

SWEDEN

By Sven Arvidsson

In 2001, economic growth slowed down somewhat compared with the previous year. GDP grew by 1.2% (3.6% in 2000) to SK2,167 billion. The inflation rate rose marginally from 1.0% in 2000 to 2.9% in 2001. On the other hand, industrial production fell by 1.6% and investments are estimated to have fallen by 17%. The average exchange rate with the US dollar was SK10.31:US\$1.00 (compared with SK9.16:US\$1.00 in 2000). The unemployment rate was 4.0% by the end of the year compared with 4.4% in 2000. There was a 6% increase in labour costs for manufacturing and mining (2.5% in 2000).

Exploration remained at almost the same level as in 2000. Expenditures rose marginally, to SK193 million from SK190 million the previous

year. The increase is attributed to intensified drilling at a number of targets.

The number of exploration permits granted mainly for ore minerals fell substantially from 169 in 2000 to 137 in 2001. The area covered by the permits was 2,630 km². There were also some permits granted for diamond exploration. The total area covered by exploration permits, related mainly to ore minerals, amounted at the end of the year is 11,328 km² (21,616 km² if diamonds are included).

Exploration in recent years has led to some new discoveries. In northern Sweden, several gold occurrences are being investigated west of Boliden's gold/sulphide ore deposits in the Skellefte Ore Field. Two of them, Svartliden

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and Fäboliden, have been drilled extensively. Svartliden is 80%-owned by the Australian company, Dragon Mining, which was recently awarded an exploitation concession by the Inspector of Mines and is now awaiting an environmental permit. Svartliden is situated some 50 km west of the city of Lycksele in southern Lapland. The tonnage reported is 1.4 Mt at 5.7 g/t Au. The Fäboliden gold deposit is situated close to Svartliden and some 100 holes have been drilled. The owner, Lapland Goldminers AB, is applying for an exploitation concession. The deposit was discovered by the owners, who are local geologists.

Iron Ore

At LKAB's Kiruna mine, production of crude ore in 2001 was 21.3 Mt compared with 22.3 Mt in 2000. The entire production is hoisted from the new main haulage level at 1,045 m and the mining method is sub-level caving. The volume drilled has increased and higher productivity and better performance from the equipment has been achieved. There are six remote-controlled Atlas Copco rigs equipped with Wassara water-powered drilling machines, and two remote-controlled Solo 1000 rigs. Mine development included 14,500 m of drifting.

High productivity and high performance are essential for the mine. It is thus essential to increase the utilisation of the present equipment. The night shifts are run entirely with remote-controlled equipment and the number of remote-controlled 25 t loaders was increased from four to seven during 2001.

Output of finished products at Kiruna and Svappavaara fell to from 13.8 Mt in 200 to 12.4 Mt in 2001 of which 9.8 Mt (10.9 Mt in 2000) comprised pellets and the remainder fines. The lower demand for pellets during the year meant that more time could be spent on plant maintenance and this provided an opportunity to change the cooler at the Svappavaara works.

Crude ore production at Malmberget was 12.3 Mt in 2001, marginally lower than the 12.4 Mt in 2000. The mixing of waste rock with ore in

the mine still causes dilution with resultant lower grades delivered to the dressing plant. The new main haulage level at 1,000 m was inaugurated in the autumn of 2000 and is contributing an increasing part of the production (4.4 Mt in 2001).

Production drilling rose to 406,000 m, compared with 390,000 m in 2000. Productivity was high and several production records were achieved. All production drilling is done with four remote-controlled rigs. Development work included 14,700 m of drifting, 2,400 m more than in 2001.

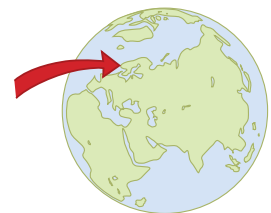
Output of finished products at Malmberget totalled 7.1 Mt, somewhat higher than the 6.8 Mt produced in 2000. The finished products consisted of 4.0 Mt of pellets and 3.1 Mt of concentrate. Haematite production was halted for a period in the latter part of the year, magnetite supplies being sufficient to meet the needs of the planned pellet production.

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Base and Precious Metals

Boliden Mineral AB operated eight mines in Sweden during 2001, and the total production of crude ore amounted to 21.9 Mt. The company has by four ore-dressing plants; at Boliden, Aitik, Garpenberg and Laisvall. Production at the Aitik open-pit copper mine was 17.7 Mt of copper ore. At Garpenberg and Garpenberg North, 1.0 Mt of zinc, lead and copper ore were mined at depths of 800 m to 1,000 m utilising backfill methods. The four mines of Kristineberg, Murliden, Petiknäs and Renström are served by the ore-dressing plant in Boliden.

At Garpenberg, drilling has been directed towards a new deposit located between Garpenberg and Garpenberg North. At the Renström mine, Boliden decided to invest SK21 million in order to commence mining the deep, high-grade, Simon zinc orebody.

The Laisvall lead mine in the mountains of northern Sweden was closed in December 2001. It was the biggest lead mine in Northern Europe and had been in operation for 58 years. The ore was hosted in a flat-lying, quartz-rich sandstone and was mined by room-and-pillar methods. More than 62 Mt of lead ore was extracted with an average grade of 4% Pb. The concentrate was sent some 320 km to Boliden's Rönnskär smelter near the city of Skellefteå, and was the main source of feed for lead production. Copper production at Rönnskär rose substantially last year, from 133,000 t to 216,000 t, as a result of the expansion completed in 2000.

At the Boliden ore-dressing plant, new leaching facilities commenced operations in 2000. They are designed to treat gold ores mainly from the Einarsson and Einarsson West zones of the Kristineberg mine.

During the year, Boliden and Rio Tinto completed the sale of their equally owned Norwegian zinc smelter Norzinc A/S to Outokumpu Oy.

Boliden and North Atlantic Natural Resources (NAN) decided to go ahead with the Storliden

project, just north of Malå. According to the agreement, Boliden will act as the operator of the mine and will also purchase the ore, which will be treated at the Boliden concentrator, which will need minor adjustments for that purpose. A 960 m long ramp is under construction to access the ore, which will be mined by room-and-pillar, backfill and open-stopping methods. A vertical ventilation shaft will also be sunk. Mining is forecast to begin this summer. Storliden is a complex sulphide ore estimated to contain some 1.8 Mt at 3.4% Cu, 10.3% Zn, 0.25 g/t Au, and 24 g/t Ag. A mining rate of 300,000 t/y is envisaged, indicating a mine life of six years.

Zinkgruvan Mining AB, owned by Rio Tinto, continued its operations at the Zinkgruvan mine. Although exploration activity was lower than in the previous year, ore reserves were increased by 0.8 Mt and resources by 1.9 Mt. The additions were made in the western parts of the mine. Exploration was focused on the central and western parts of the ore zone and drilling was performed from an exploration drift at the 650 m level.

Ore production during 2001 rose by 79,000 t to 812,000 t averaging 8.4% Zn, 3.6% Pb and 84 g/t Ag. The main part of the ore production or 89% came from drifts and benching work, 10% came from development work and the remaining 1% from back-fill mining. Development work, mainly in the Burkland area, also contributed 161 000 t of barren rock of which almost 50% was used for underground backfill. A ramp between the 450 m, 650 m and 800 m levels at Burkland was completed during the year, and the mine's equipment was expanded, with two new-generation Atlas Copco units, one Simba M4 and one Boltec, the latter for bolting. Five new ventilation shafts of the six planned have been completed in the Burkland area.

The Zinkgruvan ore-dressing plant treated 806,700 t of ore, establishing a new record. Production amounted to 112,600 t of zinc concentrate and 35,000 t of lead concentrate, somewhat less than in 2000 owing to lower

grades. A paste-fill plant was brought into operation during the year. Cement is mixed into the tailings thus creating a paste which is pumped back into the mine to form a stable fill.

An application has been sent to the Environmental Court in order to get permission to raise ore output to 1.5 Mt/y including mining and beneficiation of copper ore. Continuous efforts are being made to increase further safety at the tailings dam. The company has also adopted Rio Tinto's safety standards now that it is a member of that group.

Operations restarted in September 2001 at the Björkdal gold concentrator. The gold mine, formerly owned by Terra Mining, a subsidiary of the Canadian company William Resources, went bankrupt in 1999, and the plant had been under care and maintenance until last summer. So far, stockpiled low-grade ore is being used as feed, and there is sufficient to last for another two years by which time open-pit mining should have resumed. Production in 2001 was close to 9,000 oz.

Industrial Minerals

Production of limestone in Sweden was 8.9 Mt during 2001, up 0.5 Mt from the previous year. Nordkalk (formerly Partek Nordkalk) produced 3.4 Mt at its Swedish plants (Storugns, Uddagården, Ljung, Ignaberga and Orsa) that is 0.1 Mt more than in 2000. Of the production, 3.0 Mt came from Storugns. All the Swedish plants have been certified according to ISO 9002 and ISO 14001. The other major limestone producer, Svenska Mineral, is running quarries at Gåsgruvan, Rättvik and Stucks. Omya is running the Sala, Glanshammar and Larsbo quarries, which all produce dolomite.

Cement production at the three plants (Slite, Degerhamn and Skövde) operated by Cementa, part of the Heidelberg Cement Group, remained at 2.6 Mt. Of the total sales, 46% were exported. The company has improved its environmental performance substantially with reduction of nitrogen oxides to the atmosphere (85%) and sulphur dioxide (95%). The furnace heat is used to generate electricity.

At Kringelgruvan, production of graphite was suspended in the summer. The owner, Woxna Graphite, has applied for a permit to build an additional plant for leaching to get higher grade concentrates. Meanwhile, it has kept the mine idle awaiting the permission to go ahead with the new plant. Production of graphite concentrate was 1,000 t in 2001.

Swedish Ore and Mineral Production

('000 t except where stated)

	1999	2000	2001
Iron ore products ¹	18,853	20,557	19,484
Processed sulphide ores	23,526	23,608	22,695
Copper concentrate	262	252	268
Lead concentrate	157	147	123
Zinc concentrate	316	320	285
Gold concentrate (t)	1.7	0.2	1.3
Lime and limestone	6,604	8,351	8,888
Cement	2,300	2,600	2,600
Talc/soapstone	19	20	15
Graphite ore	4.5	5.6	1.0

¹ Marketable products.