements on whole core has also been taken. This data has been used to produce a density formula for the ore lens based on sulphur and copper content.

3.9 Exploration activities

Nautanen resource exploration in 2023 consisted of eleven drillholes totaling 7,572 meters. One of these holes was abandoned before reaching the target depth due to deviating hole paths. Drilling primarily tested the existing resource at depth and for a plunge extension to the south. (Fig. 8).

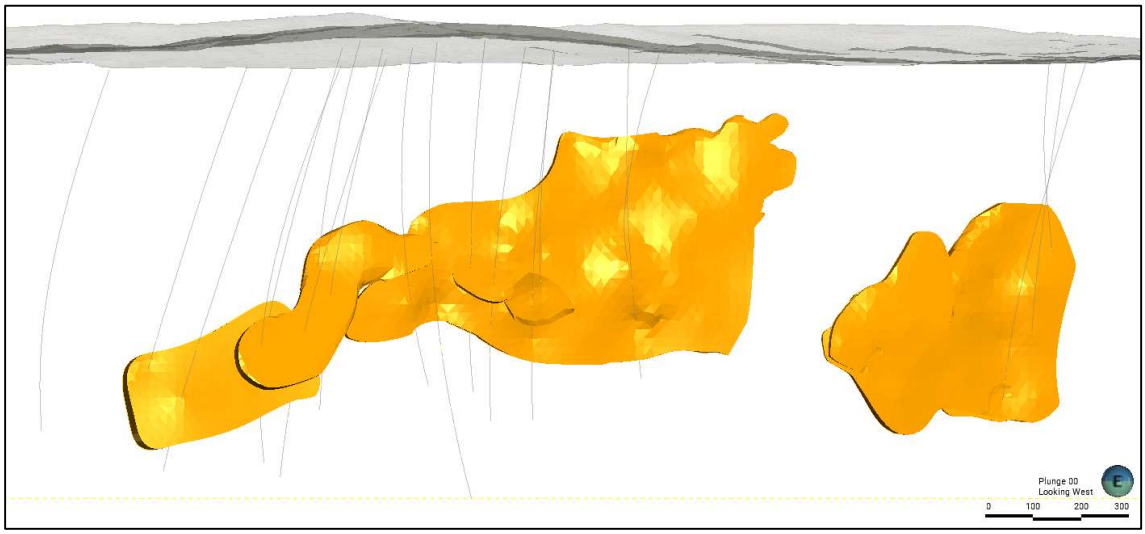


Figure 8 West looking longitudinal section view of Nautanen. Orange wireframes show the 2023 mineral resource. Grey drill hole trace lines show new drilling since the 2020 mineral resource estimate.

To date, 207 drillholes totaling 123,900 meters have been drilled on the project, however some of these are drilled at the Bratt and Sorvanen prospects around the historical mines to the south of the Nautanen Mineral Resource.

3.10 Prices, terms and costs

Anticipated operational costs at an underground operation in Nautanen and processing in Aitik existing process plant is roughly estimated to 400 to 450 SEK/t. For the mineral resource estimate, a cut-off grade of 0.9% copper was used to inform a stope optimization carried out in Deswik Stope Optimiser in order to prove Reasonable Prospects for Eventual Economic Extraction ("RPEEE"). With estimated process results and Boliden's long time price forecast from 2023 (Table 5), a cut-off of 0.9% Cu is equivalent to approximately 505 SEK/t only considering copper. Also considering gold and silver values, 0.9 %Cu correspond to 608 SEK/t. The 0.9 %Cu cut-off is the same as been used in all previous resource estimations on Nautanen.

Table 5. Boliden long term planning prices at the time of the Mineral Resource estimate

Metal/Exchange rate	Planning prices, 2023
Copper	USD 7 800/tonne
Gold	USD 1 400/tr.oz
Silver	USD 20/tr.oz
USD/SEK	9.00

3.11 Mineral resources

The Nautanen Mineral Resource estimation is an update with new drill hole information since the previous estimation in 2020. The project limits and coordinates were based upon the SWEREF99 TM system. Most of the deposit was delineated with drillholes drilled at approximately 50 degrees to the west. Drillholes were spaced at around 70 to 100 m of the target. The resource estimate has used an updated drillhole database as of May 2, 2023, which includes all drillhole sample assay results together with interpretations of the prevailing geology that relates to the structure, lithology, alteration and the spatial distribution of Cu, Au, Ag, Mo and S mineralisation. Interpolation parameters were based upon the geology, styles of mineralisation, drill hole spacing and geostatistical analysis of the data.

The block model utilizes a block size of 20 m x 2.5 m x 20 m, with sub-blocks down to down to 10 m x 2.5 m x 5 m. The block model framework parameters are reproduced in Table 6.

Table 6. Block model framework parameters

	x	y	z
Parent blocks	20	2.5	20
Sub-blocks	10	2.5	5
Base point	751844	7468146	645
Boundary size	4240	2127	1160
Size in blocks	212	851	58
Rotation	Dip	0	
	Azimuth	65	

A 3D geological model was created by the Aitik Near Mine Exploration team in Leapfrog Geo. The mineralization domains were also created in Leapfrog Geo using the geological model as a guide. High grade domains were modelled explicitly (full user control), using 0.9% Cu as a rough cut-off guide. Three low grade domains were created by implicit modelling (computer aided simulation), using 0.2% Cu and 0.1% Cu for indicator estimations, and a <200m from drill hole buffer wireframe. All domains were coded individually to allow individual statistical analysis and estimation.

Due to differences in sample length low grade domains and high grade domains received different composite lengths, 3 m for high grade domains and 4 m for low grade domains. After compositing the drill holes were evaluated for grade outliers. Gold was capped at 6 ppm in the high grade domains and 2 ppm in the low grade domains. Molybdenum was capped at 800 and 500 ppm in the respective domain, and Silver was capped at 20 ppm in the low grade domains. Grade capping is summarized in Table 7 below.

Table 7. Capped grades

		Cap
HG	Au	6
	Ag	-
	Mo	800
LG	Au	2
	Ag	20
	Mo	500

The grade estimation used Ordinary Kriging. A continuity analysis was performed in Snowden Supervisor, using the low-grade domain (0.2% Cu), including the high-grade domains which it envelopes. Variogram models were created for each estimated element. Variable Orientation was used to orientate the search ellipse in Leapfrog Edge. Two sets of search parameters were used in the estimation, one for all zones considered high grade domains, and one for zones belonging to the low-grade domain. Where the first search did not yield enough composites to estimate the block, the search radii were doubled, and finally, tripled. Search parameters are presented below in Table 8 for high grade domains and Table 9 for low grade domains.

Table 8. Search parameters for all high grade domains

HG	**Search direction**			**Samples**						**Dh Max**
	1st	2nd	3rd	Min	Max	Min2	Max2	Min3	Max3	
Cu	75	75	10	4	15	4	15	2	15	3
Au	65	65	10	4	15	4	15	2	15	3
Ag	80	80	25	4	15	4	15	2	15	3
S	95	95	15	4	15	4	15	2	15	3
Mo	105	105	15	4	15	4	15	2	15	3

Table 9. Search parameters for all low grade domains

LG	Search direction			Samples						Dh Max
	1st	2nd	3rd	Min	Max	Min2	Max2	Min3	Max3	
Cu	75	75	10	2	12	2	12	2	12	3
Au	65	65	10	2	12	2	12	2	12	3
Ag	80	80	25	2	12	2	12	2	12	3
S	95	95	15	2	12	2	12	2	12	3
Mo	105	105	15	2	12	2	12	2	12	3

Mineral Resource estimates were classified according to the following key indicators:

- Geological complexity
- Quality and quantity of informing data
    - Confidence in analytical results
    - Confidence in borehole surveying
    - Analytical data
    - Results of the geostatistical analysis and variography
- Metallurgical factors or assumptions
- Confidence in the block estimates
- Reasonable Prospects for Eventual Economic Extraction

The Nautanen deposit has been classified as containing Inferred and Indicated Mineral Resource. Required drill pattern are for Inferred Mineral Resource < 160×160 m and for Indicated Mineral Resource < 80×80 m. Only blocks within the explicitly interpreted high grade domains were considered for Mineral Resources.

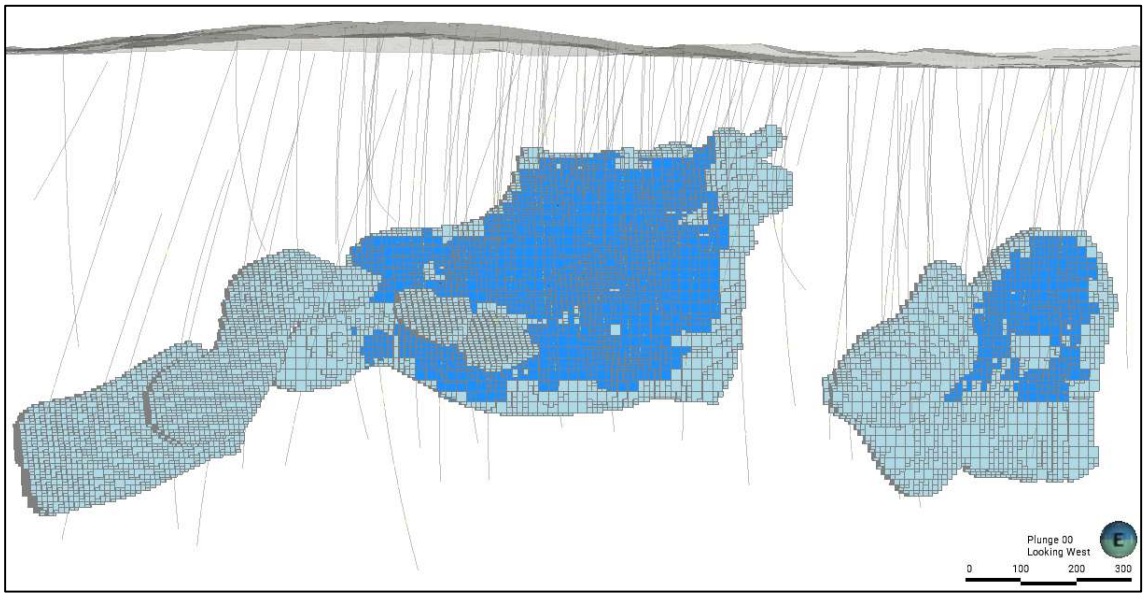


Figure 9. North (right) – south (left) longsection view of the classified Nautanen block model (light blue: Indicated; cyan: Inferred).

The Nautanen Mineral Resource as of December 31, 2023 are given in Table 10. The Mineral Resource statement reports all blocks which are considered to have Reasonable Prospects for Eventual Economic Extraction (RPEEE). RPEEE was defined by a stope optimization

where 20m (length) x 20m (height) x 5-999m (variable width) stopes were used at a cut-off of 0.9% Cu. All reported tonnes in the following Mineral Resource statement fall within the optimized stopes and include a dilution of 10% material below cut-off. No additional dilution is used.

Table 10. Nautanen Mineral Resource statement Cu >= 0.9 %, demonstrating reasonable prospects for eventual economic extraction (Dec. 31, 2023), figures are presented from optimized stopes including 10 % material below cut-off, dilution.

Mineral Resource Classification	**2023**					2020				
	kt	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**	**Mo (g/t)**	kt	Cu (%)	Au (g/t)	Ag (g/t)	Mo (g/t)
Indicated	**13,800**	**1.56**	**0.78**	**6**	**109**	12,700	1.54	0.9	6	100
Inferred	**11,700**	**1.42**	**0.79**	**5**	**101**	8,700	1.37	0.6	6	98

Notes on Mineral Resource statement.

- The optimized stopes include 10 % material below cut-off. No other dilution or ore recovery is applied.
- Reasonable prospect eventual economic extraction is defined by Deswik Stope optimizer with a 0.9 % Cu cut-off.
- Copper corresponds to 83% of the Long Term Planning NSR value for the Total Resource.
- The 0.9 % Cu cut-off corresponds to at NSR value of 505 SEK/t not taking other metals into account and to 608 SEK/t when including gold and silver values.

3.12 Comparison with previous estimate

The methodology applied to modelling and estimating the deposit was unchanged since the previous estimation. Increases in costs since 2020 have been largely balanced by increased metal prices and therefore the same cut-off has been applied for reporting. New drilling since 2020 has focused on extending the known extents of the mineralisation, especially towards the southern plunge. In Figure 10 below, the additional domains since the 2020 model can be seen in gold, while the previous interpretation is displayed in blue.

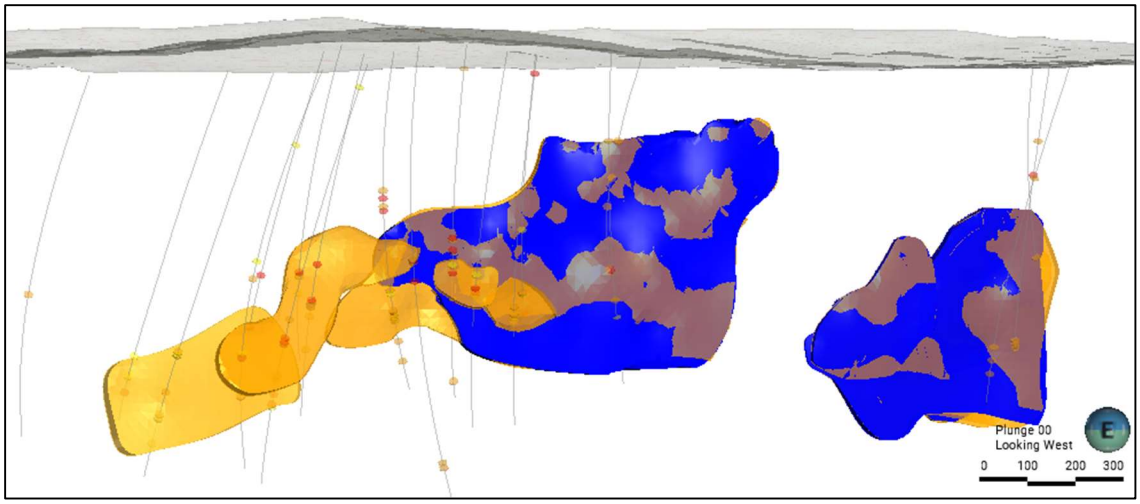


Figure 10. Comparison with previous estimate; 2023 mineralization domains in gold, 2020 domains in blue.

4 REFERENCES

Andersson, J.B.H., Bauer, T.E., and Lynch, E.P., 2020, Evolution of structures and hydrothermal alteration in a Palaeoproterozoic supracrustal belt: Constraining paired deformation–fluid flow events in an Fe and Cu–Au prospective terrain in northern Sweden: Solid Earth, v. 11, p. 547–578.

Andersson, J.B.H., Bauer, T.E., and Martinsson, O., 2021, Structural Evolution of the Central Kiruna Area, Northern Norrbotten, Sweden: Implications on the Geologic Setting Generating Iron Oxide-Apatite and Epigenetic Iron and Copper Sulfides: Economic Geology, v. 116, no. 8, p. 1981–2009.

Bauer, T.E., Skyttä, P., Allen, R.L., and Weihed, P., 2011, Syn-extensional faulting controlling structural inversion – Insights from the Palaeoproterozoic Vargfors syncline, Skellefte mining district, Sweden: Precambrian Research, v. 191, no. 3, p. 166–183.

Bauer, T.E., Andersson, J.B.H., Sarlus, Z., Lund, C., and Kearney, T., 2018, Structural Controls on the Setting, Shape, and Hydrothermal Alteration of the Malmberget Iron Oxide-Apatite Deposit, Northern Sweden: Economic Geology, v. 113, no. 2, p. 377–395.

Bauer, T.E., Lynch, E.P., Sarlus, Z., Drejing-Carroll, D., Martinsson, O., Metzger, N., and Wanhainen, C., 2022, Structural Controls on Iron Oxide Copper-Gold Mineralization and Related Alteration in a Paleoproterozoic Supracrustal Belt: Insights from the Nautanen Deformation Zone and Surroundings, Northern Sweden: Economic Geology, v. 117, no. 2, p. 327–359.

Bergman, S., and Weihed, P., 2020, Archean (>2.6 Ga) and Paleoproterozoic (2.5–1.8 Ga), pre- and syn-orogenic magmatism, sedimentation, and mineralization in the Norrbotten and Överkalix lithotectonic units, Svecokarelian orogen, in Stephen, M.B. & Bergman Weihed, J. (Eds) Sweden: Lithotectonic Framework, Tectonic Evolution and Mineral Resources: London, The Geological Society of London, p. 27–81.

Bergman, S., Kübler, L., and Martinsson, O., 2001, Description of regional geological and geophysical maps of northern Norrbotten County (east of the Caledonian orogen): Ba56, Uppsala, Sweden, Sveriges geologiska undersökning, 110 p.

Danielsson, S. (1985): Nautanen: Borrhålsprotokoll och Analysintyg från 1985-års arbeten. Sveriges Geologiska AB.

Degen, C. (2016): Mineral Resource estimate for the Nautanen Cu-Au deposit. Boliden Internal Report.

Drejing-Carroll, D., 2023, The Geology of the Nautanen North Cu-Au deposit, Norrbotten, Sweden, Ph.D. Thesis: Dublin, Ireland, University College Dublin: 316 p.

Drejing-Carroll, D., Coller, D., Karlsson, P., Bauer, T., Nordin, R., Hitzman, M., and Allen, R., 2015, New insights into the links between major magnetite-apatite, IOCG, and porphyry

copper deposits from the Gällivare area, northern Sweden, in SEG 2015: World-Class Ore Deposits: Discovery to Recovery – Hobart, Australia.

Drejing-Carroll, D., Hitzman, M.W., and Coller, D., 2023, Geology of the Nautanen North Cu-Au-Ag-(Mo) Deposit, Norrbotten, Sweden: Economic Geology, v. 118, no. 8, p. 1765–1794.

Edfelt, Å., Sandrin, A., Evins, P., Jeffries, T., Storey, C., Elming, S.-Å., and Martinsson, O., 2006, Stratigraphy and tectonic setting of the host rocks to the Tjårrojåkka Fe-oxide Cu-Au deposits, Kiruna area, northern Sweden: GFF, v. 128, no. 3, p. 221–232.

Geijer, P. (1917): Nautanenområdet: En Malmgeologisk Undersökning. Stockholm: Sveriges Geologiska Undersökning.

Geijer, P., 1930, Gällivare Malmfält Geologisk Beskrivning: Sveriges geologiska undersökning C 22, 115 p., accessed at http://resource.sgu.se/dokument/publikation/ca/ca22rapport/ca22-rapport.pdf.

Kumpulainen, R.A., 2000, The Paleoproterozoic record of northernmost Norrbotten, Sweden: Stockholm University, 45 p.

Lahtinen, R., Korja, A., Nironen, M., and Heikkinen, P., 2009, Palaeoproterozoic accretionary processes in Fennoscandia: Geological Society, London, Special Publications, v. 318, no. 1, p. 237–256.

Lynch, E., Jönberger, J., Bauer, T., Sarlus, Z., and Martinsson, O., 2015, Meta-volcanosedimentary rocks in the Nautanen area, Norrbotten: preliminary lithological and deformation characteristics: Sveriges geologiska undersökning Barents Project 2014 SGU-rapport 2015:30, 0–51 p.

Lynch, E., Bauer, T., Jörnberger, J., Smarlus, Z., Morris, G., and Persson, P.-O., 2018, Petrological and structural character of c. 1.88 Ga meta-volcanosedimentary rocks hosting iron oxide-copper-gold and related mineralisation in the Nautanen–Aitik area, northern Sweden, in Stefan, B. (Eds) Geology of the Northern Norrbotten ore province, northern Sweden: Uppsala, Sveriges Geologiska Undersökning, p. 107–150.

Martinsson, O., 1997, Paleoproterozoic greenstones at Kiruna in northern Sweden: a product of continental rifting and associated mafic-ultramafic volcanism, in Martinsson, O., (eds.) Tectonic Setting and Metallogeny of the Kiruna Greenstones: PhD Thesis, Luleå, Sweden, Luleå University of Technology: Luleå University of Technology.

Martinsson, O., 2004, Geology and Metallogeny of the Northern Norrbotten Fe-Cu-Au Province, in Allen, R.L., Martinsson, O., and Weihed, P. eds., Svecofennian Ore-Forming Environments: Volcanic-Associated Zn-Cu-Au-Ag, Intrusion-Associated Cu-Au, Sediment-Hosted Pb-Zn, and Magnetite-Apatite Deposits in Northern Sweden of Northern Sweden: Society of Economic Geologists, p. 131–148.

Offerberg, J., 1967, Beskrivning till berggrundskartbladen Kiruna NV, NO, SV, SO: Af, Stockholm, Sveriges geologiska undersökning, 147 p.

Pan-European Standard for reporting of Exploration results, Mineral Resources and Mineral Reserves (The PERC Reporting standard 2017. www.percstandard.eu

Sarlus, Z., Andersson, U.B., Bauer, T.E., Wanhainen, C., Martinsson, O., Nordin, R., and Andersson, J.B.H., 2018, Timing of plutonism in the Gällivare area: implications for Proterozoic crustal development in the northern Norrbotten ore district, Sweden: Geological Magazine, v. 155, no. 6, p. 1351–1376.

Sarlus, Z., Andersson, U.B., Martinsson, O., Bauer, T.E., Wanhainen, C., Andersson, J.B.H., and Whitehouse, M.J., 2020, Timing and origin of the host rocks to the Malmberget iron oxide-apatite deposit, Sweden: Precambrian Research, v. 342.

Skiöld, T., 1979, Zircon ages from an Archaean gneiss province in northern Sweden: Geologiska Föreningen i Stockholm Förhandlingar, v. 101, no. 2, p. 169–171.

Skiöld, T., and Page, R., 1998, SHRIMP and isotope dilution zircon ages on Archaean basement–cover rocks in northern Sweden, in Nordiske geologiske vintermøde 1998 – Abstracts: Aarhus.

Skyttä, P., Bauer, T.E., Tavakoli, S., Hermansson, T., Andersson, J., and Weihed, P., 2012, Pre-1.87Ga development of crustal domains overprinted by 1.87Ga transpression in the Palaeoproterozoic Skellefte district, Sweden: Precambrian Research, v. 206–207, p. 109–136.

Smith, M., Coppard, J., Herrington, R., and Stein, H., 2007, The Geology of the Rakkurijarvi Cu-(Au) Prospect, Norrbotten: A New Iron Oxide-Copper-Gold Deposit in Northern Sweden: Economic Geology, v. 102, no. 3, p. 393–414.

Smith, M.P., Storey, C.D., Jeffries, T.E., and Ryan, C., 2009, In Situ U–Pb and Trace Element Analysis of Accessory Minerals in the Kiruna District, Norrbotten, Sweden: New Constraints on the Timing and Origin of Mineralization: Journal of Petrology, v. 50, no. 11, p. 2063–2094.

Wanhainen, C., 2005,On the origin and evolution of the Palaeoproterozoic Aitik Cu-Au-Ag deposit, northern Sweden : a porphyry copper-gold ore, modified by multistage metamorphic-deformational, magmatic-hydrothermal, and IOCG-mineralizing events. Ph.D. Thesis: Luleå, Luleå University of Technology: 151 p.

Wanhainen, C., Stein, H., Nordin, R., Kjell, B., and Martinsson, O., 2005, 160 Ma of magmatic/hydrothermal and metamorphic activity in the Gällivare area: Re–Os dating of molybdenite and U–Pb dating of titanite from the Aitik Cu–Au–Ag deposit, northern Sweden: Mineralium Deposita, v. 40, p. 435–447.

Weihed, P., Billström, K., Persson, P.-O., and Weihed, J.B., 2002, Relationship between 1.90–1.85 Ga accretionary processes and 1.82–1.80 Ga oblique subduction at the Karelian craton margin, Fennoscandian Shield: GFF, v. 124, no. 3, p. 163–180.

Westhues, A., Hanchar, J., Whitehouse, M., and Martinsson, O., 2016, New constraints on the timing of host-rock emplacement, hydrothermal alteration, and iron oxide-apatite mineralization in the Kiruna District, Norrbotten, Sweden: Economic Geology, v. 111, no. 7, p. 1595–1618.

Witschard, F., 1996, Berggrundskartan 28K Gällivare NO, NV, SO, SV. 1:50 000-scale maps (with a description in English): Ai 98–101