THE MINERAL INDUSTRY OF

SWEDEN

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Sweden is endowed with significant deposits of iron ore, certain base metals (copper, lead, and zinc), and several industrial minerals (dolomite, feldspar, granite, ilmenite, kaolin, limestone, quartz, and wollastonite). Still, it is best known for production of high-quality steel. Sweden relies heavily on hydrocarbon imports, due to inadequate indigenous resources; as a result, the country has developed substantial nuclear and hydroelectric generating capacity.

Government Policies and Programs

Sweden liberalized its mineral policy to parallel European Union (EU) standards in response to the acceptance of the EU membership by the Swedish electorate in 1994. The new policy eliminated laws requiring foreign companies to get special permission for prospecting, annulled the state's participation in mining enterprises (so-called "crown shares"), and revoked all taxes and royalties, except for the normal 27% corporate tax. Initial exploration permits are now granted for 3-year periods, with possible extensions. Mining concessions were valid for 25 years. The State Mining Property Commission was closed and previous restrictions on real estate ownership were eliminated, thus allowing foreign participation in the mining of a wide range of minerals.

Production

The mining industry in 1994 employed about 8,400 people and accounted for about 1.4% of industrial production, corresponding to 0.3% of gross domestic product.[2] In 1994, Sweden produced 19.7 million metric tons (Mmt) of iron ore concentrate, or about one-half of all western European production. Output of polymetallic sulfide ore was 23 Mmt, about one-third of western Europe's copper and lead ore production, and about one-fifth of the region's zinc ore production. While comparative metal production was somewhat lower, Sweden remained the leading producer of copper and lead metal in western Europe. The gold, lead, and zinc content of indigenous ore production exceeded domestic consumption, while copper and silver production each covered about 60% of consumption. *(See table 1.)*

Trade

The mineral industry accounted for about 13% of Sweden's exports, one-third of which was steel. Because Sweden lacked a zinc smelter, one of the largest mineral exports was zinc ore and concentrate, shipped mostly to Norway. The country imported duty-free most of the raw material needed to operate its copper and lead smelter at optimal capacity.

Structure of the Mineral Industry

The ownership of the two largest mineral companies in Sweden—Boliden AB and Luossavaara-Kiirunavaara AB (LKAB)—has remained essentially unchanged.

Boliden Mineral AB, a subsidiary of the privately owned Trelleborg Group, was predominantly a nonferrous mining and processing company. It also traded in concentrates, metals, and other products and provided engineering expertise, built mineral processing plants, and sold mining equipment. Boliden Mineral AB consisted of Swedish Mines and Smelters, International Mines and Smelters, Technology Sales, and Metal Recovery. At yearend 1994, Swedish Mines and Smelters operated 10 mines, 4 concentrators, and 1 smelter. It produced 20.2 Mmt of ore, resulting in 549,300 metric tons (mt) of concentrate with an average metal content of about 49%.[3] International Mines and Smelters managed the wholly owned Aznalcollar Mine and the partially owned Sukhaybarat Mine, both in Spain.

The Government-owned LKAB was one of the world's leading producers of highly upgraded iron ore products, such as iron pellets. In 1994 it operated two mining complexes, ore dressing and pelletizing plants in Kiruna and Malmberget, a pelletizing plant in Svappavaara, and shipping ports in Lulea and Narvik, both in Norway.

Commodity Review

Metals

Aluminum.—Radical cost cutting in recent years by Granges Aluminium, a division of Granges AB, increased the profitability of the Sundsvall smelter. In 1994, it reported a 37% improvement in profit from 1993.[4] The 98,000-metric-ton-per-year (mt/a) capacity primary aluminum smelter in Sundsvall is a combination of two adjacent plants, using both Soderberg and prebake technology. Plant 1 was converted to prebake technology in 1987 and produced about 25% of the total 1994 output. Plant 2, built in 1963 and

later expanded, produced the remaining output with 262 pots. About 80% of production was used by Granges' downstream extrusion sector, the Saga Group, consisting of 12 companies.

Sweden had a high recycling rate (90%) for aluminum cans because of close cooperation between producer of can stock (Finspong), the can manufacturer (PLM Fosie), the collection companies (Returpak and PLM Fosie), and the secondary smelters (Gotthard Aluminium and Finspong). Consequently, secondary aluminum production more than doubled during the past 2 years to an estimated 33,000 mt in 1994.

Copper.—Swedish copper mining was dominated by the Boliden-owned Aitik open pit mine in the northern part of the country, 100 kilometers (km) north of the Arctic Circle. The main open pit, the largest in Europe, was reportedly 2,500 meters (m) long, 915 m wide, and 230 m deep. According to Boliden Mineral, the proven and indicated reserves amounted to 205 Mmt, which would enable production to continue well into the next century. The low average content of copper (0.38%) was offset by 0.22 grams per metric ton (g/mt) of gold and 4 g/mt of silver.[5] A large crusher was reportedly utilized directly in the 16.5-Mmt/a-capacity mine. A conveyor belt transported the 1994 production of 16.3 Mmt of crushed ore through a 700-m tunnel to an intermediate storage area near the concentrator. The 1994 production of 190,000 mt of concentrate contained 54,000 mt of copper, and about 2 mt of gold and 40 mt of silver. The concentrate was sent to Boliden's Ronnskar smelter, where it accounted for more than one-half of its feed.

Viscaria and the adjacent Pahtohavare mines, 5 kilometers (km) west of Kiruna, was the second largest copper mining complex in Sweden. Both underground mines are owned by Outokumpu of Finland. In 1994, Viscaria produced 587,000 mt of ore, while Pahtohavare's output amounted to 291,000 mt. The total production of 878,000 mt was locally beneficiated and the resulting concentrate, having a content of 16,700 mt and 200 kg of gold, was shipped to the Ronnskar smelter in Skelleftehamn. Ore reserves at Viscaria/Pahtohavare were estimated at 0.9 Mmt of contained metal at an average grade of 2.1% copper and 0.3 g/mt of gold.[6] The minable reserve will be exhausted by 1996.

Other copper-producing polymetallic mines in operation in 1994 were Garpenberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom. All the ore was beneficiated at Aitik, Boliden, and Garpenberg, and transported to the Ronnskar smelter. The feed for the smelter was augmented with imported concentrates, scrap, and metal ashes. In addition to the main products, copper (103,000 mt/a) and lead (40,000 mt/a), gold, silver, zinc oxide, and sulfur were produced in Ronnskar, as well as special products, such as selenium and raw nickel sulfate. In 1994, a decision was made to increase production by 15% by investing $31 million[7] in the copper smelter and the electrolysis plant.

Boliden made a number of investments in 1994. The largest was in the Skellefte field, where test drilling indicated polymetallic mineralization below the 970 m level in the Renstrom Mine, below the 800 m level in the Petiknas Mine, and at a depth of 1,100-1,200 m in the Kristineberg Mine. Boliden planned to link the Petiknas Mine with a 2.5-km-long tunnel to the existing transportation and hauling system of the Renstrom Mine.

Gold.—Terra Mining AB owned western Europe's largest gold mine, the Bjorkdal Mine. Crude ore production in 1994 amounted to 939,549 mt yielding 2.1 mt of gold. The vein-type (lode gold) deposit was close to the surface, allowing opencast mining. This, coupled with improved gold content in the lower levels and large-scale ore processing, helped to keep production costs under $5,000 per kg of gold metal. Because of dwindling resources (19 Mmt graded 3 g/mt in 1994[8]), Terra Mining continued its exploration activities. Even though most of the exploration was in the vicinity of Bjorkdal Mine, the largest deposit was found in northern Finland. It had proven reserves of 2 Mmt with 3.15 g/mt gold.[9] Open pit operation was planned for the summer of 1996.

The second largest gold mine was Boliden's Akerberg Mine in northern Sweden. Output in 1994 was about 140,000 mt of ore, all from open pit production. Together with other polymetallic ore from Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom, beneficiation was at the Boliden concentrator, resulting in 1.7 mt of gold and 70 mt of silver content in concentrate.

One of the newest gold-producing companies in Sweden is Wermland Guldbrytning AB. In 1994, it started up a small-scale gold operation in Harnas, southwestern Sweden. Reserves were estimated about 60,000 mt with a grade of 5 g/mt.[10]

Iron Ore.—Crude ore production in 1994 was 30.8 Mmt, of which 20 Mmt was produced at Kiruna and 10.8 Mmt at Malmberget. Production of concentrate and pellets amounted to 20 Mmt. Deliveries were limited by production capacity and amounted to 19.4 Mmt, 4 Mmt of which went to domestic customers. Of the total deliveries, 10.2 Mmt consisted of pellets, mainly olivine pellets for blast furnace (76%). The remainder was sold either as low-phosphorus (less than 0.05% P) sinter fines or high-phosphorus (0.1% P) sinter fines or lump ore.

The Kiruna mining complex, owned by LKAB, consisted of three open pit mines, Kiirunavaara, Leveaniemi, and Luossavaara. The ore body was approximately 4 km long, 80 m thick, and 2 km deep and consisted mainly of magnetite (average 60% iron content), with minor amounts of hematite. The ore body contained an estimated 460 Mmt. Introduction of a night shift in fall 1994 helped boost crude iron ore production by 1.7 Mmt to 20 Mmt. Of that total, 18 Mmt were produced by sublevel caving and 2 Mmt by sublevel stoping. LKAB reportedly was investing $513 million in a new mining system, transportation network, beneficiation,

and pellet plants. The new transportation system, at the depth of 1,045 m (270 m below the current level), was designed for 26 Mmt/a production, and was scheduled for startup in 1997. The new beneficiation and pellet plants were to be finished in April 1995. The new grate kiln-type pellet plant was to have a capacity of 4 Mmt/a. When in full operation, LKAB would be able to deliver 14.5 Mmt of pellets per year, compared with 10.5 Mmt presently.

An unresolved environmental issue for LKAB is the drainage of a part of the Kiruna Lake already separated from the rest of the lake by a railway causeway. It would expand mining by 5 years at the present rate of production.

At Malmberget, LKAB produced 10.3 Mmt of crude iron ore from large-scale, sublevel caving and the rest, 0.5 Mmt, from development work. The development work reached 10.3 km of drifts; production hole drilling was 298 km. The estimated 770 Mmt reserves contained about 49% iron. LKAB was planning to increase pellet production from 3.5 Mmt/a to 4.2 Mmt in 1995.

Lead.—With the 1994 production of 1.75 Mmt of ore, Laisvall Mine was one of the largest lead mines in Europe. Located in northern Sweden, the deposit was 5 km long, 3.5 km wide, and up to 90 m deep. It consists of three major mineralization zones, unevenly disseminated in sandstone. The ore grade ranged from 0% to 40% lead, with an average metal content of about 5% lead, 10 g/mt silver, and 0.44% zinc. The proven and indicated reserves, according to Boliden, amounted to 8.4 Mmt. Because part of the deposit is under Laisan Lake and, therefore, inaccessible without emptying the lake, recoverable reserves were expected to last only until 1997. Ore was locally beneficiated, and in 1994 amounted to 110,900 mt, with a metal content of 87,600 mt of lead; 7,700 mt of zinc; and 17.6 mt of silver, according to Boliden officials. Lead concentrate was transported by truck and railway to the Ronnskar smelter, where it supplied 78% of total feed.

Other polymetallic sulfide mines producing lead included Garpenberg, Langdal, Petiknas, and Renstrom. While the Garpenberg output of 0.8 Mmt was locally beneficiated, ore from remaining mines was beneficiated in Boliden. According to company officials, the concentrate from both plants collectively contained about 80,600 mt of zinc, 19,000 mt of lead, 9,300 mt of copper, 170 mt of silver, and 2 mt of gold.

Boliden Bergsoe AB's secondary lead smelter in Landskrona has become the center for recovery of lead batteries in the Nordic countries. In 1994, it smelted about 56,000 mt of lead batteries. Combined with other lead scrap, this smelter produced about 42,500 mt of secondary lead.

Steel.—Svenskt Stal AB (SSAB) is Scandinavia's leading manufacture of commercial steel. Most production consisted of steel sheets and plates, produced mainly in two SSAB subsidiaries: Oxelosund and Tunnplant. A small amount of steel sheet was processed by subsidiaries Plannja and Dickson PSC. The 2-Mmt/a SSAB Tunnplant AB complex was an integrated steel company with a coking plant, blast furnaces, and continuous casting line for the manufacture of slab and heavy plate at Inexa Lulea; a sheet rolling and coating plant in Borlange; and an organic-coated sheet plant in Finspang. The 1994 crude steel production at Tunnplant increased by 9% to 1.9 Mmt, of which about 1 Mmt was hot-rolled, 0.5 Mmt was cold-rolled, and the remainder was coated. During 1994, a new pickling line was put into operation and conversion of a bell-type furnace to hydrogen annealing was concluded at the Borlange plant. The SSAB Oxelosund AB complex consisted of a coking plant, blast furnaces, a steel mill, and a continuous casting line for slabs and heavy plate in thicknesses of up to 155 millimeters (mm). Heavy plates were further processed by the subsidiary Oxelo Komponenter AB in Gothenburg. Out of 1.4 Mmt slab production in 1994, 0.5 Mmt was rolled into heavy plate. A switch to pellet charging of the blast furnace, planned for 1995, would eliminate the sintering plant, thus reducing sulfur and nitrogen oxide emissions by 65% and 55%, respectively.

Zinc.—In 1994, 292,500 mt of zinc concentrate was produced in Sweden, of which 178,200 mt came from eight Boliden mines and 114,300 mt from Zinkgruvan Mine. Ore from Boliden mines was beneficiated at Boliden, Garpenberg, and Laisvall, and contained 98,300 mt of zinc. Because Sweden does not have a zinc smelter, concentrate was shipped to foreign smelters, mainly to the 50%-owned Norzik smelter in Norway.

The Zinkgruvan Mine, the largest zinc mine in Sweden, operated by Ammeberg Mining AB, was put up for sale in 1994 by its owner, Union Miniere (UM) of Belgium. However, owing to unfavorable market conditions, UM withdrew its offer by yearend. The Zinkgruvan Mine, at the northern end of Lake Vattern in south-central Sweden, had substantial ore reserves, sufficient to sustain a production rate of between 650,000 mt/a and 700,000 mt/a for a minimum of 15 years.[11] The deposit consisted of two ore bodies: the Burkland section discovered in 1992, and the main ore body, Zinkgruvan, that accounted for the bulk of the 1994 production. The development of 350-m and 650-m levels of the Burkland section was 90% completed by yearend 1994. It is adjacent to the main ore body, and was to be worked using Zinkgruvan's hauling and hoisting facilities. According to company officials, output of zinc and lead concentrate in 1994 amounted to 114,281 mt and 22,329 mt, respectively.

The largest of three beneficiation plants, in Boliden, processed 1.4 Mmt of ore from six different mines: Akerberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom, all in northern Sweden. The Boliden plants produced 106,000 mt of concentrate with about 59,000 mt of zinc content. Concentrators at Garpenberg and Laisvall produced 59,000 mt and 13,200 mt of concentrate, respectively.

Industrial Minerals

Feldspar.—The most recent feldspar mine was opened in 1992 by Berglings Malm and Mineral AB (BMM) in Beckegruvan. In 1994, BMM became a subsidiary of Germany's Omya GmbH Plusstaufer. The 50 Mmt deposit consisted of high-purity, homogenous pegmatite ore, with low levels of iron. Processing was by froth flotation at a nearby abandoned iron ore mine, and was available in sand and milled form. In addition to the Beckergruvan Mine, BMM operated Hojderna Mine near Skinnskatteberg, and Limbergsbo Mine, 23 km north of Lindesberg. Mineral composition of both mines is about 60% to 70% feldspar, 25% to 30% quartz, and 5% to 10% muscovite.

Niili Mineral AB decided in 1994 to begin production at the open pit mine at Niilivaara, in northern Sweden. It planned to build a beneficiation plant at Nattavaara, 40 km from the mine. Processed feldspar was to be transported to Lulea port for export for the ceramic industry.

Dolomite.—Despite low activity in building and construction, about 12% of all industrial mineral production in Sweden was generated by dolomite mining.

Ernstrom Mineral AB changed its name in 1994 to Ernstrom Production AB when it was bought by Omya GmbH Plusstaufer of Germany. In 1994, production at its Bjorkagruvan underground mine at Glanshammar was 170,000 mt. In addition to the parent company, Omya GmbH also acquired three Ernstrom subsidiaries: Larsbo Kalk AB, Forshammar Mineral AB, and Norwegian Talc. Larsbo Kalk operated a 350,000-mt/a-capacity underground white crystalline dolomite mine at Glanshammar, near Orebro, and a 200,000-mt/a-capacity opencast mine at Larsbo. Reserves at both mines were expected to last for 42 and 13 years, respectively. The other two subsidiaries produced feldspar and talc.

Strabruken AB, a subsidiary of Nordic Construction Company, was the second largest dolomite producer in Sweden. In 1994, it produced about 130,000 mt of crushed and ground dolomite at its Tistbrottet opencast quarry in Sala, 100 km northwest of Stockholm. Unlike other dolomite produced in Sweden, it contained a high concentration of magnesium, an essential nutrient for crops and animals. Four people were employed at the quarry, producing up to 10,000 mt from a 12-m bench.

Graphite.—Although no production of graphite was reported in 1994, a number of potential deposits were explored. The most promising were in the vicinity of Edsbyn, central Sweden, where reserves of all four deposits amounted to 10 Mmt.[12] Exploration and exploitation rights were owned by Woxna Graphite AB, a joint venture of three Swedish mining companies. Production at one of the deposits at Kringeltjarn, northwest of Edsbyn, was expected to start in 1995. Initially, a mobile beneficiation plant was to be used, and if successful, a permanent plant with an annual capacity of 150,000 mt would be built. Production would include both medium and coarse graphite flakes as well as high-carbon products.

The other promising deposit was in Raitajaervi, close to the Finnish border and Arctic Circle. A concession was obtained in 1993 by newly formed Norrbotten Grus and Grafit AB, based in Haaparanda. The deposit was about 6 km long and 1.5 km wide, and contained an estimated 0.6 Mmt of ore with a carbon content of 10% to 20%. Exploration continued at the Lehtodelkae deposit, about 80 km north of Raitajaervi. Ore thickness was as much as 150 m with a carbon content of 19% to 23%.

Limestone.—About one-half of the industrial mineral value was contributed by limestone. Three-fourths of Sweden's total limestone production was produced by Nordkalk Kalcium AB, a subsidiary of the Finnish-based Partek Group. In 1994, it produced 2.7 Mmt from 4 quarries and operated 15 processing plants. With an average production of about 2.5 Mmt, Storugns quarry, on the Baltic Sea island of Gotland, southeast of Sweden, was the largest of the four. Because of the high quality of limestone, about 40% of its production was used in metallurgy. Limestone was locally processed by Kalkproduction Storugns AB, a joint venture of Nordkal with Faxe Kalk of Denmark. Using its modern shaft kiln commissioned in 1989, about 150,000 mt/a of burnt lime was produced in 1994. A portion of the limestone was shipped to the Landskrona plant to manufacture quick and hydrated lime as well as ground and fractionated quick lime.

Svenska Mineral AB produced 390,000 mt of limestone in 1994. It operated two quarries in Gasgruvan and Jutjarn. Jutjarn, the larger of two, had reserves of about 15 Mmt of sedimentary limestone.

Mineral Fuels

Coal.—Coal production in Sweden, about 30,000 mt/a, was extracted as a byproduct of clay production by Hoganas Corp. at Skane. It was mainly used locally by the Perstrop Co., with a small remainder used at the nearby Helsingborg heating plant. Coal reserves were about 30 Mmt.

Peat.—Swedish peatland covers 6.4 million hectares (ha), about 15% of the country's total land area, of which about 865,000 ha were suitable for commercial production. In 1994, about 7,900 ha was in production, most of which was used for fuel; the remainder was used by agriculture. Extraction was covered by various legislation depending on whether it is used for energy or agriculture, so every application for harvesting peat was required to contain an end-use designation.

About 60% of production was in the form of sod peat, and the remainder was milled peat. About 80% of Sweden's annual peat production was used for energy purposes, mainly in cogeneration plants for electric power and district heating.

In 1994, about 50 local authorities and industrial enterprises used peat as fuel and produced about 120 megawatts (MW) of power and 190 MW of heat.

Reserves

Since exploration rights were transferred by the State Mining Property Commission to individual enterprises in 1992, there was an increased interest in exploration by Swedish as well as foreign mining companies. Areas covered by new exploration permits in 1994 increased nearly sevenfold. So far, this increased activity in exploration has not resulted in a dramatic increase in metallic ore reserves. *(See table 3.)*

Infrastructure

Sweden has a well-developed transportation system, especially in the southern part of the country. It included 97,400 km of highway and 12,000 km of railroads. In addition to its long coastline, Sweden maintained about 2,050 km of inland waterways. Ports were either privately or municipally owned, or a combination of the two. There were 50 general ports, and 130 minor ports; about 65% of the total flow of cargo was handled by the five biggest ports—Goteborg, Helsingborg, Lulea, Stockholm, and Malmo. Truck-ferries are the fastest growing form of transportation, increasing about 8% per year.

Outlook

The privatization of the mineral industry in Sweden, based on the Minerals Act of July 1992, boosted its development and was expected to be further supported by Sweden's membership in the EU, beginning January 1, 1995. An influx of foreign capital and know-how was expected to make the Swedish mineral industry exceedingly competitive in the world market. Liberalization of the mining laws already had encouraged smaller companies to invest in exploration for industrial minerals, where return on investment was smaller, but more certain.

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[1]Text prepared June 1995.
[2]Mining Annual Review 1994. Western Europe. Sweden, by a Special Correspondent. V. 88, No. 1095, p. 198.
[3]Trelleborg Group. Annual Report 1994.
[4]Mining Journal. Mar. 17, 1995. V. 324, No. 8318, p. 207.
[5]Metal Bulletin Magazine. Nordic Steel and Metals: Boliden Eyes Growth From Firm Home Base. Jan. 1994, pp. 48-49.
[6]Outokumpu. Annual Report 1994.
[7]Where necessary, values have been converted from Swedish krona (SK) to U.S. dollars at the rate of SK 7.8=US$1.
[8]Mining Journal. Exploration Trends in Scandinavia. V. 324, No. 8319, Mar. 24, 1995, p. 218.
[9]Mining Annual Review 1995, Western Europe 17.
[10]Bergsmannen. New Entrants into the Mining Scene. Mar. 1994, pp. 58-59.
[11]Union Miniere. Annual Report 1994.
[12]Grus, Sand och Industrimineral by Sveriges Geologiska Unersokning 1993, p. 31.

Major Sources of Information

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Upsala, Sweden.
Swedish Ports and Stevedores Association
Stockholm, Sweden.
Swedish Statistical Office
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LKAB, Annual Report 1994.
Industri 1993, Statistiska Centralbyran.
NCC, Annual Report 1993.
Partek, Annual Report 1993.
Trelleborg, Annual Report 1994.
SSAB, Annual Report 1994.

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

(Metric tons unless otherwise specified)

Commodity		1990	1991	1992	1993	1994 e/
METALS						
Aluminum metal:						
Primary		96,300	96,900	77,200	82,400 r/	82,900
Secondary		30,000	22,200	16,500	19,000 r/	33,000
Arsenic, trioxide, refined e/		7,000	2,500			
Copper:						
Mine output, Cu content		74,300	81,700	89,100 r/	88,900 r/	79,400
Metal:						
Smelter:						
Primary		76,400	68,100	77,800	76,300	79,100
Secondary		31,600	29,400	20,600	22,100	19,600
Total		108,000	97,600	98,400	98,400	98,700
Refined:						
Primary		66,300	67,600	71,600	76,300	77,300
Secondary e/		31,000	29,000	30,000	22,500	25,800
Total		97,300	96,600	102,000	98,800	103,000
Gold:						
Mine output, Au content	kilograms	6,330	6,250	6,160 r/	6,550 r/	4,600
Metal, primary 4/	do.	7,950	6,860	5,370 r/	7,280	8,000
Iron and steel:						
Iron ore concentrate and pellets:						
Gross weight	thousand tons	19,900	19,300	19,300	18,700	20,000
Fe content	do.	12,900	11,100	9,790	9,800 e/	10,000
Pyrite, roasted	do.	375	462	500	500 e/	500
Metal:						
Pig iron and sponge iron	do.	2,740	2,810	2,740	2,850 r/	3,040 3/
Ferroalloys:						
Ferrochromium		118,000	121,000	133,000 r/	128,000 r/	134,000 3/
Ferrosilicon		18,700	21,100	15,500 r/	20,400 r/	22,000
Total		136,000	142,000	149,000 r/	148,000 r/	156,000
Steel, crude	thousand tons	4,450	4,250	4,360	4,590 r/	4,950 3/
Semimanufactures, rolled e/	do.	4,000	4,000	4,000	4,000	4,000
Lead:						
Mine output, Pb content		98,300	91,100	105,000 r/	112,000 r/	125,000
Metal:						
Smelter: e/						
Primary:						
Crude		1,200	1,000	1,000	1,000	1,000
Refined		55,800	55,000	55,000	49,000	40,200
Total		57,000	56,000	56,000	50,000	41,200
Secondary		27,500	26,000	26,000	37,500	42,500
Total smelter		84,500	82,000	82,000	87,500	83,700
Refined:						
Primary		47,500	49,200	54,100 r/	46,800 r/	46,600
Secondary		22,100	38,800	37,100 r/	37,800 r/	36,000
Total		69,600	88,000	91,200 r/	84,500 r/	82,600
Molybdenum, oxide, roasted, Mo content		3,000 e/	2,160	4,280	4,000 e/	4,000
Nickel, metal:						
Unwrought, secondary		298	244	250 e/	250 e/	250
Primary		610	490	500 e/	500 e/	500
Selenium, elemental, refined		29	23	32 r/	50 r/	50
Silver:						
Mine output, Ag content	kilograms	243,000	239,000	210,000 r/	255,000 r/	276,000
Metal, primary 4/	do.	274,000	293,000	270,000 r/	294,000	295,000
Tin, metal:						
Unwrought		364	23	32 r/	30 r/	30
Alloy		1,480	1,240	1,000 r/	1,040 r/	1,100
Zinc: Mine output, Zn content		164,000	161,000	161,000 r/	169,000 r/	160,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity		1990	1991	1992	1993	1994 e/
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	2,480	2,400	2,290 r/	2,200	2,100
Clays: Kaolin e/		108 2/	100	100	100	100
Feldspar, salable, crude and ground		41,200	32,900	34,600 r/	30,000 e/	30,000
Fertilizer, manufactured:						
Nitrogenous	thousand tons	401	403 r/	448 r/	450 r/ e/	450
Phosphatic	do.	91	92	3 r/	10 r/ e/	10
Mixed	do.	514	468	312 r/	300 r/ e/	300
Lime	do.	603	506	460 r/	500 e/	500
Olivine	do.	100	114	120 e/	120 e/	120
Phosphate rock (byproduct):						
Gross weight	do.	7	--	--	--	--
P2O5 content	do.	3	--	--	--	--
Pyrite, gross weight	do.	252	89	37	--	--
Quartz	do.	378	11	5 r/	5 r/ e/	5
Sodium sulfate, synthetic e/	do.	100	100	100	100	100
Stone:						
Dimension, mostly unfinished:						
Granite	do.	113	91 r/	82 r/	80 r/ e/	80
Limestone	do.	6	12	2 r/	5 r/ e/	5
Slate	do.	26	23	22 r/	20 e/	20
Other	do.	29	25 r/	20 r/	20 r/ e/	20
Crushed:						
Dolomite	do.	321	450 r/	631 r/	700 r/ e/	700
Granite	do.	6,360	4,920	4,450 r/	5,000 e/	5,000
Limestone:						
For cement manufacture	do.	1,180	1,210	1,030 r/	1,000 r/ e/	1,000
For lime manufacture	do.	760	600	712 r/	700 r/ e/	700
For other construction and industrial uses	do.	1,950	1,920	1,560 r/	1,500 r/ e/	1,500
Chalk	do.	29	40	28 r/	30 r/ e/	30
For agricultural uses	do.	347	264	335 r/	350 r/ e/	350
For other uses	do.	96	88	78 r/	100 e/	100
Total	do.	4,360	4,120	3,740 r/	3,680 e/	3,680
Quartzite	do.	1,230	1,470	1,430 r/	1,500 e/	1,500
Sandstone e/	do.	50	50	50	50	50
Undifferentiated	do.	24,900	29,000	30,000 e/	30,000 e/	30,000
Other	do.	718	715	749 r/	700 e/	700
Sulfur:						
S content of pyrite	do.	121	89 r/	53 r/	40 e/	40
Byproduct: e/						
From metallurgy	do.	125	125	125	125	125
From petroleum	do.	40	40	40	40	40
Total e/	do.	286	254	218	205	205
Sulfuric acid, gross weight		855	928	900	1,000 e/	1,000
Talc, soapstone		15,000	19,200	10,000 r/ e/	-- r/ e/	--
MINERAL FUELS AND RELATED MATERIALS						
Carbon black	thousand tons	33	26	24 r/	25 e/	25
Coal, anthracite and bituminous	do.	11	28	30 e/	30 e/	30
Coke, metallurgical	do.	318	1,110 r/	1,150 r/	1,200 r/ e/	1,200
Gas, manufactured:						
Coke oven gas	million cubic meters	501	514	545 r/	500 e/	500
Blast furnace gas	do.	3,720	4,330	4,200 r/	4,000 r/ e/	4,000
Peat:						
Agricultural use	thousand tons	250	263	260 e/	250 e/	250
Fuel e/	do.	1,400	1,400	1,400 e/	1,400	1,400
Petroleum:						
Crude	thousand 42-gallon barrels	19	19	20 e/	20 e/	20
Refinery products:						
Liquefied petroleum gas	do.	2,550	2,950	4,620 r/	3,000 e/	3,000
Naphtha	do.	503	226	-- r/	500 e/	500

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity		1990	1991	1992	1993	1994 e/
MINERAL FUELS AND RELATED MATERIALS--Continued						
Refinery products--Continued:						
Gasoline, motor	do.	31,800	31,300	31,500 e/	31,500 e/	31,500
Jet fuel	do.	4,200	2,390	2,500 e/	2,500 e/	2,500
Kerosene	do.	113	38	50 e/	50 e/	50
Distillate fuel oil	do.	46,500	80,700	81,000 e/	81,000 e/	81,000
Residual fuel oil	do.	24,900	27,300	28,000 e/	28,000 e/	28,000
Other e/	do.	4,500	4,000	4,000	4,000	4,000
Refinery fuel and losses e/	do.	11,300	10,000	10,000	10,000	10,000
Total e/	do.	126,000	159,000	162,000	161,000	161,000

e/ Estimated. r/ Revised.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Table includes data available through June 1995.
3/ Reported figure.
4/ Includes only that recovered from indigenous ores excluding scrap.

TABLE 2
SWEDEN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1994

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Granges AB (Electrolux 100%)	Sundsvall smelter at Kubikenborg	98
Cement	Cementa AB (Euroc 100%)	Plants at Degerhamn, Skovde, and Slite	3,400
Copper:			
Ore, copper content	Boliden Mineral AB (Trelleborg AB 100%)	Mines at Aitik, Garpenberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	68
Do.	Outokumpu Oy	Mine at Viscaria/Pahtohavare	22
Metal	Boliden Mineral AB (Trelleborg AB 100%)	Smelter and refinery at Ronnskar	100
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 tons	Terra Mining AB (Norsk Hydro A/S 42%)	Bjorgdal Mine	3
Do.	Boliden Mineral AB (Trelleborg AB 100%)	Mines at Aitik, Akerberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	2
Metal	Boliden Metals AB (Trelleborg AB 100%)	Smelter and refinery at Ronnskar	9
Iron ore	Luossavaara-Kiirunavaara AB (Government 98%)	Mines at Kiruna and Malmberget	28,500
Iron and steel	Svenskt Stal AB (Government 48%)	Steelworks at Lule, Oxelosund, and Domnarvet	3,500
Kyanite	Svenska Kyanite AB (Svenska Mineral 100%)	Quarry at Halskoberg	10
Lead:			
Ore, lead content	Boliden Mineral AB (Trelleborg AB 100%)	Mines at Garpenberg, Laisvall, Langdal, Petiknas, and Renstrom	110
Do.	Ammeberg Mining AB (Union Miniere)	Zinkgruvan Mine at Ammeberg	20
Metal	Boliden Metals AB (Trelleborg AB 100%)	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
Petroleum, refined barrels per day	Skandinaviska Raffinaderi AB	Refinery at Lysekil	210,000
Do.	BP Raffinaderi AB	Refinery at Goteborg	100,000
Do.	Shell Raffinaderi AB	Do.	82,000
Do.	AB Nynas Petroleum	Refineries at Goteborg, Malmo, and Nynashamn	54,000
Silver, metal tons	Boliden Metals AB (Trelleborg AB 100%)	Smelter and refinery at Ronnskar	300
Zinc, ore, zinc content	Boliden Mineral AB (Trelleborg AB 100%)	Mines at Garpenberg, Laisvall, and Langdal	112
Do.	Ammeberg Mining AB (Union Miniere)	Zinkgruvan Mine at Ammeberg	60

TABLE 3
SWEDEN: ESTIMATED RESERVES OF MAJOR
MINERAL COMMODITIES FOR 1994

(Million metric tons)

Commodity	Reserves
Copper ore	280
Iron ore	1,230
Lead ore	40
Zinc, metal	20