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2007 Minerals Yearbook

SWEDEN [ADVANCE RELEASE]

U.S. Department of the Interior
U.S. Geological Survey

April 2009

The Mineral Industry of Sweden

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In 2007, Sweden continued to be an active mining country; the principal mining centers were the Bergslagen, the Norrbotten, and the Skellefte districts. Three of Sweden's largest mines are located in the Norrbotten district. Metal mining and metal products manufacturing dominated the mineral industry. Owing to inadequate indigenous fossil fuel energy resources, Sweden relied on hydrocarbon imports. The country has also developed hydroelectric and nuclear power energy sources.

Foreign companies were actively exploring for base metals, diamond, and gold. Mineral exploration spending rose by 70% in 2007, to $92 million. Drilling companies in Sweden were fully contracted, and drilling equipment was in limited supply; as a result, companies that were conducting mineral exploration were finding it difficult to get additional drilling done (Mining Journal, 2008).

Minerals in the National Economy

Mining and metals production continued to be of economic importance to the country. Sweden was one of the leading ore and metal producing countries in the European Union (EU). The output of the mineral and manufacturing industries enabled Sweden to become a leading exporting country in the EU. The mineral industry contributed 0.3% to Sweden's gross domestic product (Mbendi Information Services (Pty) Ltd., 2007).

Production

Sweden has a variety of mineral resources and was the leading producer of iron ore in the EU. The country exploited ferrous and nonferrous metals, including copper, gold, iron ore, lead, silver, and zinc; and industrial minerals, including crushed stone, dimension stone, and feldspar. Sweden was a major trading country, and the amount of mineral commodities produced depended mainly on the demand for these commodities. Mine production of copper decreased in 2007 whereas primary copper production increased. Production of gold and ferrochrome decreased, whereas production of lead and silver increased (table 1).

Structure of the Mineral Industry

The Swedish mineral industry was composed mostly of privately owned companies and operated on a free-market basis. The Government was the major equity owner of the country's iron ore operations (98%) and had significant ownership in the steel operations (48%). Table 2 is a list of the major mineral industry facilities, their production capacities, and the mineral products they produced.

Mineral Trade

The total value of exported goods in 2007 was $17.5 billion, of which mineral products, including fuels, accounted for 17%. The total value of imported goods was $15.2 billion (Economist, The, 2007).

In 2007, U.S. export trade with Sweden was valued at $4.5 billion and U.S. import trade was valued at $13 billion. Significant export commodities to Sweden from the United States included nonferrous metals (which includes precious metals), $174.4 million; metallurgical grade coal, $50.4 million; and nuclear fuel materials, $33.3 million. Significant import commodities from the United States included iron and steel mill products, $704.5 million; and steelmaking and ferroalloying materials, $73 million. Mineral fuel imports from the United States included fuel oil, $201.6 million; and liquefied petroleum gas, $22 million (U.S. Census Bureau, 2007a, b).

Commodity Review

Metals

Copper.—Lundin Mining Corp. of Canada announced an expansion program at the Zinkgruvan facility in 2007, which would include a significant increase in ore production to 1.2 million metric tons per year (Mt/yr) from 900,000 Mt/yr of ore in 2010. At full capacity, copper production would be 7,200 metric tons per year (t/yr) of copper concentrate for about 12 years of mine life. Definition drilling was underway to upgrade reserves. The estimated cost of the program was expected to be $37 million (Lundin Mining Corp., 2007).

Boliden Mineral AB announced that between 2007 and 2010, the Aitik Mine's production was projected to increase to 33 Mt/yr, and that between 2011 and 2014, production was expected to increase to 36 Mt/yr. The expansion was expected to raise even further the efficiency of a mine that was already one of the world's top performers. The global average performance in ore mining was 15 metric tons per worker-hour. In 2007, the Aitik Mine produced an average of 43 metric tons per worker-hour. After the expansion, Boliden expected to average 55 metric tons per worker-hour with mine cash costs falling from $1,764 per metric ton to $948 per metric ton. The mine life was expected to be extended from 2016 to 2025, and the new production of molybdenum would be added to Aitik's flow sheet (Chadwick, 2008).

Gold.—Lappland Goldminers AB announced the upgrade of its ore resources at Fäboliden. The new estimated mineral reserves and mineral resources totaled 54.2 million metric tons (Mt), excluding inferred mineral resources, with an average grade of 1.23 grams per metric ton (g/t) gold and 4.5 g/t silver, which was equivalent to 66.9 t of gold and 246.5 t of silver. The deposit continued down to a depth of about 600 meters (m). The feasibility study for the open pit mine and potential underground mine was expected to be completed by yearend 2007. The upgraded mineral reserves and resources indicated that the underground operation could contain more gold than the open pit (Lappland Goldminers AB, 2007).

In 2007, Dragon Mining Sweden AB continued exploration that was outlining and upgrading the Svartliden project. The Svartliden project is located in the world class Skelleftea mining district and was a greenfield discovery with a style of mineralization previously not found in the broader region. Dragon Mining held contiguous exploration permits that covered 257 square kilometers (km^2) in the area, and encompassed prospective Palaeoproterozoic meta-sediment-volcanic rock units. Exploration drilling focused on testing depth and strike extensions of known mineralization. Results from 10 drill holes returned the following results, including intercept highlights: 6 m at 41.8 g/t gold from 90 m; 6 m at 6.1 g/t gold from 118 m; and 6 m at 5.6 g/t gold from 132 m. Drilling continued through 2007 to extend known mineralization, define the depth of the deposit, and convert further resources to additional reserves. In the first quarter of 2007, resources were estimated to be 12,000 kilograms of gold (Dragon Mining Sweden AB, 2007, p. 11).

Beowulf Mining plc's Grundtrask project is located near the town of Mala in the Skellefta mining district and comprised three licenses that covered an area of 43 km^2. A gold-bearing structure that runs for a strike length of 750 m and a width of up to 27 m had been associated through diamond drilling and was open at both ends and at depth. The gold is associated with arsenopyrite and chalcopyrite in quartz veins and stock works in altered pre-Cambrian basic volcanic rocks. Beowulf was seeking a joint venture partner for further exploration for both the Grundtrask project and the Ballek project. The Ballek project was associated with a large gravity anomaly (Beowulf Mining plc, 2007).

Iron and Steel.—Luossavaara-Kiirunavaara AB (LKAB) announced that it would conduct extended exploration for iron ore at Kuosanen, Mertainen, and Ylipääsnjaska in the municipalities of Gällivare and Kiruna in the vicinity of Malmberget. Aerial transient electromagnetic (TEM) geophysical surveys would be performed. Electrically conductive horizons down to a depth of 300 to 400 m can be discovered using TEM surveys. Drilling would be performed at locations where mineral deposits were indicated (Luossavaara-Kiirunavaara AB, 2007b).

LKAB announced that it would construct a new main level at the Malmberget Mine. The mine consisted of about 20 large and small, widely distributed ore bodies, of which about 10 were mined in 2007. The ore bodies were at different depths and the lowering of the main level would take place successively in different parts of the mine. Mining was taking place on three main levels; at 600 m, at 815 m, and at 1,000 m below the original surface level. Minable ore reserves were estimated to be 140 Mt of crude ore. Commissioning of the main level was expected to take place during the third quarter of 2010 (Luossavaara-Kiirunavaara AB, 2007a).

Silver.—Tumi Resources Ltd. announced that it had staked the historic Sala Mine, which had contained some of the richest silver ores in the world and for which historical records indicated that more than 5,670 million kilograms had been produced during the life of the mine. Exploration during the past year defined a drill target to the west of the existing mine that trended south for about 1 kilometer. Tumi Resources applied for drilling permits with the appropriate Swedish authorities as required by the Swedish Mining Law. A ground induced polarization survey would be performed before the drilling (Tumi Resources Ltd., 2007).

Uranium.—The Government reported that Sweden must build four new nuclear reactors and replace its existing 10 units when they reach the end of their lifetimes. Otherwise, according to the Government, the country would not be able to reduce greenhouse emissions. A decision was called for by the Riksdag (Parliament) to allow construction of new units after elections in 2010. That action would require revocation of the current ban on nuclear reactor construction (Platts, 2007).

Mawson Resources Ltd. announced the results of its first 19 drill holes at the Tasjo deposit. The results showed multiple near-surface uranium and rare-earth mineralized horizons, which average 5 m true thickness over an area of 100-m by 500-m. The consistency of grade, the strike extent, and the shallow depth of the uranium mineralization was considered encouraging by Mawson. Further exploration was planned to extend the drilling across a 200-m by 700-m area. Tasjo is a sedimentary uranium deposit where uranium mineralization is associated with concretions of carbonate-fluorapitite, which constitute up to 20% of the rock. Historical drill holes and geologic investigations estimated that 75 Mt to 150 Mt exist at Tasjo, with a grade range of 0.03% to 0.07% uranium oxide, 0.11% to 0.24% rare-earth elements, and 3.8% to 7.5% phosphate (Mawson Resources Ltd., 2007).

Industrial Minerals

About 90% of Sweden's industrial mineral output was from carbonates, including chalk and limestone. About 50% of this material was used in the production of cement; the remainder was used in the paper markets and the metallic industries. Nordkalk Group, which had operations at five locations, was a major producer. Other significant producers included the SMA Group and Imerys Minerals AB (Industrial Minerals, 2007).

Fluorspar.—Tertiary Minerals plc of the United Kingdom was awarded exploration licenses in the Vasterbotten district of northern Sweden to cover a major deposit of fluorspar. The Storuman deposit was defined by drilling in a 2.5-km^2 area, and Tertiary considered the deposit to have world class potential. Storuman is a flat-lying sandstone-hosted replacement deposit that had been defined by 39 drill holes. No resource estimate had been made for the deposit, which is typically 3-m to 10-m thick over the license area. Tertiary was planning to initiate a drilling program at Storuman to confirm grades, establish resources, and provide samples for metallurgical test work. Tertiary's conceptual target was a mining operation that would produce about 100,000 t/yr of acid-grade fluorspar (Mineweb, 2007).

Mineral Fuels and Related Materials

Petroleum.—Tethys Petroleum AB was granted a license valid for 3 years to explore for petroleum on the Island of Gotland. The license covered an area of about 54,000 hectares of the northern part of the Baltic Sea. Petroleum had previously been produced on Gotland from Ordovician reef structures that

could be traced along a trend line originating on the other side of the Baltic Sea and terminating on Gotland Island. Historical data suggests that only a limited number of the reefs present in the Gotland area had been mapped and drilled (Tethys Petroleum AB, 2007).

Outlook

Mining is expected to remain very significant to Sweden's economy. The global role of Sweden as an iron ore producer may increase dramatically. Within 5 to 10 years, iron ore production is expected to reach 50 Mt/yr, or about double that of today. Sweden has substantial base-metals, gold, and iron ore deposits, which will continue to be actively exploited and developed. Foreign companies are likely to continue to explore actively in Sweden for base metals, diamond, and gold. The quantity of ores in existing mines that can be mined economically will likely be increased by effective and successful ongoing exploration in the vicinity of the mines.

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TABLE 1
SWEDEN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Aluminum, metal:						
Primary		101,200	101,400	102,567 [r]	101,180 [2]	98,014 [3]
Secondary[e]		30,000	29,000	30,000	32,000	32,000
Total		131,200	130,400	132,567 [r]	133,180 [2]	130,014 [3]
Copper:						
Mine output, Cu content		83,143 [r]	82,415 [r]	87,068 [r]	86,746 [r]	62,905 [2]
Metal:[e]						
Smelter:						
Primary		185,000	206,000	192,000	194,200 [2]	203,107 [3]
Secondary		30,000	30,000	55,000	64,000	55,000
Total		215,000	236,000	247,000	258,200 [2]	258,107 [2]
Refined:						
Primary		189,000	235,620 [r]	223,482 [r]	229,241 [2]	213,894 [3]
Secondary		25,000	25,000	22,000	25,000	25,000
Total		214,000	260,620 [r]	245,482 [r]	254,241 [2]	238,894 [2]
Gold:						
Mine output, Au content	kilograms	5,900	5,200	6,564 [r]	6,848	5,159 [2]
Metal, primary[e, 3]	do.	8,000	8,000	8,000	8,000	8,000
Iron and steel, metal:						
Iron ore concentrate and pellets:[e]						
Gross weight	thousand metric tons	21,500	22,300	23,300	23,300	24,700
Fe content	do.	14,100	14,700	15,300	15,300	16,100
Metal:						
Pig iron and sponge iron	do.	3,710	3,871	3,730 [r, 2]	3,577 [r, 2]	3,815 [2]
Ferroalloys:						
Ferrochromium		110,529	128,191	127,451	136,374 [2]	124,403 [2]
Ferrosilicon[e]		17,100 [r]	18,500 [r]	9,800 [r]	4,000	4,000
Total[e]		128,000 [r]	147,000 [r]	137,000 [r]	140,374 [2]	128,403 [2]
Steel, crude	thousand metric tons	5,707	5,949	5,692	5,435 [2]	5,700
Semimanufactures[e]	do.	4,600	4,700	4,700	4,500	4,600
Lead:						
Mine output, Pb content		50,962	54,347	60,445 [r]	55,644 [r]	63,224 [2]
Metal, refined:[e]						
Primary		24,200	21,500 [r]	32,800 [r]	25,400	37,900
Secondary		52,000	52,000	46,100 [r, 2]	39,800 [2]	40,000
Total		76,200	73,500 [r]	78,900 [r, 2]	65,200 [2]	77,900 [3]
Molybdenum, oxide, roasted, Mo content[e]		3,000	3,000	3,000	3,000	3,000
Nickel, metal, secondary[e]		50	50	50	50	50
Selenium, elemental, refined[e]		20	20	20	20	20
Silver:						
Mine output, Ag content	kilograms	340,701 [r]	319,563 [r]	309,933 [r]	292,255	323,171 [2]
Metal, primary[e, 3]	do.	250,000	250,000	250,000	225,000	225,000
Zinc, mine output, Zn content		185,884	197,034	215,691 [r]	210,029 [2]	214,576 [2]
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	2,476 [r]	2,588 [r]	2,600 [e]	2,600	2,500
Diamond, synthetic[e]	thousand carats	20,000	20,000	20,000	20,000	20,000
Feldspar, salable, crude and ground[e]		41,000	42,000	43,000	43,000	42,000
Fertilizer, manufactured:[e]						
Nitrogenous	thousand metric tons	400	400	400	400	400
Phosphatic	do.	10	10	10	10	10
Mixed	do.	300	300	300	300	300
Graphite[e]		850	800	800	800	800
Lime[e]	thousand metric tons	590	590	600	600	600
Quartz and quartzite[e]	do.	600	700	700	700	700

See footnotes at end of table.

TABLE 1—Continued
SWEDEN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
INDUSTRIAL MINERALS—Continued						
Stone:[e]						
Dimension:						
Mostly unfinished	thousand metric tons	170	160	170	170	170
Granite	do.	130	130	132	132	132
Limestone	do.	32	32	32	32	32
Slate	do.	15	15	16	16	16
Other	do.	6	6	6	6	6
Crushed:						
Dolomite	do.	440	430	450	450	450
Granite	do.	3,500	3,500	3,500	3,500	3,500
Limestone:						
Chalk	do.	80	80	80	80	80
For cement manufacture	do.	3,950	3,900	4,000	4,000	4,000
For lime manufacture	do.	950	950	950	950	950
For other construction and industrial uses	do.	1,700	1,700	1,800	1,800	1,800
For agricultural uses	do.	650	600	650	650	650
For other uses	do.	1,500	1,500	1,500	1,500	1,500
Total	do.	8,830	8,730	8,980	8,980	8,980
Sandstone	do.	15	20	20	20	20
Undifferentiated	do.	30,000	30,000	30,000	30,000	30,000
Other	do.	400	350	350	350	350
Sulfur:						
Metallurgy	do.	235	235	240	240	240
Petroleum	do.	57	59	60	60	60
Total	do.	292	294	300	300	300
Talc, soapstone[e]		15,000	14,000	14,000	14,000	14,000
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical[e]	thousand metric tons	1,250	1,300	1,400	1,400	1,400
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[e]	thousand cubic meters	1,800	1,100	1,200	1,716 [2]	1,700
Fuel	do.	2,633	1,866	1,900	3,041 [2]	3,000
Petroleum, refinery products:[e]						
Liquefied petroleum gas	thousand 42-gallon barrels	3,000	4,906 [r]	5,022 [2]	5,000	5,000
Naphtha	do.	500	500 [r]	500	500	500
Gasoline, motor	do.	41,000	38,301 [r]	34,164 [2]	35,000	35,000
Jet fuel	do.	1,600	1,664 [r]	606 [2]	600	600
Kerosene	do.	50	10 [r]	10 [r]	--	--
Distillate fuel oil	do.	58,000	53,995 [r]	53,509 [2]	54,000	54,000
Residual fuel oil	do.	40,000	36,297 [r]	35,785 [2]	36,000	36,000
Other	do.	8,000	20,000 [r]	20,761 [2]	21,000	21,000
Refinery fuel and losses	do.	5,000	10,000 [r]	10,147 [2]	10,000	10,000
Total	do.	157,000	166,000 [r]	161,000	162,000	162,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. -- Zero.

[1]Table includes data available through January 2009.

[2]Reported figure.

[3]Includes only that recovered from indigenous ores, excluding scrap.

TABLE 2
SWEDEN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(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, Skovde, 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 Pahtohavare	22
Metal		Boliden Metals AB	Smelter and refinery at Ronnskar	240
Feldspar		Berglings Malm & Mineral AB (Omya GmbH)	Mines at Beckegruvan, Hojderna, 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	International Gold Exploration AB (50%) and Dormant Properties AB (50%)	Bjorkdal Mine at Skellefte	3,000
Do.	do.	Boliden Mineral AB	Mines at Aitik, Akerberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	2,000
Metal	do.	do.	Smelter and refinery at Ronnskar	17,000
Graphite		Woxna Graphite AB (Tricorona Mineral AB, 100%)	Mine and plant at Kringeltjarn, Woxna	20
Iron and steel		Svenskt Stal AB (Government, 48%)	Steelworks at Borlange, Lulea, and Oxelosund	3,900
Iron ore		Luossavaara-Kiirunavaara AB (LKAB) (Government, 98%)	Mines at Kiruna and Malmberget	32,500
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 Renstrom	110
Do.		North Mining Svenska AB	Zinkgruvan Mine at Ammeberg	20
Metal		Boliden Metals AB	Smelter and refinery at Ronnskar	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	42-gallon barrels per day	Skandinaviska Raffinaderi AB	Refinery at Lysekil	210,000
Do.		BP Raffinaderi AB	Refinery at Gothenburg	100,000
Do.		Shell Raffinaderi AB	do.	82,000
Do.		AB Nynas Petroleum	Refineries at Gothenburg, Malmo, and Nynashamn	54,000
Silver, metal	kilograms	Boliden Metals AB	Smelter and refinery at Ronnskar	408,000
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

Do., do. Ditto.