EQUITY RESEARCH

Sotkamo Silver AB

Production at full capacity

By **Nick Hatch**

Non-Independent Research

21 November 2019

MMG CAPITAL
Metals & Mining Global Capital

Market Data: note priced 15 November 2019

Stock Code	SOSIL.NGM; SOSI1.OMX
Price (SEK)	4.13
12 m High (SEK)	5.00
12 m Low (SEK)	3.31
Shares (m)	134.98
Mkt Cap (SEKm)	557.5
Free Float	100%

Description

Sotkamo Silver started production at its Silver Mine in Finland in March 2019, and expects to produce 1.0-1.1Moz this year. The company also has exploration programmes in Sweden for tungsten (which includes the former Yxsjöberg mine), in the Tampere region in Finland for gold, and in Norway in the Mo I Rana area, for polymetallic targets.

Company information

President & CEO	Timo Lindborg
Non-exec Chairman	Mauri Visuri
CFO	Paul Johnsson
Chairman Sotkamo Silver Oy	Ilkka Tuokko
MD Sotkamo Silver Oy	Erkki Kuronen

www.silver.fi

Key shareholders

Ilmarinen	8.9%
Hexof	3.6%
Timo Lindborg	2.7%
Finnish Minerals Group	2.0%
No. of shareholders	50,300
Trading Volume Jan-Sept 2019	43m

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Production at full capacity

The Silver Mine produced first concentrate in March, and from the current reserves at Silver Mine is expected to produce 9.5Moz of silver, as well as 8,900t of lead, 21,500t of zinc and 38,000oz of gold. There is significant potential for reserve addition at depth. The current share price does not reflect any value for this potential, or the rest of the company's Nordic exploration portfolio.

- **In production.** The Silver Mine started ramp-up in March and was at full production in September 2019. Sotkamo Silver expects to produce 1.0-1.1Moz of silver in 2019, representing 60-63% of forecast revenue, as well as lead, zinc and gold.
- **Potential to increase reserves.** The mine currently contains an ore reserve of 2.75Mt at 121g/t Ag, sufficient for a 7-year mine life producing 9.5Moz Ag, 21,500t Zn, 8,900t Pb and 38,000oz Au. Total mineral resources are currently 10.92Mt grading 75g/t Ag down to a depth of c.400m. Exploration suggests mineralisation extends to at least 1,400m, and possibly 2,000m, and the company believes there could be an additional 20-40Mt grading 40-80g/t Ag.
- **Valuing the Silver Mine.** Using current spot metal prices, and a 5% discount rate, our NPV forecast for the Base Case 7-year mine life is SEK841m. Using 10% lower commodity prices across 2020-2025 would lower our valuation to SEK662m, while a 10% increase across the period would increase our valuation to SEK1,013m. Management anticipate at least an additional 5 years of mining.
- **Exploration potential.** Apart from further potential at the Silver Mine, the company has exploration elsewhere in Finland, Sweden and Norway for polymetallic deposits, tungsten and gold.
- **The market does not value the exploration potential.** We do not believe that the market places full value on the ability to extend mine life at Silver Mine or any value on Sotkamo Silver's exploration. We calculate a NAV for the company of SEK6.94/share, comprising a value for the Silver Mine (12-year life) of SEK7.93/share, a total value of SEK 2.41/share for further exploration at the mine and elsewhere in the exploration portfolio, less SEK3.39/share for net debt and central costs.

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Investment Case

- **In production** – Sotkamo Silver AB brought the Silver Mine into production this year, with first concentrate production in March. The company plans to treat 330,000-350,000t of ore this year, rising to 450,000t in 2020. Silver Mine will produce two concentrates, a lead concentrate, also containing silver and gold, and a zinc concentrate which also contains silver. The company expects to produce 1.0-1.1Moz of silver this year, and estimates this will represent 60-63% of revenue.
- **7-year mine life with the potential for additional reserves** – The Silver Mine has a JORC ore reserve of 2.75Mt grading 121g/t silver, 0.42g/t gold, 0.43% lead and 0.90% zinc, and a mineral resource (inclusive of ore reserves) of 10.92Mt at 75g/t silver, 0.21g/t gold, 0.26% lead and 0.58% zinc. According to the 2017 Technical Report, mine-life is 7 years, and over this period production is forecast to amount to a total of 9.5Moz of silver, 21,500t of zinc, 8,900t of lead and 38,000oz of gold. Management believes that mine life can be extended by a further 5 years by converting mineralisation down to a depth of 1,000m into mineable reserves. The current mineral resource extends to a depth of 400m, but 6 deep drill holes and the results of an electromagnetic survey suggest that mineralisation continues to at least 1,400m, and possibly down to 2,000m. In its 2018 annual report, Sotkamo Silver suggests that there could be further "exploration potential" of 20-40Mt grading 40-80g/t silver, 0.1-0.3 g/t gold, 0.15-0.3% lead and 0.3-0.7% zinc. If further exploration is able to prove-up additional tonnages, then mine life could increase significantly, and in turn so should the value of the mine and the company.
- **Silver and the Nordic region** – The Silver Institute, the silver mining and refining trade organization, believes that in 2018 there was a physical silver supply deficit of 29.2Moz, the sixth year in 8 years that mine and scrap supply failed to meet physical demand. This year the institute forecasts a 2% decline in mine supply and an increase in physical demand, so another year of deficit seems likely while in the longer term, growth in hybrid and electric vehicle sales is expected to result in a big increase in silver demand. Nordic countries, Finland in particular, have regularly ranked well in surveys of mining industry country risk. This supports the investment case for Sotkamo Silver.
- **Exploration potential** – Apart from exploration around the mine, the company also has a number of other exploration portfolios in Nordic countries. In Finland, this includes exploration in the general region around the Silver Mine, the Tipasjärvi Greenstone Belt, where the targets are primarily silver-lead-zinc-gold deposits, as well as gold exploration in the Tampere region. In Sweden, the company has licences in the Bergslagen district, where the main target is tungsten. The licences include the former Yxsjöberg mine, which has yielded 90% of all the tungsten mined in Sweden. Mineralisation is known to continue at depth, and it is estimated there could be 5Mt of mineralized material averaging 0.35% WO_3. Sotkamo Silver also has licences around the Mo I Rana area in Norway, including the former Mofjell copper-zinc-lead mine. The key target is for volcanogenic massive sulphide (VMS) polymetallic mineralisation (copper-zinc-lead-silver-gold). Varying amounts of work have been undertaken historically on Sotkamo Silver's exploration leases. Many of them are host to old mines or have indications of mineralisation. However, there has been limited recent exploration and much work still needs to be undertaken to determine if there is any economic potential on any of the licences.
- **Valuing Sotkamo Silver AB** - Given the Silver Mine has only just started production, and has a relatively short mine life based on current ore reserves, we believe that a sum-of-the-parts Net Asset Valuation (NAV) is the most appropriate way to value the company, rather than P/E ratio or EV/EBITDA analysis. Using a 5% discount rate, and spot metal prices (our Base Case) our Net Present Value of the Silver Mine (current reserves) is SEK 841m, with a further SEK229m for the additional 5 years of production anticipated by management and a nominal SEK150m to for further optionality at depth. We have valued the exploration portfolio (Tipasjärvi Greenstone Belt, Swedish tungsten, Tampere gold and Mo I Rana VMS) primarily by peer transactions and attribute a value of SEK176m to it. However, it is important to stress that these exploration valuations should be seen as an indication of potential value. There is no certainty that any economically viable mineralisation can be found on any of Sotkamo Silver's exploration licences. After deducting net debt and central costs we calculate a value for Sotkamo Silver AB of SEK937m, or SEK6.94/share, compared with the current share price (15 November 2019) of SEK 4.13, implying potential upside of 68%. SEK 4.54/share comprises our valuation of Silver Mine (assuming the current seven-year Base Case plus five years), less corporate cost and net debt assumptions. In our view, the market is not fully valuing this, and applies no value for further mine life extensions, or the exploration portfolio.

Sotkamo Silver AB: a snapshot

History and structure

Sotkamo Silver AB is a Swedish company, headquartered in Stockholm. The company's key asset is the Silver Mine, located in Taivaljärvi, Finland, and operated by a wholly-owned Finnish subsidiary, Sotkamo Silver Oy. The deposit was discovered in 1980, and explored by Kajaani Oy, a Finnish exploration company, initially by itself, and then, from 1986, in joint venture with the large Finnish mining company Outokumpu Oy. In 1991 Outokumpu undertook a feasibility study, and concluded that the project was not economically viable. The joint venture let the leases lapse in 2005. Silver Resources (later renamed Sotkamo Silver) was established in 2006 and applied for a number of permits covering the Silver Mine project, including a mining concession. Sotkamo Silver AB listed in 2010 on Stockholm's NGM stock exchange, with a parallel listing on NASDAQ OMX in Helsinki. Final financing for the mine was obtained in late 2018, and concentrate production started in March 2019. Sotkamo Silver is forecasting production of 1.15-1.25Moz of silver in 2019.

Apart from the Silver Mine, the company has additional exploration licences in the Taivaljärvi region and three other Scandinavian exploration projects in its portfolio. These include gold deposits in the Tampere area of Finland; there are six known deposits on the claims, the most advanced project, Hopeavuori East, contains 238,000t at 3.8g/t gold. In the Grangesberg area of Sweden, Sotkamo Silver holds exploration permits for six deposits, which include the former Yxsjöberg tungsten mine, from which over 90% of the tungsten previously produced in Sweden was sourced. In Norway, in the Mo I Rana area, Sotkamo Silver holds 5 mining concessions and 20 exploration licences. These cover the Mofjell mine (which contains a zinc-lead-copper resource), other areas of volcanogenic massive sulphide (VMS) mineralisation containing zinc, copper, lead, silver and gold, as well as iron formations, and an area with Platinum Group Metals (PGM)/nickel potential.

Management, key shareholders and financial position

Sotkamo Silver is led by Timo Lindborg, President and CEO since 2010, and Mauri Visuri, who has been on the board since 2010 and has been Chairman since 2011. The company's largest shareholder is Finnish pension and insurance company Ilmarinen Mutual (9.2%), Finnish financial services firm Hexof Oy (3.2%), the company's President and CEO, Timo Lindborg (2.7%) and Finnish government-owned Finnish Minerals Group (2.0%). 80% of the company's shareholders are Finnish, and they hold approximately 92% of the equity. The company currently (15 November 2019) has a market capitalisation of SEK557.5m (US$58.0m) and as at 30th September 2019 had net debt (long and short-term liabilities less inventories and cash) of SEK419.1m (US$43.6m).

Silver market in deficit; Nordic Region a safe haven

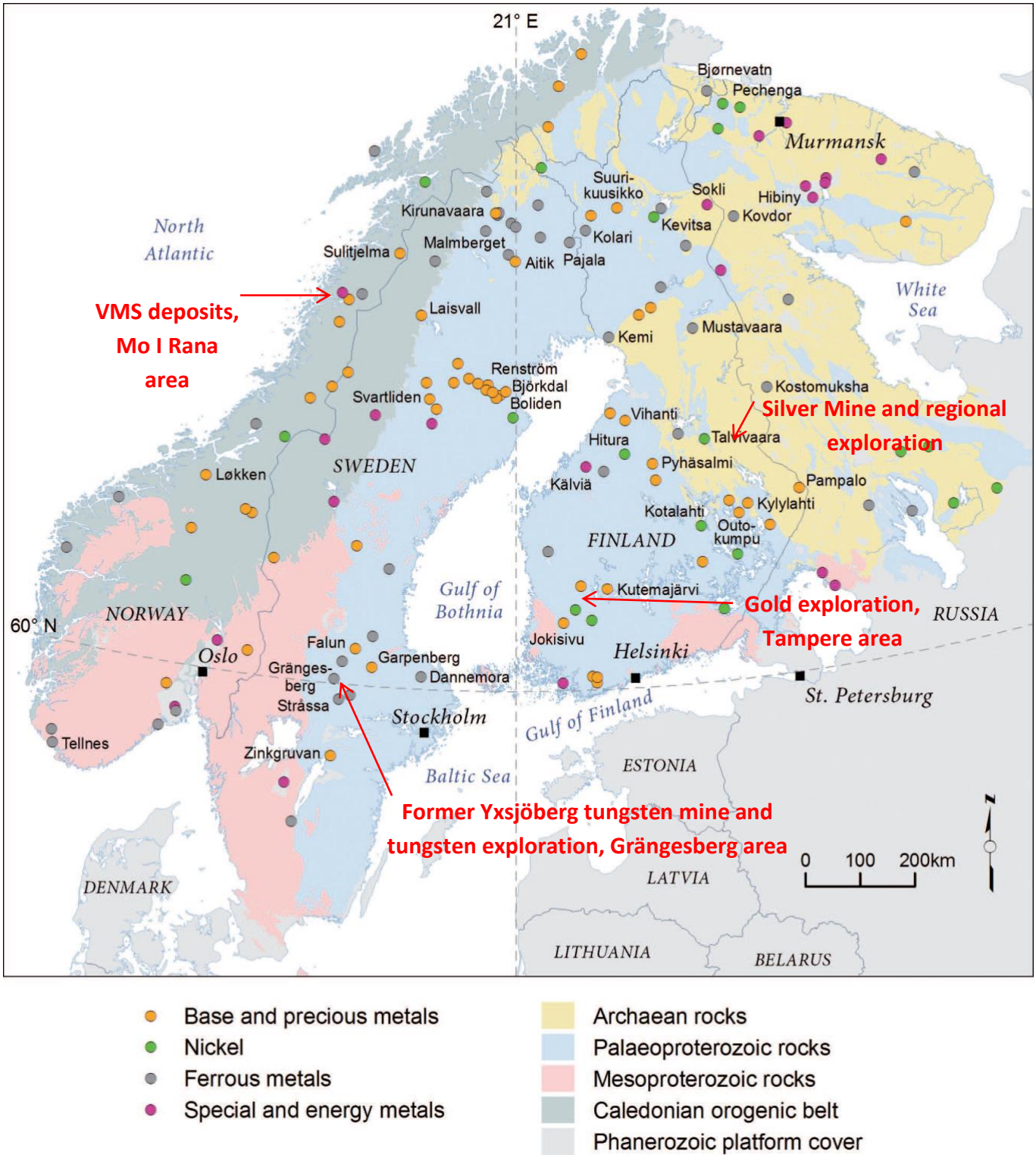
In its 2019 World Silver Survey, the Silver Institute estimates that global mine production fell 2.4% in 2018 to 855.7Moz and that for the sixth year in the last 8 years there was a physical deficit (ie total supply failed to meet physical demand); in 2018 this physical deficit was 29.2Moz, and between 2011 and 2018 totalled 359.4Moz. The silver price averaged US$15.71/oz in 2018, down 7.9% from US$17.05/oz in 2017.

For 2019, the Silver Institute is forecasting a better year for the metal; a 2% decline in mine supply, a modest pick-up in silver scrap, an increase in physical demand and therefore another physical deficit of metal (Silver Market Trends – 2019, 5th February 2019). While annual demand for silver has been broadly flat in the last 8 years (ranging between 992-1,124Moz pa), in the longer term silver is expected to benefit from demand growth in hybrid (HEV) and all-electric (EV) vehicles. A report for the LBMA (Alchemist 90, 26th July 2018) suggests that silver usage in HEVs and EVs will double by 2020 from 123t (3.95Moz) in 2018, to reach 450t (14.47Moz) in 2025. European countries and their car industries are at the forefront of this, and this could be of long-term benefit to the silver market, and Sotkamo Silver.

Sotkamo Silver also benefits from its presence in the Nordic Region. In the Fraser Institute's Annual Survey of Mining Companies 2018 (the latest survey was published on 28th February 2019), the Canadian think-tank publishes an Investment Attractiveness

Index, and Nordic countries, and Finland in particular, always rank highly. Finland was first out of 91 jurisdictions in the 2017 survey and 17th out of 83 in the 2018 survey, while Sweden ranked 16th in 2017 and 21st in 2018, and Norway was 41st in 2017 and 53rd in 2018.

Figure 1: Sotkamo Silver's Nordic Assets and Mineral Occurrences in Fennoscandia



Source: Adapted from Eilu, P. 2011. Metallic mineral resources of Fennoscandia, Geological Survey of Finland, Special Paper 49, 13-21

The Silver Mine, Finland

Commissioned!

Project history

The 100%-owned Sotkamo Silver's mine, known simply as Silver Mine, is located on a 372ha mining permit 40km from the municipality of Sotkamo and 82km from the city of Kajaani. Mineralisation at the Sotkamo Silver's silver-gold-lead-zinc deposit was first discovered in 1980. Exploration was carried out by Kajaani Oy, a Finnish exploration company, initially by itself, and then, from 1986, in joint venture (the Taivalhopea JV) with the large Finnish mining company Outokumpu Oy (Outokumpu 50%/Kajaani 50%). The JV carried out extensive work, including the development of a decline and some 2.6km of tunnels and 330m of ventilation shafts, constructed in the 1988-1990 period. On behalf of the JV, Outokumpu undertook numerous pre-feasibility studies between 1985 and 1988 and a full feasibility study in 1991, which included metallurgical work. Outokumpu concluded that the project was not economically viable due to low metal prices, and the project was put on hold.

The joint venture let the leases lapse in 2005, and Silver Resources Oy (later renamed Sotkamo Silver Oy) was established in 2006 and applied for a research permit on the leases. Mining and environmental permits were granted in 2012 and 2013 respectively. Wardell Armstrong published a bankable feasibility study in 2012, and this was updated by CTS Engtec in 2014, and again in 2016.

The most recent comprehensive study undertaken on the Silver Mine was a Technical Report published in July 2017 and undertaken by a combination of outside consultants and Sotkamo Silver personnel. The project detail provided below comes from that report and where this has subsequently been updated, this is noted accordingly.

Geology – in brief

The Silver Mine is located in the Tipasjärvi Archaean Greenstone Belt in eastern Finland, and in particular in the southern part of the north-south 200km long and 3-15km wide Tipasjärvi-Kuhmo-Suomussalmi greenstone complex. The majority of the greenstone belts consist of metamorphosed mafic, ultramafic and felsic volcanic rocks, and the balance (approximately 20%) consist of metasediments. The Silver Mine discovery has been variously described as fitting the volcanic-hosted exhalative model and the epithermal model.

The Silver Mine deposit is hosted within the lower portion of the Taivaljärvi Formation, and more particularly between two sequences of altered metavolcanic rocks – a felsic metatuff and pyroclastic breccia below the ore zone, and a cordierite-bearing metatuff above the orebody. The ore zone is characterised by quartz veins, and the ore deposit itself appears to contain four ore bodies, labelled A, B, C, and D. The sub-outcrop is covered with glacial till, and is 400m long by between 5-110m wide (averaging 40m). The deposit dips 65^0 to the southeast and plunges 60^0 to the south-southwest. Drilling, and deep-penetrating Sampo electromagnetic geophysical surveys undertaken by GTK (the Geological Survey of Finland) suggest that the mineralisation continues to at least 1,400m and maybe even 2,000m depth.

There are three different mineralisation types, two of which appear to be economically viable. One type, the Ag-type, contain silver minerals in quartz-carbonate veins, often with galena (lead sulphide). The Zn-Pb-Ag type, also economic, primarily contains galena and sphalerite (zinc sulphide) in quartz-carbonate veins, with less contained silver. In practice the ore types are gradational and run-of-mine ore will be a blend of both types. The third, lower grade mineralisation type is not economic, and not included in the current mining plan.

Regional exploration potential

While exploration in the near future is expected to be centred on further ore delineation at the Silver Mine, there is the potential for further Silver Mine-style discoveries in the Tipasjärvi Archaean Greenstone Belt. Exploration was carried out by Kajaani Oy in 1979-1990 and the GTK in 2005-2007 which included bedrock mapping, bedrock and soil sampling, over 9km of

drilling and a 400km^2 airborne geomagnetic survey. Sotkamo Silver has various exploration permits along a c. 30km SW-NE stretch of the greenstone belt. Early-stage exploration has outlined 16 areas of potential mineralisation of which the most significant are Talassuo (also known as Kivisuo and Hiidenkirkko), Sauna-aho (also known as Hietajärvi) and Kokkokorpi. They include silver-zinc-lead-gold occurrences, like the Silver Mine deposit itself (and could potentially provide additional mill feed if exploration is successful) as well as gold, nickel, copper and zinc mineral occurrences. Not much exploration, however, has been undertaken in recent years, and historical work primarily consisted of geological mapping, soil, till and boulder sampling, trenching, and limited geochemical, geophysical and drilling work. In our view, given the limited exploration work undertaken to date it is too early to ascribe any more than a nominal SEK20m value to the regional exploration potential the company has in the Tipasjärvi Archaean Greenstone Belt.

Infrastructure

Infrastructure in the mine area is good. The mine is located 40km or a 45-minute drive from the centre of the municipality of Sotkamo, the majority of which is on tarred roads. There is a national airport 90km away, near the city of Kajaani, with regular flights to Helsinki, and the city is also on the rail network. Fresh water supply is ample, both from dewatering the existing underground mine and also from a local lake, and the mine is connected to the national grid by two power lines, including a 45kV line which is solely for mine use. The port of Kokkola is easily accessible, and there are two smelters in Finland, Kokkola (zinc, Boliden) and Harjavalta (copper/nickel, Boliden) while the port and copper smelter at Ronnskär (Boliden), in Sweden, is also accessible. Indeed, in October 2018, Sotkamo Silver announced an offtake agreement with Boliden to supply lead (silver) and zinc concentrates to the Kokkola and Rönnskär smelters, the two nearest smelters to the mine.

Reserves and resources

The latest JORC (2012) mineral resource and ore reserve estimates were published by the company in its 2018 annual report and were calculated in December 2017. The resource figure was reviewed by consultants Wardell Armstrong. They differ slightly from those included in the 2017 Technical Report (audited by Outotec in January 2016), in that the measured and indicated ore resource in the Technical Report was 7.41Mt and total resources were 11.48Mt, while reported grades in the Technical Report were slightly lower than in the latest mineral resource calculation. The resource was calculated at a cut-off grade of 30g/t Ag.

Figure 2: Silver Mine Mineral Resources (JORC 2012)

Category	Mt	Ag (g/t)	Au (g/t)	Pb (%)	Zn (%)
Measured	2.97	88	0.25	0.31	0.66
Indicated	3.66	79	0.23	0.29	0.62
Inferred	4.30	61	0.17	0.20	0.47
Total	**10.92**	**75**	**0.21**	**0.26**	**0.58**

Source: Sotkamo Silver AB 2018 annual report

Sotkamo Silver's mineral resources are inclusive of ore reserves (note: the norm under the Australasian JORC code is that mineral resources are stated as additional to ore reserves ie reserves are not included in the resource figure. Under the Canadian NI 43-101 reporting standards resources include ore reserves). The current ore reserves appear to be the same as those reported in the 2017 Technical Report. The ore reserve is derived from the JORC measured and indicated resources and, according to the 2017 Technical Report) includes an open-pit reserve of 854,000t and an underground reserve of 1.893Mt; the underground grades are significantly higher than those in the open-pit reserve. Combined open-pit and underground reserves

total 2.747Mt grading 121g/t Ag, 0.42g/t Au, 0.43% Pb and 0.89% Zn. The 30g/t Ag cut-off was also used for the ore reserve estimate. Before the commencement of mining, the Silver Mine contained reserves of 10.69Moz of silver, 37,000oz of gold, 11,760t of lead and 24,480t of zinc.

Approximately 59,000m of drilling has been carried out at the Silver Mine deposit (with additional drilling in the surrounding area), and as a result the company has a high conversion rate from measured resources (2.97Mt) to ore reserves (2.75Mt) and a high proportion of ore reserves, 1.55Mt out of a total reserve of 2.75Mt, ie 57%, is in the proven category. In our view, we are confident that additional resources can be converted into mineable ore reserves.

Figure 3: Silver Mine Ore Reserves (JORC 2012)

Category	Mt	Ag (g/t)	Ag 000oz	Au (g/t)	Au 000oz	Pb (%)	Pb t	Zn (%)	Zn t
Proven	1.554	113	5,647	0.37	18	0.35	5,440	0.71	10,880
Probable	1.193	132	5,047	0.49	19	0.53	6,320	1.14	13,600
Total	**2.747**	**121**	**10,694**	**0.42**	**37**	**0.43**	**11,760**	**0.90**	**24,480**

Source: Sotkamo Silver 2018 annual report

Further 5-year mine life potential

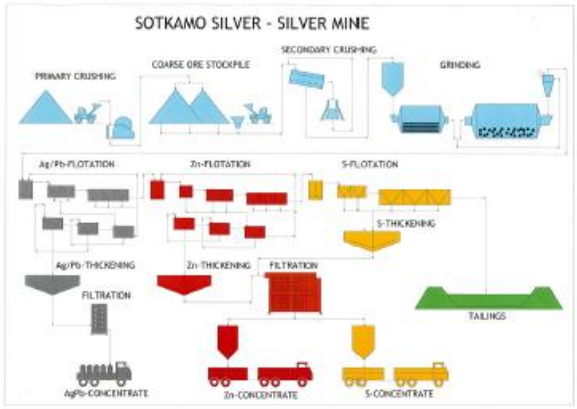
In the Management Case, presented in the 2016 Bankable Feasibility Study (BFS), it was estimated that between the currently planned bottom of the underground mine (at c.400m) and 1,000m there is an additional "Exploration Potential" of 10.3Mt grading 71.5g/t Ag. Of this, management believes that there is an additional 2.25Mt of mill feed, averaging 144g/t Ag, sufficient for an additional five years of production. As part of our NPV analysis, we have put a value of SEK229m on this potential (see page 19).

Source: Sotkamo Silver AB. Photo - Silver Mine in operation

Further exploration potential around the mine

The current mineral resource of 10.9Mt extends to a depth of 400m. However, electromagnetic geophysics undertaken by GTK (the Geological Survey of Finland) in 2011-2012, together with 6 deep drillholes which intersected Silver Mine-style mineralisation, suggests that the ore mineralisation extends to a depth of at least 1,400m, and possibly down to 2,000m. A 2013 study undertaken by a consultant geologist suggested that there could be an "exploration target" of over 20Mt grading 60g/t Ag at a 30g/t cut-off, while Sotkamo Silver's 2018 annual report speaks of an "exploration potential" of 20-40Mt grading 40-80g/t silver, 0.1-0.3g/t gold, 0.15-0.3% lead and 0.3-0.7% zinc. There is therefore the possibility of extending the mine life beyond the current 7-year life, and further beyond the additional 5 years outlined in the Management Case in the 2016 BFS. Further exploration work clearly needs to be undertaken before the company can determine the potential of the mine beyond a depth of c.1,000m. At this stage we place a nominal current value of SEK 150m on the optionality that the company has between 1,000m and 2,000m.

Figure 4: Silver Mine flow sheet



Source: Sotkamo Silver AB 2018 annual report

Base Case production plans and costs

We refer to the initial 7-year mine life based on the current reserves, as outlined in the 2017 Technical Report, as the Base Case. The report envisaged that Sotkamo Silver would start open-pit and underground mining simultaneously, with high grade underground stopes (with a value of >€62/t) augmenting lower grade open-pit ore during the first 3 to 4 years. Open-pit mining called for a two-year starter pit (with minimal mining of waste rock), followed by a pushback in Year 3, while underground mining will be carried out by longitudinal bench-and-fill mining with production in the first two years from higher grade mine areas. The overall Base Case mine life is estimated at 7 years, with the possibility, as noted, to extend by a further 5 years (or more).

In terms of processing, Sotkamo Silver will produce three different concentrates, silver/lead, zinc and pyrite, via a traditional froth flotation circuit. Lower grade ores will be screened via an XRT sorter prior to the concentrator. The higher grade silver/lead and zinc concentrates will be sold to European smelters (note the agreement to supply Boliden's Scandinavian smelters). Mining and the operation of the crushing plant will be contracted out by the company.

Figure 5: Silver Mine Combined Open-pit and Underground Mine Mining and Milling Schedule

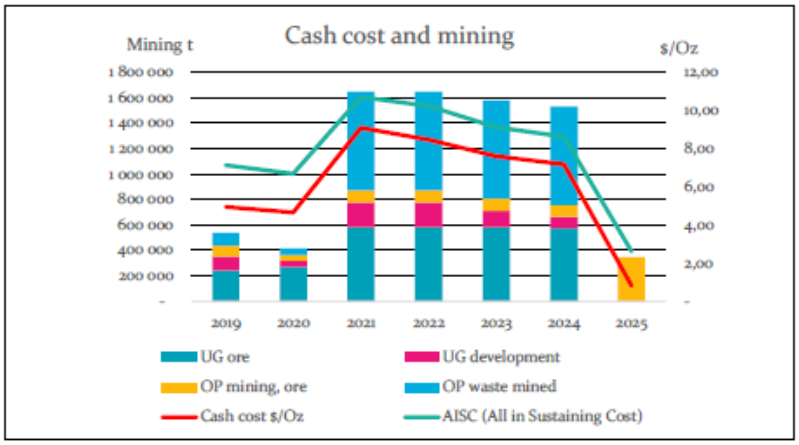
Year	Total Mined	Ore mined	Ore milled	Sorter Waste	Ag	Au	Pb	Zn
	000t	000t	000t	000t	g/t	g/t	%	%
-1	327	0	0	0				
1	546	415	340	0	133.9	0.53	0.44	0.74
2	547	415	339	0	156.7	0.35	0.38	0.67
3	1,632	792	431	244	122.2	0.45	0.48	1.06
4	1,656	792	431	244	122.2	0.45	0.48	1.06
5	1,586	792	431	244	122.2	0.45	0.48	1.06
6	1,537	786	428	242	122.1	0.45	0.48	1.06
7			347	273	75.8	0.26	0.23	0.49
TOTAL	**7,831**	**3,993**	**2,747**	**1,246**	**122.0**	**0.42**	**0.43**	**0.90**

Source: Sotkamo Silver Technical Report 2017. Numbers may not add due to rounding

The 2017 Technical Report envisaged an October 2018 operational start-up (after a commissioning period of c.4 months). The Technical Report suggests a two-month ramp-up period, during which time 33,600t of ore are expected to be milled, producing 294t of concentrate. In the subsequent 10 months the plans envisage an average production rate of 1,152tpa of silver-lead concentrate. The Environmental Permit restricts the processing plant to an ore feed rate of 350,000tpa in the first two years, rising to 450,000tpa thereafter.

Pre start-up capital costs were estimated at €27.4m. The life-of-mine cash production costs are estimated at €45.81/t, dropping to the €32.74-42.23/t range during the main production phase. Sustaining capital expenditure (€1.2m) and other indirect capital costs (including environmental costs and payments to former owners) amount to €4.4m, and a further €7m is earmarked for potential expenditures to prolong mine life beyond 7 years and into deeper parts of the orebody.

Figure 6: Annual Operating Cash Costs net of By-product Credits



Source: Sotkamo Silver Technical Report 2017

2017 Technical Report Revenue Assumptions

The economic forecasts presented in the 2017 Technical Report use consensus commodity price forecasts made in May 2017, and an exchange rate of 1.1US$/EUR. As one can see, current spot silver and zinc prices are below the prices used in the Technical Report, while lead is in line and the gold price is higher.

Figure 7: Commodity Price & Exchange Rate Assumptions used in 2017 Technical Report & Current Spot Prices

		2019	2020	2021	2022-2026	Spot Prices 15 Nov 19
Silver	US$/oz	18.6	19.1	19.1	19.6	17.00
Zinc	US$/t	2,543	2,488	2,524	2,535	2,427
Lead	US$/t	2,049	1,995	1,981	2,024	2,004
Gold	US$/oz	1,283	1,287	1,257	1,297	1,468
US$/€		1.1	1.1	1.1	1.1	1.11

Source: Sotkamo Silver technical Report 2017, LME, BoE

Based on the production profile and assumptions used, the 2017 Technical Report has identified the following revenue profile for Sotkamo Silver. Recovered silver output peaks in Year 2 of production, at 1.44Moz, and is then essentially flat for Years 3 to 6 at c.1.35Mozpa. Recovered zinc production peaks in Year 3 at c.4,000t and remains flat for the remaining life-of-mine. In Year 1 of production, NSR revenues are forecast at €26.6m, rising to €32.0m in Year 2, and are then broadly flat in the €36.3-37.1mpa range for Years 3-6 before dropping to €20.3m in Year 7, the final year of production.

Over the life-of-mine, the economic summary in the Technical Report 2017 envisages that a total of 9.5Moz of silver, 21,500t of zinc, 8,900t of lead and 38,000oz of gold will be recovered (the numbers below show production payable to Sotkamo Silver, ie after treatment and refining charges).

Source: Sotkamo Silver AB. Photo - Silver Mine in operation

Figure 8: Silver Mine Concentrate Revenues after Freight and Refinery Costs

Year		1	2	3	4	5	6	7	Total
Lead concentrate	t	1,818	1,734	2,696	2,696	2,696	2,674	1,051	15,365
Silver recovered	000 oz	1,036	1,440	1,355	1,355	1,355	1,345	685	8,570
Zinc concentrate	t	3,941	4,017	7,141	7,141	7,141	7,141	7,141	43,665
Zinc recovered	t	2,136	2,177	3,981	3,981	3,981	3,981	3,981	24,220
Lead-silver Concentrate:									
Lead revenue	€ 000	1,808	1,679	2,592	2,649	2,649	2,627	1,033	15,037
Silver revenue	€ 000	16,907	24,154	22,704	23,298	23,298	23,117	11,780	145,258
Gold revenue	€ 000	5,107	3,685	5,573	5,751	5,751	5,704	5,789	37,359
Charges	€ 000	-2,857	-3,750	-4,214	-4,225	-4,225	-4,192	-2,086	-25,548
Zinc Concentrate:									
Zinc revenue	€ 000	5,595	5,702	10,824	10,824	10,824	10,735	4,073	58,579
Silver revenue	€ 000	898	1,320	1,142	1,172	1,172	1,163	619	7,487
Charges	€ 000	-450	-417	-1,751	-1,761	-1,761	-1,747	-663	-8,550
Freight for both conc.	€ 000	-378	-367	-601	-601	-601	-596	-232	-3,375
Total NSR Revenue	**EUR 000**	**26,630**	**32,008**	**36,271**	**37,107**	**37,107**	**36,812**	**20,312**	**226,246**

Source: Sotkamo Silver Technical Report 2017. Numbers may not add due to rounding

Economic Valuation Summary – 2017 Technical Report

The Technical Report envisages a pre-tax Net Present Value of future cashflows of €57.1m at a 5% discount rate, dropping to €48.7m at 8% and €43.8m at 10%. At the 5% rate, the IRR is 40.9% and the payback period post start-up is 1.75 years. Clearly, if one applied current spot commodity prices across the life-of-mine, these parameters would change, though the impact of a lower silver price, is partially offset by higher zinc, lead and gold prices. We illustrate our NPV valuation later in this research note.

Figure 9: 2017 Technical Report Economic Valuation Summary – pre-tax

NPV 5%	€57.1m
NPV 8%	€48.7m
NPV 10%	€43.8m
IRR (NPV 5%)	40.9%
Payback period (NPV 5%)	1.75 years

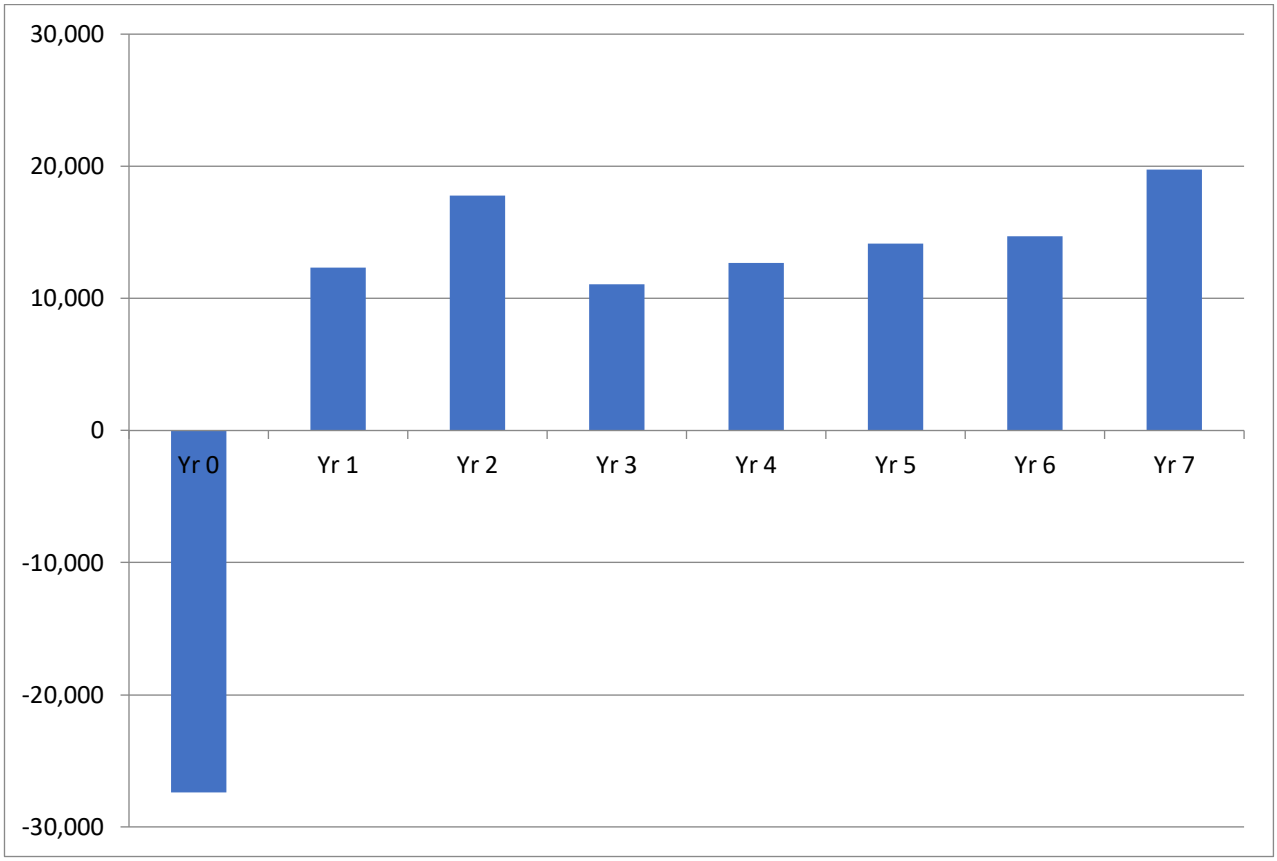
Source: Sotkamo Silver Technical Report 2017

Potential for upside or downside

There is always the potential for a mining project to exceed expectations. For instance, mining rates, grades and recovery rates may exceed the assumptions in technical reports, and capital and cash costs may have been overestimated, commodity prices and exchange rates may be higher than forecast, and there may be beneficial changes to laws governing mining, and to tax and royalty rates.

Equally, there is always a downside risk to a mining project. Mining rates, grades and recovery rates may have been overestimated, capital and cash costs may have been underestimated, commodity prices and exchange rates may be lower than forecast, and there may be detrimental changes to laws governing mining, and to tax and royalty rates.

Figure 10: Silver Mine Operational Free Cashflow (€ 000)



Source: Sotkamo Silver Technical Report 2017

Figure 10, derived from the 2017 Technical Report, illustrates the projected operational free cashflow of Silver Mine. It shows the €27.4m initial capital expenditure in the first year, and then the free cashflow generated by the mine. In the first year of production, the mine is forecast to generate €12.3m of free cashflow, increasing to €17.8m in Year 2. However, free cashflows are then forecast to fall back to the €11.0-14.7m range for the next few years, before rising in Year 7 as mining stops but the company processes previously mined ore (ie operating costs fall in the final year). Sotkamo Silver should be able to enhance its NPV (and thus shareholder returns) if it can extract more metal more quickly (through one or more of greater mining and milling rates, higher grades or greater recoveries), and in turn this should help to lower unit costs.

Source: Sotkamo Silver AB. Photo - Silver Mine's processing plant in operation

Production start-up and updates to the production

The opening ceremony took place in March 2019, coinciding with the start of concentrate production, and was attended by the Finnish Prime Minister Juha Sipilä. At the time, the company noted that it planned to mill 330,000-350,000t of ore in 2019, rising to 450,000t in 2020. This follows a December 2018 application to change the environmental permit to allow the total mining volume to increase from 500,000tpa to close to 1.8Mtpa and an increase in the maximum ore concentration capacity to 600,000tpa. The increased ore throughput is planned to come from underground, while open-pit production remains within the bounds of the original environmental permit. First concentrate was delivered to the Rönnskär smelter in April 2019. At the same time, Sotkamo Silver noted that it planned production of 1.0-1.1Moz Ag in 2019, and that it expected this to represent 60-63% of total revenue. In April, the company also confirmed that production capacity had been increased to 450,000tpa.

MMG Capital valuation of the Silver Mine

We have modelled the Silver Mine using different commodity and exchange rate forecasts from those in the 2017 Technical Report. For forward periods we have used LME spot commodity prices of 15th November 2019, rounded down. Our production and cost profile is based on the 2017 Technical Report, but also take into account publicly production and cost data since start-up, and typical treatment and refining charges for lead and zinc concentrates. We have summarised our Base Case model in Figures 11 and 12.

Figure 11: MMG Capital Base Case assumptions and production forecasts for the Silver Mine

		2019e (Apr-Dec)	2020e	2021e	2022e	2023e	2024e	2025e
Assumptions								
Silver	US$/oz	16.50	17.00	17.00	17.00	17.00	17.00	17.00
Gold	US$/oz	1,415	1,465	1,465	1,465	1,465	1,465	1,465
Zinc	USc/lb	114	110	110	110	110	110	110
Lead	USc/lb	90	90	90	90	90	90	90
US$/EUR		1.10	1.11	1.11	1.11	1.11	1.11	1.11
SEK/EUR		10.60	10.65	10.65	10.65	10.65	10.65	10.65
SEK/US$		9.65	9.61	9.61	9.61	9.61	9.61	9.61
Mill Production								
Ore milled	000t	350	450	450	450	450	450	450
Silver grade	g/t	130	140	130	130	130	130	130
Gold grade	g/t	0.45	0.35	0.50	0.50	0.50	0.50	0.50
Lead grade	%	0.40%	0.40%	0.50%	0.50%	0.50%	0.50%	0.50%
Zinc grade	%	0.75%	0.80%	1.05%	1.05%	1.05%	1.05%	1.05%
Contained silver	000oz	1,463	2,025	1,881	1,881	1,881	1,881	1,881
Contained gold	oz	5,064	5,064	7,234	7,234	7,234	7,234	7,234
Contained lead	t	1,400	1,800	2,250	2,250	2,250	2,250	2,250
Contained zinc	t	2,625	3,600	4,725	4,725	4,725	4,725	4,725
Pb concentrate produced	t	2,250	2,850	3,475	3,475	3,475	3,475	3,475
Ag recovered	000oz	1,156	1,600	1,486	1,486	1,486	1,486	1,486
Au recovered	oz	4,405	4,405	6,294	6,294	6,294	6,294	6,294
Pb recovered	t	1,050	1,350	1,688	1,688	1,688	1,688	1,688
Zn concentrate produced	t	4,600	6,300	8,600	8,600	8,600	8,600	8,600
Zn recovered	t	2,284	3,132	4,111	4,111	4,111	4,111	4,111
Ag recovered	000oz	132	182	169	169	169	169	169

Source: MMG estimates

In our view, the Silver Mine is essentially de-risked. Capital expenditure has been spent, and the mine is operating at a throughput rate that exceeds initially planned levels. As a result, we believe that a 5% real post-tax discount rate seems reasonable. On that basis, we calculate a Base Case NPV for the current Silver Mine mine plan (ie 7 years' production) of SEK840.7m (US$87.1m, €78.9m).

Figure 12: MMG Capital Base Case cashflow forecasts for the Silver Mine

		2019e (Apr-Dec)	2020e	2021e	2022e	2023e	2024e	2025e
Revenue								
Revenues Pb in Pb Concentrate	US$m	2.1	2.7	3.2	3.2	3.2	3.2	3.2
Revenues Ag in Pb Concentrate	US$m	18.1	25.8	24.0	24.0	24.0	24.0	24.0
Revenues Au in Pb Concentrate	US$m	5.9	6.1	8.8	8.8	8.8	8.8	8.8
Total TCRC	US$m	2.4	3.3	3.2	3.2	3.2	3.2	3.2
Pb concentrate transport cost	US$m	0.1	0.2	0.2	0.2	0.2	0.2	0.2
NSR for Pb Concentrates	US$m	23.6	31.1	32.6	32.6	32.6	32.6	32.6
Revenues Zn in Zn Concentrate	US$m	4.9	6.4	8.8	8.8	8.8	8.8	8.8
Revenues Ag in Zn Concentrate	US$m	1.2	1.7	1.6	1.6	1.6	1.6	1.6
Zn treatment charge	US$m	1.1	1.5	2.1	2.1	2.1	2.1	2.1
Zn concentrate transport cost	US$m	0.2	0.3	0.4	0.4	0.4	0.4	0.4
NSR for Zn Concentrates	US$m	4.7	6.7	8.4	8.4	8.4	8.4	8.4
Revenue - Pb concentrates	US$m	23.6	32.3	33.8	33.8	33.8	33.8	33.8
Revenue - Zn concentrates	US$m	4.8	6.3	7.8	7.8	7.8	7.8	7.8
TOTAL REVENUE	**US$m**	**28.3**	**37.4**	**40.4**	**40.4**	**40.4**	**40.4**	**40.4**
TOTAL REVENUE	**SEKm**	**278.9**	**380.3**	**419.5**	**419.5**	**427.9**	**436.3**	**440.5**
Cash costs/oz Ag (before by-product credits)	US$/oz Ag	13.2	9.1	18.5	17.8	16.9	16.4	5.7
TOTAL CASH COSTS	**US$m**	**14.4**	**13.8**	**26.1**	**25.1**	**23.9**	**23.1**	**8.0**
TOTAL CASH COSTS	**SEKm**	**139.4**	**133.0**	**252.1**	**242.4**	**230.7**	**223.1**	**77.2**
OPERATING CASHFLOW	**US$m**	**13.8**	**23.6**	**14.3**	**15.3**	**16.5**	**17.3**	**32.4**
OPERATING CASHFLOW	**SEKm**	**133.3**	**227.7**	**137.7**	**147.4**	**159.1**	**166.7**	**312.5**
Tax rate		0%	10%	15%	20%	20%	20%	20%
Tax	US$m		2.4	2.1	3.1	3.3	3.5	6.5
Tax	SEKm		22.8	20.7	29.5	31.8	33.3	62.5
Capital expenditure	US$m		1.3	0.6	0.6	0.6	0.6	2.5
Capital expenditure	SEKm		12.5	5.8	5.8	5.8	5.8	24.1
FREE CASHFLOW	**US$m**	**13.8**	**19.9**	**11.5**	**11.6**	**12.6**	**13.2**	**23.4**
FREE CASHFLOW	**SEKm**	**133.3**	**192.4**	**111.3**	**112.1**	**121.5**	**127.6**	**225.9**

Source: MMG estimates

To compare this with the 2017 Technical Study valuation, we must subtract the sunk capital expenditure. The study estimated capital expenditure of €27.4m, equivalent to US$30.1m or SEK292.4m. That leaves us with a project NPV including capital expenditure of SEK548.3m (€51.5m or US$57.0m). Our valuation of €51.5m is broadly in line with the Technical Report figure of €57.1m, but the latter is on a pre-tax basis. We have assumed tax rates ranging from 0% to 20%, the corporate tax rate in Finland. If we strip tax out of our NPV model, our NPV increases to €66.2m.

As noted before, our Base Case valuation is based on a flat commodity price profile, using spot metal prices of 15th November 2019. We have run four other scenarios to illustrate how the value of the mine may change with a different commodity price profile over the 2020 to 2025 period. For all four metals produced, we have used spot prices minus 5% and 10%, and plus 5% and 10%. So, for instance, with metal prices 10% lower than our Base Case, we value the mine at SEK662.4m, while at 10% higher metal prices, out valuation increases to SEK1,013.1m.

Figure 13: MMG Capital Base Case valuation sensitivity of the Silver Mine – changes in metal prices 2020-2025

	-10%	-5%	Base Case	+5%	+10%
Silver (US$/oz)	15.30	16.15	17.060	17.85	18.70
Gold (US$/oz)	1,319	1,392	1,465	1,538	1,612
Lead (USc/lb)	81	85.5	90	94.5	99
Zinc (USc/lb)	99	104.5	110	115.5	121
NPV SEKm	662.4	750.1	840.7	925.5	1,013.1
NPV SEK/share	4.91	5.56	6.23	6.86	7.51

Source: MMG Capital

We have also looked at the Management Case, presented in the 2016 BFS, which assumes an additional 5 years of production covering 2026-2030. According to the BFS, additional capital expenditure of €3.5m will be required. We have conservatively assumed €7.0m, and apart from altering this and our operating cost profile, we have used the same metal prices, exchange rates and production rates as in the seven year Base Case model. The net result is that we estimate that an additional five years of underground production increases our NPV (5% discount rate) by SEK229.4m (€21.5m, US$23.8m) or SEK1.70/share (€0.16, US$0.18).

Sotkamo Silver's Nordic exploration potential

Apart from regional exploration in the Tipasjärvi Greenstone Belt, in the area around the Silver Mine (for further details see page 8), Sotkamo Silver is exploring in three key areas:

- Tungsten exploration in the Bergslagen mining district, Sweden;
- Gold exploration in the Tampere area, Finland;
- Exploration for volcanogenic massive sulphide (VMS) mineralisation (for Zn-Cu-Pb-Ag-Au deposits) at Mo I Rana, Norway.

Tungsten potential in Sweden

In 2017, Sotkamo Silver acquired a portfolio of exploration permits in south-central Sweden, in the Bergslagen mining district near Grängesberg. The area is host to a number of tungsten deposits. These include Gubbo, Hörken, Högfors, Sandudden, Gansen and Yxsjöberg. These areas include some of the largest known tungsten deposits in Scandinavia and include the former Yxsjöberg mine which accounts for more than 90% of all the tungsten mined in Sweden.

The five key tungsten deposits are:

Yxsjöberg - between 1897 and 1989 the skarn deposits in the Yxsjöberg area yielded a total of 5Mt of ore grading 0.38% W, equivalent to 24,800t WO_3;

Hogfors - a fluorite-rich skarn deposit was also mined at Wigströmsgruvan. Between 1978 and 1981, 130,000t at 0.44% WO_3 was produced and mineralisation remains open at depth. An unmined skarn deposit, Båtens, contains 250,000t at 0.26% WO_3;

Hörken – a resource of 43,000t at 0.26% WO_3 has been identified, of which 3,000t were mined between 1937 and 1944. Numerous other mineral occurrences containing scheelite and molybdenite have been identified;

Sandudden – contains a skarn deposit with historical resources of 670,000t at 0.25% WO_3 and 5-6% fluorite. Scheelite-rich boulders also indicate other undiscovered sources of tungsten;

Baggetorp – between 1944 and 1958, the mine at Baggetorp produced around 278,000t at unknown grades from what are thought to be high grade wolframite vein deposits. Nearby wolframite-rich boulders have a different chemistry, suggesting additional mineralisation remains to be discovered.

The Yxsjöberg mine – source of 90% of Sweden's historical tungsten production

The orebody at the former Yxsjöberg mine is by far the largest known area of tungsten mineralisation in Sweden. The skarn-hosted ore deposit consists of three mineralised bodies containing a tungsten-copper-beryllium-fluorite assemblage. The ore deposit was discovered in 1728 and initially mined for copper. Scheelite was discovered in 1862. During WW1 20t of WO_3 were recovered from 6,405t of ore. The mine reopened in 1936 and between then and 1963, when the mine closed due to the fall in the tungsten price, around 2.7Mt of ore were mined (this includes small tonnages mined at Örabergsgruvan and Baggetorp between 1936 and 1945. Fluorite and copper concentrates were also produced from 1954. Ore grades averaged 0.35% scheelite, 0.16% copper and 5.5% fluorite. Overall, it is estimated that 5,550t of contained tungsten were recovered in the 1936-1963 period. State-owned AB Statsgruvor re-started production in 1972, after constructing a new concentrator and headframe. The mill was originally based around gravity separation, but was converted to selective flotation in 1977. The mine was closed again in 1989 as tungsten prices fell once more, and has not been in operation since. Underground operations reached a depth of c.600m. Known mineralisation continues to a depth of 750m and geophysics suggests it may extend to at least 900m.

Sotkamo Silver estimates that in total over 5Mt of mineralised material averaging 0.35% WO_3 (together with copper and fluorite) have been mined. Significant tungsten mineralisation remains, while the company believes that fluorite could be commercially extracted as a by-product. The mill is largely untouched since the mine closed.

A number of juniors have held interests in the licences that Sotkamo Silver has acquired, including Tumi Resources, which acquired the licences in 2011/2012. Tumi noted that the remaining identified tungsten at the Yxsjöberg mine totalled 500,000t averaging 0.35% WO_3 and noted the potential for reprocessing the two tailings dams (one contains 2.4Mt, the other 2.2Mt). The average grade is c.0.19% WO_3 with additional values of beryllium (potentially over 920t at an average grade of 0.02% beryllium), copper and fluorite (Tumi Resources press release, 28th November 2012). Tasman Metals acquired Tumi's land package in 2013. Tasman was taken over by Flinders Resources in 2016, and the combined company was renamed Leading Edge Materials. Sotkamo Silver acquired the leases in late 2017/early 2018.

Like Tumi, Sotkamo Silver is also considering tailing reprocessing. The company's current thoughts are that the plant will contain four elements. Magnetic separation would be used to remove iron contaminants and minerals (magnetite and pyrrhotite), followed by a Knelson gravity circuit to recover scheelite particles. Conventional froth flotation would be used to recover fluorite, chalcopyrite, helvite (a beryllium mineral), bismutite (a bismuth mineral) and scheelite in two size fractions; 10-75 microns and 75-150 microns. For particles less than 120 microns, the plan is to use column flotation and flocculation flotation.

Tampere area, Finland: gold potential

Dragon Mining operates two small gold mines in the region, at Jokisivu and Kaapelinkulma (as well as the Orivesi mine which is currently in the process of closing) and has a concentrator at Vammala that produces around 25,000-30,000ozpa. The gold typically occurs with arsenopyrite in quartz veins and is both orogenic and epithermal in origin. The Finnish Geological Survey, GTK, and other mining companies have conducted exploration in the area, and this data is available to Sotkamo Silver including c.9,000m of previous drilling data on the leases.

Sotkamo Silver holds 7 gold claims in the Tampere area. Of these licences, and based upon historical drilling, the most promising areas are:

- Hopeavuori - the most advanced project. Drilling started in late 2017; inferred resource of 238,470t at 3.84g/t Au at Hopeavuori East and 51,453t at 1.34 g/t at Hopeavuori West;
- Kalliojärvi 1 – best diamond drill core intervals include 4.8m at 6.5g/t, 4.3m at 7.2g/t, 3.0m at 5.6g/t and 1.0m at 15.7g/t Au;
- Metsäkylä 1 - best diamond drill core interval 1m at 27.6g/t;
- Järvenpää 1 – up to 2g/t in drill samples;
- Lavajärvi 1 - best diamond drill core interval 4m at 1g/t;
- Isovesi 1 - best diamond drill core interval 3.7m at 5.3g/t.

At Hopeavuori, GTK undertook exploration in the 1990's, including geophysical and geochemical surveys, as well as drilling. Apart from the mineral resource calculation, Sotkamo Silver has also commissioned gravity and flotation recovery tests. The deposit remains open along strike and down-dip, and Sotkamo Silver therefore has the potential to significantly add to the mineral resource already outlined.

Mo I Rana, Norway: VMS polymetallic mineralisation

The Mo I Rana area is highly prospective for polymetallic VMS deposits and is host to the Rana Gruber iron ore mine. There is widespread evidence of sulphide deposition in the area, with 200 individual areas of mineralisation, prospects and deposits, 90 of which are on Sotkamo Silver tenements. In total Sotkamo Silver has 5 mining concessions and 20 exploration licences in the area. The 5 mining concessions cover the most advanced opportunity, the former Mofjell mine. 14 exploration licences contain targets for VMS polymetallic targets (Zn-Cu-Pb-Ag-Au), 4 more exploration licences are held over iron formations with gold potential, and another two on unexplored tenements with ultramafic rocks with Platinum Group Metals (PGM) and nickel potential. Sotkamo Silver has acquired a large database from the Norwegian Geological Survey (NGU) and Gexco (a predecessor of Sotkamo Silver). NGU and Gexco flew a 4,000 line-kilometre helicopter TEM survey over c.500km^2 (the TEM, or transient electromagnetic method measures the resistivity/conductivity of the sub-surface). 147 holes were drilled, totaling 16,406m, but work stopped in 2008 due to the global economic crisis.

Sotkamo Silver's licences in the Mo I Rana area expire on 5th June 2020. It is possible to apply for an extension under certain circumstances but it is not certain that this will be granted. Another option could be to apply for an extraction licence on the most prospective areas, but again it is not certain that this would be granted.

The Mofjell mine – the most advanced opportunity

The closed Mofjell mine has a coastal location and good infrastructure. The mine still has a remaining resource of 3.16Mt grading 2.5% Zn, 0.4% Pb and 0.3% Cu. According to Sotkamo Silver, the mine has reportedly produced 4.35Mt grading 3.61% Zn, 0.71% Pb, 0.31% Cu, 10g/t Ag And 0.3g/t Au. Drilling in the last few years of mining at Mofjell intersected high grade gold

mineralisation, including 1.4m at 7.35g/t Au and 2.8m at 3.88g/t. The gold appears to be associated with low grade base metal mineralisation beside the main ore zone, and adds an interesting dimension to the future resource potential at the mine.

Apart from the immediate Mofjell mine area, the most prospective areas (based on combined Cu-Zn-Pb) concentrations are at Hammaren (east of Mofjell), Hesjelia, Småvatnan and Hellerfjellet where NGU collected samples from outcrops, trenches and old pits the best of which contained over 10% combined Cu-Zn-Pb and over 100g/t Ag. The best drill intersections include:

- 5.7m at 0.9% Zn, 0.1% Pb and 1.5% Cu (2.5% combined);
- 5.2m at 2.0% Zn, 0.1% Pb, 0.3% Cu (2.4% combined);
- 5.0m at 1.2% Zn, 0.4% Pb and 0.4% Cu (2.0% combined);
- 4.9m at 2.2% Zn, 0.1% Pb and 0.2% Cu (2.5% combined);
- 3.1m at 3.3% Zn, 1.1% Pb and 0.3% Cu (4.7% combined);
- 2.7m at 1.6% Zn, 0.1% Pb, 04% Cu (2.4% combined);
- 2.7m at 1.7% Zn, 0.1% Pb and 0.7% Cu (2.2% combined).

Exploration projects' peer valuations

Cautionary note

Sotkamo Silver has undertaken limited work on its exploration portfolio, and attempting to put a value on the portfolio is difficult given the lack of exploration data. We have attempted to do so by looking at the company's peers. In the case of the Swedish tungsten assets we have compared against global peers, a number of which are in the Iberian Peninsula. Some are producers, some have a defined mineral resource, and others are in early stage exploration. In the case of the Tampere area gold projects, there are a number of gold exploration peers in the Nordic Region – some in Sweden, some in the Central Lapland Greenstone Belt (CLGB) of northern Finland, but there are also some in the Tampere region – both in production and at the exploration stage. In the case of the Mo I Rana VMS prospects, we have benchmarked Sotkamo Silver against other Norwegian polymetallic exploration transactions.

However, investors and potential investors should be aware that proximity to existing or historical mining operations, or to encouraging exploration programmes, or the presence of historical mining and exploration work on Sotkamo Silver's licences does not mean that economically viable mineralisation will be found on Sotkamo Silver's exploration licences. Each peer project that we have reviewed may have materially different characteristics from Sotkamo Silver's licences in terms of location, prospectivity, previous work, infrastructure, lease area etc. The conclusions that we draw do, we believe, offer a sense of the order-of-magnitude of the potential current value of the exploration portfolio. As exploration progresses, value definition should improve, although this does not necessarily mean an increase in the perceived value of the exploration licence.

Grängesberg area, Sweden: tungsten potential

Global tungsten peers

The biggest use of tungsten (over half of global demand) is in cemented carbides, or hardmetals, made by "cementing" very hard tungsten monocarbide grains in a binder matrix of tough cobalt or nickel alloys. The hardness, strength and toughness of cemented carbides mean that it is used in a wide range of engineering and tooling applications, for the shaping of metals, alloys, wood, composites, plastics and ceramics, as well as for mining and construction industry applications. Tungsten is also a key component in tool steels, high speed steels, stellites (cobalt-chromium alloys), creep-resistant steels and other alloys. Tungsten mill products include lighting filaments, electrodes, electrical and electronic contacts, wires, sheets, rods etc as well as tungsten alloys. There are also widespread chemical applications for tungsten.

Economic concentrations of tungsten are relatively rare, and China dominates global production, although there are a few listed producers mining tungsten ores in Spain, Portugal and South Korea and these are useful peers for comparison with

Sotkamo Silver's Swedish tungsten assets. We have based our valuation on transaction value considerations relative to contained WO_3.

Almonty Industries – Canadian-listed Almonty operates the Los Santos mine in Spain, the Panasqueira tin-tungsten mine in Portugal, the Sangdong mine in South Korea, and also controls the Valtre Valtrixal tin-tungsten project in Spain. In 2015 and 2016, Almonty undertook 3 acquisitions, and these are potentially useful indicators for Sotkamo Silver's Swedish tungsten assets.

In early 2015, Almonty took control of the Panasqueira mine for €1.5m. At the time, the soon-to-be-released NI 43-101 report noted ore reserves of 1.66Mt grading 0.21% WO_3 (contained WO_3 of 3,431t or 343,104MTU) and a total resource of 14.45Mt at 0.23% WO_3 (contained WO_3 of 32,925t or 3,292,516MTU).

In late 2015, Almonty took control of Woulfe Mining. The valuation at acquisition was C$25.7m (€17.8m). Woulfe was planning to reopen the Sangdong mine (total resources of 58.7Mt at 0.44% WO_3 and 0.05% MoS_2).

In December 2016, Almonty acquired the 49% of the Valtreixal project that it did not own, for €1.5m, valuing the whole project at €3.0m. At the time, the total resource on the project was 18.25Mt at 0.12% Sn, 0.11% WO_3 and 0.20% WO_3 Eq. This transaction reinforces Almonty's position as the leading producer of tungsten concentrate outside of China. We believe that the Valtreixal transaction (involving a non-producing asset) is the most appropriate metric for comparison with Sotkamo Silver's leases.

Masan Resources – the Núi Pháo tungsten mine in Vietnam, the world's largest outside of China, started commercial production in 2014 and is now wholly-owned by Vietnamese company Masan Resources. In August 2018, Masan bought out the 49% that it did not own from JV partner HC Starck for US$29.1m, valuing 100% of the mine at US$59.4m. In a 2012 presentation to the International Tungsten Industry Association (ITIA), Masan quoted total resources of 97.41Mt at 0.18% WO_3, 7.73% fluorspar, 0.18% Cu 0.08% bismuth and 0.18g/t Au. Based on Masan's results, we estimate that c.16.6Mt has been mined by the time that Starck was bought out, implying a remaining resource of 80.8Mt at the time Masan assumed full control. In September 2019, Masan and Starck struck a further deal, the most recent tungsten deal in the market, for Masan to buy Starck's mid-stream tungsten products business (tungsten metal powders and carbides) for an undisclosed sum.

W Resources – W Resources, listed on AIM, has three tungsten projects in the Iberian Peninsula. The La Parilla mine started production earlier this year and has a total resource of 49Mt at 0.10% WO_3. In Portugal, the Régua deposit has a resource of 5.46Mt at 0.28% WO_3; the company also holds the Tarouca project, a former tungsten/tin mine, and the São Martinho gold project (with modest resources of 112,000oz Au). Given that La Parilla recently entered production, and W Resources also owns a small gold project, a direct correlation with Sotkamo Silver's assets is again imperfect.

Saloro JV – the joint venture is 70% owned by Oaktree Capital And 30% by AIM (London) and Euronext Growth (Dublin)-listed Ormonde Mining, and recently (February 2019) commissioned its Barruecopardo tungsten mine in Spain. The mine has a total ore reserve of 8.69Mt at 0.30% WO_3, containing 2.61m WO_3 MTU and a total resource of 27.39Mt at 0.26% WO_3 for a total of 7.12m WO_3 MTU. Plans called for a capital expenditure of €53.6m, a 9-year initial mine life, and annual production of 2,600t WO_3 (260,000 WO_3 MTU). This transaction can be used as a marker for Sotkamo Silver.

Strategic Minerals – the AIM-listed company agreed a deal in March 2019 to buy out its 50% JV partner in the Redmoor project tungsten-copper-gold project in Cornwall, England. A resource of 11.7Mt at 0.56% WO_3, 0.16% Sn and 0.50% Cu, making 1.17% Sn Eq, has been outlined. The agreement is for payment of A$3m to New Age Exploration through cash installments, with payment in full by the end of June 2020. The outstanding declining balance (as instalments are paid) is subject to a 5% interest charge; on this basis, the total cost could be c.A$3.1m. Although Redmoor is arguably a tin project, not tungsten, it can be used to help in valuing Sotkamo Silver's assets.

Apollo Minerals – this ASX-listed company has a 100% interest in the Couflens project in the French Pyrennes, which includes the high grade Salau gold mine, closed in 1986. Contiguous with this, and over the border in Spain, Apollo has a 75% interest

in the Aurenere project. Both lease areas have reported high grade tungsten and gold mineralisation. While there is currently a licence dispute between the regional court in Toulouse and the French State over Couflens, and neither the French or Spanish project currently has a resource, the projects are reasonable peers for Sotkamo Silver. In March 2018, and for the remaining 20% of Couflens that it did not own, Apollo agreed to pay up to A$1m cash to and assume €400,000 of debt from the seller, Variscan France. There are also staged payments, in Apollo shares, of up to c.A$2.75m, subject to various project developments, up to first production (any Variscan liabilities over €400,000 will be deducted from future staged payments). In March 2018 Apollo acquired 75% of Aurenere for €250,000 plus the commitment to spend €500,000 in 3 years and €2.5m in 5 years. Given the challenges in France, Apollo has had a change of tack, and is buying into a zinc-lead project in Gabon.

PanEx – in Portugal, private company PanEx is earning a 90% interest in the Borralha project in Portugal (formerly the country's second largest tungsten producer) for C$5m, by taking the project to feasibility. The company also holds the Villa Verde project, also in northern Portugal. There are clear indications of mineralisation on both properties, but no resources have been announced.

Rafaella Resources – Australian-listed Rafaella Resources' recently acquired the privately-held Galicia Tin & Tungsten which owns the Santa Comba project in Spain. The project has a JORC inferred resource of 5.35Mt grading 0.236%WO_3 and 0.026% Sn made up of a near-surface resource of 5.11Mt grading 0.203% WO_3 and 0.014% Sn, and a much higher grade underground resource of 234,000t at 0.95% WO_3 and 0.28% Sn. In 1987, using the same underlying data as used in the JORC underground resource, the previous operator, Coparex, calculated (on a non-JORC basis) a resource for the Mina Carmen underground mine of 738,000t at 0.81% WO_3 and 0.18% Sn. There is good infrastructure and former owners undertook substantial underground development and started to build a processing plant (c.70% complete). The project has an offer of an offtake agreement from HC Starck Tungsten, and via Starck pre-approval of €11m of pre-production development finance from the German government. The acquisition will be satisfied by the issue of 17.5M Rafaella shares, priced at A$0.20/share, and two further tranches of 15M shares each subject to the project hitting certain resource and reserve criteria. At the A$0.20/share price level, that would imply an entry cost of A$9.5m or SEK62.2m.

Tampere area, Finland: gold potential

Finnish gold peers

There are a number of gold explorers and producers in Finland, but few are directly comparable. Agnico-Eagle is a substantial producer, with gold mines in Canada and Mexico, as well as Finland. Dragon Mining, Endomines, Mawson Resources and Rupert Resources are also either in production (at a substantially lower level than Agnico-Eagle) or they are at a more advanced stage of exploration than Sotkamo Silver; all four companies have reported mineral resources. Should Sotkamo Silver report mineral resources in the future, it may be possible to compare the company against these four peers on the basis of Enterprise Value/contained gold in resources. Instead, we believe that the most relevant metric is a valuation based on peer group prospect acquisitions. We believe that four companies provide suitable transaction metrics; Aurion Resources, Firefox Gold, Nero Projects and Sunstone Metals/Nortec Minerals.

Agnico-Eagle Mines - Canada's Agnico Eagle Mines dominates gold production in Finland, with 2018 production of 189,000oz from its Kittilä mine in Lapland in northern Finland, the largest primary gold mine in Europe. Agnico-Eagle also has numerous exploration plays, primarily in Lapland. The company is guiding to production at Kittilä of 175,000oz in 2019, 215,000oz in 2020 and 245,000oz in 2021 and is clearly too large to compare with Sotkamo Silver.

Dragon Mining - Dragon Mining delisted from the ASX in Australia in October 2018, and moved its listing to the Hong Kong Stock Exchange. Dragon Mining operates two small gold mines in the region, at Jokisivuand Kaaspelinkulma (as well as the Orivisi mine which is currently in the process of closing) and has a concentrator at Vammala that produces around 25,000-30,000ozpa. The company also operates at Svartliden in Sweden. Mining here has ceased, and the plant is treating stockpiles, and ore acquired elsewhere, including from its Finnish mines. This will be augmented by ore from Faboliden in northern Sweden, which recently recommenced production. While Dragon Mining operates in the Tampere region, it is a producer, not an explorer, and also operates in Sweden. The Hong Kong listing also makes complicates comparisons.

Endomines AB - listed in Stockholm and Helsinki, like Sotkamo Silver, Endomines produced 10,652oz in 2018 from the Pampalo mine in south-eastern Finland. The mine is now on care-and-maintenance, and not a good peer for Sotkamo Silver's exploration programme. The company is focusing on a project in Idaho.

Mawson Resources – Toronto-listed Mawson's flagship project is the Rompas-Rajaplot gold-cobalt exploration project in northern Finland. The company has outline an inferred mineral resource of 4.3Mt at 2.3g/t Au and 430ppm Co, for a total of 424,000oz Au at a gold equivalent grade of 3.1g/t. Mawson also has a less advanced gold exploration programme in the USA.

Rupert Resources – the company also operates in the Central Lapland Greenstone Belt, and holds 100% of the Pahtavarra gold mine and mill, and a number of other exploration permits in central Finland, in particular Hirsikangas (resource of 2.2Mt at 1.2g/t or 89,000oz contained) and Osikonmäki (3.23Mt at 2.7g/t or 276,000oz contained). The Pahtavarra mine operated between 1996 and 2014, and annual production peaked at 37,000oz. Rupert recently announced the discovery of a major new area of mineralisation at the project. The mine has an inferred resource of 4.64Mt at 3.2g/t Au, containing 474,000oz at a 1.5g/t Au cut-off. The company also has a couple of early stage exploration projects in Canada.

Nordic Gold Oy – listed on the TSXV in Canada, Nordic Gold Oy (formerly Nordic Mining Oy) started production at the Laiva gold mine, near the central west coast of Finland, in August 2018. Nordic had expected the mine to reach commercial production of 70,000oz pa in Q2 2019. However, due to mining and milling issues, production was suspended in January 2019, and the mine is currently on care-and-maintenance pending resolution of the operating issues. The company recently released an updated mineral resource for the mine and the new management team hope to resume mining in June 2020.

Aurion Resources – like Agnico-Eagle, Aurion also operates in the Central Lapland Greenstone Belt (CLGB) in northern Finland. The company's gold exploration in the region commenced in 2014, with the acquisition of the Kutuvouma and Silasselka projects from Dragon Mining in May 2014 for 6.75M Aurion shares and a commitment to spend €1m on the projects within 3 years. The deal was worth c.€1.3m in total at that time. Historical drilling on the Kutuvuoma leases by Outokumpu had yielded a number of high grade gold intercepts including, for example, 7.2g/t Au over 19.4m, inclusive of 26.7g/t over 1.0m. Historical exploration on Silasselka was for vanadium, but Dragon and Aurion were both optimistic of gold potential. Both licences are 35-40km from Agnico's Kittilä mine. Aurion also now controls the Ahvenjarvi concession; Kutuvouma and Ahenjarvi are now joint-ventured with B2 Gold. The Risti project, which includes the Aamursko discovery, is now Aurion's flagship wholly-owned project. While Aurion operates in a different part of Finland to Sotkamo, the CLGB, on leases close to Europe's largest gold mine, it is a reasonable peer for Sotkamo Silver.

Firefox Gold – listed in Canada, Firefox has interests in 5 Finnish gold projects. Four of them, Jessiö, Mustajärvi, Seuru and Riikonoski, are in the CLGB, but the fifth, Ylöjärvi, is in the Tampere region, relatively close to Sotkamo Silver's leases. The Ylöjärvi project includes the former Haveri gold mine which produced 142,000 Au and 6,000t Cu before closing in 1960. Haveri contains a resource (neither JORC nor NI 43-101 compliant) of 24.7Mt at 0.89g/t. Some interesting gold grades have been encountered on some of the CLGB leases, but there are no NI 43-101-compliant mineral resources yet defined. Firefox is currently capitalised at C$4.0m or €2.7m and is considered to be a reasonable peer for Sotkamo Silver's Finnish gold exploration assets.

Nero Projects – in November 2016, Dragon Mining announced the conditional sale of Kuusamo Gold Oy (owner of the Kuusamo gold-cobalt project) to a private Australian company, Nero Projects Australia Pty Ltd, for A$500,000 (€350,000). It is unclear what the current status of the project is, but it would appear that relatively little exploration work has been done on the property, so the transaction terms could be a reasonable guide for valuing a relatively unexplored licence area like Sotkamo Silver's.

Sunstone Metals/Nortec Minerals – in May 2016, Canadian miner Nortec Minerals entered into an agreement with Australia's Avalon Minerals (which changed its name to Sunstone Metals in 2017) on Nortec's Tammela lithium project in the Tampere region of southern Finland. The property includes the Kietyönmäki lithium prospect, and two gold prospects, Riukka and Satulinmaki. Sunstone has acquired an 80% interest in the leases at a cost (cash and shares, and subsequent project expenditures) of €1.74m. Drill intersections include 23.5m at 3.3g/t, within which is 9.2m at 7.3g/t Au. From work undertaken to date, it would appear that the gold prospects have greater potential than the lithium prospect, and if one applies 80% of the transaction price to gold, this would in turn imply that the gold projects are worth c.€1.74m. Sunstone's key focus, however,

is its Bramaderos gold-copper project in Ecuador. Sunstone also holds an indirect interest in the Viscaria copper project in Sweden. The Sunstone/Nortec gold transaction is a reasonable peer for Sotkamo Silver's gold assets in the Tampere area.

Mo I Rana area, Norway: VMS polymetallic potential

Scandinavian polymetallic peers

There are a small number of peers with polymetallic mines and exploration licences in Scandinavia, some of which may be volcanogenic massive sulphide (VMS) deposits. Mid-tier companies with base metal production in Scandinavia include Boliden, Lundin Mining and First Quantum Minerals. In addition, there are several companies exploring for polymetallic deposits in Scandinavia. There have been a number of polymetallic asset transactions in Norway, by EMX Royalty to Boreal Metals and Nora Metals, and by Koppar Resources and these make suitable comparisons for Sotkamo Silver. We have also used the fixed asset value of privately owned Vilhelmina Mineral.

EMX Royalty – EMX describes itself as a royalty generator. The company makes low cost early stage exploration property acquisitions to build value, and then develops partnerships with other companies to advance those projects, whilst retaining a royalty (it also may make strategic investments and acquire existing royalties). The company has interests in a number of projects in the USA, Turkey, Serbia, Australia, Haiti and Canada. However, Norway is EMX's latest exploration jurisdiction – the company has 13 exploration projects, and EMX is the largest mineral-rights holder in Norway. These include Bleikvassli, which is near to Mo I Rana (and therefore near to Sotkamo Silver's leases) and is considered to be a potential VMS or sedimentary exhalative deposit (SEDEX). In December 2018 the project was sold to OK2 Minerals (now Norra Metals) as was the Meråker copper-rich polymetallic and Sagvoll VMS deposits, located near Trondheim. EMX also holds Kjøli, in the historic Rørøs mining district, which is considered to be a polymetallic VMS deposit and is available for partnership. Tynset, also in the Rørøs mining district, was sold in late 2016 to Boreal Metals. EMX also has interests in 13 prospects in Sweden, including the Adak and Gumsberg polymetyallic VMS projects, acquired by Boreal in December 2016. In December 2018, OK2 Minerals (now Norra Metals) acquired the Bastuträsk polymetallic VMS deposit. EMX is seeking a buyer for its Tomtebo and Trollberget polymetallic VMS deposits, located in the Bergslagen district, and close to the Falun and Garpenberg polymetallic VMS mines. A number of these transactions give good valuation markers for Sotkamo Silver's Mo I Rana polymetallic VMS exploration projects.

Boreal Metals – Canadian-listed Boreal has seven projects in Sweden and Norway, covering a variety of metals. These include the Gumsberg and Adak VMS projects on Sweden, and the Tynset VMS project in Norway. Gumsberg has over 30 historic mines on the property, while the Adak mine closed in the 1970's following a fire. Tynset was also mined in the past. The deal between Boreal and EMX is a combination of equity issuance and royalties and includes these three VMS projects, and a fourth project, the Burfjord iron oxide copper-gold (IOCG) deposit in Norway. Boreal issued EMX 1,713,390 shares on closing (at a cost of C$215,233). The deal provided with an anti-dilutive right to maintain a 19.9% equity position in Boreal at no cost to EMX until Boreal had raised C$5m, and then EMX has a right to participate in any offering to maintain its 19.9% interest. Including the anti-dilutive share issuance, Boreal has issued C$1,506,230 of equity to EMX. EMX was also granted a 3% net smelter return (NSR) royalty on each property, of which, under certain circumstance, 1% may be repurchased by Boreal for US$2.5m, valuing the NSR on each property at US$7.5m. If one assumes that the four properties were valued equally at acquisition, this would imply that C$1.125m (US$850,000) of the CS$1.5m shares issued apply to the three polymetallic VMS projects. If one assumes that one of the three VMS projects advances to production, then the price paid (ie the value at transaction) for the 3 polymetallic VMS projects equates to US$8.35m.

Norra Metals – Norra, (formerly OK2Minerals), is also listed in Canada. In February 2019 the company completed a deal with EMX to acquire four polymetallic Scandinavian exploration projects. These include the Bleikvassli deposit which, like Sotkamo Silver's licences, is in the Mo I Rana area of Norway. When closed, the former mine still had a resource of 720,000t grading 5.17% Zn, 2.72% Pb, 0.27% Cu, 45g/t Ag and 0.2g/t Au (non-NI 43-101 compliant). The other two Norwegian projects,

Sagvoll and Meråker, host a number of small scale former mines mined, variously, between 1760 and 1918. Bastuträsk, in Sweden, is an advanced-stage Cu-Zn VMS project, with over 70 historical drill holes on the property. In payment, Norra issued EMX with 4,808,770 shares, worth C$288,528 (US$220,000), representing 9.9% of Norra's equity. Until Norra raises C$5m of additional equity to fund exploration on the projects, it must provide up to 13,398,958 additional anti-dilutive shares free to EMX to maintain EMX's 9.9% shareholding – currently worth C$670,000 or US$515,000. There is an additional equity provision that requires Norra to raise and spend C$2m within 2 years of the deal closing, otherwise EMX's stake rises to 14.9%. EMX also has a 3% NSR per project (Norra may buy back 1% for US$2.5m) and also receives a 0.5% NSR on any other mineral exploration that Norra generates in Norway and Sweden, as well as a 1% royalty on Norra's Pyramid project in Canada. If one assumes that one of the four projects proceeds (and therefore applies a US$7.5m royalty) and adds the value of the shares currently issued, and the potential maximum anti-dilutive sum for equity issuance to EMX, then the price paid (ie the value at transaction) for the 4 polymetallic VMS projects equates to US$8.23m.

Koppar Resources – while the Australian-listed company's most recent foray is into a German lithium brine project, the company does hold interests in six lease areas in the Trondheim area of Norway that contain a number of historical copper-zinc-lead mines. The leases are at Grimsdalen, Nygruva, Killingdal, Løkken, Storwatz and Tverrfjellet. Løkken is considered to be one of the largest ophiolitic-VMS deposits in the world, and was mined from 1654 to 1987, yielding 24Mt at 2.3% Cu, 1.8% Zn, 0.02% Pb, 16g/t Ag and 0.2g/t Au. Smaller tonnages of ore were recovered from the other project areas. The company is currently capitalised at A$5.9m and has an Enterprise Value of A$9.3m. Koppar can be considered to be a reasonable peer for Sotkamo Silver's Norwegian VMS assets.

Vilhelmina Mineral - privately-owned Vilhelmina has postponed its plans to list in Stockholm due to weak financial markets. Vilhelmina has a 50% interest in the old Joma mine in Norway, where about 11.5 Mt were produced between 1972 and 1998 with 1.49% Cu and 1.45% Zn. It is believed that a resource of 5.5Mt grading 1.55% Cu and 0.82% Zn remains. In the period August 2017 to May 2018, Vilhelmina Mineral acquired 50% for SEK5.9 m and can increase its ownership to 100%. In Sweden, Vilhelmina holds the Stekenjokk and Levi projects. Stekkenjokk produced 7.1Mt of ore between 1987-1988 grading 1.5% Cu and 3.5% Zn. Based on previous drilling, total remaining indicated reserves are estimated to be 7.4 Mt at 1.17% Cu and 3.01% Zn as well as 2.7 Mt of inferred resources at 0.94% Cu and 2.95% Zn. At the end of 2018, Vilhelmina had a fixed asset value of SEK11.5m. Vilhelmina is a reasonable peer for Sotkamo Silver's VMS assets.

Valuation of exploration assets

Cautionary note

Limited work has been carried out to date by Sotkamo Silver on its exploration assets, and as a result we repeat our investment warning. Investors and potential investors should be aware that proximity to existing or historical mining operations, or to encouraging exploration programmes, or the presence of historical mining and exploration work on Sotkamo Silver's licences does not mean that economically viable mineralisation will be found on Sotkamo Silver's exploration licences. Each peer project that we have reviewed may have materially different characteristics from Sotkamo Silver's licences in terms of location, prospectivity, previous work, infrastructure, lease area etc. The conclusions that we draw do, we believe, offer a sense of the order-of-magnitude of the potential current value of the exploration portfolio. However, there can be no guarantee that shareholders will derive any value from the exploration portfolio.

Swedish tungsten exploration

The core asset in the tungsten portfolio is the prospect containing the former Yxsjöberg tungsten mine. Given that mineralisation is known to extend to depth, below mined areas, we have assumed that 20,000t of WO_3 remains in total resources, and have compared the Yxsjöberg prospect with other tungsten producers and explorers on an EV/t WO_3 basis. We have added €5m for the existing infrastructure in place at the old mine. For the other 4 prospects, we have given a nominal $0.5m valuation per project. On this basis, we value the tungsten exploration portfolio at SEK 85.8m (€8.0m or US$8.9m).

Figure 14: Valuation for Sotkamo Silver's Swedish tungsten exploration assets

	Value SEKm
YXSJÖBERG - assume 20,000 WO_3 recoverable in total resources	
Almonty - assume pro rata same value as Valtreixal plus €5m for Yxsjoberg infrastructure	70.9
Masan - pro rata Starck Núi Pháo transaction valuation	64.2
W Resources - EV/t WO_3 in resource, with 75% discount because La Parilla in production	52.1
Saloro JV - EV/t WO_3 of 30% owner Ormonde Mining, with 75% discount because Barruecopado in production	34.2
Strategic Minerals - pro rata same value as Redmoor deal (assume contained WO_3 only) plus €5m for Yxsjoberg infrastructure	59.6
Apollo Metals - March 18 deal to buy 20% of Couflens based on initial transaction of A$1m cash and assumption of €400,000 of debt	54.3
PanEx - 100% equivalent of Borralha deal, discounted by 50% (u/g vs o/p) plus €5m for Yxsjoberg infrastructure	81.2
Rafaella Resources - EV/t WO_3 resource +/- EUR 0m given infrastructure already at Santa Comba	99.1
AVERAGE	**64.4**
€0.5m for each of the other four projects	21.1
SOTKAMO SILVER'S SWEDISH TUNGSTEN PROSPECTS	**85.8**

Source: MMG Capital

Gold exploration in the Tampere area, Finland

If Sotkamo Silver is able to undertake sufficient exploration and drilling to determine a mineral resource, it may be possible to value the gold exploration portfolio on an EV/oz in total resource basis against peers like Dragon Mining, Endomines, Mawson Resources and Rupert Resources, all of whom have gold exploration or production assets in Finland. Until then, we have based our valuation on transactions – the price paid to acquire gold exploration projects in Finland. We do not differentiate on the basis of historical exploration work, location (ie Tampere area or Central Lapland Greenstone Belt) or lease area. Based on the average value per lease area tabulated below, Sotkamo Silver's Finnish gold exploration portfolio is worth SEK51.7m (€4.8m or US$5.4m).

Figure 15: Valuation for Sotkamo Silver's Tempare area Finnish gold exploration assets

		SEKm
Aurion Resources	Kutuvuoma & Silasselka prospects	13.1
Nero Projects	Kuusamo Gold acquisition	3.7
Sunstone Metals/Nortec Minerals	Eiukka & Satulinmaki prospects	18.6
Firefox Gold	Mustajarvi prospect	1.2
Firefox Gold	Riikonkoski, Jeesio & Ylojarvi prospects	33.3
Firefox Gold	Seuru prospect	16.3
Average per prospect		8.6
SOTKAMO SILVER'S TAMPERE GOLD PROSPECTS	**Six prospects**	**51.7**

Source: MMG Capital

Polymetallic VMS exploration in the Mo I Rana area, Norway

There has been only limited mineral exploration in Norway in recent years. We have valued Sotkamo Silver's Norwegian polymetallic assets based on the sale of three sets of exploration prospects, and on the fixed asset value of Vilhelmina Mineral, a private Swedish polymetallic explorer operating in Norway and Sweden. Based on the average value per lease area tabulated below, Sotkamo Silver's Norwegian polymetallic VMS portfolio is worth SEK71.9m (€6.7m or US$7.5m). However, because Sotkamo Silver's exploration leases expire on 5th June 2020 with no guarantee of renewal, we discount this figure by 75% and ascribe a valuation of SEK18.0m to them (€1.7m, US$1.9m).

Figure 16: Valuation for Sotkamo Silver's Norwegian polymetallic VMS exploration assets

	SEKm
Boreal Metals - Gumsberg, Adak & Tynset	80.3
Norra Metals - Bleikvassli, Sagvoll, Meraker & Bastutrask	79.1
Koppar Resources - Lokken, Grimsdalen, Nygruva, Kikkingdal, Storwatz & Tverrfjellet	61.3
Vilhelmina Mineral - Joma, Stekenjokk & Levi	9.5
Average per prospect	14.4
SOTKAMO SILVER'S MO I RANA VMS PROSPECTS (undiscounted)	**71.9**
SOTKAMO SILVER'S MO I RANA VMS PROSPECTS (discounted by 75% due to expiration of title in June 2020)	**18.0**

Source: MMG Capital

Conclusion

Based on the comparative methodologies outlined above, we value Sotkamo Silver's exploration portfolio (Tampere gold, Swedish tungsten and Mo I Rana VMS) at SEK139.3m (€14.5m or US$16.2m). However, we reiterate that only limited work has been carried out on the company's licences and there can be no guarantee that economic mineralisation will be found on any of the company's tungsten, gold or VMS licences. We have noted separate valuations for the Management Case (an additional mine life of 5 years), brownfields exploration at the Silver Mine and regionally elsewhere in the Tipasjärvi Greenstone Belt on pages 19, 11 and 9 respectively.

MMG Capital's Valuation of Sotkamo Silver AB

Methodology: sum-of-the-parts asset valuation

Given that Sotkamo Silver AB's one operating asset, the Silver Mine, has a relatively short seven-year mine life, and the rest of the company's assets comprise mineral exploration assets, we believe that a sum-of-the-parts net asset value calculation is the most appropriate way to value the company.

We have used the following assumptions in our valuation:

- Silver Mine (Base Case; 2019-2025) – NPV of future Base Case cashflows, discounted at 5% (see page 17);
- Silver Mine (additional 5 years; 2026-2030) - NPV of future Base Case cashflows, discounted at 5% (see page 19);
- Additional Silver Mine depth optionality – notional value of at-depth exploration potential at mine (see page 11);
- Tipasjärvi region exploration – notional value (see page 9);
- Swedish tungsten exploration – peer transaction valuations (see page 28);
- Tampere area gold exploration – peer transaction valuations (see page 29);
- Mo I Rana VMS exploration – peer transaction valuations (see page 29);
- Central costs - estimate discounted by 5%pa over life-of-mine;
- Net debt (short and long term liabilities less cash and inventories) – as at 30 September 2019.

Based on the methodology outlined in this research note, we calculate a potential value for Sotkamo Silver AB of SEK936.8m, or SEK6.94/share. This compares with the current share price (15 November 2019) of SEK 4.13. Of our SEK 6.94/share valuation, SEK 4.54/share comprises out valuation of Silver Mine (assuming the current seven-year Base Case plus five years), less corporate cost and net debt assumptions. The market is therefore not applying full value for the potential five-year mine life extension at Silver Mine, nor any value for either further at-depth mineralisation at the mine or any value for Sotkamo Silver's other exploration assets. While little recent work has been undertaken on the company's exploration leases or on the potential to extend mining at depth at the Silver Mine, some option value for exploration is, we believe, warranted. Investors should treat our exploration valuation as an estimate of the potential current value of the exploration assets, and not a definitive valuation of the exploration portfolio. As noted before, there is no certainty that a commercially viable project will be defined on the company's exploration leases.

Figure 17: NAV calculation for Sotkamo Silver AB

	SEKm	SEK/share
Silver Mine (Base Case; 2019-2025)	840.7	6.23
Silver Mine (additional 5 years; 2026-2030)	229.4	1.70
Additional Silver Mine depth optionality	150.0	1.11
Tipasjärvi region exploration	20.0	0.15
Swedish tungsten exploration	85.8	0.64
Tampere gold exploration	51.7	0.38
Mo I Rana VMS exploration	18.0	0.13
Central costs	-39.8	-0.29
Net cash/(debt)	-419.1	-3.10
TOTAL	**936.8**	**6.94**

Source: MMG Capital estimates

Appendix 1: Directors and Management

Board of Directors

Mauri Visuri – Non-executive Chairman - Mauri has been on the board of Sotkamo since 2010, and has been Chairman since 2011. Mauri serves as a CEO of Teknoventure Oy and is one of its main shareholders. He has over 30 years of experience from managerial positions, balance and financial arrangements and different aspects of mining and metals industry. He has lead numerous M&A and capital raising engagements. He has served on several boards, including as a chairman of the board at Kalvinit Oy (present day Endomines AB). Mauri started his working career in 1976 at the Otanmäki Oy vanadium mine. Thereafter, he worked in different technical and managerial positions (among others at Gränges Aluminium AB, Wärtsilä Diesel Oy, Kemira Oy Siilinjärvi mine, Oy Sisu-Auto Ab, Oulun Autokuljetus Oy and Höyrytys Oy Wapor Works) prior joining Teknoventure Oy as an investment director in 2002. He holds a Master's degree in Economics from University of Vaasa and an Engineer's degree in Mechanical Engineering from Vaasa Polytechnic.

Jarmo Vesanto – Non-executive Director - Jarmo has been on the board of Sotkamo Silver since 2013. A qualified geologist, Jarmo has extensive experience in the exploration and mining industry, including 25 years with Outokumpu in Finland, Australia and Canada. Prior to his retirement in 2017, Jarmo spent 9 years with Altona Mining as General Manager of its Finnish operations, and 3 years as Business Development Director of Boliden Kylyuahti Oy. In 2015 he received the fifth Fennoscandian Exploration and Mining Special Award for his outstanding contribution to Fennoscandian economic geology and the mining industry.

Maria Neovius – Non-executive Director - Maria has been a board member since 2019. She has worked for law firms in Finland, and is currently General Counsel to the Finnish Minerals Group, a state-owned group which takes long-term strategic investments in the Finnish mining sector (the Finnish Mining Group has a 2.0% shareholding in Sotkamo Silver).

Matti Rusanen – Non-executive Director - Matti has been on the board since 2017. He has 30 years' experience in the banking and financial sector and was formerly Director and Head of Investments at Ilmarinen Mutual Pension Insurance Company, Sotkamo Silver's largest shareholder, with 9.2% of the equity.

Ilkka Tuokko – Executive Director - Ilkka has been on the board of the parent company since 2017 (and also in 2010-2011), and has been Chairman of the Finnish silver mining subsidiary, Sotkamo Silver Oy, since 2015. He is a geologist and was formerly Group Geology and Mining Manager for Mondo Minerals BV.

Eeva-Liisa Virkkunen – Non-executive Director - Eeva-Liisa has been on the board since 2018. She is currently Senior Vice President, Finance and Group Control at Metso, the big Finnish manufacturer of equipment for mining, oil and gas, pulp and paper and recycling. Eeva-Liisa has over 30 years' experience in the finance and administration of listed companies in the mining sector, including M&A, restructuring, disposals and management change.

Key Management – the executive team

Timo Lindborg – President & Chief Executive Officer - Timo has been President and Chief Executive Officer of Sotkamo Silver AB since 2010. He has qualifications in geology, engineering, is a Doctor of Technology, and is an Adjunct Professor at Oulu University in Business Processes in the Mining Industry. Timo was formerly Chief Executive Officer at Swedish and Finnish mining companies Endomines AB, Endomines Oy and Kalvinit Oy and has widespread knowledge of the exploration and mining industry in Scandinavia.

Paul Johnsson – Chief Financial Officer - Paul has been CFO of Sotkamo Silver AB since 2017. He has a master's degree in Business and Economics and has spent 6 years as a financial controller in the mining sector.

Illka Tuokko – Chairman of Finnish subsidiary Sotkamo Silver Oy - Ilkka has been on the board of the parent company since 2017 (and also in 2010-2011), and has been Chairman of the Finnish silver mining subsidiary, Sotkamo Silver Oy, since 2015. He is a geologist and was formerly Group Geology and Mining Manager for Mondo Minerals BV.

Arttu Ohtonen – Deputy General Manager - Arttu is Deputy General Manager of Sotkamo Silver AB, and has been employed by the company since 2012. His primary role is as the Environmental Manager for the Silver Mine.

Erkki Kuronen – Managing Director of Finnish subsidiary Sotkamo Silver Oy - Erkki was formerly the Chief Operating Officer of Sotkamo Silver Oy, the Finnish operating subsidiary of the silver mine, and was appointed Managing Director of the mine in May 2019. He is a geologist and has over 20 years' experience in the mining industry.

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