

Boliden Summary Report

Resources and Reserves | 2018

The Kristineberg Mine



Prepared by
The Kristineberg Mine
and
Rävliden North Technical Teams

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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 Rävliiden 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 contributor to the Boliden Area Operations process plant. The Rävliiden North Mineral Resource is located around 5km west of the Kristineberg Mine and was added to the mine's Mineral Resources in 2015.

In 2018, the mine produced some 600,000t of mineralised material grading 0.6g/t Au, 33g/t Ag, 0.5% Cu, 5.4% Zn, and 0.2% Pb. Historically, the mine has been operating since 1940 and has in total produced 31.5Mt of mineralised material with average grades of 1.2g/t Au, 38g/t Ag, 1% Cu and 3.7% 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 Rävliiden North in 2018, as well as Mineral Resources and Mineral Reserves for 2017

Classification	kton	2018					kton	2017				
		Au (g/t)	Ag (g/t)	Cu (%)	Zn (%)	Pb (%)		Au (g/t)	Ag (g/t)	Cu (%)	Zn (%)	Pb (%)
Mineral Reserves												
Proved	5	1.0	15	1.4	0.4	0.1	22	0.9	48	2.4	1.9	0.1
Probable	4,282	0.5	37	0.5	5.3	0.3	4,884	0.5	34	0.5	5.6	0.3
Total P&P	4,287	0.5	37	0.5	5.3	0.3	4,915	0.5	34	0.5	5.6	0.3
Mineral Resources												
Measured	49	0.7	45	1.3	4.2	0.2	49	0.7	45	1.3	4.2	0.2
Indicated	5,211	0.4	64	0.9	4.6	0.5	5,040	0.4	61	0.9	4.6	0.5
Total M&I	5,260	0.4	64	0.9	4.6	0.5	5,089	0.4	61	0.9	4.6	0.5
Inferred	5,945	0.4	61	0.9	2.5	0.4	7,401	0.4	55	0.8	2.8	0.4

1.1 Major changes

Major changes in the Kristineberg Mineral Resources and Mineral Reserve figures from 2017 are listed below:

- Net reduction in Mineral Reserves by around 750kt; 600kt by mining activities, and approximately 150kt due to write-offs.
- Net reduction in Mineral Resources by around 1.2Mt. Approximately 1.2Mt removed from Rävliiden North Mineral Resource due to new geological information. 180kt added to the Mineral Resource during 2018, however cancelled out by conversions to Mineral Reserves and other write-offs.

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 Rävliiden North Mineral Resource (“Rävliiden 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. Many 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. 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 has started.

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.

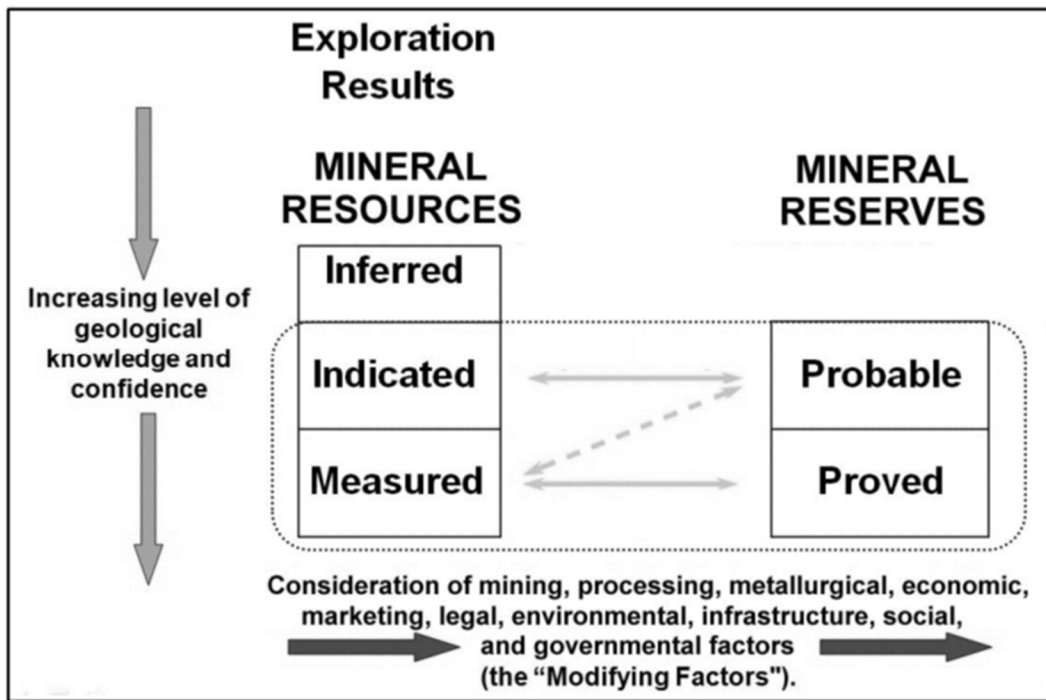


Figure 1. General relationship between Exploration Results, Mineral Resources and Mineral Reserves (PERC, 2017)

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.

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).

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

Description	Contributors	Responsible CP
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Exploration procedures and data	Samuel Baldwin, Jon Lundh, Mac Fjellerad Persson	Gunnar Agmalm
Exploration activities	Jon Lundh, Mac Fjellerad Persson	Gunnar Agmalm
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Prices, terms and costs	Gunnar Agmalm, Samuel Baldwin	Gunnar Agmalm
Mineral resource estimates	Maria Tuomi, Samuel Baldwin	Gunnar Agmalm
Mineral reserve estimates	Maria Tuomi, Samuel Baldwin	Gunnar Agmalm
Reconciliation	Maria Tuomi, Samuel Baldwin	Gunnar Agmalm

3 KRISTINEBERG

The Kristineberg Mine is located approximately 100km west of the Boliden Area Operations (“BAO”) Process Plant in Boliden, and produces from polymetallic mineralisations of Volcanogenic Hosted Massive Sulphide (“VHMS”) type. The VHMS mineralisations range in thickness from 1m to 7m, and have been explored to a depth of 1400m, along a plunge of around 3km. To date, the Kristineberg Mine has produced upwards of 31 Mt of material, and has been operating for the last 78 years. The Kristineberg Mine has a production capacity of around 750,000t/year and is the largest by volume contributor to the BAO Process Plant. 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 and M-Zone mineralisations at various levels between 900m and 1250m depth and takes place mainly by cut and fill methods.

3.1 Technical studies

Three major technical studies have been completed on the Kristineberg Mine during 2018. Details can be found in Table 3 below.

Table 3. Summary of major technical studies which have been completed at the Kristineberg Mine and Rävliiden North Mineral Resource during 2018

Study	Date Completed	Main Findings
Ag-Zone Pre-Feasibility Study	May 2018	Used the 2017 Silver Zone Mineral Resource Estimate. Economics are not justified at current time. Uncertainties remained in the Mineral Resource due to lack of drilling.
Ag-Zone Mineral Resource Estimate (2018 update)	August 2018	Performed after completion of further drilling. Increase in total Mineral Resources from 260kt to 400kt. Slight increase in average grades.
Rävliiden North Mineral Resource Estimate	December 2018	Showed a decrease in Inferred Mineral Resources of 1.2Mt due to a changed geological interpretation, although an increase in average grade.

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 BAO Processing Plant and the Kristineberg Mine is approximately 95km.

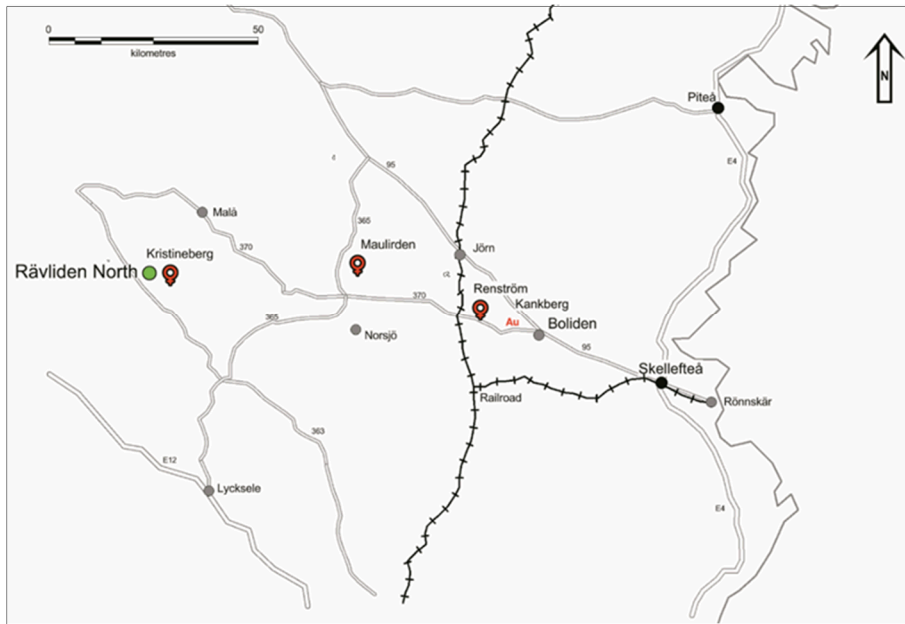


Figure 2. Schematic map showing the location of the Village of Kristineberg, and the approximate location of the Rävliiden North Mineral Resource.

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 Rävliiden North Mineral Resource and historic mines located in Rävliiden, Rävliidenmyran, and Hornträsk.

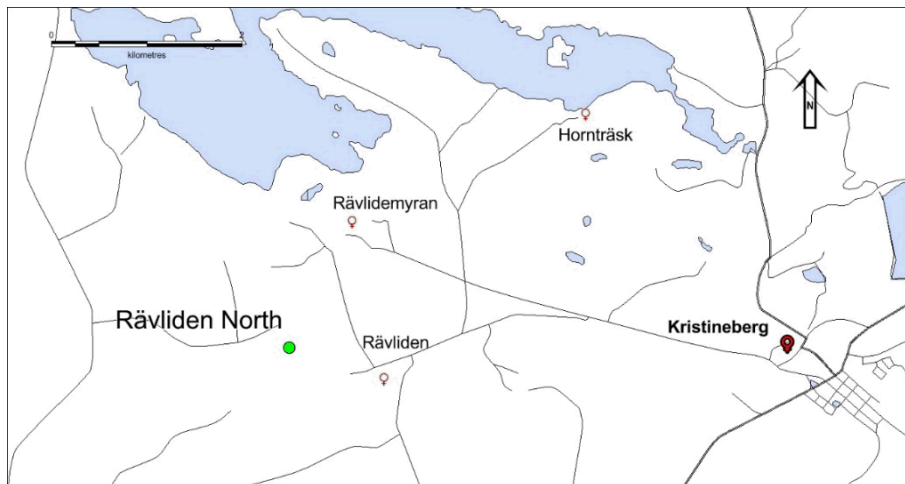


Figure 3. Schematic map of the Kristineberg Camp

3.2.1 Coordinate systems

Rävliiden North exploration programmes and Mineral Resource estimates are produced in the SWEREF99 coordinate system with a TM projection and is the standard coordinate system which is used in Sweden. 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.

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 78 years, during which time has up to and including 2018 produced around 31.5Mt of mineralised material with average grades of 1.2g/t Au, 38g/t Ag, 1% Cu and 3.7% 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.
1935	A test shaft was sunk down to 90m and 170m levels.
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.
1955	The central shaft was sunk to the 560m level and the crusher was moved to the 410m level.
1968	The central shaft was sunk to the 790m level. The crusher and the skipping station was 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.
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
2018	Update to Silver Zone and Rävliden North Mineral Resources.

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 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 $\frac{3}{4}$ to the surface owner and $\frac{1}{4}$ to the Swedish state. No additional royalties currently apply to the Kristineberg Mine.

3.5.1 Exploration permits

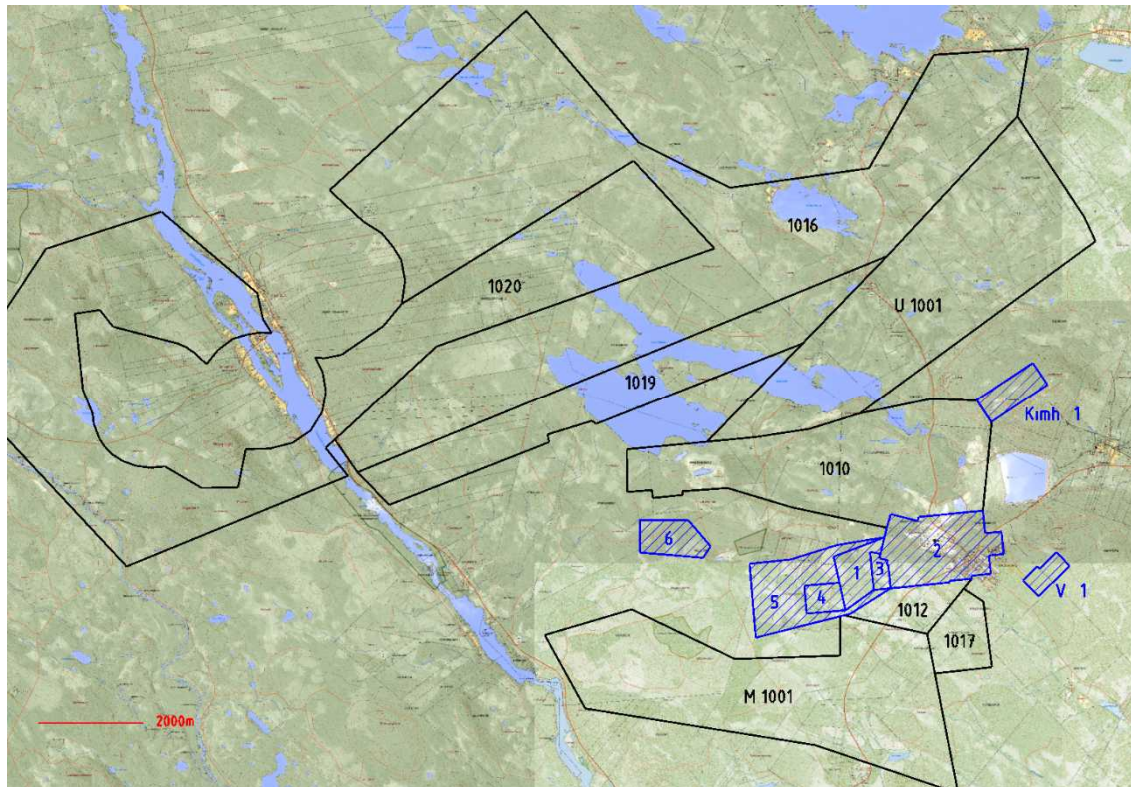
Boliden Mineral AB wholly owns exploration permits around much of The Kristineberg mine. Valid exploration permits are presented in Table 5 A map of valid exploration permits are displayed in Figure 4.

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 1010	Boliden Mineral AB	2004001081	1056.5802	Cu	2005-02-03	2020-02-03
Kristineberg nr 1012	Boliden Mineral AB	2010000673	125.7400	Zn	2010-10-26	2020-10-26
Kristineberg nr 1017	Boliden Mineral AB	2016000267	136.9600	Zn, Cu	2016-05-27	2019-05-27
Kristineberg nr 1019	Boliden Mineral AB	2017001038	826,9600	Zn, Cu, Ag, Au	2018-01-11	2021-01-11
Kristineberg nr 1020	Boliden Mineral AB	2018000260	3022.1000	Zn, Cu, Pb, Ag, Au	2018-06-05	2021-06-05
Ullusdal nr 1001	Boliden Mineral AB	2016000253	1511.3300	Zn, Cu	2016-05-31	2019-05-31
Mörkliden nr 1001	Boliden Mineral AB	2005001459	1404.7000	Cu	2006-02-10	2021-02-10

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

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



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3.6 Environmental studies, permitting and social impact

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.

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 was 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 Same people and forestry companies.

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

The nearest inhabited area is the Kristineberg community, with houses located approximately 200 m from the industrial area. There are approximately 260 residents in Kristineberg. There are also a few small villages and single homes located approximately 2 km from the industrial area.

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).

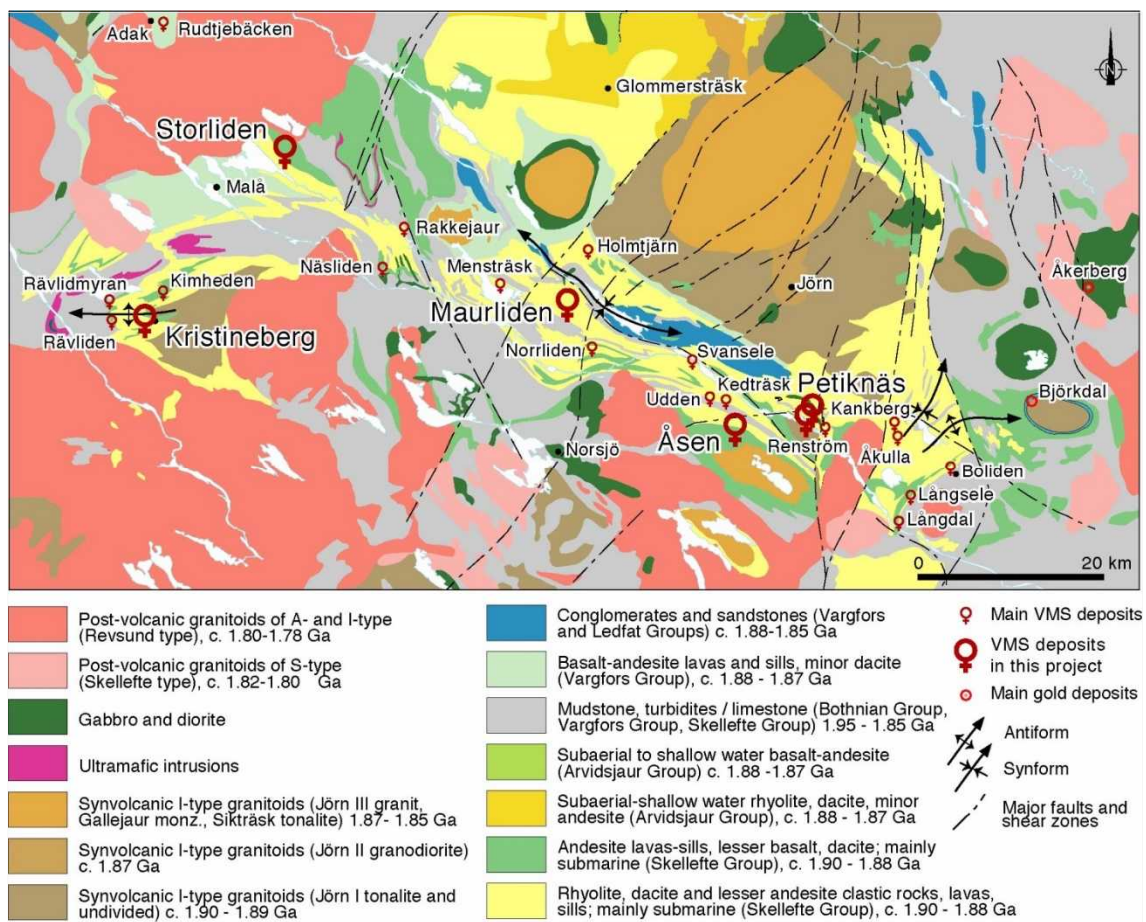


Figure 5. Regional geologic map of the Skellefte District (Allen et al., 1996)

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 granitoids 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 Rävliiden, Rävliiden North, Rävliidmyran, Hornsträsksviken and Kimheden are considered examples of VHMS mineralisations Figure 6.

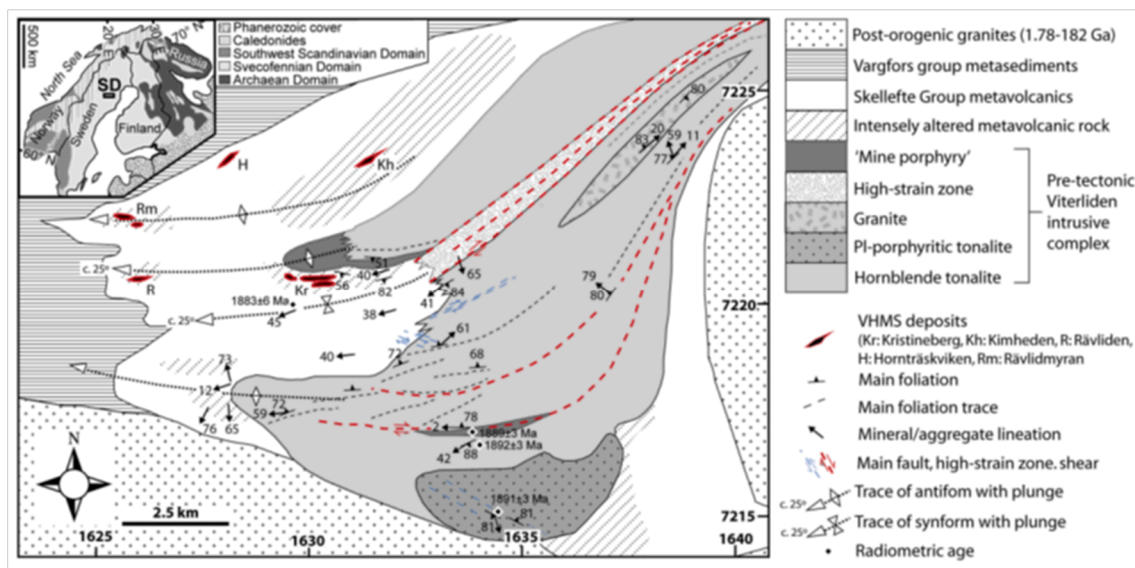


Figure 6. Geologic map showing the Kristineberg Camp, and associated VHMS deposits. Modified after (Skyttä, Hermansson, Andersson, Whitehouse, & Weihed, 2011)

The mineralisations of the Kristineberg Camp are situated on separate stratigraphic horizons that relating 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 Rävliiden North deposits are located on the “Rävliiden Horizon” along with the Rävliiden and Rävliidmyran mineralisations (Lindberg, 1979). The Rävliiden 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 Rävliiden North and Kristineberg Mine mineralisations are located within “local” antiformal structures. Rävliiden 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 presented a summary of current and historical mineralisations within the Kristineberg Mine, along with a brief and general description of the mineralisation types: Of the listed mineralisations, the L-Zone and M-Zone 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
L-Zone	VHMS	Chlorite Schist	Zn-Cu-Au	Mining Area
M-Zone	VHMS	Chlorite Schist	Zn-Cu	Mining Area
Raimo & Tommy	VHMS	Chlorite Schist	Zn-Cu	Mineral Resource
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 and Tommy 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 (CuFeS_2), sphalerite ($(\text{Zn}, \text{Fe})\text{S}$) 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 ($(\text{Ag,Cu,Fe})_{12}(\text{Sb,As})_4\text{S}_{13}$) being the dominant one with minor amounts of hessite (Ag_2Te) often present. High silver grades are often present in narrow zones associated with galena veins or fracture fillings.

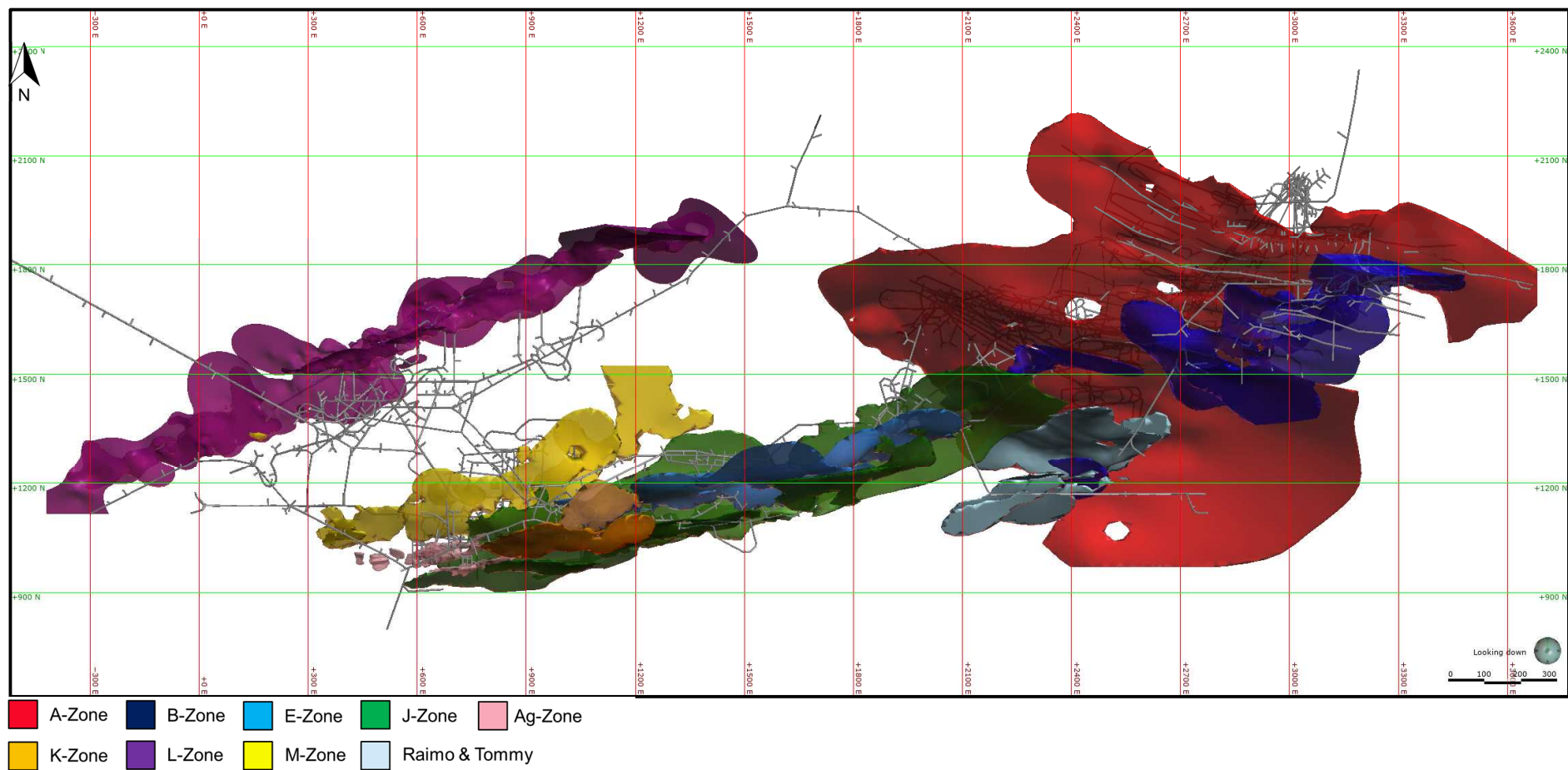


Figure 7. Overview map of mine and location of mineralisations. This map does not show Mineral Resources, This image is taken from the working geological model of the mine, and is updated as of December 31st 2018. Mine infrastructure is shown in grey. This map is displaying coordinates in KRIBERGSYSTEMET.

3.7.3.2 Rävliiden North

Exploration drilling and direct structural measurements in oriented core (Jansson & Fjellerad Persson, 2014) suggest that Rävliiden 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 Rävliiden and Rävliidmyran 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).

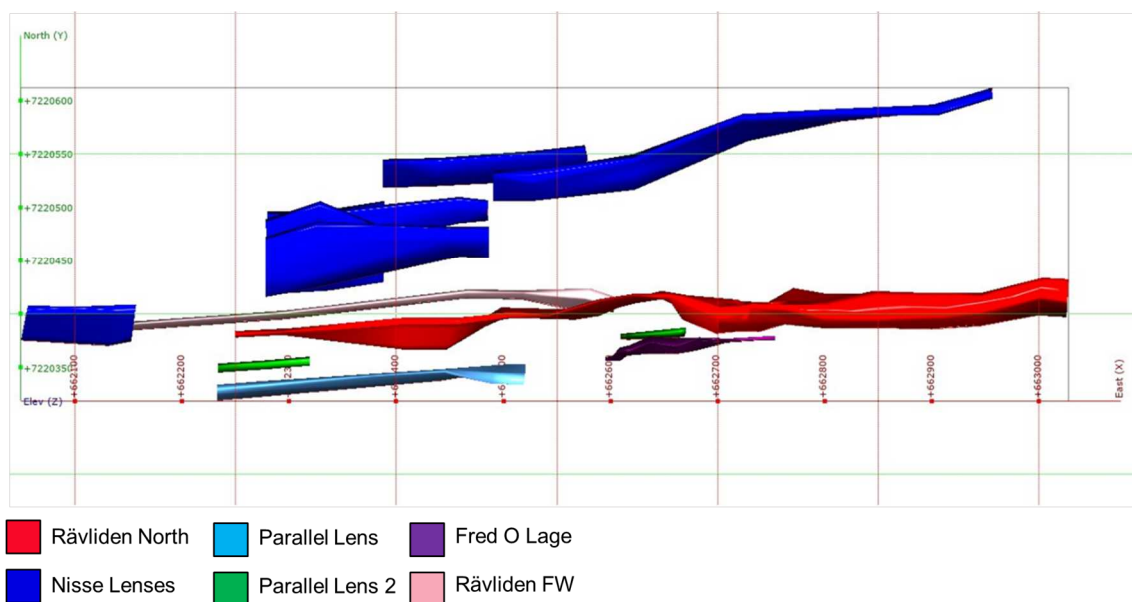


Figure 8. overview map of The Rävliiden Norra mineralisations. This map does not show Mineral Resources. This image is taken from the working geological model of the deposit, and is updated as of December 31st 2018. This map is displaying coordinates in SWEREF99TM

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. 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. Drilling for field exploration in Rävliiden North is currently carried out by diamond drilling of a 47mm core in combination with directional “navi” drilling, and is performed by drilling contractors Protek.

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 use a combined deviation and BHEM sonde for down hole surveying. This tool utilises a non-magnetic accelerometer and gyroscopic instrument for deviation measurements. When “navi” drilling at Rävliiden Norra, drillers will survey the hole with a gyroscopic tool every 20-50m to control deviation, as well as a complete survey at the end of the drill hole.

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 are sent to ALS in Piteå, which complete 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. ALS Piteå is accredited by SWEDAC, and as such is not accredited under any ISO standard laboratory body. The preparation methods used as such are not accredited by any international certification body.

Samples are sent from ALS Piteå prep lab to ALS Vancouver for further analysis. ALS Vancouver is an accredited laboratory, completely independent from Boliden AB. The laboratory is accredited by the Standards Council of Canada under ISO:17025:2005, with the scope of accreditation covering the analysis methods used for the Kristineberg Mine and Rävliiden North. Analysis packages used are found presented in Table 9.

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

	Prep	Cu	Zn	Pb	Ag	As	Au	S
ALS Analysis Package	Prep-31	OG46	OG46	OG46	OG46	OG46	ICP21/GRA21 (over range)	IR08

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. Currently density samples are not routinely taken in the Kristineberg Mine, with the exception of the Silver Zone. The density formula is as follows for mineralised material:

$$\text{Density} = 0.0043 \cdot \text{Cu} + 0.004 \cdot \text{Zn} + 0.02 \cdot \text{Pb} + 0.0375 \cdot \text{S} + 0.027 \cdot \text{As} + 2.70$$

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 Rävliiden 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 and Field Exploration teams use QA/QC samples to verify the assay results returned from the laboratory. The Kristineberg Mine geology department does not use QA/QC samples in its infill drilling campaigns or grade control drilling/sampling to verify assay results.

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

Exploration work conducted on the Rävliiden North deposit in 2018 totaled 20 new diamond drill holes from surface for a total of 14,035m. These drill holes targeted the Inferred portion of the Rävliiden North Mineral Resource at depth in order to increase the geologic confidence of the Mineral Resource sufficiently to classify the volume as an Indicated Mineral Resource. An additional objective was to test a parallel lens which was discovered in 2016 with a view to bringing in an additional lens to the Mineral Resources for Rävliiden North. A number of these drill holes were also targeting the “Nisse” lenses with the objective of expanding the Mineral Resource (See Figure 9).

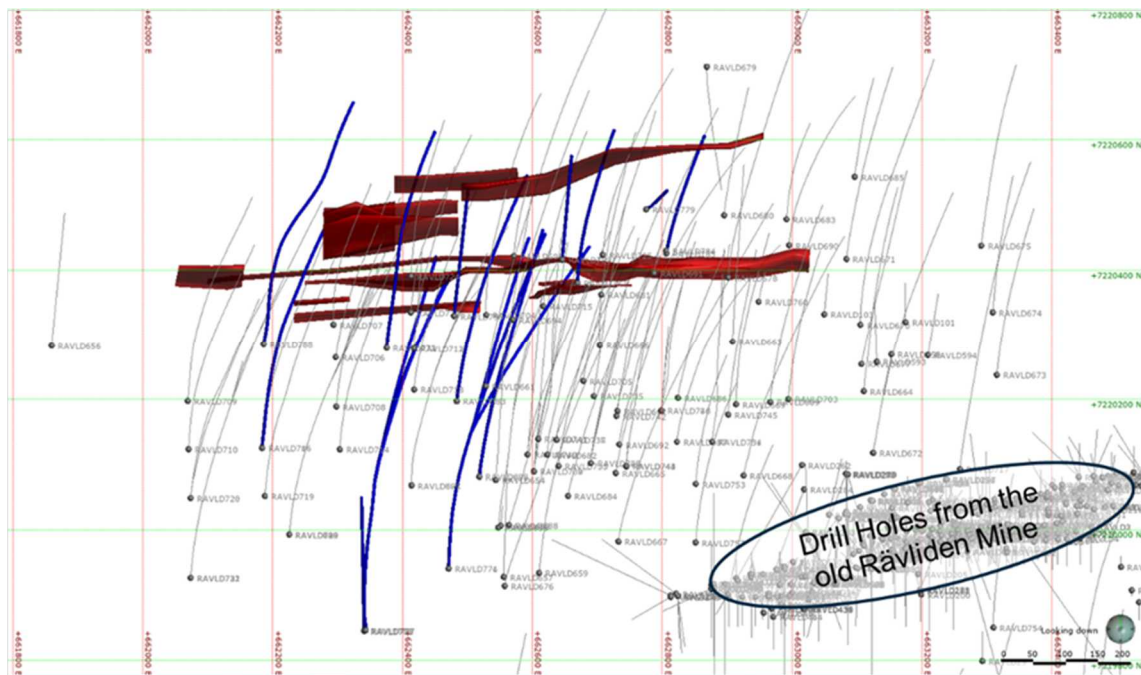


Figure 9. Map of the Rävliiden North Mineral Resource showing drilled holes in 2018 in blue. Mineralised lenses are shown in red

Six of the holes drilled at Rävliiden North were steered using directional core drilling techniques and all holes surveyed using Boliden’s down hole electromagnetic tool and deviation surveyed with ISGYRO from Inertial Sensing.

Focus for exploration within the Kristineberg Mine in 2018 has been to drill high-priority targets, whilst also performing infill drilling. This year’s campaigns have highlighted the increasing geological complexity of the Kristineberg Mine mineralisations, including several faults and/or shear zones coupled with strongly altered rocks with different alteration assemblages. 54 holes were drilled totaling 16,309m (see Figure 10)

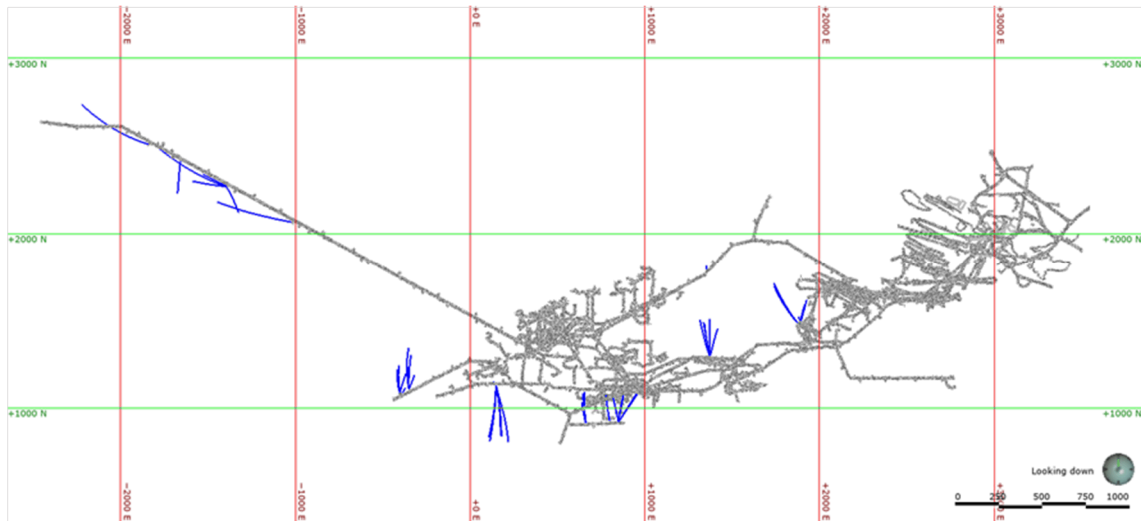


Figure 10. Top view of the Kristineberg Mine infrastructure with this year's drill holes highlighted in blue

A large and detailed geological 3D-model of the mine was built during 2018 and has led to a better understanding of the currently known ore bodies and has also highlighted several areas of interest for further exploration. New exploration drifts in the Kristineberg Mine have improved drilling angles and distance to mineralisation as well as access to areas previously abandoned.

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.

Test work which has been carried out in Kristineberg this year mainly focusses on the Silver Zone and Rävliiden North mineralisations in support of ongoing technical work to prove the economic viability of the deposits.

Flotation test work was carried out on samples taken from the silver zone in 2018. Grades in concentrate as well as metal recoveries were highly variable and somewhat lower than expected. This is thought to be due to variable mineralogy and grades within the lenses. Mineralogical studies which have been carried out since, show that most of the silver is contained within tetrahedrite, and was not able to be selectively floated using the method of testing.

Test work completed on the Rävliiden North mineralisations shows that results from flotation tests are inconsistent. Froth stability is drastically reduced in cleaning flotation for

laboratory test work. This includes both Cu and Zn flotation, however is most prominent within Zn flotation, where froth has collapsed completely in certain cases. One offered explanation is that the mineralisation contains high quantities of pyrrhotite, Pyrrhotite has a high surface area which can absorb reagents, although this is currently unproven as a cause. It is also questions if this scenario only appears in laboratory scale.

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.

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.

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.

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 11

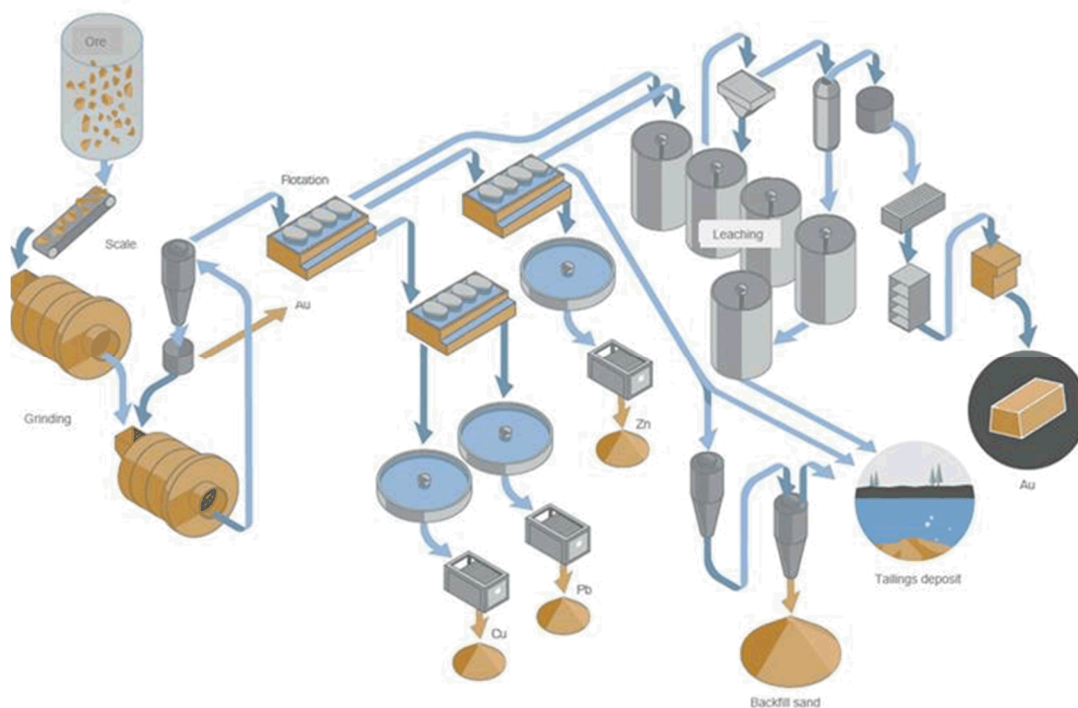


Figure 11. Schematic diagram of the Boliden Area Operations processing plant

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.

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 79 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. Considering that there are multiple payable elements, which vary in their respective metal constituents in the Kristineberg and Rävliiden mineralisations, it makes sense to represent the value of the total mineralisation as one cash value rather than only one metal equivalent.

Table 10. Long term planning prices currently used in the Kristineberg Mine. Including exchange rates.

Planning prices, 2018	
Copper	USD 6,600/tonne
Zinc	USD 2,400/tonne
Lead	USD 2,100/tonne
Gold	USD 1,200/tr.oz
Silver	USD 17/tr.oz
USD/SEK	7.50

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

$$\text{NSR_LTP}(18\text{LTP}20) = (145 \cdot \text{AU_PPM}) + (2.05 \cdot \text{AG_PPM}) + (374 \cdot \text{CU_PCT}) + (119 \cdot \text{ZN_PCT}) + (49.2 \cdot \text{PB_PCT})$$

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. Marginal cut-off 1 is the value of a final blast which can be taken in a position. i.e it does not need to pay for infrastructure investments. Marginal cut-off 2 is the lowest value of any blasted material which can be processed in the BAO Processing Plant. Cut-off values are presented in Table 11.

Table 11. operating and marginal cut-off values for the Kristineberg Mine

Cut-Off	Cut-Off Value (SEK/t)	Costs included
Operational cut-off - Cut & Fill	675	Mining, Processing, Transport and Mine + Infrastructure
Operational cut-off – Rill	575	Mining, Processing, Transport and Mine + Infrastructure
Marginal Cut-Off 1	525	Mining, Processing, Transport
Marginal Cut-Off 2	350	Processing, Transport

3.12 Mineral resource estimates

Mineral Resource estimates which have been produced for the Kristineberg Mine 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 Silver Zone, and Rävliiden Norra estimates which were estimated in 2018 and are accompanied by a PERC Compliant Mineral Resource statement and report, as well as sign-off by a FAMMP CP.

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.

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. On-going work includes an update to the western portion of the L-Zone. A planned update to the A-Zone will be completed this year, as well as an update to the western M-Zone following additional drilling.

Table 12 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	Author (internal)	Software	Estimation method	Reporting code	Comments	Actions
A	Internal (historic)	Propack	IDW	FRB	No documentation exists – unreliable estimate	Drilling through 2019 and new MRE
B	Internal (historic)	Propack	IDW	FRB	No documentation exists – unreliable estimate	New MRE required as an audit
J	Kruuna (2011)	Propack	IDW	FRB	Reconciliation results provide confidence	New MRE required as an audit
M	Wiik (2009) Fjellström (2011)	Propack	IDW	FRB	Reconciliation results provide confidence	Drilling through 2019 and new MRE
L	Kruuna (2011)	Propack	IDW	FRB		MRE ongoing in L-West
Raimo	McGimpsey (2016)	Datamine	IDW	FRB		New MRE required
Tommy	McGimpsey (2016)	Datamine	IDW	FRB		New MRE required
Ag-Zone	Baldwin (2018)	Datamine	OK	PERC	PERC compliant	None
Rävliden norra	McGimpsey (2018)	Datamine	IDW	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 Silver Zone.

To estimate metal grades and tonnages, wireframes are constructed in Microstation or Datamine software from 2D geological vertical sections drawn by either the mine or exploration geologist. These wireframes are usually based on a Net Smelter Return (NSR) value of the analysis section of 675 SEK. Wireframes are not extended beyond these intersections if the value is lower than 675 SEK. The NSR value is defined by a formula based on prices and terms outlined in section 3.12. 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.

Propack, a module for Microstation, or Datamine is then used to draw a block model within the constructed wireframe. Blocks are set to the Smallest Mining Unit (SMU) in Kristineberg, which are defined in Table 13.

Table 13. Block dimensions for the Kristineberg Mine production models. Dimensions in KRIBERGSYSTEMET

Models	Y	X	Z
L, A, B	5	4	6
J, M	2	10	2

Following the construction of the block model, Propack or Datamine is then used to interpolate grades. A 3D search ellipsoid is defined for the IDW, which is set to reflect the wireframe's geometry. Variography is used to define a search ellipsoid for OK interpolations. Grades are interpolated for Au, Ag, Cu, Zn, Pb, and S.

After interpolation, blocks are classified according to geological confidence into Mineral Resource categories. In the Kristineberg Mine a drilling spacing of 100m is used to generate sampling data, giving geological confidence for an Inferred Mineral Resource and 50m for an Indicated Mineral Resource. 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 with a 15% dilution of zero-grades, with a 675SEK/t cut-off, with the exception of the Silver Zone, which is reported to a minimum width of 4.5m, and a cut-off grade of 550SEK/t without dilution. Currently a 70% portion of remaining mineralised pillars are also included in the Mineral Resource. Mineral Resources for The Kristineberg Mine including Rävliiden 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 12, the Rävliiden North Mineral Resource is presented in Figure 13.

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 Rävliiden 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 at the discretion of the Mine Geologist. This conversion happens after infill drilling at a normal spacing of 25m or where drilling provides suitable geologic confidence, and the estimated grades and tonnages indicate that the volume is above operational cut-off. Mining engineers then plan their mining on the volume with the assumption that all of the material can be mined profitably. A 15% dilution of zero grades is calculated into the value of the tonnage. A 30% portion of remaining mineralised pillars are included in the Mineral Reserve.

Classification of Mineral Reserves into Proved or Probable categories depending 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 2018 therefore are reported under Chapter 17 of the PERC Standard. Mineral Reserves are presented in Table 16 and Figure 12.

Table 14. PERC Compliant Mineral Resource statement for the Kristineberg Mine and Rävliiden North Mineral Resources as of 31-12-2018. Ag-Zone Mineral Resources are reported to a minimum width of 4.5m, and a cut off of 550SEK/t (Baldwin, 2018). Rävliiden Mineral Resources are reported to a minimum width of 5m and a cut-off of 470SEK/t (McGimpsey, 2018).

PERC Compliant Mineral Resource Statement Classification	kton	Au (g/t)	2018 Ag (g/t)	Cu (%)	Zn (%)	Pb (%)
Indicated Mineral Resources						
Rävliiden North	2,837	0.19	89	1.00	5.3	0.7
Silver Zone	112	0.30	220	0.05	0.0	0.7
Total M&I	2,949	0.19	94	1.00	5.1	0.7
Inferred Mineral Resources						
Rävliiden North	2,895	0.23	82	1.20	2.8	0.5
Silver Zone	333	0.20	189	0.10	0.0	1.1
Total Inferred	3,228	0.23	93	1.10	2.5	0.6

Table 15.FRB Compliant Mineral Resources and Mineral Reserves for the Kristineberg Mine

FRB Compliant Mineral Resources & Reserves Classification	kton	Au (g/t)	2018 Ag (g/t)	Cu (%)	Zn (%)	Pb (%)
Proved Mineral Reserves						
J-Zone	5	1.04	15	1.43	0.4	0.0
Probable Mineral Reserves						
A-Zone	44	0.80	44	0.80	2.9	0.2
B-Zone	16	0.75	8	0.90	0.5	0.0
J-Zone	171	0.60	2	1.00	2.0	0.1
L-Zone	3,785	0.50	39	0.50	5.6	0.4
M-Zone	265	0.30	17	0.70	4.0	0.1
Total P&P	4,287	0.50	37	0.50	5.3	0.3
Measured Mineral Resources						
A-Zone	49	0.70	45	1.30	4.18	0.23
Indicated Mineral Resources						
J-Zone	546	0.85	19	1.00	2.4	0.2
Raimo	1,666	0.55	26	0.80	4.3	0.2
A-Zone	50	0.90	41	0.35	7.5	0.7
Total M&I	2,310	0.63	25	0.80	3.9	0.2
Inferred Mineral Resources						
A-Zone	785	0.90	32	0.85	2.3	0.2
J-Zone	38	0.80	64	0.45	6.7	0.6
B-Zone	420	1.00	8	1.10	0.3	0.0
L-Zone	1,014	0.30	22	0.40	3.0	0.2
M-Zone	228	0.20	8	0.30	3.2	0.0
Raimo	127	0.15	33	0.20	4.6	0.5
Tommy	104	0.90	12	1.10	1.0	0.0
Total Inferred	2,717	0.60	22	0.66	2.43	0.2

Table 16. Total aggregated FRB & PERC Mineral Resources and Mineral Reserves Kristineberg Mine including Rävliiden North and Silver Zone Mineral Resource Estimates as of 31-12-2018

Classification	2018						2017					
	kton	Au (g/t)	Ag (g/t)	Cu (%)	Zn (%)	Pb (%)	kton	Au (g/t)	Ag (g/t)	Cu (%)	Zn (%)	Pb (%)
Mineral Reserves												
Proved	5	1.0	15	1.4	0.4	0.1	22	0.9	48	2.4	1.9	0.1
Probable	4,282	0.5	37	0.5	5.3	0.3	4,884	0.5	34	0.5	5.6	0.3
Total P&P	4,287	0.5	37	0.5	5.3	0.3	4,915	0.5	34	0.5	5.6	0.3
Mineral Resources												
Measured	49	0.7	45	1.3	4.2	0.2	49	0.7	45	1.3	4.2	0.2
Indicated	5,211	0.4	64	0.9	4.6	0.5	5,040	0.4	61	0.9	4.6	0.5
Total M&I	5,260	0.4	64	0.9	4.6	0.5	5,089	0.4	61	0.9	4.6	0.5
Inferred	5,945	0.4	61	0.9	2.5	0.4	7,401	0.4	55	0.8	2.8	0.4

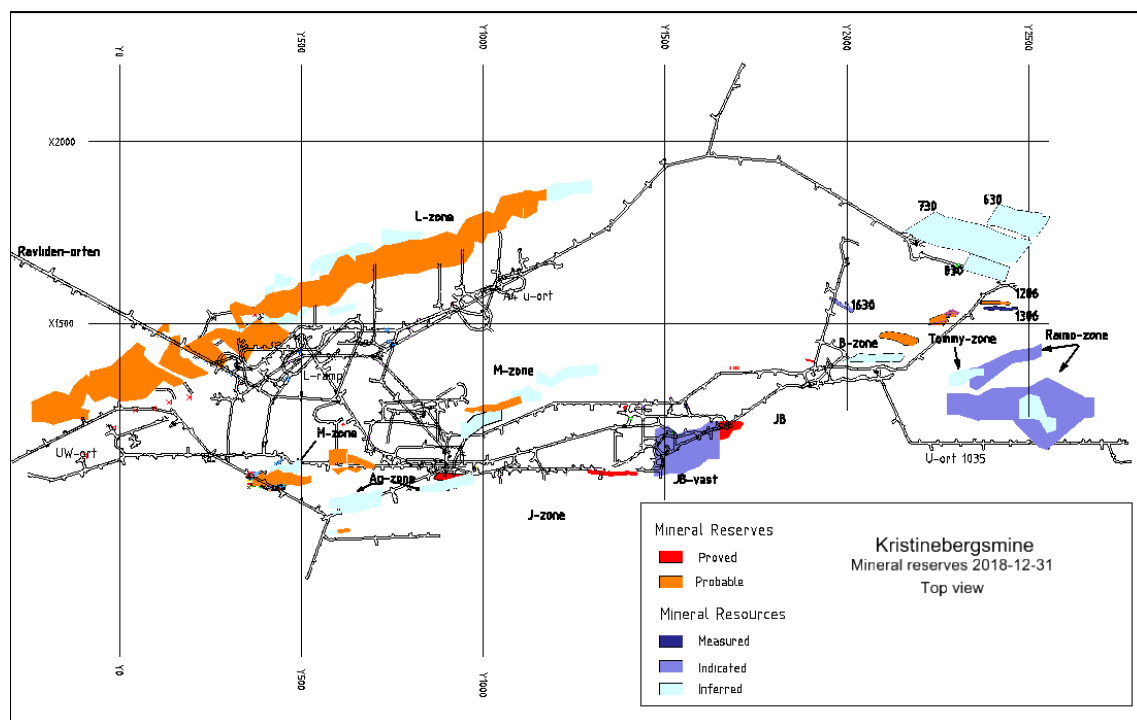


Figure 12. Plan view of the Kristineberg Mine showing mine infrastructure and locations of Mineral Resources and Mineral Reserves

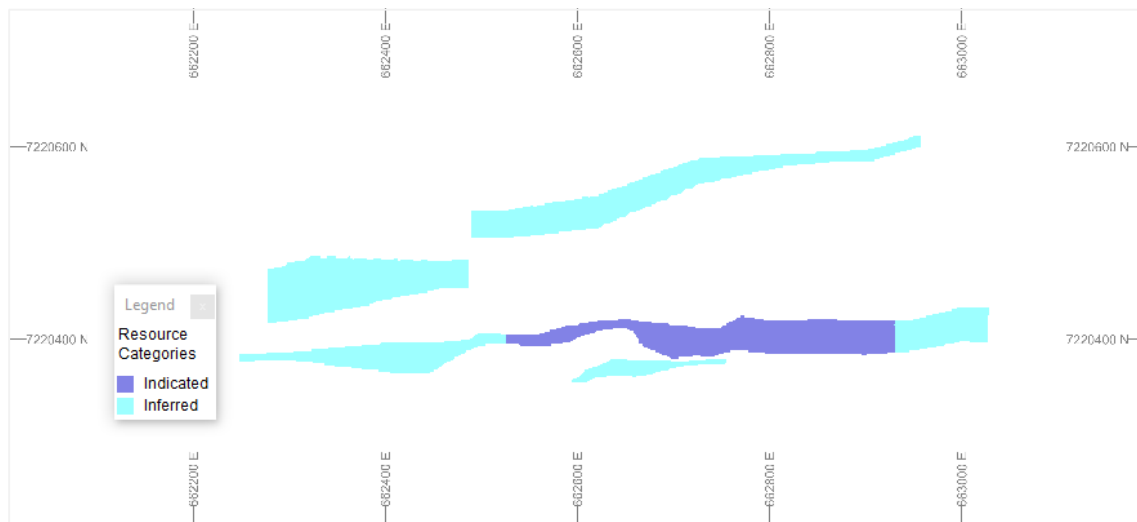


Figure 13. Plan view of the classified Rävliiden Norra Mineral Resource block model (McGimpsey, 2018)

3.14 Comparison with previous year

2018 sees a net reduction in both Mineral Resources and Mineral Reserves from 2017. These are detailed in the sections below.

3.14.1 Mineral resources

- Overall net reduction in Mineral Resources by around 1200kt.
- 25kt mined from the A-Zone Mineral Resource
- 41kt converted to Mineral Reserve in the L-Zone
- 177kt added to Ag-Zone Mineral Resource from updated Mineral Resource Estimate
- 98kt written off L- and M-Zones due to a reinterpretation of the geology
- 1172kt written off from Rävliiden North Mineral Resource due to new geological information.
- 132kt written off from J-Zone due to lack of RPEEE.

3.14.2 Mineral reserves

- Overall net reduction in Mineral Reserves by around 800kt
- 603kt mined from J-, M-, and L-Zones.
- Added 41kt from upgrades to Mineral Resources
- 30kt written off due to changed geological interpretations.
- 123kt written off due to roof failures and pillars which now will not be mined.

3.15 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 2018 is shown in Table 17. Reconciliation data shows that predicted tonnages match the sum of products figures from the BAO processing plant, with the exception of Pb, which shows that there is 21% less Pb 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 17. Reconciliation data for the Kristineberg mine 2018, aggregated

2018 Reconciliation - Kristineberg								
Category	Tonnes	Au	Ag	Cu	Zn	Pb	S	Dilution
	kt	g/t	g/t	%	%	%	%	%
Mined	623654	0.6	34.8	0.5	5.4	0.3	20	15
Sum of Products	623654	0.6	33.1	0.5	5.4	0.2	21.7	
Difference vs. BAO PP	-	0	-1.7	0.0	0.0	-0.1	1.7	
Difference vs. Plant (%)	-	4.6	-5.0	-7.7	-0.3	-21.0	8.6	

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