

THE MINERAL INDUSTRY OF

NORWAY

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While about 25% of Norway's gross national product (GNP) is supplied by natural resource industries (including agriculture, fisheries and forestry), only a small amount (less than 1%) is contributed by the mineral industry. Readily available hydroelectric power and ice-free ports facilitated the growth of energy intensive industries, namely production of aluminum, ferroalloys, magnesium, and silicon metal. However, by far the largest mineral contribution to the GNP (about 17%) is by the hydrocarbon industry.

Government Policies and Programs

Despite rejection of membership in the European Union (EU), Norway has continued to liberalize its mining law. The Government refunded up to 50% of the cost of exploration drilling, and additional grants provided up to 35% of the capital cost of developing certain minerals and specific areas (mainly north of Trondheim). Laws for metallic ore mining were relatively simple. Mineral rights were obtained by filing claims and maintained by paying small annual fees. In addition to a 28% corporate tax, there were also municipal and county taxes ranging from 7.5% to 13.5%. The Norwegian mining laws for industrial minerals were more complicated and often overlapping. While most of the minerals were regulated by special mining laws, aggregates, sand, and gravel were subject to construction laws.

Production

Production of metallic ores has fallen gradually for many years, as existing mines were being depleted and no major new mines were replacing those being exhausted. This decline of mineral output has been partially offset by increased production of industrial minerals. Results in the Norwegian metallurgical industry improved during 1994. (See table 1.)

Trade

The Norwegian economy remained highly dependent on foreign trade and more than one-half of the GDP was derived from it. About 75% of the minerals consumed were imported. Commodity imports, which comprised 7.5% of total imports, were dominated by alumina/bauxite, apatite/phosphate, and potassium. Petroleum represented

about 45% of total exports, followed by metals (7.7%) and industrial minerals, mainly dimension stone.

Structure of the Mineral Industry

Despite recent changes, the Norwegian Government's involvement in the mineral industry remained relatively high, especially in offshore hydrocarbon production. The Government, through the state-owned Den norske stats oljeselskap A/S (Statoil), continued to control all production and refining. The rest of the mineral industry was dominated by Elkem A/S and Norsk Hydro A/S.

Elkem A/S is one of the world's leading diversified metallurgical companies with a strong hydroelectric energy base and significant global presence through its 17 plants and 26 offices on 3 continents. Elkem is publicly owned company in which the largest investors, Orkla, Folketrygdfondet, and Saga Petroleum, were Norwegian. Its six divisions included Aluminium, Carbon/Materials, Energy, Ferrosilicon, Manganese/Chrome and Special Metals, and Silicon Metal. Net income before taxes in 1994 was \$42 million,² more than double that of 1993.

Norsk Hydro A/S is Norway's largest publicly owned industrial concern in which the Norwegian Government's share in 1994 remained 51%, while private investors rose slightly, to 16.29%. Norsk Hydro's division and subdivisions were grouped together in four segments, reflecting the company's core business areas: Agriculture (Industrial Chemicals and production of fertilizer/urea); Oil and Gas (Exploration/Production and Refining/Marketing); Light Metals (Aluminium, Magnesium, and Energy); and Petrochemicals. Net income in 1994 was \$562 million, 30% higher than in 1993. (See table 2.)

Commodity Review

Metals

Aluminum.—Both Norwegian aluminum producers, Elkem and Norsk Hydro, benefited from the 65% price increase for primary metal during 1994 and from the exemption of energy-intensive industries from a special electricity tax levied on other industries by the Norwegian Government.

With an annual capacity of 650,000 metric tons (mt), Norsk Hydro was the larger of the two primary aluminum

producers. Its aluminum division consisted of four wholly owned and one partly owned smelters. The largest, with a 210,000 metric ton per year (mt/a) capacity, was in Karmoy, followed by smelters in Ardal (180,000 mt/a), Sunndalsora (140,000 mt/a), and Hoyanger (70,000 mt/a). The capacity of jointly owned Sor-Al in Husnes was 50,000 mt/a. Total production in 1994 was 618,000 mt, a 5% decline compared to 1993.³ According to Norsk Hydro, semimanufacturing capacity was about 60% of primary metal production. Most of the semis were in the form of extruded products (276,000 mt), followed by rolled products (117,000 mt). According to its 1994 annual report, about 624,000 mt, representing 52% of alumina requirements, was covered by affiliated alumina refineries in Jamaica (Alpart) and Guinea (Friguia), in which Norsk Hydro owned 35% and 10.2% interest, respectively. The remaining amount was secured through long-term contracts linked to primary aluminum prices. The installation of a continuous homogenizing facility at the Sunndal smelter, which was to increase homogenizing capacity to 170,000 mt/a of extrusion ingots, was scheduled to be completed at the beginning of 1995. However, following the rejection of EU, expansion of the smelting capacity at the plant was reportedly put on hold. According to company officials, the Sunndal smelter has increased the remelting capacity to 143,000 mt/a, and plans to increase production of secondary aluminum from 12,000 mt in 1994 to 25,000 mt/a to 35,000 mt/a in the near future, still much less than the expanded capacity. With the addition of two large melting furnaces and a new casting center, the Hoyanger casthouse's capacity will reportedly reach 100,000 mt/a and was expected to permit production of 9.5-meter (m) long sheet ingots.

Elkem Aluminium ANS, a division of Elkem A/S, operated two primary aluminum smelters in Farsund and Mosjoen, with a combined capacity of about 250,000 mt/a. According to the company's 1994 annual report, production in 1994 totaled 239,000 mt of refined primary aluminum, a 19% increase from 1993. Both smelters were jointly owned by Elkem and Aluminum Company of America (Alcoa). Elkem Aluminium Lista has reportedly launched a major program to modernize its Farsund plant. The \$36 million investment is aimed at reducing air and water pollution, and was scheduled to be completed by 1998.

Copper.—In 1994, only two copper-containing sulfide mines were operating in Norway. The combined production of two adjacent Outokumpu mines at Royrvik and Gjersvik was reportedly about 0.6 million metric tons (Mmt) in 1994. Production at Joma Mine at Royrvik, operated by Grong Gruber, began in 1972. Mine officials reported that metal content of the ore averaged 1.18% copper and 2.18% zinc. The Gjersvik Mine, opened in 1993, is 30 kilometers (km) from Royrvik, near the Swedish border. Ore from both mines was beneficiated at the 660,000 mt/a capacity concentrator resulting in 7,400 mt of copper and 9,100 mt of zinc in concentrate, Outokumpu reported. The combined proven reserves amounted to 1.1 Mmt, graded 1.5% copper and

1.5% zinc.⁴

Ferromanganese.—The market for ferromanganese alloys was affected by growing competition, mainly from China. It resulted in falling prices, particularly in the second half of 1994. Despite these difficulties, Norway's production of ferromanganese increased by 10% to 248,648 mt in 1994, according to Elkem's 1994 annual report. Elkem operated three plants in Norway, two in the United States, and one in Australia. Elkem Mangan, a limited partnership in which Elkem owns 51% and Broken Hill Proprietary Company Limited (BHP) of Australia owns 49%, operated ferromanganese plants in Porsgrunn and Sauda. This partnership was established in 1993 to ensure a steady supply of manganese ore from BHP's Groote Eylandt Mine in Australia. At the wholly owned Rana smelter, Elkem started up a second ferrochrome furnace, out of production since fall 1992, and has reportedly undertaken other major renovations.

Ferrosilicon.—The Ferrosilicon Division of Elkem underwent several changes in 1994. Ferrosilicon production at Elkem Ashtabula, of the United States, was reportedly closed down in April 1994 and was replaced by production of calcium carbide. While production from furnace No. 1 at Elkem Thamshavn in Orkanger resumed in July 1994, the furnace at Bjolvefossen was shut down in December due to high electric power prices. Despite this internal restructuring, Elkem still produced about 40% of the ferrosilicon in western Europe and retained 25% of market share.

Ferrosilicomanganese.—The 1994 production at the Tinfos Jernverk-owned Oye Smelteverk at Kvinesdal amounted to about 130,000 mt in 1994, according to its annual report. The smelter utilized two 45-megavoltampere submerged arc furnaces using Soderberg-type electrodes. The source of power was the local Sira-Kvina power stations, the largest hydroelectric power complex in Norway. Company officials reported that the smelter used up to 0.5 Mmt of manganese ore, mainly from Australia, Brazil, Gabon, and South Africa. While the principal product was ferrosilicomanganese, the plant is reportedly capable of converting to production of high carbon ferromanganese in short notice.

Iron Ore.—Norwegian iron ore mines, owned by A/S Sydvaranger, Rana Gruber A/S, and Fosdalen Bergverk A/S, produced about 2.5 Mmt of iron ore concentrate in 1994, an increase of 16% compared with 1993.

The largest producer, Sydvaranger, is in northern Norway, near the Finnish border. Company-reported production in 1994 was about 4.2 Mmt of crude ore yielding about 1.5 Mmt iron pellets, most of which was exported to Germany and the United Kingdom. A small amount, about 70,000 mt, was converted into 72% iron concentrate for

powder metallurgy. Because reserves reportedly amounted to about only 10 Mmt,⁵ the mine was expected to close in 1996.

The recently privatized Rana Gruber Mining Company produced about 1.7 Mmt of crude ore, graded 33% of iron, Outokumpu reported. The final product, 0.8 Mmt of concentrate, was sold mainly to German and French steelworks in a form of sinter and pellets. A small amount, about 10%, was sold to the powder metallurgy market.

Magnesium.—Norsk Hydro was engaged in the production of primary metal in Norway and Canada, recycling in Germany and Canada, and production of magnesium granules and anodes in Norway. In addition, it had an interest in a number of diecasting operations. According to company officials, the improved market conditions in the second half of 1994 allowed for a gradual increase of capacity utilization, to an equivalent of 70,000 mt annual production, at its two smelters: 35,000 mt/a capacity plant in Porsgrunn and 45,000 mt/a capacity Becancour plant in Canada. The company reported that combined production of both plants in 1994 was 56,500 mt of primary magnesium, of which 27,600 mt originated in Norway. Further expansion of sales was hampered by high, 21% antidumping duty on magnesium exports to the United States.

Nickel.—For the last 2 years, the Nikkel og Olivin Mine, in northern Norway, 40 km south of Narvik, was under the management of Outokumpu's subsidiary Norsulfid A/S. At yearend 1994, when a new part of deposit was opened up for production, Outokumpu had reportedly exercised its option to take over the operation. The underground production in 1994 amounted to 676,000 mt of ore with a nickel and copper content of 0.6% and 0.15%, respectively.⁶ The 24,500 mt of concentrate, attained by conventional froth flotation, contained up to 12% nickel and 3.5% copper, was exported to Finland for smelting, the company reported.

Additional nickel was extracted from the ilmenite ore at the Tellnes Mine, owned and operated by Titania A/S. Reportedly about 10,000 mt/a of sulfide ore was produced with an average content of 5% nickel and 2% copper.

Nickel matte and concentrates, imported mostly from Canada and Botswana, were processed at the 66,000 mt/a capacity smelter in Kristiansand. The smelter was operated by Falconbridge Nikkelverk AS, jointly owned by Noranda Inc. of Canada and Trelleborg AB of Sweden. According to plant officials, in addition to about 68,000 mt of refined nickel cathode, small amounts of copper, cobalt, and precious metals were produced at the refinery. The planned opening up of the Ungava deposit in Northern Quebec, will reportedly necessitate expansion of the refinery in Kristiansand.

Silicon Metal.—Production of silicon metal was helped by strong growth in demand for silicon metal grades for the

chemicals and electronics industries, and increased use by aluminum smelters. Elkem's production capacity at its three plants in Norway and one in the United States amounted to 140,000 mt/a. With a market share of about 20%, Elkem was one of the world's leading suppliers of silicon metal.

Titanium.—Titania A/S was reportedly one of two hardrock ilmenite producers in the world. According to mine officials, the mine in Tellnes averaged about 2.5 Mmt/a of crude ore from which about 795,000 mt of concentrate was produced with a 44.4% titanium oxide (TiO) content and small amounts of magnetite and pyrite concentrates. The ore body was a 2.3 km-long lens with 18% TiO, 2% magnetite, and 0.25% sulfide content.⁷ The reserve in 1994 reportedly amounted to about 245 Mmt.⁸ Crude ore was transported from the mine by conveyor belt and by a 4 km-long pipeline to silos at the loading pier on the southwest coast of Norway. More than half of the concentrate was exported, with the remainder used domestically for slag (25%) and pigment production (25%).

BHP was reportedly planning to invest \$29 million in the 350,000-mt/a-capacity ilmenite smelter in Tysseidal, in southwestern Norway, owned by Tinfos Titan & Iron KS. Concentrate was to be shipped from BHP's Beenup Mine in western Australia. Production would include iron and titanium dioxide.

Zinc.—The only sulfide mine containing lead and zinc was in Bleikvassli, 40 km south of Mo i Rana. The beneficiation plant's capacity was 15,000 mt of zinc concentrate and 7,000 mt of lead concentrate. The mine, sold by A/S Sydvaranger to the employees in 1994, has reasonable reserves for its small production and was expected to remain open for a few more years.

Concentrates were smelted at Norzink's smelter at Eitheimsneset, in western Norway near Odda. Norzink AS is jointly owned by Boliden AB of Sweden and Rio Tinto Minerals Developments Ltd. of the United Kingdom. The smelter received its zinc concentrate from mines in Sweden as well as from the Red Dog Mine in Alaska and additional sources in Ireland. Company-reported production in 1994 amounted to 136,751 mt of zinc metal, a new production record. Norzink was planning to reduce the 1995 production by 20% due to an ongoing supply-demand imbalance in the world market.

Industrial Minerals

Norway has a long coastline with excellent ports and favorable geology for producing and exporting many industrial minerals. In 1991, the export value of industrial minerals surpassed that of ore minerals, which, according to Norwegian mining laws, included ilmenite. Opening of the mineral industry to foreign investors is ensuring a steady growth of industrial mineral output.

Fertilizer.—At yearend 1994, market prices for principal fertilizers were about 45% higher than at yearend 1993. Norsk Hydro was Europe's leading fertilizer manufacturer, with production facilities in several European countries. Its fertilizer operations included the production and sale of ammonia and fertilizer products, the most important of which were nitrate and complex fertilizer and urea. According to its 1994 annual report, production of ammonia in 1994 totaled 3 Mmt and fertilizer output came to 9.7 Mmt. Most of the phosphate rock and potassium needed for fertilizer production was imported, mainly from Russia, followed by Israel and Morocco.

Nepheline Syenite.—North Cape Mineral A/S is the world's second largest producer of nepheline syenite. In 1994, it operated two mines, of which the underground mine at Stjernoy, in northern Norway, was the largest. Production began in 1961, and by 1994 had reached about 350,000 mt. The lenticular deposit is reportedly 1,700 m long, 300 m wide, and about 500 m deep. According to industry sources, proven reserves amounted to about 300 Mmt. The deposit consists of perthitic potassium feldspar (56%), nepheline (34%), and other minerals. Ore was transported by conveyor belt to a dressing plant, where it was dried, crushed, magnetically separated, and milled.

Olivine.—One of the world's largest olivine deposits is on the southwestern coast of Norway. It reportedly covers an area of about 6 square kilometers and represents estimated reserves of 2 billion mt. The average mineral content was 92% olivine, 5% pyroxene and serpentine, 1.5% chlorite, and 1% spinel.⁹

The 1994 production of more than 3 Mmt in Norway represented about one-half of world production. Three producers were active in 1994, the largest of which was A/S Olivin at Aheim near Sunnmore. The 2-Mmt-capacity open pit mine was 4 km from the plant and the ocean harbor; olivine ore was transported in a tunnel by a conveyor belt. The two other producers, Franzefoss Bruk A/S and Industrimineraler A/S, mined the nearby deposits of Lefdal and Stranda, respectively.

Stone.—Norwegian production of dimension stone has been steadily expanding. The industry was composed of many small firms. The most sought after stone was larvikite, a syenite with a feldspar lamellar structure that gives it a special luster,⁹ followed by the banded dolomite from Fauske area.

The Sokdal area, on the southwestern coast of Norway, has emerged as a premier location for producing crushed stone. In addition to the established Rekefjord Verk, Titania A/S has been negotiating with Alpine Process Technology Ltd. to utilize the overburden from its Tellnes ilmenite open pit mine. Further production increases may result from a planned \$95 million investment in a quarry near Jossingfjord by a British company, Tarmac PLC, and unnamed

Norwegian partners.

Mineral Fuels

Offshore hydrocarbon production will remain Norway's principal economic activity for the next several decades. It contributed 16% to GNP and comprised 34% of all exports, while employing only 0.7% of total workforce, industry officials reported. As of December 31, 1994, the total discovered resources on the Norwegian Continental Shelf amounted to 2,466 million cubic meters (Mm³) of crude oil, 2,867 Mm³ of natural gas, and 195 Mmt of natural gas liquids.¹⁰ At present levels of output, crude oil reserves will reportedly last for 20 years and natural gas reserves for 115 years. According to industry sources, a total of 27 exploration wells were completed in 1994, of which 22 were wildcats and 5 were appraisal wells. Petroleum was discovered in 14 of the 22 exploratory wells. During 1994, the Norwegian Government approved the development of the second phase of the Ekofisk Field, the Vigdis and Snorre Lunde Fields. The Tordis, Lille-Frigg, Statfjord East, and Gullfaks West Fields came on-stream in 1994; and the Odin and Mime Fields ceased production.

Natural Gas.—Of four new fields, only Lille-Frigg contained natural gas. Production began in May 1994, and was expected to reach 0.8 billion m³ per year in 1995. Reserves, according to the Royal Ministry of Industry and Energy, amounted to 7 billion m³ of natural gas and 3.6 Mm³ of crude oil.

During 1994, six natural gasfields were being developed. The largest, Troll field, was to be developed in phases: Phase 1 will tap the gas reserves in the eastern part; Phase 2 will cover development of oil reserves in the western part; and Phase 3 will develop natural gas deposits in Troll West. Troll's reserves amounted to about 68 Mm³ of crude oil and 1,286 billion m³ of natural gas.

To secure sufficient transportation capacity for the gas produced at the Troll and Sleipner East Fields, with an estimated lifespan of 50 years, the Norwegian Government approved a third pipeline to the European Continent. The 1-m diameter Europipe would connect the Troll gas terminal at Kollsnes, north of Bergen, with the 16/11-E platform in the North Sea and would continue to Emden, Germany. It was expected to deliver 12 billion m³ of gas per year starting in October 1995.

Petroleum.—The Tordis Field was the largest of the four new fields that started operation in 1994. Discovered in 1987, it began operation in June 1994. Reserves amounted to 29 Mm³ of crude oil and 2 billion³m of natural gas, according to the Royal Ministry of Industry and Energy. Estimated production was planned to be 62,000 barrel per day (b/d). Other new fields include, in order of production: Statfjord East (52,000 b/d) and Lille-Frigg (12,000 b/d). With the opening of the western field, the production of

Gullfaks will increase to 520,000 b/d.

The 119 Mm³ (748 million barrels) Heidrun Field was the biggest oilfield discovered in more than a decade. First oil production was expected by mid-August 1995, reaching 200,000 b/d before the end of the year. According to the Royal Ministry of Industry and Energy, Statoil held 76.25% stake in the field, of which 65% is state's direct financial investment.

The Norwegian refining industry consisted of three refineries: 7-Mmt/a-capacity Statoil refinery at Mongstad, 4.5 Mmt/a Esso's refinery in Slagenstangen, and Shell's refinery at Sola, with a capacity of 2.5 Mmt/a.

Reserves

No new major discoveries were reported in 1994, so resources and reserves of minerals, except hydrocarbons, did not change. The increase of recoverable hydrocarbon reserves was based not only on major new finds but also on new technology that increased expected recoveries. (*See table 3.*)

Infrastructure

Most of Norway's land transportation was concentrated in the better developed southern portion of the country. In the less populated northern Arctic region, bisected by many fjords and mountain ranges, development of modern surface infrastructure was more difficult. Therefore, more than one-half of Norway's 79,540 km of roads are gravel, crushed stone, or earth. Almost all of the 4,223 km of standard-gauge railroad track is electrified. With one exception (Narvik), all major ports for the 867 ships of Norway's merchant marine are in the southern portion of the country. The largest ports include Bergen, Fredrikstad, Kristiansand, Oslo, Stavanger, and Trondheim.

The transportation system between the Norwegian Continental Shelf and Europe consisted of a natural gas pipeline to Emden and Zeebrugge in Germany and Saint Ferguson in the United Kingdom, and a crude oil pipeline to Cruden Bay and Teesside in the United Kingdom.

Outlook

While liberalization of mining law will attract new investors in exploration, stringent environmental laws may inhibit traditional extraction. To comply with environmental

restrictions, Norway has invested in new mineral production technologies. The most promising may be bioleaching, which is suitable for recovery of metals from low-grade deposits, either as in situ or as heap leaching.

The electric industry was deregulated in 1994. One reason for this was an emerging scarcity of electric power, which now has to be imported at a high price. Consequently, the metallurgical industry, previously dependent on abundant and cheap electricity, will have to base its future growth on value-added end-products.

According to a recent study, production of crude oil and natural gas liquids will peak in 1996 at 2.85 million b/d, only about 8% more than that of 1994. Annual Norwegian gas sales were forecasted to reach 63 billion m³ by early in the next century, more than twice the 1994 level. This increase will require additional pipelines, starting with Europe, which should be finished by yearend 1995.))))

¹Text prepared July 1995.

²Where necessary, values have been converted from Norwegian krone (NOK) to U.S. dollars at the rate of NOK6.96=US\$1.00.

³Norsk Hydro. Annual Report 1994.

⁴Outokumpu. Annual Report 1994.

⁵Norges Bergverksdrift 1992.

⁶Sandvik, Knut L., Norway. Mining Annual Review 1994, Western Europe.

⁷Olerud, S. Norway's Industrial Minerals, Production & Development Trends. Industrial Miner. Apr. 1993, pp. 55-58.

⁸Work cited in footnote 5.

⁹Work cited in footnote 7.

¹⁰Norwegian Petroleum Activity. Summary, Petroleum Resources. Fact Sheet 95, p. 25.

Major Sources of Information

Norges geologiske undersøkelse
P.O. Box 3006 Lade 7002
Trondheim, Norway
The Ministry of Industry and Energy
P.O. Box 8148 Dep. 00330
Oslo 1, Norway

Major Publications

Elkem A/S. Annual Report 1994.
Fact Sheet 1994.
Hydro Aluminium. Facts and Figures 1994.
Norsk Hydro A/S. Annual Report 1994.
Norzink. Annual Report 1994.
Tinfos. Annual Report 1993.

TABLE 1
NORWAY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1991	1992	1993	1994	1995 e/
METALS					
Aluminum:					
Primary	832,558 r/	812,850	887,461 r/	858,190 2/	846,735
Secondary	63,066 r/	57,043 r/	51,987 r/	47,994 2/	65,000
Cadmium, smelter	227	247	213 r/	288 2/	250
Cobalt	1,983 r/	2,293 r/	2,414 r/	2,824 2/	2,600
Copper:					
Mine output:					
Concentrate	84,592 r/	49,645 r/	36,002 r/	31,116 2/	30,000
Cu content	17,393 r/	12,668 r/	8,696 r/	7,412 2/	6,800
Metal, primary and secondary:					
Smelter	38,444 r/	39,259 r/	37,205 r/	39,516 2/	34,000
Refined	38,400	39,300	37,200	39,400 2/	34,000
Gold e/ kilograms	800	800	600	200	--
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	2,209 r/	2,152 r/	2,162 r/	2,364 2/	2,200
Fe content do.	1,440	1,400	1,360	1,568	1,460
Metal:					
Pig iron do.	61	70	73	70	70
Ferroalloys:					
Ferrochromium do.	83	102	80	120 2/	
Ferromanganese do.	173	203	226	249 2/	
Ferrosilicomanganese do.	227	213	219	197 2/	
Ferrosilicon (75% basis) do.	377	367	400	456 2/	
Silicon metal e/ do.	65	60	60	60	
Other e/ do.	14	14	14	14	
Total do.	939	959	998	1,090	
Steel, crude do.	438	446	505 r/	454 2/	470
Semimanufactures, rolled e/ do.	300	300	290	300	
Lead, mine output:					
Concentrate	6,739 r/	7,083 r/	3,224 r/	5,953 2/	6,000
Pb content	3,517 r/	3,767 r/	1,698 r/	3,096 2/	3,000
Magnesium, primary	44,322 r/	30,404 r/	27,300	27,635 2/	28,000
Nickel:					
Mine output:					
Concentrate	21,156 r/	31,306 r/	31,719 r/	26,470 2/	26,000
Ni content	2,200	3,398 r/	3,462 r/	2,938 2/	3,000
Metal, primary	58,730 r/	55,686 r/	56,817 r/	67,955 2/	52,000
Platinumgroup metals e/ 3/ kilograms	1,500	1,500	1,500	1,500	
Titanium:					
Ilmenite concentrate thousand tons	625	708	713	826 2/	
TiO2 content do.	277	318	315	366 2/	
Zinc:					
Mine output:					
Concentrate	37,690	41,055 r/	27,469 r/	30,117 2/	30,000
Zn content	18,886 r/	21,658 r/	14,327	15,869 2/	16,000
Metal, primary	124,916 r/	125,564 r/	129,192 r/	131,921 2/	130,000
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	1,147 r/	1,266	1,344 r/	1,444 2/	1,400
Feldspar e/	90,000	100,000	75,000 r/	62,905 2/	60,000
Graphite e/	6,930	7,000	6,500	5,566 2/	5,000
Lime, hydrated, and quicklime e/ thousand tons	100	100	100	100	
Mica, flake e/	3,000	3,000	3,000	3,000	
Nepheline syenite e/ thousand tons	292	334	350	279 2/	
Nitrogen: N content of ammonia do.	384	343	315	271 2/	
Olivine sand do.	2,505	2,789 r/	2,955 r/	3,109 2/	
Pyrite do.	306	247	92	1	
Stone, crushed:					
Dolomite do.	600	650	650	743 2/	
Limestone do.	4,000	3,500	3,500	4,357 2/	

See footnotes at end of table.

TABLE 1--Continued
 NORWAY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued					
Quartz and quartzite do.	800	900	900	891 2/	900
Sulfur:					
Pyrite, S content e/ do.	121	125	125	125	
Byproduct of: e/					
Metallurgy do.	75	75	75	75	
Petroleum do.	15	15	15	15	
Total do.	211	215	215	215	
Talc, soapstone, steatite e/ do.	80	60	50	28 2/	30
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades thousand tons	389	449	309 r/	301 2/	300
Gas, natural:					
Gross million cubic meters	28,300	27,700	28,100 r/	30,833 2/	47,000
Marketed 4/ do.	25,000 e/	27,700	28,500	26,800 2/	
Peat: e/					
For agricultural use do.	30	30	30	30	
For fuel use do.	1	1	1	10	
Petroleum:					
Crude 5/ thousand 42-gallon barrels	679,184 r/	793,553 r/	855,643 r/	913,632 2/	980,000
Natural gas liquids do.	17,204	17,200	25,342 r/	24,500	27,300
Refinery products:					
Naphtha e/ do.	4,200	4,200 2/	4,000	1,000	
Gasoline do.	23,228 r/	28,087	28,680 r/	27,149 2/	
Kerosene do.	6,549 r/	8,134 r/	8,499 r/	9,068 2/	
Distillate fuel oil do.	44,796 r/	47,274 r/	48,515 r/	55,000	
Residual fuel oil do.	9,960	11,200	10,700 r/	11,255 2/	
Other e/ do.	4,000	4,000	4,000	4,000	
Refinery fuel and losses e/ do.	4,000	4,000	4,000	4,000	
Total e/ do.	96,707 r/	106,904 r/	108,427 r/	111,472 r/	

e/ Estimated. r/ Revised.

1/ Table includes data available through May 1996.

2/ Reported figure.

3/ Data represent exports.

4/ Reported as total methane sales.

5/ Excluding natural gas liquids.

TABLE 2
NORWAY: 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	Hydro Aluminum A/S (Norsk Hydro A/S 70%)	Smelters at Ardal, Hoyanger, Karmoy, and Sunndalsora	600
Do.	Elkem Aluminium (Elkem A/S 50% and Alcoa 50%)	Smelters at Farsund and Mosjoen	250
Do.	Sor-Norge Aluminium A/S (Alusuisse 50% and Hydro Aluminium 49%)	Smelter at Odda	50
Cadmium	Norzink AS (Boliden AB 50% and Rio Tinto Minerals Development Ltd.)	Smelter at Eitrheimsneset	0.3
Cement	Norcem A/S	Plants at Brevik and Kjøpsvik	2150
Coal	Store Norske Spitsbergen Kulkompani A/S	Mines at Longyearbyen and Svea	450
Cobalt	Nikkelverk A/S (Falconbridge Nickel Mines Ltd 100%)	Smelter at Kristiansand	3
Copper:			
Ore, Cu content	Grong Guber A/S (Norsulfid A/S 100%)	Mines at Roysrvik and Gjersvik	8
Do.	Nikkel og Olivin AS (Norsulfid A/S 100%)	Mine at Narvik	1
Metal	Nikkelverk A/S (Falconbridge Nickel Ltd 100%)	Smelter at Kristiansand	40
Dolomite	Franzefoss Bruk A/S	Mine at Ballagen	350
Do.	Norwegian Holding A/S	Mines at Hammerfall, Logavlen, and Kvitblikk	500
Feldspar	Franzefoss Bruk A/S	Mine at Lillesand	100
Ferroalloys	Elkem Rana (Elkem A/S 100%)	Ferromanganese plant at Mo i Rana	140
Do.	Elkem Sauda (Elkem A/S 51% and BHP 49%)	Ferromanganese plant at Sauda	250
Do.	Elkem PEA (Elkem A/S 51% and BHP 49%)	Ferromanganese plant at Porsgrunn	200
Do.	Elkem Salten (Elkem A/S 100%)	Ferrosilicon plant at Straumen	85
Do.	Elkem Bjølvefossen (Elkem A/S 100%)	Ferrosilicon plant at Alvik	60
Do.	Elkem Thamshavn (Elkem A/S 100%)	Ferrosilicon plant at Orkanger	60
Do.	Finnfjord Smelterverk, Rana Metal (Fesil 100%)	Ferrosilicon plant at Mo i Rana	140
Do.	A/S Hafslung Metal (Fesil 100%)	Ferrosilicon plant at Sarpsborg	75
Do.	Ila og Lilleby Smelterverk (Fesil 100%)	Ferrosilicon plant at Finnsnes	60
Do.	Oye Smelterverk (Tinfos Jernverk A/S 100%)	Silicomanganese plant at Kvinesdal	235
Iron, metal	Ulstein Jernstoperi A/S	Hordvikneset	10
Iron ore	Rana Gruber A/S (Norsk Jernverk Holding A/S 100%)	Mine at Mo i Rana	2,000
Do.	A/S Sydvaranger (Government 8745%)	Bjørnevatt Mine at Kirkenes	1,500
Lead ore, Pb content	A/S Bleikvassli Gruber (A/S Sydvaranger 100%)	Mine at Bleikvassli	2
Lime	Hylla Kalkverk (Nikolai Bruch A/S 100%)	Verdal/Trondheim Mine and plant	80
Do.	A/S Norsk Jernverk	Plant at Mo i Rana	48
Do.	Ardal og Sunndal Verk A/S	More og Romsdal Mine at Surnadal	20
Do.	Brevik Kalkverk A/S	Alesund Mine at Larsnes	20
Do.	Mjøendalen Kalkfabrik	Plant at Asen/Drammen	7
Limestone	Norcem A/S	Dalen, Bjørntvedt, and Kjøpsvik mines	1,600
Do.	Vardelskalk A/S (Franzefoss Bruk A/S 100%)	Sandvika Mine	800
Do.	Brevik Klakverk A/S	Visnes and Glaerum mines	500
Magnesium	Norsk Hydro A/S (Government 51%)	Plant at Porsgrunn	35
Natural gas			
million cubic meters	Den norske stats oljeselskap A/S	Gama, Gullfaks, Sleipner Ost, and Statfjord fields	12,270
Do.	Phillips Petroleum Company Norway	Ekofisk Field	9,900
Do.	Elf Petroleum Norge AS	Frigg, Heimdal, and Ost-Frigg fields	5,750
Do.	Norsk Hydro Produksjon as	Troll-Oseberg Field	2,600
Do.	BP Petroleum Development of Norway	Gyda and Ula fields	1,040
Do.	Esso Norge as	Odin Field	1,000
Do.	Amoco Norway A/S	Hod and Valhall fields	910
Nepheline syenite	North Cape Mineral A/S (Unimin Corp 84%)	Mine at Stjernoy	350
Nickel:			
Ore, Ni content	Nikkel og Olivin AS (Norsulfid A/S 100%)	Mine at Narvik	3
Do.	Titanita A/S (Kronos Norge A/S 100%)	Mine at Tellnes	0.5
Metal	Nikkelverk A/S (Falconbridge Nickel Mines Ltd 100%)	Smelter at Kristiansand	60

TABLE 2--Continued
 NORWAY: 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
Olivine	A/S Olivin	Aheim Mine at Sunnmore	2,500
Do.	Franzefoss Bruk A/S	Lefdal Mine at Bryggja	500
Do.	Industrimineraler A/S	Stranda Mine at Nordfjord	300
Petroleum barrels per day	Den norske stats oljeselskap as	Gullfaks, Staffjord, Tommeliten, and Veslefrikk fields	1,069,300
Do.	Norsk Hydro Produksjon as	Brage, Mime, and Oseberg fields	566,200
Do.	Phillips Petroleum Company Norway	Ekofisk field	237,500
Do.	Saga Petroleum as	Snorre field	170,000
Do.	BP Petroleum Development of Norway	Gyda and Ula fields	155,000
Do.	A/S Norske Shell	Draugen field	90,000
Pyrite	Folldal Verk A/S (Norsulfid A/S 100%)	Mine at Hjerkin	10
Quartzite	Elkem Tana (Elkem A/S 100%)	Mine at Tana	540
Do.	Elkem Marnes (Elkem A/S 100%)	Mine at Sandhornoy	200
Do.	Vatnet Kvarts A/S	Mine at Nordland	150
Do.	Snekkevik Kvartsbrudd	Mine at Kragero	110
Steel	Fundia AB (Norsk Jenverk 50% and Rataruukki 50%)	Plants at Christiania, Spigerverk, Mandal Stal, and Mo i Rana	600
Talc	A/S Norwegian Talc (Pluess-Staufer AG 51%)	Mine/plant at Altermark/Knarrevik and Framfjord	90
Do.	Kvam Minerals A/S	Mine/plant at Kvam	6
Titanium, concentrate	Titania A/S (Kronos Norge A/S 100%)	Mine at Tellnes	800
Zinc:			
Ore, Zn content	Grong Guber A/S (Norsulfid A/S 100%)	Mines at Roysvik and Gjersvik	10
Do.	A/S Bleikvassli Gruber (A/S Sydvaranger 100%)	Mine at Bleikvassli	10
Metal	Norzik A/S (Boliden Mineral AB 50%)	Smelter at Eittheimsneset	137

TABLE 3
NORWAY: RESERVES OF MAJOR MINERAL COMMODITIES FOR 1994

(Million metric tons unless otherwise specified)

Commodity	Reserves
Copper ore	1
Iron ore	20
Natural gas	million cubic meters 1,345
Nepheline syenite	300
Olivine	2,000
Petroleum	1,131
Titanium ore	245