

THE MINERAL INDUSTRY OF

SWEDEN

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In 2000, Sweden continued to be among the most active mining countries in Europe. Important mineral commodities that were mined and exploited included base metals (copper, lead, and zinc), industrial minerals (dolomite, feldspar, granite, ilmenite, kaolin, limestone, marble, and quartz), and iron ore. Swedish steelmaker Svenska Stal AB (SSAB) was well-known for producing high-quality steel.

Tertiary Minerals Ltd. of the United Kingdom completed drilling at its Windfall polymetallic property in Bergslagen District. The results identified an extension of the strike of mineralization at Windfall and discovered a second zone of mineralization at Sortarnan. Tertiary Minerals was to conduct a detailed geochemical survey in the area (Mining Magazine, 2000b).

Glencore International AG of Switzerland acquired Kubikenborg Aluminum AB, which owned the 100,000-metric-ton-per-year (t/yr) smelter at Sundsvall in Sweden. The smelter worked exclusively for Glencore under a tolling agreement—Glencore supplied all the smelter's alumina and purchased all the aluminum it produced. The purchase helped to secure access to supplies supporting Glencore's metal trading activities (Financial Times, 2000).

Boliden Mineral AB reopened its open pit Aitik copper mine in northern Sweden, which was closed for a weekend after a 100-meter (m) section of tailing containment failed. The concentrator milled 150,000 t/yr of ore. In 2000, the company completed the \$245 million expansion at its Ronnskar smelter to increase capacity to 240,000 t/yr from 140,000 t/yr of copper cathode. The expansion included a new flash furnace, a new anode casting plant, a new converter aisle, an expanded tank house, and an expanded sulfur production plant. Production cost would be lowered by 25% per metric ton of copper (Metal Bulletin, 2000b).

In another development, Inmet Mining Corp. of Canada entered into an option and joint-venture agreement in connection with the copper/zinc sulfide deposits of Boliden in Bergslagen District. The area covers approximately 150 square kilometers of mineral properties. Inmet had the option to earn a 50% interest in the properties by incurring \$8.5 million in exploration expenditures prior to yearend 2005 (Canada NewsWire, May 1, 2000, Inmet announces earn-in agreement, accessed May 1, 2000, at URL <http://www.newswire.ca/releases/May2000/01/c0232.html>).

Dragon Mining NL of Australia completed the reverse circulation and diamond drilling program begun in April on its Svartliden gold project. A total of 3,448 m of reverse circulation and 1,329 m of diamond core drilling was completed. The results contained further intercepts of high-grade mineralization that continued to confirm the continuity and grades of lode systems (Australian Mining & Exploration, September 14, 2000, Company news—Dragon Mining—Further drilling results from Svartliden gold project, accessed September 16, 2000, at URL <http://www.reflections.com.au/>

MiningandExploration/Companies/NewsSep00.html).

Billiton Resources of the United Kingdom agreed with Redmond Ventures Corp. to explore Redmond's Copper Lake iron oxide/copper/cobalt property in Norrbotten. The main target was a series of magnetic geophysical anomalies. Drilling of these anomalies yielded intersections of rocks interpreted to be geologically similar to the Olympic-Dam-type mineral deposits in Australia (Mining Magazine, 2000a). Billiton would have the right to earn an initial 50% interest in the property by incurring a work expenditure of \$1 million during a 4-year period.

Luossavaara-Kiirunavaara AB spent \$42.5 million on the new main haulage levels at the Kiruna and the Malmberget iron ore mines. All iron ore production at Kiruna had been via the new main level at a depth of 1,045 m since July 1999, and the new main level at Malmberget was partly operational in April. The company also prepared for mining the northern part of the Kiruna ore body. The total cost of the project was estimated to be \$40 million, and production was scheduled to start in 2003 (Metal Bulletin, 2000c).

Total pig iron production decreased by 2.1% to 3.15 million metric tons (Mt). Output of crude steel reached 5.23 Mt, which was up from 5.07 Mt in 1999, despite the closure of SSAB's Lulea blast furnace for a relining. Stainless steel production rose by 14% to 807,800 metric tons. The country's mills were running at 100% of capacity utilization. Strong worldwide demand drove the increases in production (Metal Bulletin, 2001).

AvestaPolarit Oyj Abp was to be formed from the merger of Avesta Sheffield and Outokumpu Oyj of Finland in January 2001. In Sweden, Avesta would produce heavy stainless steel, and Nyby and Langshyttan would deal with very thin material. The Tornio mill in Finland would produce mostly slab and cold-rolled coil. There were no plans to sell off or close the 300,000-t/yr Degerfors plant and the Avesta Sandvick Tube and the Fagersta Stainless facilities for long products, all located in Sweden (Metal Bulletin, 2000a).

Boliden Mineral AB and North Atlantic Natural Resources AB (NAN) signed a letter of intent for the joint development of the Storliden zinc/copper deposit owned by NAN and located in the Skellefte mineral district of northern Sweden. The deposit was estimated by NAN to contain 1.8 Mt of ore at an average grade of 10.3% zinc, 3.5% copper, and 24 grams per metric ton silver (Mining Journal, 2000a). The mine would have a 6-year life, with mining and processing estimated to be between 250,000 t/yr and 350,000 t/yr of ore, which would produce 25,200 t/yr of zinc and 11,200 t/yr of copper in concentrate. All ore mined would be delivered to Boliden Mineral's mill near Boliden and processed to produce zinc and copper concentrates. Commercial production was scheduled to begin in 2002. The cost of development of the deposit was estimated to be between \$35 million and \$50 million. The partners would share a calculated net smelter royalty on the concentrates produced—

two-thirds for NAN and one-third for Boliden Mineral. Boliden Mineral held a 38.3% interest in NAN, as did South Atlantic Resources of Canada (Mining Journal, 2000a). NAN received a mine permit for the Storliden project in March.

According to the company's interim report (January to June), ScanMining AB was confident about its Blaiken zinc/gold mine coming into operation. Production was expected to start in early 2001. The project included two zinc and gold mines in the Sorsele field and an ore dressing plant. About 2 Mt of ore with an average grade of 3% zinc was discovered in Svarttrask (ScanMining AB, 2000). Kvaerner Metals Davy completed a feasibility study of the proposed open cast mine.

Alcaston Diamond Exploration AB acquired 2 additional exploration licenses for diamonds of fluvial type in the Norbotten region of northern Sweden, bringing its total exploration holdings in the region to 16 granted licenses. The licenses were acquired from Geoforum Scandinavia AB by cash and an issue of shares in Alcaston. These licenses cover a total area of 1.53 million hectares. Approximately 300 targets were identified, of which 22 were of high priority, having geophysical signatures appropriate to kimberlite pipes. Approximately 160 samples were gathered during 1999. More detailed sampling would be required in the 2000 field season to give a valid evaluation of the diamond potential (Mining Journal, 2000b).

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Major Source of Information

Geological Survey of Sweden
Mineral Resources Information Office
Skolgatan 4
93070 Mala, Sweden

TABLE 1
SWEDEN: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1996	1997	1998	1999 e/	2000 e/
METALS					
Aluminum metal:					
Primary	98,306	98,377	95,670	99,340 r/ 3/	100,800 3/
Secondary e/	24,000	24,000	25,000	25,000	26,000
Copper:					
Mine output, Cu content	71,660	86,640	73,685	71,200	75,600 3/
Metal:					
Smelter:					
Primary e/	100,000	95,000	90,000	85,000	95,000
Secondary e/	26,000	33,000	35,000	30,000	35,000
Total	126,000	128,000	125,000	115,000	130,000
Refined: e/					
Primary	100,000 r/	105,000 r/	100,000 r/	95,000 r/	105,000
Secondary	25,000 r/	23,000 r/	25,000 r/	20,000 r/	25,000
Total	125,000 r/	128,000 r/	125,000	115,000 r/	130,000
Gold:					
Mine output, Au content kilograms	6,145	6,777	5,944	4,400	3,300 3/
Metal, primary 4/ do.	10,100 e/	10,000	9,000 e/	8,000	8,000
Iron and steel:					
Iron ore concentrate and pellets:					
Gross weight thousand tons	21,020	21,893	20,930	18,558 3/	20,560 3/
Fe content do.	13,453 r/	13,912	12,977	11,506 3/	12,747 3/
Metal:					
Pig iron and sponge iron do.	3,255	3,060	3,373	3,212 3/	3,146 3/
Ferroalloys:					
Ferrochromium	138,110	101,842	123,958	131,140 3/	135,000
Ferrosilicon	21,287	22,409	20,356 r/	21,440 r/ 3/	20,000
Total	159,397	124,251	144,314 r/	152,580 r/ 3/	155,000
Steel, crude thousand tons	4,910	5,147	5,062	5,075 3/	5,227 3/
Semimanufactures, rolled do.	4,457	4,545	4,485	4,400	4,500
Lead:					
Mine output, Pb content	98,800	108,600	114,430	116,300 3/	108,000 3/
Metal, refined:					
Primary	42,200	34,700	40,600	38,000	37,800
Secondary	41,900	51,500	52,000	48,000	45,000
Total refined	84,100	86,200	92,600	86,000	82,800
Molybdenum, oxide, roasted, Mo content e/	4,000	3,500	3,000	3,000	3,000
Nickel, metal, secondary e/	100	100	100	60	50
Selenium, elemental, refined	20	20 e/	20 e/	20	20
Silver:					
Mine output, Ag content kilograms	271,866	304,048	299,051	284,100 3/	307,400 3/
Metal, primary 4/ do.	301,000	300,000 e/	250,000 e/	250,000	250,000
Zinc, mine output, Zn content	160,325	155,400	164,711	174,400 r/ 3/	176,200 3/
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	2,447	2,253	2,105	2,100	2,150
Clays, kaolin e/ do.	460	450	450	450	440
Feldspar, salable, crude and ground	45,000	50,000	45,000	45,000	45,000
Fertilizer, manufactured: e/					
Nitrogenous thousand tons	400	400	400	400	400
Phosphatic do.	10	10	10	10	10
Mixed do.	300	300	300	300	300
Graphite	463	1,470	3,011	4,500 r/	5,000
Lime e/ thousand tons	540	600	500	500	550
Quartz and quartzite e/ do.	525	500	500	500	500
Stone: e/					
Dimension: thousand tons					
Mostly unfinished	160	150	150	150	160
Granite do.	100 3/	100	100	100	90
Limestone do.	5	5	5	5	5
Slate do.	20	20	20	20	20
Other do.	10 3/	10	10	10	10

See footnotes at end of table.

TABLE 1--Continued
 SWEDEN: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1996	1997	1998	1999 e/	2000 e/
INDUSTRIAL MINERALS--Continued					
Stone--Continued: e/					
Crushed:					
Dolomite do.	600	600	600	600	700
Granite do.	3,500 3/	3,500	3,500	3,500	3,500
Limestone:					
For cement manufacture do.	4,000	4,000	4,000	4,000	4,000
For lime manufacture do.	1,000	1,000	800	800	800
For other construction and industrial uses do.	2,000	1,800	1,600	1,600	1,600
Chalk do.	25	30	30	30	30
For agricultural uses do.	475 3/	400	400	400	450
For other uses do.	1,000	1,000	1,000	1,000	1,000
Total do.	8,500	8,230	7,830	7,830	7,880
Sandstone do.	100	100	75	75	75
Undifferentiated do.	25,000	25,000	25,000	25,000	30,000
Other do.	500	500	500	500	500
Sulfur, byproduct: e/					
From metallurgy do.	67 r/	71 r/	73	65	91
From petroleum do.	50 r/	62 r/ 3/	63	55	60
Total do.	117 r/	133 r/	136	120	151
Talc, soapstone e/	30,000	25,000	25,000	25,000	26,000
MINERAL FUELS AND RELATED MATERIALS					
Coke, metallurgical thousand tons	1,145	1,200 e/	1,150 e/	1,200	1,200
Gas, manufactured: e/					
Coke oven gas million cubic meters	500	500	500	500	500
Blast furnace gas do.	3,500	3,500	3,500	3,500	3,500
Peat:					
Agricultural use thousand cubic meters	1,084	1,100	670	1,460 r/ 3/	1,500
Fuel do.	2,278	2,400	390	2,652 r/ 3/	1,372 3/
Petroleum, refinery products: e/					
Liquefied petroleum gas thousand 42-gallon barrels	3,500	3,500	3,000	3,000	3,000
Naphtha do.	500	500	500	500	500
Gasoline, motor do.	32,500	36,932 3/	38,862 3/	38,000	39,000
Jet fuel do.	2,500	1,872 3/	1,288 3/	1,400	1,500
Kerosene do.	50	50	50	50	50
Distillate fuel oil do.	75,000	53,152 3/	56,582 3/	56,000	57,000
Residual fuel oil do.	25,000	35,304 3/	38,508 3/	38,000	39,000
Other do.	3,000	7,714 3/	7,800	7,800	7,800
Refinery fuel and losses do.	5,000	5,000	5,000	5,000	5,000
Total do.	147,000	144,000	152,000	150,000	153,000

e/ Estimated. r/ Revised. -- Zero.

1/ Table includes data available through August 14, 2001.

2/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

3/ Reported figure.

4/ Includes only that recovered from indigenous ores excluding scrap.

TABLE 2
SWEDEN: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Granges AB (Glencore International AG, 100%)	Sundsvall smelter at Kubikenborg	100
Cement		Cementa AB (Scancem, 100%)	Plants at Degerhamn, Skövde, and Slite	3,400
Copper:				
Ore, copper content		Boliden Mineral AB	Mines at Aitik, Garpenberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	68
Do.		Outokumpu Oyj	Mines at Viscaria (closed)/Pahtohavare	22
Metal		Boliden Mineral AB	Smelter and refinery at Rönnskär	240
Feldspar		Berglings Malm & Mineral AB (Omya GmbH)	Mines at Beckegruvan, Højderna, and Limbergsbo	50
Do.		Forshammar Mineral AB (Omya GmbH)	Mines at Limberget and Riddarhyttan	30
Do.		Larsbo Kalk AB (Omya GmbH)	Mines at Glanshamar and Larsbo	20
Ferroalloys		Vargon Alloys AB	Plant at Vargon	175
Gold:				
Ore, gold content	kilograms	William Resources Inc.	Björgdal Mine at Skellefta	3,000
Do.	do.	Boliden Mineral AB	Mines at Aitik, Akerberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	2,000
Metal		Boliden Metals AB	Smelter and refinery at Rönnskär	9
Graphite		Woxna Graphite AB (Tricorona Mineral AB, 100%)	Mine and plant at Kringeltjärn, Woxna	20
Iron ore		Luossavaara-Kiirunavaara AB (Government, 98%)	Mines at Kiruna and Malmberget	28,500
Iron and steel		Svenskt Stal AB (Government, 48%)	Steelworks at Borlänge, Luleå, and Oxelosund	3,500
Kyanite		Svenska Kyanite AB (Svenska Mineral AB, 100%)	Quarry at Halskoberg	10
Lead:				
Ore, lead content		Boliden Mineral AB	Mines at Garpenberg, Laisvall, Langdal, Petiknas, and Renström	110
Do.		North Mining Svenska AB	Zinkgruvan Mine at Ammeberg	20
Metal		Boliden Metals AB	Smelter and refinery at Rönnskär	115
Lime		Euroc Mineral AB	Plants at Limham, Koping, and Storugns	250
Do.		Svenska Mineral AB	Plants at Rattvik and Boda	250
Limestone		Kalproduction Storugns AB (Nordkalk AB, 100%)	Mines at Gotland Island	3,000
Marble	cubic meters	Borghamnsten AB	Quarry at Askersund	15,000
Petroleum, refined	barrels per day	Skandinaviska Raffinaderi AB	Refinery at Lysekil	210,000
Do.	do.	BP Raffinaderi AB	Refinery at Goteborg	100,000
Do.	do.	Shell Raffinaderi AB	do.	82,000
Do.	do.	AB Nynas Petroleum	Refineries at Goteborg, Malmo, and Nynashamn	54,000
Silver, metal	kilograms	Boliden Metals AB	Smelter and refinery at Rönnskär	300,000
Do.	do.	North Mining Svenska AB	Zinkgruvan Mine at Ammeberg	25,000
Zinc, ore, zinc content		Boliden Mineral AB	Mines at Garpenberg, Laisvall, Langdal, and Renstrom	112
Do.		Zinkgruvan Mining AB (North Ltd., 100%)	Zinkgruvan Mine at Ammeberg	60