NEW BOLIDEN

Boliden Summary Report

Resources and Reserves | 2021

The Kristineberg Mine

Prepared by
The Kristineberg Mine
and
Rävliden North Technical Teams

Table of Contents

1 SUMMARY

This summary report is issued annually to inform the public (shareholders, potential investors and their advisers) of the mineral assets in the Kristineberg mining operation and the Rävliden North Mineral Resource held by Boliden Mineral AB.

The Kristineberg Mine is located approximately 100km west of the Boliden Area Operations Process Plant in Boliden, and produces from polymetallic mineralisations of Volcanogenic Hosted Massive Sulphide type. The mine has a production capacity of 750,000t per year and is the largest tonnage contributor to the Boliden Area Operations process plant. The Rävliden North deposit is located around 5km west of the Kristineberg Mine and was added to the mine's Mineral Resources in 2015.

In 2021, the mine produced some 615kt of mineralised material grading 0.5g/t Au, 35g/t Ag, 0.5% Cu, 5.02% Zn, and 0.3% Pb. Historically, the mine has been operating since 1940 and has in total produced 33.3Mt of mineralised material with average grades of 1.2g/t Au, 37.8g/t Ag, 1% Cu and 3.8% Zn. A summary table of Mineral Resources and Mineral Reserves is presented in Table 1 below.

Table 1. Summary of Mineral Resources and Mineral Reserves for the Kristineberg Mine and Rävliden North in 2021, as well as Mineral Resources and Mineral Reserves for 2020

	2021						2020					
Classification	kton	Au (g/t)	Ag (g/t)	Cu (%)	Zn (%)	Pb (%)	kton	Au (g/t)	Ag (g/t)	Cu (%)	Zn (%)	Pb (%)
Mineral Reserves												
Proved	40	0.6	38	0.45	6.05	0.48	62	1.0	35	0.5	6.5	0.6
Probable	4,400	0.3	72	0.76	5.53	0.60	2,388	0.5	36	0.6	5.4	0.3
Total P&P	**4,400**	**0.3**	**72**	**0.76**	**5.53**	**0.60**	**2,451**	**0.6**	**36**	**0.6**	**5.4**	**0.3**
Mineral Resources												
Measured	170	0.7	33	0.77	3.42	0.23	49	0.7	45	1.3	4.2	0.2
Indicated	3,900	0.5	42	0.63	3.47	0.24	6,590	0.4	65	0.8	4.6	0.5
Total M&I	**4,100**	**0.5**	**41**	**0.63**	**3.47**	**0.24**	**6,638**	**0.4**	**65**	**0.8**	**4.6**	**0.5**
Inferred	8,100	0.3	60	0.80	3.25	0.43	7,772	0.3	60	0.8	3.4	0.5

1.1 Major changes

Major changes in the Kristineberg Mineral Resources and Mineral Reserve figures from 2020 are listed below:

- Net increase in Mineral Reserves by around 2000kt; -615kt by mining activities, +2819kt converted from Mineral Resource, -255kt geological interpretation changes, and -19kt written off.
- Decrease in Mineral Resources by around 2000kt. 2802kt converted to Mineral Reserve, 1386kt added by exploration, -193kt geological interpretation changes and -600kt written off due to lack of Reasonable Prospects for Eventual Economic Extraction ("RPEEE").

2 GENERAL INTRODUCTION

This summary report is issued annually to inform the public (shareholders, potential investors and their advisers) of the mineral assets in the Kristineberg mining operation ("The Kristineberg Mine") and the Rävliden North Mineral Resource ("Rävliden North") held by Boliden Mineral AB ("Boliden"). The report is a summary of internal reports and technical reports produced for public reporting under the "Recommended Rules for Public Reporting of Exploration Results, Surveys, Feasibility Studies and Estimates of Mineral Resources and Mineral Reserves in Sweden, Finland and Norway" ("The FRB Standard") of 2012 set by the Fennoscandian Review Board ("FRB"). Boliden's reporting of Mineral Resources and Mineral Reserves is currently changing to the Pan-European Standard for reporting of Exploration results, Mineral Resources and Mineral Reserves of 2017 ("The PERC Standard"). The PERC Standard is an international reporting standard recognised by the Committee for Mineral Reserves International Reporting Standards ("CRIRSCO") 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 (Svemin Press Release, 12th March 2018, (Svemin, 2018)).

Until 2017, Boliden used the FRB Standard (Boliden Press Release 14th February 2018, (Boliden Mineral AB, 2018)) which will be no longer updated, and was not recognised by CRIRSCO. A number of the Mineral Resource and Mineral Reserve estimations summarised in this report were made before the change from the FRB Standard to the PERC Standard (See chapter 3.12). Boliden consider these estimations accurate enough to directly be reported according to the PERC Standard under chapter 17 of the standard, although the process of replacing them with PERC Standard compliant Mineral Resource estimations is ongoing.

2.1 The PERC standard

The Pan European Resources and Reserves Committee ("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, and the PERC Standard is fully aligned with the CRIRSCO Reporting Template of 2012.

The PERC Standard sets out minimum standards, recommendations and guidelines for Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves in Europe (PERC, 2017). Boliden is listed on the Stockholm stock exchange (OMX:BOL), and as such falls under the European Securities and Markets Authority ("ESMA") directive recommending stock exchanges and their listed companies across European member countries to abide by International Reporting Standards as defined in Commission Regulation (EC) No 809/2004 (ESMA Press Release , 2012, (ESMA, 2012)).

2.2 Definitions

Public Reports on Exploration Results, Mineral Resources and/or Mineral Reserves must only use terms set out in the PERC Standard. The relationship between Mineral Resources and Mineral Reserves is displayed in Figure 1 below. Generally the figure represents increasing geological confidence and knowledge moving downwards and increased consideration and accuracy of the application of "Modifying Factors" towards the right.

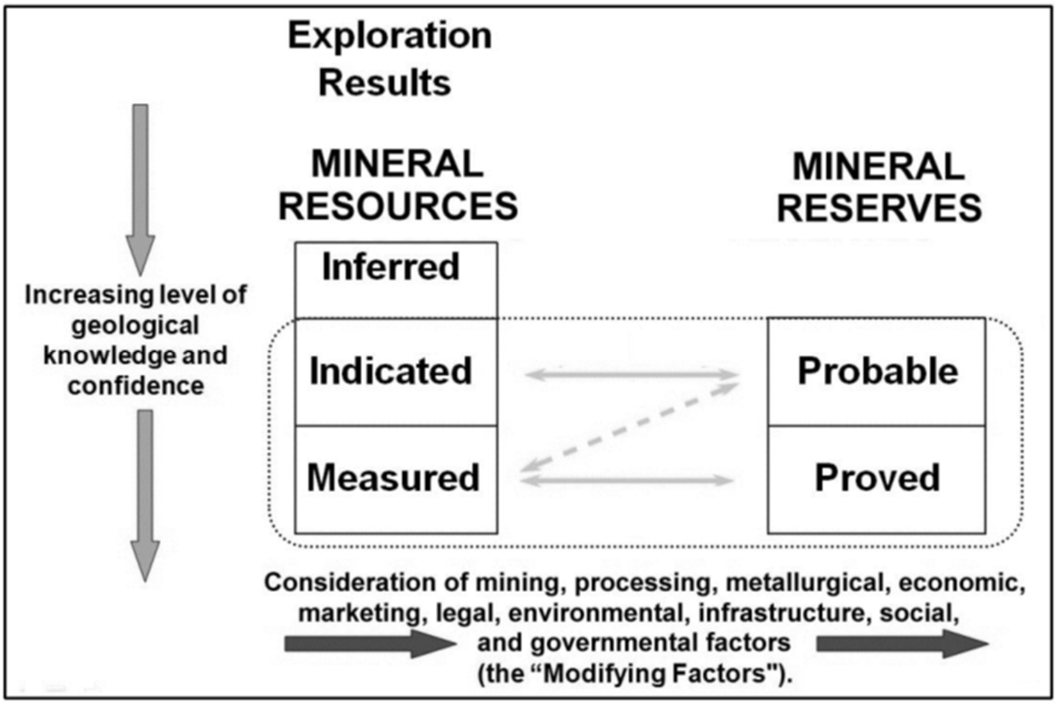

Figure 1. General relationship between Exploration Results, Mineral Resources and Mineral Reserves (PERC, 2017)

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.

The Mineral Resources are reported exclusive of Mineral Reserves.

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.

2.3 Competence

The compilation of this report has been completed by a team of professionals who work directly for Boliden Mineral AB, and are listed as contributors in Table 2 below. The report has been verified and approved by Gunnar Agmalm, who is Boliden's Ore Reserves and Project Evaluation department's manager and a Member of The Australasian Institute of Mining and Metallurgy (AusIMM) and a Member of The Fennoscandian Association for Metals and Minerals Professionals (FAMMP). Mr. Agmalm is responsible Competent Person ("CP") for the compilation and content of the report except Environmental, Permitting and Social Impact, where Seth Mueller is responsible CP. Mr. Mueller is a professional member of the Fennoscandian Association for Metals and Minerals Professionals (FAMMP, membership number 36). Mr. Mueller is a full-time employee of Boliden Mineral AB.

Both Mr. Agmalm and Mr. Mueller consent to the inclusion in the report of the matters based on his information in the form and context in which it appears.

Table 2. Contributors and responsible competent persons for the Kristineberg Mine summary report

Description	Contributors	Responsible CP
Report Compilation	Samuel Baldwin	Gunnar Agmalm & Seth Mueller
Summary and introduction	Samuel Baldwin	
Project location	Samuel Baldwin	
History	Samuel Baldwin	
Ownership and permits	Samuel Baldwin	
Permits and Environmental Social Governance	Seth Mueller, Anton Lundqvist	Seth Mueller
Geologic setting and mineralisations	Samuel Baldwin, Helen Thomas, Pierre-Marie Machault, Mac Fjellerad Persson	
Exploration procedures and data	Samuel Baldwin, Helen Thomas, Pierre-Marie Machault, Mac Fjellerad Persson	
Exploration activities	Pierre-Marie Machault, Helen Thomas, Mac Fjellerad Persson	
Mineral processing and metallurgical testing	Samuel Baldwin, Nils-Johan Bolin, Marie Lundberg	
Mining methods, infrastructure and recovery methods	Akos Csicsek, Linda Bjurén, Marie Lundberg, Markus Isaksson	
Prices, terms and costs	Gunnar Agmalm, Johan Olofsson Samuel Baldwin	
Mineral resource estimates	Erik Bjänndal, Maria Tuomi, Samuel Baldwin	
Mineral reserve estimates	Erik Bjänndal, Maria Tuomi, Samuel Baldwin	
Reconciliation	Erik Bjänndal, Samuel Baldwin	

3 KRISTINEBERG

The Kristineberg Mine is located approximately 100km west of the Boliden Area Operations ("BAO") Process Plant ("BAOPP") in Boliden, and produces from polymetallic mineralisations of Volcanogenic Hosted Massive Sulphide ("VHMS") type. The VHMS mineralisations range in thickness from 1m to 10m, and have been explored to a depth of 1400m, along a plunge of around 3km. To date, the Kristineberg Mine has produced upwards of 32 Mt of material, and has been operating for the last 82 years. The Kristineberg Mine has a production capacity of around 750,000t/year and is the largest by volume contributor to the BAOPP. Cu and Zn are the main mined metals at The Kristineberg Mine, with Au, Ag and Pb credits. Mining activity is currently taking place in the L-Zone, Raimo, and Koppar Klumpen mineralisations at various levels between 900m and 1250m depth and takes place mainly by cut and fill methods.

3.1 Technical studies

Two major technical studies have been completed on the Kristineberg Mine during 2021. Details can be found in Table 3 below.

Table 3. Summary of major technical studies which have been completed at the Kristineberg Mine and Rävliden North during 2021

Study	Date Completed	Main Findings
Rävliden North Feasibility Study	December 2021	NPV positive project defined, along with new Mineral Reserve in parts of the Rävliden mineralisation.
Raimo Mineral Resource Estimation	May 2021	Increase in Mineral Resources based on exploration drilling and geological modelling.

3.2 Location

The Kristineberg Mine is located within the village of Kristineberg and is accessible year-round by good quality all weather road. The village of Kristineberg is located approximately 100km to the west of the village of Boliden (see Figure 2). The Kristineberg Mine is connected to Boliden and Skellefteå to the west by highways 370 and 95. A local all-weather sealed road links the main Malå 370 highway to Kristineberg. Total driving distance between the BAOPP and the Kristineberg Mine is approximately 95km.

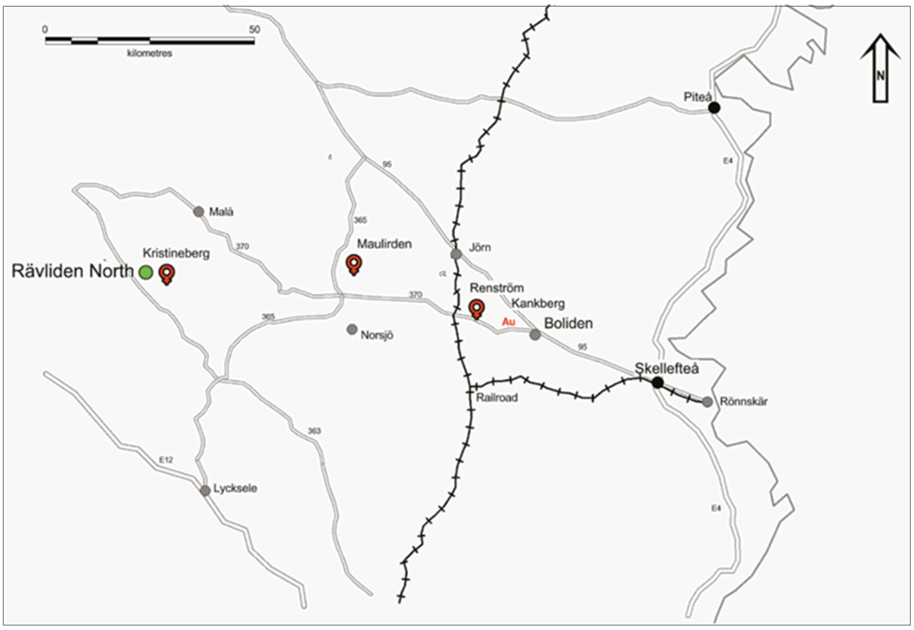

Figure 2. Schematic map showing the location of the Village of Kristineberg, and the approximate location of the Rävliden North Mineral Resource.

A schematic map is presented in Figure 3 showing the Kristineberg Camp. This includes the locations of the Kristineberg Mine, as well as the approximate location of the Rävliden North Mineral Resource and historic mines located in Rävliden, Rävlidmyran, and Hornträsk.

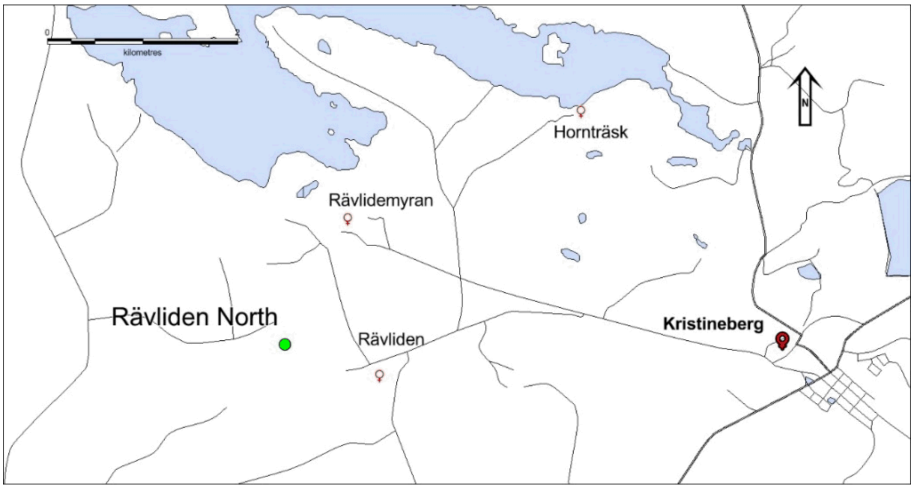

Figure 3. Schematic map of the Kristineberg Camp

3.2.1 Coordinate systems

The Kristineberg Mine's local coordinate system ("KRIBERGSYSTEMET") is a translated and rotated local Cartesian coordinate system. The original definition of the translation of the origin was based on an old RT system of unknown age; however, the coordinates of the system have been verified according to SWEREF99 TM projection. In KRIBERGSYSTEMET, the Y and X axes are switched so that the relative longitudinal axis becomes Y and the relative latitudinal axis becomes X. Both Rävliden North and the Kristineberg Mine are currently using KRIBERGSYSTEMET.

3.3 History

A summary of the history of the Kristineberg Mine is presented in Table 4. The Kristineberg Mine has been operating continuously for 82 years since 1940. In total during this time, the mine has produced around 33.3Mt of mineralised material with average grades of 1.2g/t Au, 37.8g/t Ag, 1% Cu and 3.8% Zn.

Table 4. Brief history of the Kristineberg mine

Year	Events
Pre-1918	Mineralised boulders found on surface in the vicinity of Kristineberg, however no mineralised bodies found in bedrock due to thick glacial cover. Exploration activities commence.
1918	Mineralised body found in the subsurface by Boliden's Electro Magnetic geophysics.
1940	First production year in Kristineberg. Approximately 40,000t of mineralised material was produced.
1943	Cable skip transport was constructed between Boliden and Kristineberg in order to transport mineralised material to the BAO Processing Plant.
1968	The central shaft was sunk to the 790m level. The crusher and the skipping station were placed at the 690m and 751m levels respectively.
1979-1983	The main ramp was built in order to connect the 690m level to the surface.
1991	Mill and Process plant decommissioned
1993	The main ramp reaches the 1000m level
1996	Decision taken to develop the main ramp down to 1100m level. Einarsson Zone (E-Zone) is intersected.
2000	The decision is taken to build a cyanide leach facility in the BAO Process Plant. Production from the Einarsson Au/Cu Zone in Kristineberg begins. Intersection of the K-Zone.
2001	J-Zone is intersected by exploration drilling.
2002	Production starts from the K-Zone (Zn).
2004	L-Zone is intersected by exploration drilling following up on a downhole geophysical anomaly. Production starts in the J-Zone.
2006	M-Zone is intersected by drilling.
2010	Pre-Feasibility on the L-Zone is completed. Development of drifts towards the L-Zone is started. Silver Zone is intersected by drilling. Tommy and Raimo mineralisations intersected with drilling.
2011	K-Zone mined out.
2012	L-Zone production started.
2014	E-Zone mined out. M-Zone extension to the west discovered through drilling.
2015	Rävliden Norra added to Kristineberg's Mineral Resources after a field exploration campaign around the abandoned Rävliden and Rävlidmyran mines.
2016	Drifting started between Kristineberg L-Zone and Rävliden North total 3km. Update to Raimo & Tommy Mineral Resource
2020	Test Mining Rävliden North and Ag1-7. Updates to Rävliden North and A-Zone Mineral Resources. Rävliden Feasibility Study initiated.
2021	Feasibility study Rävliden North concluded. Raimo Mineral Resource estimation. Construction on Ola Orten started. Mining of Raimo mineralisation started.

3.4 Ownership

The Kristineberg Mine is 100% owned by Boliden Mineral AB. No other owners have operated on the property.

3.5 Permits

Boliden Mineral AB is in possession of all required permits required to mine Zn, Cu, Pb, Ag and Au at the Kristineberg Mine, in addition to owning wholly the rights for exploration covering the Kristineberg Mine and much of the surrounding area. Exploration and Mining permits are issued by Bergstaten and are governed by the Minerals Act (1991:45), issued on the 24th January 1991, which came into force on the 1st july 1992.

All Mining permits within the Kristineberg Area are subject to a standard legally prescribed royalty of 0.2% of the annual value of metal recovered after mineral processing. Calculation and other details of this royalty is also governed by the Minerals Act. 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. No additional royalties currently apply to the Kristineberg Mine.

The capacity of the tailings management facility at BAOPP is sufficient to include material from the Kristineberg and Rävliden life of mine plan ("LoMP") up to and including 2028. The final two to three years of production are expected to exceed the existing tailings dam capacity. It is not certain at this stage how the balance of this tailings material will be accommodated. Studies are however on-going, a suitable capital provision has been made and it is reasonable to assume that an appropriate solution will be selected in good time for necessary permitting, design and construction to take place.

3.5.1 Exploration permits

Boliden Mineral AB wholly owns exploration permits around much of The Kristineberg mine. Valid exploration permits are presented in Table 5. A map of valid exploration permits around the Kristineberg Mine and Rävliden North are displayed in Figure 4.

Table 5. Valid exploration permits which are held by Boliden Mineral AB around the Kristineberg Mine

Name	Owner	Diary Nr.	Area (ha)	Mineral	Valid from	Valid to
Kristineberg nr 1012	Boliden Mineral AB	2010000673	125.74	Zn	2010-10-26	2025-10-26
Kristineberg nr 1013	Boliden Mineral AB	2012001075	106.17	Zn	2012-11-07	2022-11-07
Kristineberg nr 1014	Boliden Mineral AB	2012001189	81.22	Zn	2013-01-24	2023-01-24
Kristineberg nr 1016	Boliden Mineral AB	2015001137	4027.40	Zn, Cu, Ag, Au	2016-01-19	2023-01-19
Kristineberg nr 1017	Boliden Mineral AB	2016000267	136.96	Zn, Cu	2016-05-27	2022-05-27
Kristineberg nr 1019	Boliden Mineral AB	2017001038	826.96	Zn, Cu, Ag, Au	2018-01-11	2024-01-11
Kristineberg nr 1020	Boliden Mineral AB	2018000260	3022.10	Zn, Cu, Pb, Ag, Au	2018-06-05	2022-06-05
Kristineberg nr 1021	Boliden Mineral AB	2019000922	584.13	Zn, Cu, Ag, Au	2020-03-04	2023-03-04
Rävliden nr 1006	Boliden Mineral AB	2018001422	930.56	Zn, Cu, Pb, Ag, Au	2019-03-04	2022-03-04

3.5.2 Mining permits

Boliden Mineral AB wholly owns the exploitation permits as presented in Table 6. A map of the exploitation permits is presented in Figure 4.

A permit application for Kristineberg K nr 7 which covers a small extension of the Raimo mineralisation is ongoing.

Table 6. Valid Exploitation permits which are held by Boliden Mineral AB around the Kristineberg Mine

Name	Owner	Diary Nr.	Area (ha)	Mineral	Valid from	Valid to
Kristineberg K nr 1	Boliden Mineral AB	1997000366	68.2950	Zn, Cu, Pb, Ag, Au	1998-02-20	2023-02-20
Kristineberg K nr 2	Boliden Mineral AB	1998000700:R	257.2557	Zn, Cu, Pb, Ag, Au	2000-01-01	2025-01-01
Kristineberg K nr 3	Boliden Mineral AB	2001000461	20.2031	Zn, Cu, Pb, Ag, Au	2001-10-16	2026-10-16
Kristineberg K nr 4	Boliden Mineral AB	2001000462	37.3106	Zn, Cu, Pb, Ag, Au	2001-10-01	2026-10-01
Kristineberg K nr 5	Boliden Mineral AB	2007000825:R	204.4713	Zn, Cu, Pb, Ag, Au	2007-09-07	2032-09-07
Kristineberg K nr 6	Boliden Mineral AB	2017001080	77.8600	Zn, Cu, Pb, Ag, Au	2018-10-16	2043-10-16
Viterliden K nr 1	Boliden Mineral AB	2000000028:R	31.9353	Zn, Cu, Pb, Ag, Au	2002-08-26	2027-08-26
Kimheden K nr 1	Boliden Mineral AB	2002000056:R	63.9905	Zn, Cu, Pb, Ag, Au	2002-12-05	2027-12-05

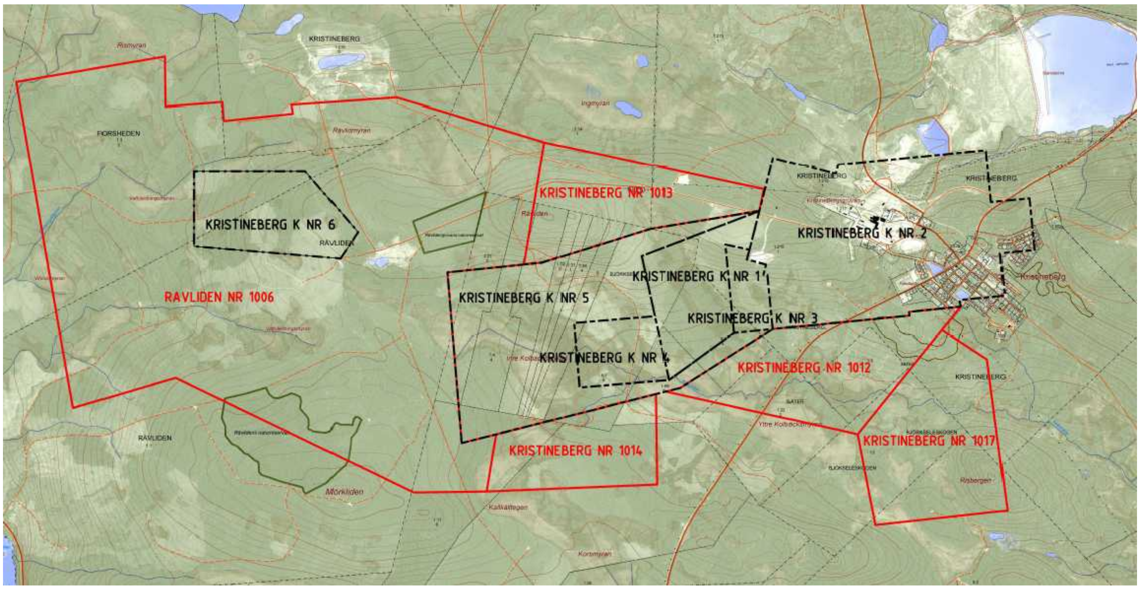

Figure 4. Map of the Kristineberg Mine with Exploitation permits (black), and exploration permits (red).

3.6 Permits and Environmental Social Governance

3.6.1 Existing Permits

Boliden Mineral AB completed an Environmental Consequence Description, or environmental impact assessment in 2012 (Eriksson & Rönnblom-Pärson, 2012), which is the basis for the current environmental permit. The Kristineberg Mine has a valid environmental permit from the Swedish Environmental Court issued in 2014 with an amendment in 2018, shown in Table 7. The Permit is valid for the life of mine under current operating conditions and production levels, any major changes in operations, increase in production or changes to discharge will require a new permit. The permit is in accordance with Swedish national environmental legislation and European Union mining regulations.

Table 7. Valid Environmental permits held by Boliden Mineral AB for the Kristineberg Mine

Owner	Permit	Date
Boliden Mineral AB	Umeå Tingsrätt M 1993-12 Deldom 2014-04-30	2014-04-30
Boliden Mineral AB	Umeå Tingsrätt M 1993-12 Deldom 2018-02-09	2018-02-09

The Environmental permit for the Kristineberg Mine encompasses the following aspects:

- production rates for mineralised and waste rock,
- placement of waste rock, management of waste rock
- water management and water treatment,
- discharge water quality,
- noise and vibrations associated with blasting, transport and other operations,
- monitoring programs for dusting, noise, and water quality,
- dam safety and management,
- mine closure and rehabilitation,
- the economic security for mine closure and rehabilitation,
- chemicals and chemical management.

3.6.2 Necessary Permits

Boliden submitted the environmental permit application for the Rävliden deposit to the Swedish environmental court on the 9th of April 2021. Mining operations at the Rävliden deposit can only commence after the court's approval of the environmental permit.

3.6.3 Environmental Social Governance "ESG"

3.6.3.1 ESG Commitments

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 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 strives 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 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.

3.6.3.2 Socio-economic impact

In the overview plan for Lycksele municipality from 2006 the Skellefteå district-Kristineberg area is named as an important area for the development of industry. The mining industry is described as very meaningful to the economy with the creation of direct and indirect jobs and the effects on other businesses.

The overview plan emphasizes measures that important industry in the area must be promoted as they are important for the municipalities development. The mining industry is described as being able to provide positive development in the region over the coming 30-40 years if mining occurs. A mining operation has large synergy effects within trade, maintenance and transport.

The planned expansion project at Rävliden is in good agreement with the municipalities overview plan and is necessary for the continuation of the Kristineberg Mine. The mine is also a very important employer within Malå and Lycksele municipalities.

3.6.3.3 Communities and Landowners

The mine is located on the property designated Kristineberg 1:215 and is wholly owned by Boliden. The Kristineberg Mine is located directly next to the Kristineberg community. The area, including the existing mine and associated infrastructure, are designated as an area of national interest for mining. Vormbäcken is the recipient of discharge water from Kristineberg Mine's operations and is a tributary to Vindel River, which is a nationally protected river and classed as a Nature 2000 area. There are no other national interest areas or protected areas.

The Kristineberg Mine has been in operation since 1940. The mine operated as 4 smaller open pits prior to the development of underground infrastructure. Until 1991 there was a mill and concentrator on site. The tailings from the concentrator were deposited in five tailings facilities in the valley below the mine. All of the tailings facilities, with the exception of Magazine 4, have been closed and reclaimed or are being reclaimed. Today Magazine 4 functions as a settling pond after water treatment with slaked lime. A small quantity of waste rock is temporarily stored in the footprint of Magazine 2, this rock will be used as fill under the life of the mine.

Land usage in the area around the Kristineberg Mine is predominately forestry and reindeer herding and grazing. Hunting, fishing and other outdoor activities also take place here. Boliden maintains good working relationships with the Sámi people and forestry companies.

The nearest inhabited area is the Kristineberg community, with houses located approximately 200 m from the industrial area. There are approximately 195 residents in Kristineberg. There are also a few small villages and single homes located approximately 2 km from the industrial area.

For the Rävliden project, a delimitation consultation was undertaken with the county environmental board (the regulator), and individuals who are assumed to be affected by the mine, as well as other national regulators, the municipality and the general public under April and May of 2020.

The general public was informed of the consultation via advertisement in the local newspapers and on the company's website. An additional consultation was held April 28th, 2020 via Skype. There has not been an in person consultation with the general public due to the continued restrictions associated with the spread of the Covid-19 virus. The advertisements were published the 2nd of May, 2020 in the newspaper Norran.
All of the views received have been addressed in the work completed for the permit application and associated background information.

3.6.3.4 Indigenous People

The Kristineberg Mine is located within the Sami villages Måla and Grans total reindeer grazing area. Svaipa Sami village has reindeer migration routes that pass through the area. The current condition of Reindeer husbandry, the impact of the industry and the effects and consequences associated with the mining operation are described in a reindeer husbandry analysis which was developed in consultation with the Sami villages as part of the EIA (MKB, 2021).

3.6.3.5 Historical Legacy

There are a number of closed mines in the area, including the Rävliden field, and Kimheden that were closed over 15 years ago. Only complementary closure and rehabilitation measures are ongoing.

3.7 Geologic setting, mineralisations and deposit types

3.7.1 Regional geology

The Kristineberg Camp is located on the western extent of the Skellefteå district Figure 5. The Skellefte district is a Paleoproterozoic (1.89 Ga) Volcanic sedimentary area Located in Västerbotten, northern Sweden. The area stretches roughly 100 km from the village of Kristineberg in the west to the village of Boliden in the east. The Skellefte district hosts more than 85 VHMS deposits, of which 26 have been, or are currently hosting mining operations. The VHMS deposits of the area are mostly hosted in the upper parts of a volcanic sequence of intermediate to felsic juvenile volcanoclastic rocks, sub volcanic intrusions and lavas. These rocks together form the Skellefte group, which in turn is the lowest stratigraphic sequence in the Skellefte district. (Allen, Weihed, & Svenson, 1996).

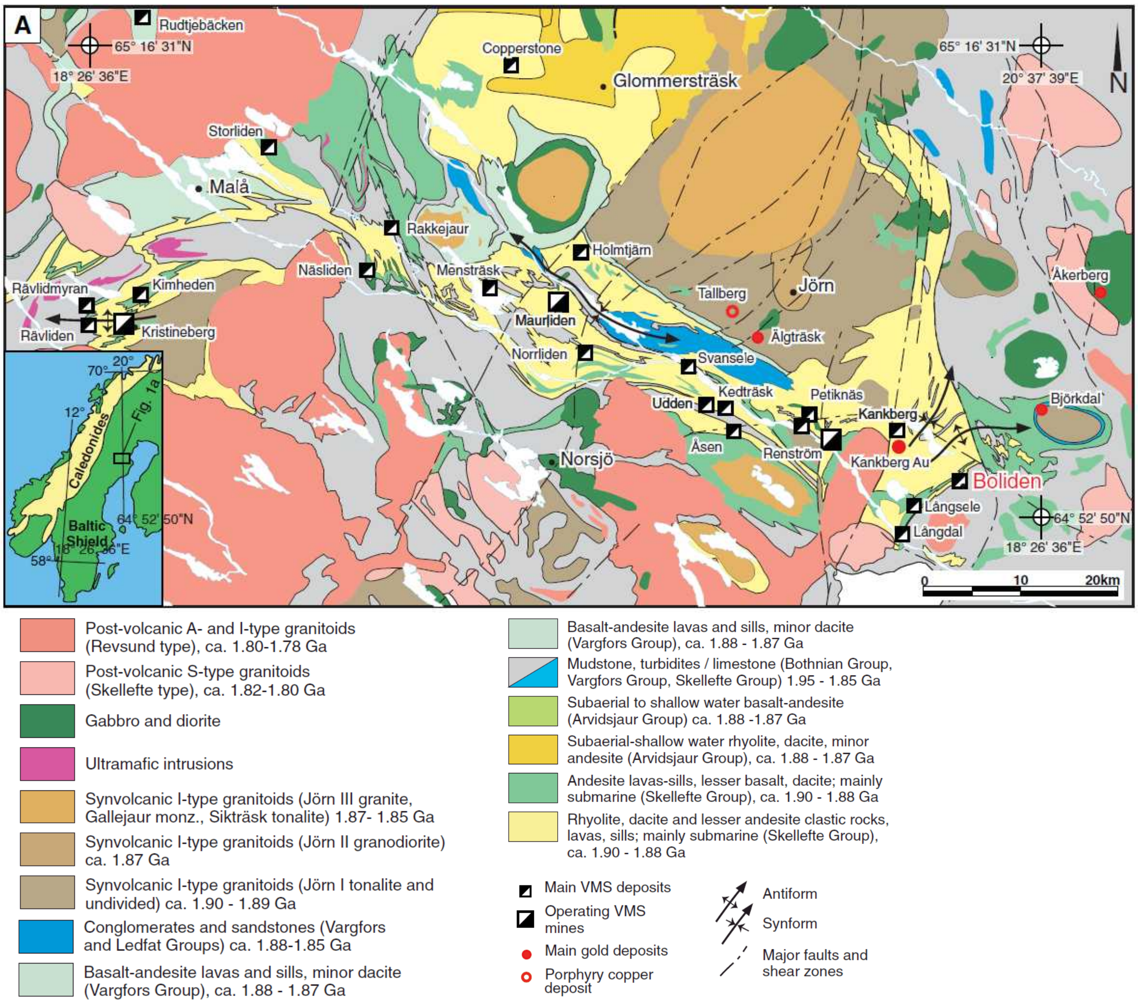

Figure 5. Regional geologic map of the Skellefte District (from Mercier-Langevin et al. (2012), modified after Allen et al. (1996))

The rocks of the Skellefte group in turn are overlain by the Vargfors group, a unit of shales, tubiditic clastic sedimentary rocks and conglomerates. There are local intercalations of volcanic rocks and rare occurrences of limestone.

The Skellefte District is bordered by syn-volcanic granitiods to the north and south. Peak metamorphism is interpreted to have occurred at ~1.84-1.82 Ga and reached upper green schist facies, and amphibolite isograds at the margins to the west and south. (Allen et al., 1996).

3.7.2 Local and property geology

The Kristineberg Camp mineralisations of the Kristineberg Mine and surrounding mineralisations of Rävliden, Rävliden North, Rävlidmyran, Hornsträsksviken and Kimheden are considered examples of VHMS mineralisations Figure 6.

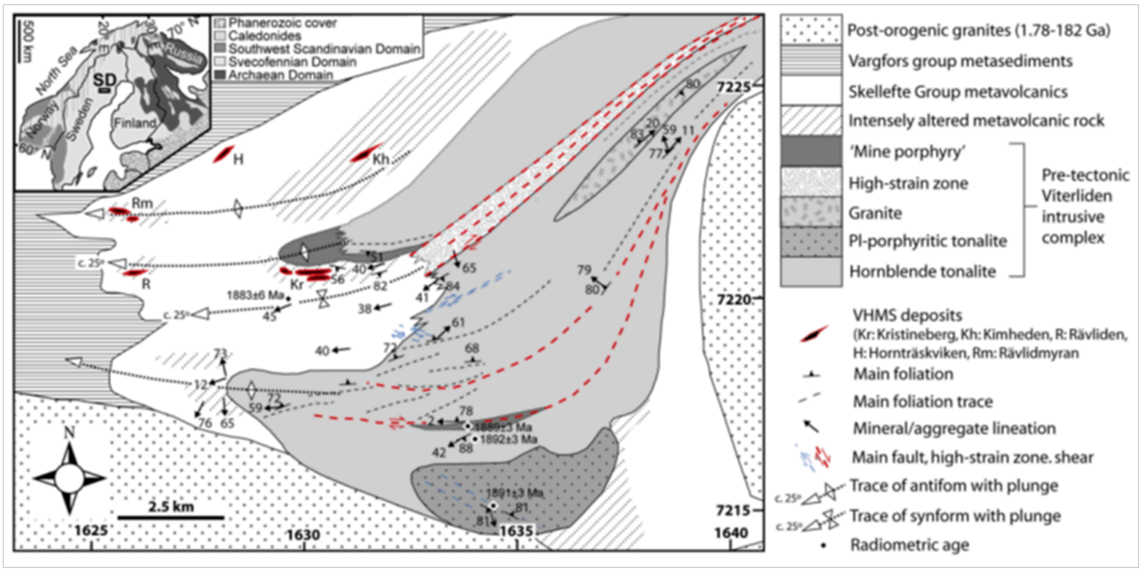

Figure 6.Geologic map showing the Kristineberg Camp, and associated VHMS deposits. Modfied after (Skyttä, Hermansson, Andersson, Whitehouse, & Weihed, 2011)

The mineralisations of the Kristineberg Camp are situated on separate stratigraphic horizons that relate to differing ages and mineralisation events. The economically important Kristineberg Mine mineralisations as well as the Kimheden mineralisation is located on the “Kristineberg Horizon” and Rävliden North deposits are located on the “Rävliden Horizon” along with the Rävliden and Rävlidmyran mineralisations (Lindberg, 1979). The Rävliden horizon is hypothesised to be representative of a distinct stratigraphic and chemostratigraphic shift in the lithology where replacement deposits have been emplaced, whereas the Kristineberg Horizon is assumed to be representative of more primary mineralisation emplacement following a more traditional VHMS formation model (Jansson & Fjellerad Persson, 2014).

The Rävliden North and Kristineberg Mine mineralisations are located within “local” antiformal structures. Rävliden North consists of two major first order antiforms and an intervening synform, or major shear zone (Jansson & Fjellerad Persson, 2014). The Kristineberg Mine mineralisations are located within multiple layers of stacked “lenses” of intensely chlorite altered schists which have been accumulated by thrusting and associated crustal shortening in a NNE-SSW direction (Hermansson, 2012).

3.7.3 Mineralisations

3.7.3.1 The Kristineberg Mine

In Table 8 is a summary of current and historical mineralisations is presented within the Kristineberg Mine, along with a brief and general description of the mineralisation types: Of the listed mineralisations, the L-Zone, Koppar Klumpen and Raimo are currently being mined. An overview of the mine and its mineralisations can be found in Figure 3.6.

Table 8. Summary table of mineralisations that are currently and have been present within the Kristineberg Mine

Mineralisation	Type	Host Rock	Metals	Status
A-Zone	VHMS	Chlorite Schist	Cu-Zn-Au	Historic
B-Zone	VHMS	Chlorite Schist	Cu-Au	Historic
E-Zone	VHMS	Quartzites	Au-Cu	Historic
J-Zone	VHMS	Chlorite Schist	Zn-Cu-Au	Historic
K-Zone	VHMS	Chlorite Schist	Zn	Historic
M-Zone	VHMS	Chlorite Schist	Zn-Cu	Historic
L-Zone	VHMS	Chlorite Schist	Zn-Cu-Au	Mining Area
Koppar Klumpen	VHMS	Chlorite Schist	Zn-Cu	Mining Area
Raimo	VHMS	Chlorite Schist	Zn-Cu	Mining Area
Ag-Zone	Remobilised	Quartzites	Ag-Pb	Mineral Resource

Mineralisations of the Kristineberg Mine are hosted in steeply-gently dipping Chlorite Schist lenses, with a gentle plunge towards the SW. The mineralisation generally appears as two "arms", the southern arm consisting of the B-, E-, J-, K-, M-,and Ag-Zones as well as the Raimo mineralisations, see Figure 7. On the northern "arm" lies the L-Zone and A-Zones. Mineralisations can be generally split into two types:

- Chlorite Schist hosted mineralisations, and
- Ag-Pb "remobilised" mineralisation.

Chlorite schist hosted mineralisation generally contains sulphide mineralisation that is semi-massive to massive in nature with variable abundances of economically important minerals: chalcopyrite (CuFeS2), sphalerite ((Zn, Fe)S) and galena (PbS), with minor silver and gold. The schists themselves contain variable amounts of muscovite, quartz, chlorite, phlogopite, biotite, cordierite, andalusite, pyrite and magnetite. The chlorite schists appear as lenses within colloquially named "quartzites" which are hypothesised to be highly altered rhyolitic to dacitic rocks (Barrett & MacLean, 2000). Chlorite, cordierite, sericite and andalusite as well as quartz, overprint the original rock textures making primary rock identification difficult.

The "remobilised" Ag-Pb type is hosted within silicified cordierite and chlorite quartzites. Five silver bearing minerals are present within the Ag-Zone; freibergite ((Ag,Cu,Fe)12(Sb,As)4S13) being dominant with minor amounts of hessite (Ag2Te) often present. High silver grades are often present in narrow zones associated with galena veins or fracture fillings.

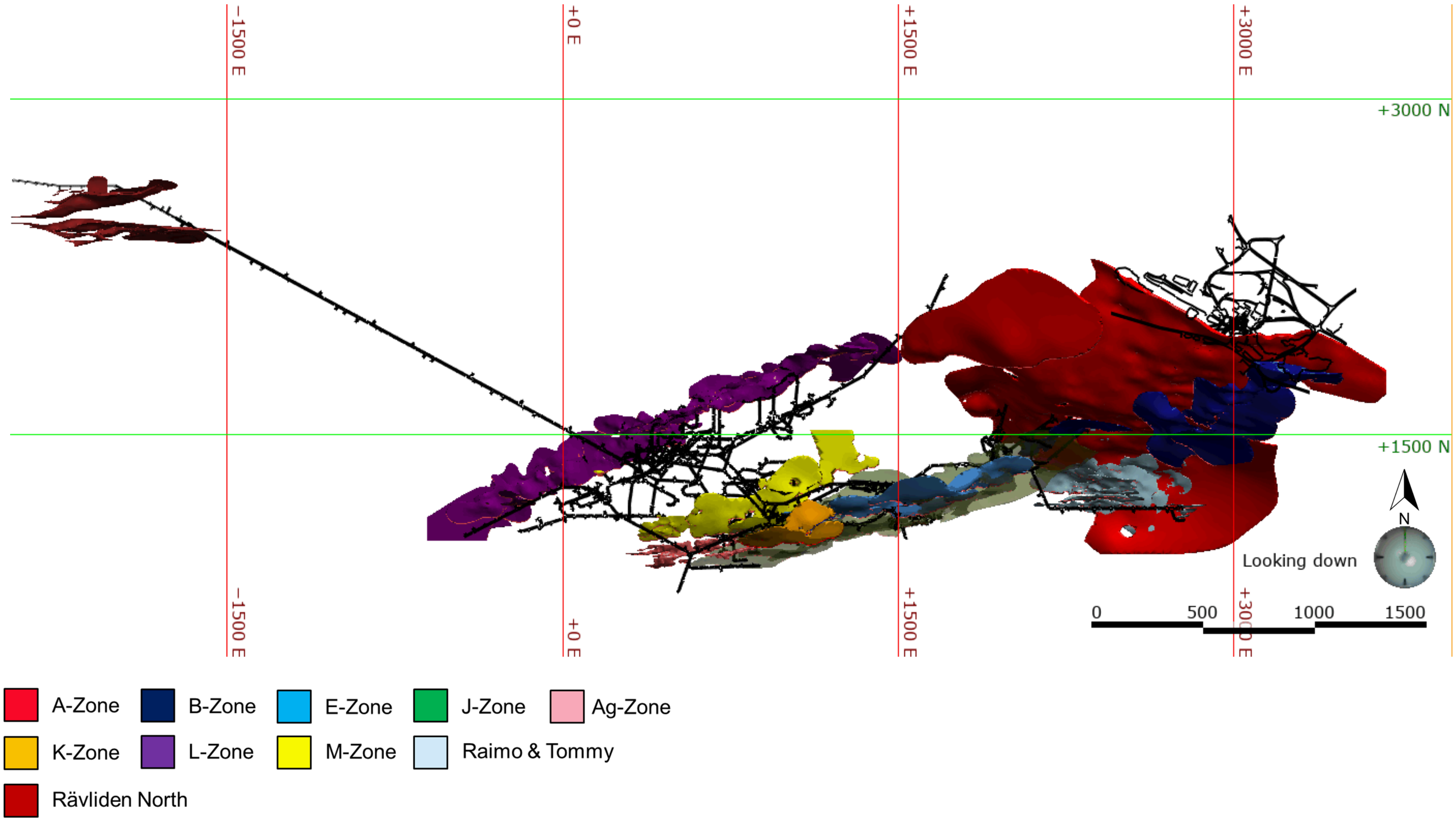

Figure 7. Overview map of mine and location of mineralisations. This map does not show Mineral Resources. This image is taken from a previous working geological model of the mine and is updated as of December 31st 2020. Mine infrastructure is shown in black. This map displays coordinates in KRIBERGSYSTEMET.

3.7.3.2 Rävliden North

Exploration drilling and direct structural measurements in oriented core (Jansson & Fjellerad Persson, 2014) suggest that Rävliden North constitutes a sub-vertical to steeply S-dipping, c. 5 to 25m wide and c. 150 m high mineralised lens, or system of lenses, with a length extent of at least 900 m along plunge (See figure 8). Mineralisation types can be split broadly into two categories:

- massive to semi-massive sphalerite-dominated mineralization, and
- breccia-type Cu>Zn mineralization.

The sphalerite-dominated mineralisation is most commonly associated with tremolite skarns, talc schists, chlorite schists and dolomitic marble. The massive sphalerite mineralization locally carries porphyroblasts of pyrite. Furthermore, it has been observed to be accompanied by zones of massive pyrrhotite mineralisation. Locally, the pyrite porphyroblasts are gathered in bands, giving the mineralisation a crudely banded appearance.

Sulphide-bearing stringers, veins and breccias are present stratigraphically and structurally below the sphalerite mineralization. Large parts of these zones are dominated by pyrrhotite and pyrite, and only carry traces of sphalerite and chalcopyrite. A c. 10-30 m wide part of this zone proximal to, and stratigraphically directly below, the main sulphide lens carries substantially elevated contents of chalcopyrite in association with minor idiomorphic arsenopyrite crystals and sphalerite. Grades are in the range of c. 2-3 % Cu over several meters, and network-style breccias are a common texture.

Lithologically, these zones are predominantly associated with strongly to intensely silicified footwall rhyolite (in which the sulphides are hosted by hydraulic breccias) and strongly to intensely chlorite-altered (dark green) footwall rhyolite. In schistose parts of the latter, the sulphides form a subtle (compared with the veins) but strong impregnation. In contrast, the more common quartz-sericite-altered footwall rhyolite appears to be less endowed in metals, even though it commonly carries minute crystals of pyrite.

Even though the deposits of Rävliden and Rävlidmyran appear to be bound to a certain stratigraphic interval, no universal stratigraphic marker horizon for this given interval has been recognised. Consequently, it is to a large extent identified based on alteration patterns as primary textures are rarely preserved. (Jansson & Fjellerad Persson, 2014).

3.8 Exploration procedures and data

3.8.1 Drilling techniques

Current drilling for Near Mine Exploration and Mine Infill Drilling is carried out by the mine's own drill rigs, as well as contractors. The drill rigs which are currently being used are Atlas Copco rigs of model Diamec PHC 4 or PHC 6 which are adapted to drill a 39mm drill core from a wireline 56 system.

Core is retrieved using a typical wireline and overshot system on the core barrel. When the core is retrieved by the driller, the core is placed carefully into a core box and labelled according to depth. Each run is marked by a core block with its corresponding depth written onto the block. Core boxes are transported to the Kristineberg Mine core shed facilities for logging by a geologist.

3.8.2 Downhole surveying

Near Mine Exploration and Mine Geology departments principally use a DeviGyro down hole gyroscopic deviation tool for hole surveying. A combined deviation and BHEM sonde is used for smaller diameter grade control drill holes for surveying. The BHEM tool utilises a non-magnetic accelerometer and gyroscopic instrument for deviation measurements.

Once the measurements are completed, the data is sent to Boliden's Geodata department, which validates the data and inputs it into the database. The project responsible geologist will verify the survey measurements.

3.8.3 Sampling preparation, analysis and security

Samples from the Kristineberg Mine are sent to ALS in Piteå for preparation, completed using the Prep 31 method to prep the samples for analysis. This involves drying and fine crushing of the core material to 70% passing 2 mm, splitting, and finally a pulverisation stage to 85% passing 75 µm to create the pulps for analysis.

Samples are sent from ALS Piteå prep lab to ALS Loughrea or Vancouver for further analysis. ALS Vancouver and Loughrea are accredited laboratories, completely independent from Boliden AB. ALS Vancouver and Loughrea are accredited under ISO:17025:2017, with the scope of accreditation covering the analysis methods used for the Kristineberg Mine.

Samples from the Rävliden North are sent to MS Analytical ("MSA") in Stensele, Sweden. Upon arrival at MSA the samples undergo the prep method "PRP910" where the sample is crushed to 2mm, split into 250g sub-sample and pulverized to 85% passing 75µm to create pulps for analysis. The pulps are then sent to the MSA laboratory in Langley, Canada for analysis. The laboratory is accredited by the International Accreditation Service under ISO 17025:2017, and as of July 2nd 2021 is accredited for ICP-140.

Analysis packages used are presented in Table 9.

Table 9. Analysis packages used ant The Kristineberg Mine and Rävliden North Mineral Resource

	Prep	Cu	Zn	Pb	Ag	As	Au	S
ALS Analysis Package	Prep-31	OG46	OG46/ME-ICPORE (over range)	OG46	OG46	OG46	ICP21/GRA21 (over range)	IR08
MSA Analysis Package	PRP910	ICP140	ICP140	ICP140	ICP140	ICP140	FAS214	S-SPM210

Internal measures are taken within Boliden to ensure that tampering of core and other samples does not occur. In addition, internal procedures are in place to prevent contamination and spoiling of samples prior to packaging and shipping to preparation and analysis laboratories in order to preserve sample integrity.

3.8.4 Density

Density in the Kristineberg Mine is calculated by a density formula. Starting in early 2022, pulp density measurements will be added as a part of the standard assay suite for Kristineberg. The density formula is as follows for mineralised material:

Density = 0.0043*Cu+0.004*Zn+0.02*Pb+0.0375*S+0.027*As+2.70

Non-mineralised rock is given a density of 2.7. The density formula is based on a regression formula based on test work which was completed historically (Larsson & Agmalm, 1994). A verification of the formula was completed in 2002 (Agmalm, 2003) which concluded that the density formula was suitable.

Density samples have been taken in the Rävliden Norra deposit routinely since 2012, in order to confirm the above regression formula with satisfactory results (McGimpsey, 2018). During estimation and reporting of tonnages, density calculated from the standard density formula is used.

3.8.5 QA/QC

Near Mine Exploration, Mine and Field Exploration teams use QA/QC samples to verify the assay results returned from the laboratory.

Each team uses different QA/QC programmes which will not be detailed in this summary report. QA/QC samples used are a combination of in-house standards and international standards. All standards used are certified reference materials having been analysed by round-robin at various external accredited laboratories. Blank samples are also used, as well as repeat duplicate samples completed internally by the laboratory. Pulp duplicates are also sent to umpire laboratories for external verification.

Assay results are verified by the geologist against geology logs and core photos, and any suspect results are sent back to the laboratory for re-analysis. Assay results are also validated when they are uploaded into the database, and accepted by the geologist.

3.9 Exploration activities

Field exploration focus in the Kristineberg area was on fieldwork. Extensive mapping and outcrop sampling was done with the objective of continuing to compile a comprehensive data set for a new geological map.

The objective of the Kristineberg near mine group in 2021 was to find new and develop existing targets to provide tonnage to the mine in 3-7 years' time. For the last 10 years near mine drilling has focused on developing and upgrading the known mineralisations with few new targets added to the project. Most of the known lenses are now delineated or close to delineated but very few new targets have been added.

The plan for Kristineberg in 2021 was to significantly increase the amount of exploration drilling, to evaluate multiple targets and either move them up the "exploration funnel" or drop them. The areas chosen for this in 2021 (illustrated in Fig.8) were:

- **A4** - surface and underground drilling, upper parts to 100x100 m, lower parts to inferred-indicated categories. Large area with relatively thin (often <5m) mineralization but with good Cu-Au grades and close to infrastructure.
- **O-zone** – underground drilling, potential new ore horizon 3-400 m south-east of currently known lenses. Chlorite schist with sphalerite mineralization encountered both 2020 and 2021, large potential in relatively untested area.
- **X-zone** – underground drilling, the Ag-zone and Kopparklumpen lenses are faulted off, possible continuation further west. Preliminary results from 2021 show promising geology in upper part of drilled profile but will need further drilling to upgrade or drop (planned for 2022).
- **Rävliden Drift FW zone –** underground drilling. Large volume with intense footwall alteration and massive py stringers up to 3m wide encountered to the south of the Rävliden drift. Contact between FW-HW seen in some field drillholes nearby and modelled using lithogeochemistry. This contact possibly represents the continuation of the L-zone ore horizon.
- **J-zone Down** – Underground drilling. The J-zone is poorly delineated downplunge and the first results from 2021 drilling shows very good mineralization 100 m downplunge of the known lens.
- **K-Zn Up –** Underground drilling. Potential up-plunge continuation of the K-Zn lenses. This area was drilled in early 2021, with drillholes positioned approximately 100 m up from last known mineralization. Only trace sphalerite and chalcopyrite was encountered and it was thus decided to drop this target.

Simultaneously to evaluating these targets the near mine project also did infill/upgrade drilling in known areas to deliver MRE updates to the mine. Areas planned for 2021 were the following (illustrated in Fig. 9):

- **Raimo** – A new geological model was created based on drilling from 2020-early 2021 and a new Mineral Resource Estimation. Continued drilling in R-zone 2021 to upgrade the eastern parts (not included in current MRE update). Metallurgical testing was done on selected parts of Raimo in late 2021, ongoing into 2022.
- **B2** – Drilling was done to extend/delineate the upper parts of the B2 lens this year. The results from this will be part of a new MRE update of the entire B-lens, planned in 2022.

- **L-West** – Drilling during 2021 to delineate and upgrade upper Zn-rich lens and extend both upper Zn- and lower Cu lenses westwards.
- **L-East** – Delineation drilling in 2021 to link in with the drilling on the lower part of A4, these two areas are spatially close and possibly geologically linked so should be delivered as a single MRE update, possibly in 2022 or 2023.

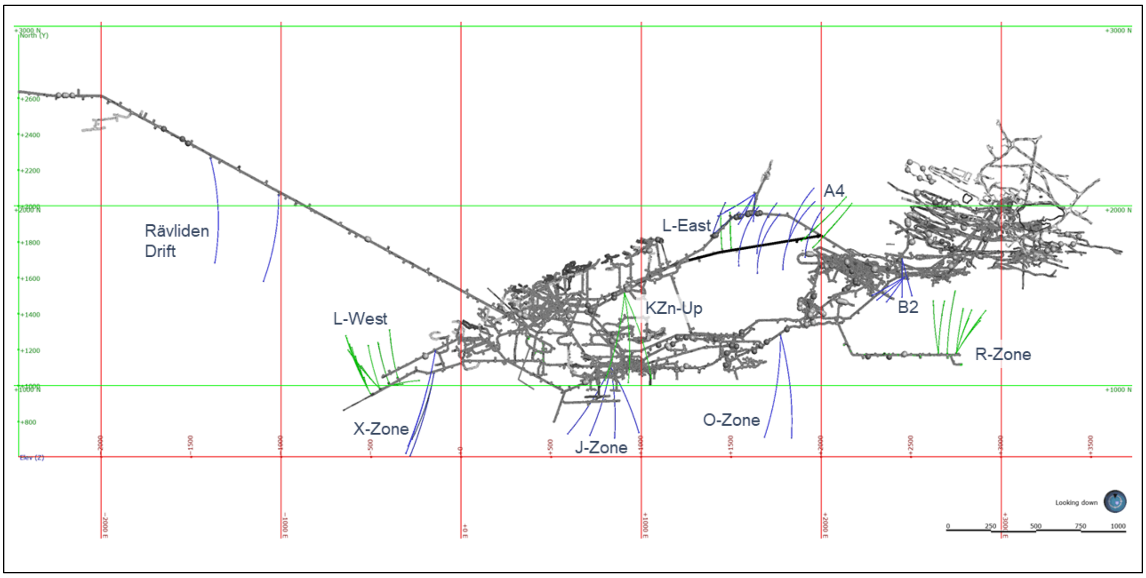

Figure 8: Top view of the Kristineberg Mine infrastructure with 2021 exploration holes coloured blue, and infill drillholes coloured green.

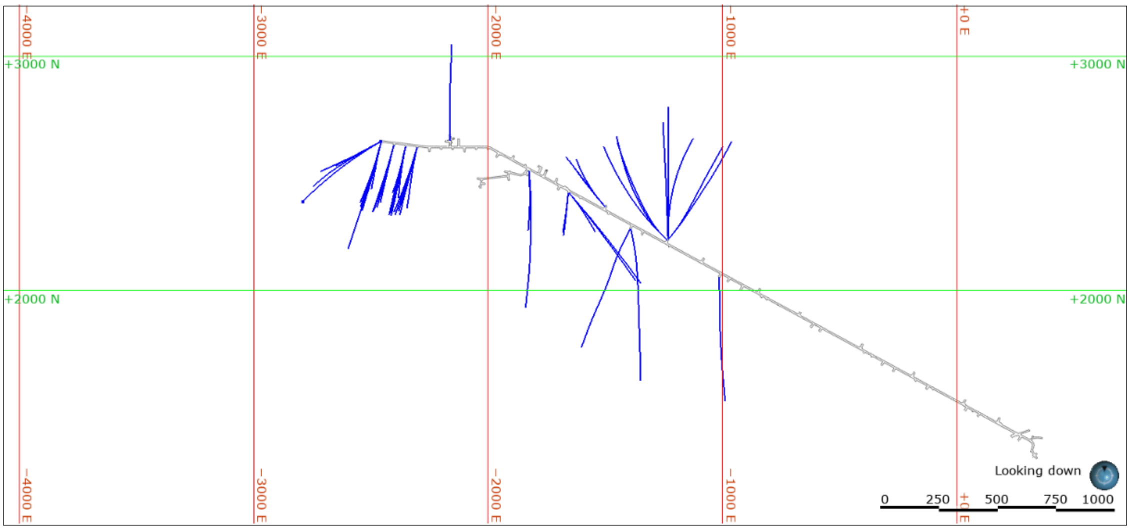

Figure 9: Top view of the Rävliden Mine infrastructure with this year's drill holes highlighted in blue.

In Rävliden, the major focus during 2021 has been on drilling the known western part of the Nisse and Norra lenses to an inferred level (approx. 80x50 m drill spacing). Orientation of drill holes was implemented during the year to strengthen the structural understanding of the mineralisation. A continuation of upgrade drilling to indicate level with 40x50 m drill spacing is planned for 2022.

Additionally, the near mine project focused on several exploration targets. The areas chosen for this in 2021 were:

- **Rävliden East –** Underground drilling**.** Exploration to delineate the eastern extent of Nisse and Norra lenses and to sterilize/investigate for the Ola drift.
- **Nisse drift** – Underground drilling. Exploration drill-hole to sterilize/investigate for the Nisse exploration drift.
- **Rävliden Extension –** Underground drilling. Exploration drilling was also carried out from the Rävliden drift towards the old Rävliden mine following up on previous Zn mineralisation and strong sulphides-andalusite alteration.
- **Rävlidmyran Syncline –** Surface drilling. A geological/structural target focusing on the syncline between Rävliden Norra and Rävlidmyran.

3.10 Mineral processing and metallurgical testing

Metallurgical testing is carried out in Kristineberg in order to test the properties of the mineralisation and its suitability for processing into a concentrate that can be profitably sold.

Currently, these tests are carried out at Boliden's pilot plant which is located at the BAO Processing Plant, and are performed on ½ core samples which are taken from exploration drill cores, or bulk samples which are "test" mined in-situ.

Tests which can be carried out in house include comprehensive comminution, flotation and hydrometallurgical tests. Studies which have been carried out or are ongoing are currently related to the Rävliden and Raimo mineralisations.

Studies carried out as part of the Rävliden FS showed that during the flotation tests and process campaigns the overall metallurgical performance for Rävliden was good. Copper, gold and silver recoveries were higher than estimated by the recovery model from previous studies, however the zinc recovery was slightly lower than the model predicted.

The recovery issues for zinc can be partially explained by poor liberation of chalcopyrite. The difficulties to separate copper and zinc is a concern and in an eventual extended test for Rävliden in the plant, the mechanisms for the separation should be investigated further.

A comprehensive metallurgical study is currently being carried out on the Raimo mineralisation, including flotation and grindability studies. Preliminary results suggest that the Raimo mineralisation does not behave differently in grinding and flotation compared to other mineralisations within Kristineberg, however the presence of Talc in the mineralisation is contributing negatively to recoveries of Zn and Cu. Work is ongoing in order to optimise the process in order to improve recoveries from the mineralisation.

3.11 Mining methods, infrastructure and recovery methods

3.11.1 Mining methods

At the Kristineberg Mine, cut and fill mining and drift and fill mining methods are utilised to mine the mineralised material underground. Generally, levels wider than 10m are mined with drift and fill mining. Both cut and fill and drift and fill are bottom-up mining methods, since the lowermost level is mined first, then backfilled either with Hydraulic Fill (HF) or with Cemented Hydraulic Fill (CHF) depending on the fill requirements. In all cases, waste rock from development headings is transported to the mined out level prior to HF/ CHF filling in order to achieve better stability in the levels above and to avoid transporting waste rock to the surface. In levels with widths between 6-10m, slashing is used to mine any remaining mineralised material on the walls of the mining room. In the uppermost slices, residual mining is also practiced in order to mine the sill pillars.

In Kristineberg, if the geological and rock mechanical conditions allow, then mineralised bodies are mined with the so-called "Rill" mining method. In Rill mining, a variation of longitudinal open stoping, the mined stope is continuously backfilled with un-cemented rock fill to stabilise the unsupported walls of the stope. The stope height is usually 10-12 m between the roof of the underdrift to the bottom of the drift above.

The planned mining methods for the Rävliden mineralisation are a combination of in-ore along strike development (13%), and longditudinal (55%) and transversal stoping (25%). Approximately 7% of the mineralisation is designed as sill pillars.

Transversal stoping also applies a primary and secondary stoping sequence. Stope heights for both methods is 25 m and stope length for primary transversal stopes is 10 meters and 15 meters for secondary transversal stopes. The stope length for longitudinal stopes is 15 meters. Stope width is dictated by ore thickness with a minimum stope widths of 4 meters applied for longitudinal stopes and a transition to transversal stopes when ore thickness exceeds 15 meters.

Sill pillars are designed with a height of 20 meters and are to be mined in 15 meters long sections. In areas where ore occurs in parallel lenses the distance between the sill pillar and parallel ore lens is at least 15 meters.

3.11.2 Infrastructure

From the active mining areas, trucks transport the mined mineralised material to the underground crusher, located at 620m level through underground transport drifts. Transportation of the material to the surface is handled by the skip hoist, which has a capacity of 160tph. The mine is able to produce up to 750,000t of material per year. (with a current permitting ceiling of 850kt/yr)

Drift access and other infrastructure to the Rävliden mineralisation currently exists, however, access to ventilation and long trucking distances place a bottleneck on the ramp up of production. A new ramp will be constructed from the main Kristineberg ramp to the Rävliden mineralisation to improve access and is planned to be completed during 2024. Primary ventilation will be fully operational during 2023.

Once the material is at surface it is stockpiled at the surface material handling station, where it is then trucked 95km to the BAO Process Plant. The route from Boliden to Kristineberg is via an all-weather road, which presents little difficulties for transporting the mined material. Both underground and surface material handling is outsourced to contractors. Media supplied directly to operational areas including electricity, ventilation, water control etc. are all handled by the mine operations.

Tailings facilities exist both at the mine site and at the BAO Process Plant. The tailings facilities at Kristineberg are currently decommissioned.

Facilities and infrastructure for filling mined rooms also exist where cut and fill operations are conducted. These include a fill mixing station and all other ancillary vehicles necessary for the filling of completed mining rooms.

Other site infrastructure includes offices, and meeting rooms as well as a core logging and sampling facility.

3.11.3 Recovery methods

The mined, crushed material is delivered by truck to the BAO Process Plant where each truck is weighed on a truck scale in order to determine the tonnage arriving to the process plant. The crushed material is then either taken into the processing plant or stored in a stockpile. Separate stockpiles are kept for each of the individual mines in the BAO. Material from the Kristineberg Mine is processed in campaigns where fresh material delivered from the mine is combined with material from the Kristineberg Mine stockpile. The feed tonnage to the process plant is determined using a weighing system with a stationary belt scale. Feed tonnage and weights from the trucks scale are used to determine current tonnage on the stockpiles. A simplified diagram of the BAO Process Plant can be found below in Figure 10

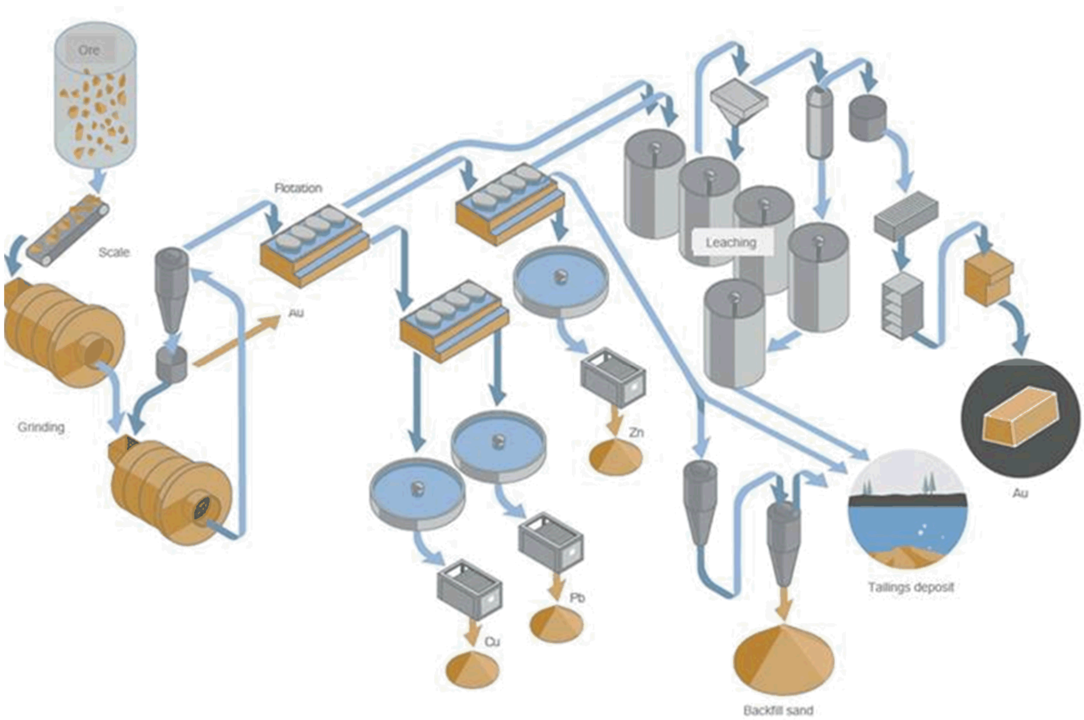

Figure 10.Schematic diagram of the Boliden Area Operations processing plant

In the process plant the material is ground in two stages. The primary mill is a fully autogenous mill and the secondary mill is a pebble mill fed with pebbles extracted from the primary mill. The ground material is classified using screens and hydrocyclones. A gravimetric concentrate containing coarse grained gold bearing minerals is produced in the grinding circuit and a flash flotation cell is used to extract mainly copper minerals with high floatability. The gravimetric concentrate is packed in large bags and delivered by truck to the Rönnskär smelter.

Flotation is done in a three-stage process: copper-lead bulk flotation, copper-lead separation and zinc flotation producing three concentrate qualities, copper, lead and zinc.

The mineral concentrates are dewatered using thickeners and vertical plate pressure filters. The concentrates are transported by truck to the Rönnskär smelter and shipping port. Lead and zinc are transported by boat to Boliden smelters in Norway and Finland or to external buyers.

Metallurgical accounting where a sum of products calculated using assays from daily composite samples of main process streams and assays and tonnage for delivered products together with feed tonnage is used to determine the head grade of the delivered material for that campaign.

3.11.4 Prices, terms and costs

The following section lists the long term prices currently used in the creation of the Net Smelter Return (NSR) formula for the Kristineberg Mine, as well as describing the cut-offs used in the Kristineberg Mine and the planned operations in Rävliden.

The NSR formula will not be described in detail here, however it takes into account metal recoveries, smelter treatment charges and costs for penalty elements. As the Kristineberg Mine has been operating for 80 years, Boliden has a large amount of experience and data on which to verify the NSR factors, which are based on figures produced by the BAO Processing Plant. NSR cash values are used as a proxy to determine the value or "equivalent grade" of a volume of a planned mining area, or drill hole section.

Table 10. Long term planning prices (LTP) currently used in the Kristineberg Mine and Rävliden. Including exchange rates.

	Planning prices, 2021 (2020)
Copper	USD 6,800 (6,600) /tonne
Zinc	USD 2,400/tonne
Lead	USD 2,100/tonne
Gold	USD 1,300/tr.oz
Silver	USD 17/tr.oz
USD/SEK	8.00

The NSR Formula for Kristineberg is shown below. NSR Values are expressed in SEK/t.

NSR_LTP = (163*Au) + (2.21*Ag) + (417*Cu) + (119*Zn) + (53.8*Pb)

For Rävliden, a separate NSR formula is used to reflect the different metallurgical properties of the mineralisation. The NSR formula applies updated metallurgical results from flotation tests of the Nisse and Norra lenses, updated cost assumptions, and updated long term prices. The Rävliden NSR formula is stated below.

NSR_LTP = (Au*105.36)+(Ag*2.96)+(Cu*420.39)+(Zn*110.02)+(Pb*48.76)

The Kristineberg Mine's operational cut-offs are calculated yearly, and are calculated inclusive of mining, processing and transportation costs. Marginal cut-offs are also used in operations whether material encountered during mining should be considered as waste or sent for processing. Definitions of different cut-offs used are as presented in table 11.

Table 11. Operating and marginal cut-off values used for Kristineberg and Rävliden

Area	Cut-Off	Cut-Off Value (SEK/t)
Rävliden	Cut-Off 1	580-690*
Kristineberg	Cut-Off 1	550-750*
Rävliden and Kristineberg	Cut-Off 4	250

** Depending mining method and backfill method applied*

- **Cut-off 1**: Is the breakeven cost, which can be used as a guide for mine planning and Mineral Reserve estimation. In practice, conversion to reserves entails assessment through a simplified cashflow model, where modifying factors specific to the lens (for example infrastructure, development, mining method and distance to crusher etc) are applied to calculate a local breakeven cost. Material with NSR above this breakeven cost is sent to the mill.

- **Cut-off 4**: Marginal cost. When material with an average NSR between 550 SEK/t and 250 SEK/t must be mined to access higher-grade material, the marginal cut-off is applied and this material trucked as ore. Rock below 250 SEK/t would be mined as waste and may be used within the mine as backfill.

3.12 Mineral Resource estimates

Mineral Resource estimates which have been produced for the Kristineberg Mine and Rävliden prior to January 1st 2018 should be considered estimates which have previously been reported under a classification scheme other than PERC, namely the FRB Standard. The FRB Standard and PERC Standard uses similar classification terminology, and therefore definitions of Mineral Resource classification categories should be considered interchangeable.

Mineral Resource statements of tonnages and grades which are included in the "Table of Mineral Resources" are included under chapter 17 of the PERC Standard and were reported under the FRB Standard in Boliden's 2017 annual report, with the exception of the A-Zone, Silver Zone, Rävliden Norra, L-West, Koppar Klumpen, and Raimo estimates which were estimated in 2018-2021 and are accompanied by a PERC Compliant Mineral Resource statement and report, as well as sign-off by a FAMMP CP. PERC Compliant Mineral Resources now represent approximately 90% of the total Mineral Resources of the Kristineberg Mine and the Rävliden Project.

Boliden views previous estimates reported under the FRB Standard to be on the whole reliable, and can be backed up by past reconciliation data, however these Mineral Resources cannot be approved by the Competent Person according to the PERC Standard, and therefore cannot be aggregated with other Mineral Resource estimates at the Kristineberg Mine according to Chapter 17 of the PERC Standard (2017).

Boliden is currently in process of updating the previously reported grades and tonnages under the FRB Standard with new estimates, which will review and if necessary re-classify and re-define Mineral Resource grades and tonnages as presented in the "Table of Mineral Resources" for the Kristineberg Mine. Ongoing work includes an update to J-Zone and B-Zone.

Table 13 outlines each reported Mineral Resource at the Kristineberg Mine and its relationship to chapter 17 of the PERC Standard.

Table 12.Summary of estimations carried out at the Kristineberg mine and their relation to PERC Standard chapter 17

Minerali-sation	Estimation Parameters, Author (internal)	Software	Estimation method	Reporting code	Comments	Actions
A	Pabst (2020)	Leapfrog Edge	OK/IDW	PERC	PERC Compliant	None
J/B	Kruuna (2011)	Propack	IDW	FRB	Reconciliation results provide confidence	New MRE required as an audit
M	Wiik (2009)	Propack	IDW	FRB	Reconciliation results provide confidence – M-Zone mined out.	None
KK	Baldwin (2019)	Leapfrog Edge	OK	PERC	PERC compliant	None
L-East	Kruuna (2011)	Leapfrog Edge	IDW	FRB	Reconciliation results provide confidence.	New MRE required
L-West	Baldwin (2019)	Leapfrog Edge	OK	PERC	PERC compliant	None
Raimo & Tommy	Baldwin (2021)	Leapfrog Edge	OK	PERC	PERC Compliant	None
Ag-Zone	Baldwin (2020)	Leapfrog Edge	OK	PERC	PERC compliant	None
Rävliden Norra	Baldwin (2020)	Leapfrog Edge	OK	PERC	PERC compliant	None

Estimation parameters used in the interpolation of grades varies depending on the lens which is being estimated. Generally estimates are carried out using the Inverse Distance Weighting (IDW) squared method at Kristineberg, however Ordinary Kriging (OK) has been used in the A-Zone, Rävliden, Silver Zone, L-West and Koppar Klumpen.

To estimate metal grades and tonnages, geological wireframes are constructed from drill hole sections, face maps and other data in Leapfrog GEO. These wireframes are updated by the mine or exploration geologists, and are built to represent the mineralisation in 3D irrespective of NSR cut-off. The sections inside the wireframe are then subject to geostatistical analysis to decide on composite length, evaluation of outliers and evaluation of domains in order to preserve the integrity of the grade interpolations done in conjunction with the Resource Geologist attached to the mine.

Leapfrog EDGE is then used to draw a block model within the constructed wireframe. Blocks are set to the Smallest Mining Unit (SMU) in Kristineberg, which is typically 4m width (minimum mining width), 5m length, and 6m height.

Following the construction of the block model, Leapfrog Edge is then used to interpolate grades. A 3D search ellipsoid is defined for IDW, which is set to reflect sample spacing within the mineralisation. Variography is used to define a search ellipsoid for OK interpolations, which is carried out in Snowden Supervisor. Grades are interpolated for Au, Ag, Cu, Zn, Pb, S and As. In both cases, variable orientation of the search ellipse is used to allow the interpolation to follow the geometry of the mineralisation.

After interpolation, blocks are classified according to geological confidence into Mineral Resource categories. This is primarily achieved through the assignment of geological confidence, as well as confidence in the estimation. This is done in collaboration between mine and exploration geologists and the Resource Geologist. Other factors such as local geological conditions and assay quality also play a role in classification, as well as the mineralisations "Reasonable Prospects for Eventual Economic Extraction" (RPEEE).

Mineral Resources at the Kristineberg Mine are reported following a stope optimisation, which uses simplified parameters in order to define RPEEE. These parameters allow a volume to be defined which is realistic in terms of geometry and allows the mineralisation to satisfy a minimum mining width in a manner that is not subjective. The optimisation also takes into account surrounding block grades allowing dilution to be represented in the Mineral Resource. All blocks which fall inside the RPEEE stopes are reported as a Mineral Resource. The Mineral Resource cut-off for RPEEE stopes is 550SEK/t for Kristineberg and 470SEK/t for Rävliden. Mineral Resources for The Kristineberg Mine including Rävliden Norra, are presented in Table 16 exclusive of Mineral Reserves. A diagram of Mineral Resources and Mineral Reserves for Kristineberg Mine are presented in Figure 11, the Rävliden North Mineral Resource is presented in Figure 12.

3.13 Mineral Reserve estimates

Mineral Resources are converted to Mineral Reserves through careful planning and application of Modifying Factors. No Inferred Mineral Resources can be converted to Mineral Reserve. The largest technical risks to the operation include poor rock quality and variable geometry and grade of the mineralised bodies.

New positions in the mine, such as the Silver Zone, or Rävliden Norra will be converted by completing a large scale technical and financial evaluation of the mineralisation, and includes pre-feasibility studies and feasibility studies, as well as updates to the Mineral Resource block models. If the Mineral Resource or parts of the Mineral Resource are found to be economically viable to mine, then that portion of the Mineral Resource will be converted to a Mineral Reserve.

Mineralisation which is located adjacent to existing mining positions is taken into the Mineral Reserve after the aforementioned mineralisation has been evaluated by geologists and mining engineers and found to be economically viable to mine. This conversion happens after the mine and resource geologists create or update the geological model and the resource classification of the area has been determined by the responsible resource geologist. The resource classification has to be at least an Indicated Resource to be potentially upgraded to Mineral Reserve. The mining engineers also examine the volume´s technical and economical characteristics. This evaluation includes the design of mining method and infrastructure to

successfully mine the area in question and a NPV calculation to determine the prospective area´s profitability.
All mineralised pillars are included in the Mineral Resource.

Classification of Mineral Reserves into Proved or Probable categories depends on the confidence of the underlying modifying factors, as well as geological confidence. This may include permitting, environmental or social factors as well as technical and economic factors.

All reported Mineral Reserves for the Kristineberg Mine have been previously reported in Boliden's 2017 Annual Report and as such have been reported under the FRB Standard. Mineral Reserves from 2021 therefore are reported under Chapter 17 of the PERC Standard. Mineral Reserves are presented in Table 15 and Figure 11 and Figure 12, with PERC compliant Mineral Reserves presented separately in Table 14.

3.14 Statement of Mineral Resources and Mineral Reserves

According to chapter 17 of the PERC Standard, Mineral Resource and Mineral Reserve estimates reported according to PERC should be presented separately from estimates previously reported using standards other than PERC. PERC Compliant Mineral Resources and Mineral Reserves are presented in Table 14 below.

Table 13. PERC Compliant Mineral Resource and Reserve statement for the Kristineberg Mine and Rävliden North as of 31-12-2021, Mineral Resources reported exclusive of Mineral Reserves. Rävliden Mineral Reserves reported from planned stopes above 580 SEK/t (Kläre, 2021). Rävliden Mineral Resources are reported using all blocks that fall within optimised stopes over 470SEK/t (Baldwin, 2020). A-Zone reported as all blocks above a minimum width of 5m and above a cut-off of 550SEK/t (Pabst, 2020). Koppar Klumpen, Silver Zone, L-West and Raimo reported within stopes above a cut-off of 550SEK/t (Baldwin 2021).

PERC Compliant Mineral Resource and Reserve Statement Classification	kton	Au (g/t)	2021 Ag (g/t)	Cu (%)	Zn (%)	Pb (%)
Probable Mineral Reserves						
Rävliden North	2,704	0.18	98	1.0	5.7	0.8
Koppar Klumpen	112	0.14	12	0.2	5.0	0.1
Total Mineral Reserves	**2,816**	**0.18**	**95**	**1.0**	**5.7**	**0.8**
Measured Mineral Resources						
Silver Zone	11	0.12	104	0.1	4.7	0.7
Raimo	87	0.79	20	0.7	3.0	0.2
Total Measured Mineral Resources	**98**	**0.71**	**29**	**0.6**	**3.2**	**0.3**
Indicated Mineral Resources						
A-Zone	604	0.53	23	0.7	2.3	0.1
Rävliden North	162	0.20	74	0.4	1.9	0.2
Koppar Klumpen	18	0.36	12	0.5	7.5	0.1
Silver Zone	240	0.27	242	0.1	3.0	0.8
L-Zone (L-West)	156	0.30	52	0.1	5.5	0.5
Raimo	1,353	0.52	29	0.7	3.8	0.2
Total Indicated Mineral Resources	2,533	0.46	52	0.6	3.4	0.3
Total M&I	**2,631**	**0.47**	**51**	**0.6**	**3.4**	**0.3**
Inferred Mineral Resources						
A-Zone	389	0.56	26	0.6	2.3	0.2
Rävliden North	4,900	0.28	65	1.0	3.2	0.5
Koppar Klumpen	40	0.25	11	0.2	7.2	0.1
Silver Zone	354	0.17	223	0.1	2.5	0.8
L-Zone (L-West)	231	0.30	43	0.5	3.0	0.3
Raimo	1,179	0.45	28	0.7	3.4	0.2
Total Inferred	**7,093**	**0.46**	**52**	**0.6**	**3.4**	**0.3**

Table 15. Total aggregated FRB & PERC Mineral Resources and Mineral Reserves Kristineberg Mine as of 31-12-2020. Mineral Resources reported exclusive of Mineral Reserves.

Classification	2021 kton	2021 Au (g/t)	2021 Ag (g/t)	2021 Cu (%)	2021 Zn (%)	2021 Pb (%)	2020 kton	2020 Au (g/t)	2020 Ag (g/t)	2020 Cu (%)	2020 Zn (%)	2020 Pb (%)
Mineral Reserves												
Proved	40	0.6	38	0.45	6.05	0.48	62	1.0	35	0.47	6.5	0.6
Probable	4,400	0.3	72	0.76	5.53	0.60	2,388	0.5	36	0.6	5.4	0.3
Total P&P	**4,400**	**0.3**	**72**	**0.76**	**5.53**	**0.60**	**2,451**	**0.6**	**36**	**0.6**	**5.4**	**0.3**
Mineral Resources												
Measured	170	0.7	33	0.77	3.42	0.23	49	0.7	45	1.3	4.2	0.2
Indicated	3,900	0.5	42	0.63	3.47	0.24	6,590	0.4	65	0.8	4.6	0.5
Total M&I	**4,100**	**0.5**	**41**	**0.63**	**3.47**	**0.24**	**6,638**	**0.4**	**65**	**0.8**	**4.6**	**0.5**
Inferred	8,100	0.3	60	0.80	3.25	0.43	7,772	0.3	60	0.8	3.4	0.5

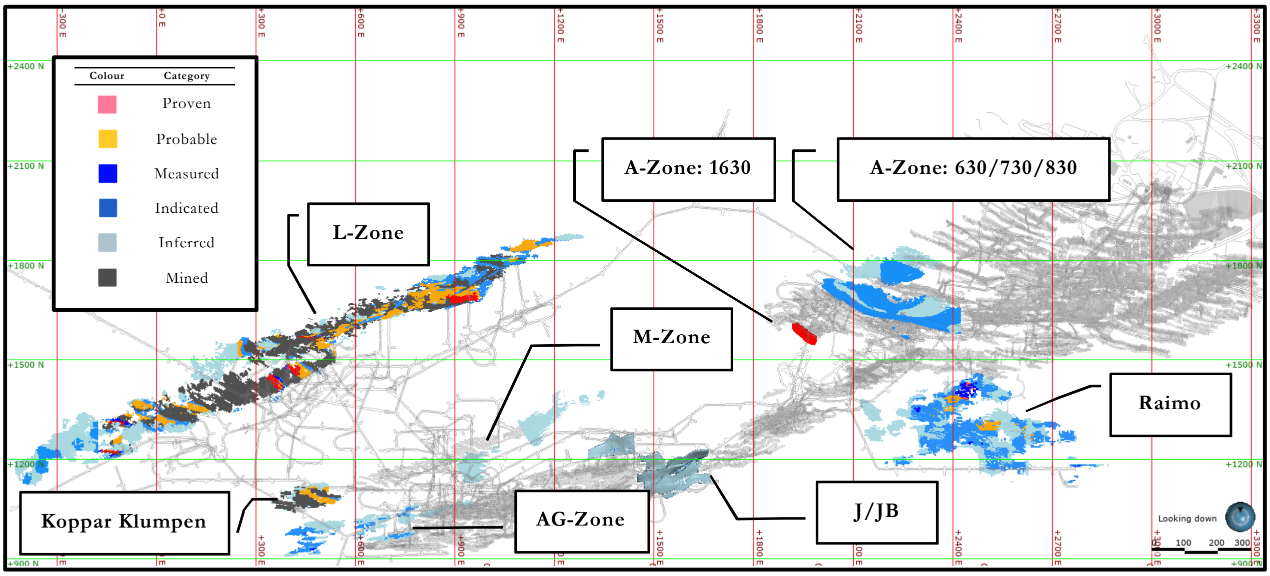

Figure 11.Plan view of the Kristineberg Mine showing mine infrastructure, historical mined areas and locations of Mineral Resources and Mineral Reserves

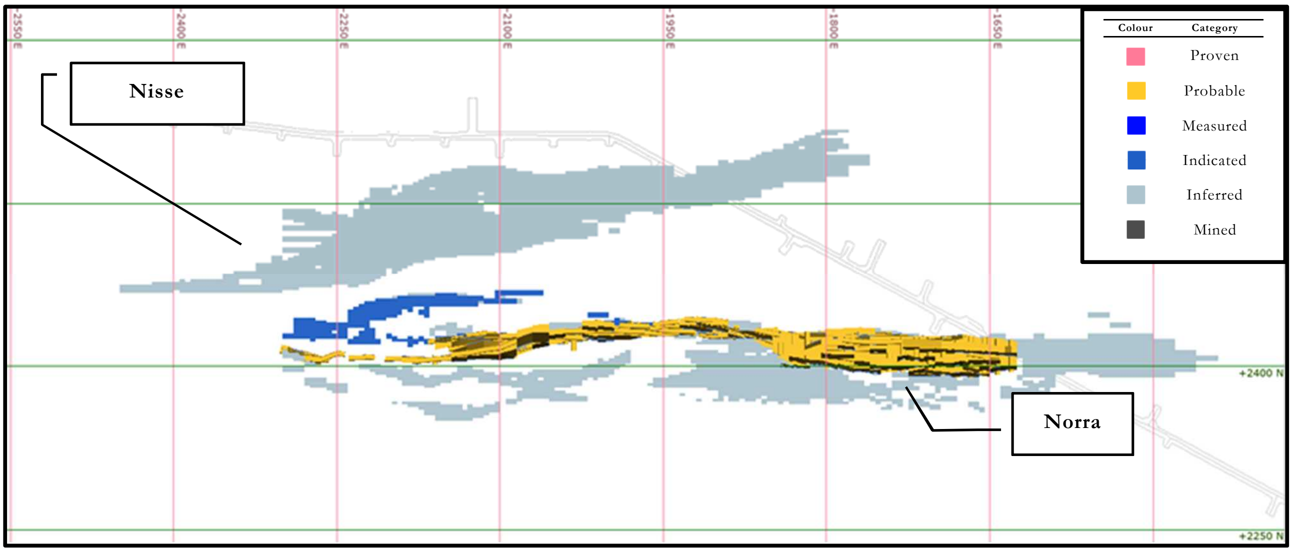

Figure 12.Plan view of the Rävliden Norra Mineral Resources and Mineral Reserves.

3.15 Comparison with previous year

2021 shows an increase in Mineral Reserves and a decrease in Mineral Resources. The breakdown of changes are outlined below.

3.15.1 Mineral Resources

- Overall total decrease of 2289kt.
- 2802kt converted to Mineral Reserves from Raimo, Koppar Klumpen and Rävliden
- 1376kt added to Mineral Resources through MRE's in Raimo and Silver Zone.
- 193k written off because of changing geological interpretations in L-Zone and Silver Zone
- 600kt written off because of lack of RPEEE in Rävliden.
- 886kt upgraded from Inferred Mineral Resources to Indicated Mineral Resources in L-Zone and Raimo.

3.15.2 Mineral Reserves

- Overall net increase in Mineral Reserves by 1967kt
- 615kt mined from A, KK, Raimo and L-Zones
- 2819kt converted to Mineral Reserves from Rävliden, Raimo and Koppar Klumpen
- 255kt written off due to changed geological interpretations in L-Zone.
- 19kt written off as the final umined portions of B-Zone and M-Zone. .

3.16 Reconciliation

Reconciliation at the Kristineberg Mine is completed for every month of production, and aggregated for the year. Mined grades and tonnages are read out from the production block model for every position that has been mined. These predicted grades are then summarised, where the average grade for that month is compared with the average grade and tonnage which has been measured and estimated by the BAO Processing Plant.

The Reconciliation for the year 2021 is shown in Table 16. Reconciliation data shows that trucked tonnages show a small deviation from the sum of products figures from the BAO processing plant. This is partly accounted for by the stockpiles at the mine and at the plant, which have yet to be skipped to surface and processed into concentrate. Approximately 605kt has been skipped to surface during 2021. Reconciliation with predicted grades shows good correlation with Zn and Cu, and Pb, however Au and S reconciliation shows that there is 25% more Au and 27% more S produced from the plant than predicted from the production block model. On the whole, the Competent Person judges this to be reasonable and sufficient.

Table 16. Reconciliation data for the Kristineberg mine 2021, aggregated

Category	Tonnes kt	Au g/t	Ag g/t	Cu %	Zn %	Pb %	S %
Mined	614,920	0.5	35	0.5	5.0	0.3	19
Sum of Products	580,984	0.6	39	0.5	4.9	0.3	24
Difference vs. BAO PP	33,936	0.1	4.2	0.1	0.0	0.0	5.3
Difference vs. Plant (%)	5.5	25.2	12.1	12.4	-0.3	0.9	27.8

4 REFERENCES

4.1 Public references

Allen, R. L., Weihed, P., & Svenson, S. A. (1996). Setting of Zn-Cu-Au-Ag massive sulfide deposits in the evolution and facies architecture of a 1.9 Ga marine volcanic arc, Skellefte district, Sweden. *Economic Geology, 91(6)*, 1022–1053. https://doi.org/10.2113/gsecongeo.91.6.1022

Boliden Mineral AB. (2018). Mineral Resources and Mineral Reserves development, 2017. Retrieved January 16, 2018, from https://www.boliden.com/media/press-releases/?pressReleaseId=1551527

Eriksson, N., & Rönnblom-Pärson, E. (2012). Miljökonsekvensbeskrivning, Nytt tillstånd för Kristineberg. Boliden Mineral AB. Retrieved from DMS#957575

ESMA. (2012). Consultation On Amendments To ESMA's Reccomendations Regarding Mineral Companies. Retrieved January 16, 2018, from https://www.esma.europa.eu/press-news/consultations/consultation-amendments-esmas-recommendations-regarding-mineral-companies

Lindberg, R. (1979). Zink–Kopparmineralisering Mörkliden – prospekteringsarbeten urförda 1969-1975. Sveriges Geologiska Undersökning. Retrieved from BRAP79021

Mercier-Langevin, P., McNicoll, V., Allen, R., Blight, J. and Dubé, B., (2012). The Boliden gold-rich volcanogenic massive sulfide deposit, Skellefte district, Sweden: new U–Pb age constraints and implications at deposit and district scale. *Mineralium Deposita*, 48(4), pp.485-504.

Skyttä, **P., Hermansson, T., Andersson, J., Whitehouse, M., & Weihed, P. (2011).** New zircon data supporting models of short-lived igneous activity at 1.89 Ga in the western Skellefte District, central Fennoscandian Shield. Solid Earth, 2(2), 205–217. https://doi.org/10.5194/se-2-205-2011

Svemin. (2018). Mer transparens för rapportering av mineraltillgångar. Retrieved January 16, 2018, from https://www.svemin.se/aktuellt/nyhet/mer-transparens-for-rapportering-av-mineraltillgangar

The Pan-European Reserves and Reporting Committee (PERC). (2017). Pan-European Standard for Reporting of Exploration Results, Mineral Resources and Reserves.

4.2 Internal references

Agmalm, G. (2003). Densitetsbestämningar av olika malmtyper i Kristineberg. Boliden Mineral AB. Retrieved from GP2002-16

Baldwin, S. (2021). *Mineral Resource estimate for the "Raimo" VHMS deposit.* Retrieved from DMS 1705481

Baldwin, S. (2018). *Mineral Resource estimate for the "Silver-zone" Ag deposit, AG1-8.* Retrieved from DMS 1182107

Baldwin, S. (2021). *Mineral Resource estimate for the "Silver-zone" Ag deposit, AG8-9.* Retrieved from DMS 1674644

Baldwin, S. (2019). *L-Zone* West *Mineral Resource estimate.* Retrieved from DMS 1516668

Baldwin, S. (2020). *Mineral Resource estimation for the "Koppar Klumpen" VHMS deposit.* Retrieved from DMS 1599354

Baldwin, S. (2020). *Mineral Resource estimation for the "Rävliden North" VHMS deposit.* Retrieved from DMS 1619620

Barrett, T., & MacLean, W. H. (2000). Chemostratigraphy, Petrography, & Alteration at the Kristineberg VMS Deposit, Northern Sweden. Ore Systems Consulting. Retrieved from GP2000-10

Hermansson, T. (2012). Lithogeochemical characterisation and structural analyses of two cross-sections in the J- and L-zones, Kristineberg mine, western Skellefte district. Boliden Mineral AB. Retrieved from GP2012-30

Jansson, N., & Fjellerad Persson, M. (2014). Results from exploration drilling in the area between the abandoned Rävliden and Rävlidmyran mines, Skellefte district, Sweden. Boliden Mineral AB. Retrieved from GP2013-17

Kläre, J. (2021). Technical Report, Rävliden Feasibility Study. Retrieved from DMS 1791892.

Larsson, R., & Agmalm, G. (1994). Densitetsberäkningar från analyshalter. Boliden Mineral AB. Retrieved from Gruvgeo.rapport 384

Pabst, A. (2020). A-Zone Mineral Resource Estimate 2020. Boliden Mineral AB. Retrieved from DMS#1622416

Miljökosekvensbeskrivning (MKB) Ändringstillstånd Kristinebergsgruvan, 2021. Tyréns. Retrieved from DMS#1790433.