THE MINERAL INDUSTRY OF

NORWAY

By Harold R. Newman

Since the discovery of North Sea petroleum in the late 1960's, petroleum production has become the most important mineral industry activity. In 1998, petroleum was the most significant mineral commodity, followed by industrial minerals and metals. (See table 1.) The Norwegian economy remained dependent on foreign trade. About 75% of the mineral commodities used were imported. About 95% of production of metallic minerals was exported as mineral concentrate with little or no refining.

Sand, gravel, and aggregate deposits were some of Norway's important mineral raw materials. The Norwegian Geological Survey (NGU) has established a Gravel and Aggregate Database containing information on all the country's deposits of sand, gravel, and aggregates. This database contains information on each deposit's location, composition, volume, quality, and operating status. The most important industrial minerals exports were calcium carbonate, dolomite, graphite, ilmenite, nepheline syenite, olivine, and talc (Norwegian Geological Survey, 1998, NGU—Mineral resources, accessed May 1999, at URL http://www.ngu.no/engelsk/fagomraader/mineralres.htm).

Production of metallic ores has fallen gradually for many years as existing mines were being depleted and exhausted mines were not being replaced. This decline of metallic mineral output has been partially offset by increased production of industrial minerals including aggregate. Every year, about 61 million metric tons (Mt) of aggregate, gravel, and sand was extracted; this is equivalent to about 12 metric tons (t) per head of the population (Norwegian Geological Survey, 1998, The minerals industry—Growth and adaptation, accessed August 1999, at URL http://www.ngu.no/aarsrapp98eng/rappeng.98/ berg.htm).

The Norwegian Government's involvement in the mineral industry remained substantial, especially in offshore hydrocarbon production. Through state-owned Den Norske Stats Oljeselskap A/S, the Government continued to control all hydrocarbon production and refining. The rest of the mineral industry was dominated by Elkem A/S and Norsk Hydro A/S. (See table 2.)

The Government and Norsk Hydro signed a 50-year agreement that allows the company to make use of the water, considered to be state property, in four of its hydropower plants in return for about \$200 million. These four plants produced about 3 billion kilowatthours per year of electricity. If approved by the Norwegian Parliament, then the agreement will provide some predictability for long-term power costs and will facilitate Norsk Hydro's expansion plan to its Årdal aluminum smelter's capacity by 50,000 metric tons per year (t/yr) to more than 240,000 t/yr.

The first phase of the expansion, starting in 1998, was expected to take a year to complete, to cost an estimated \$42 million, and to install 26 new reduction cells and a new gas cleaning system and raising rectifier capacity in the existing potroom. The second phase, expected to take from 2 to 3 years and to cost an estimated \$146 million, would replace the older Søderberg technology with prebaked anode cell technology in a second potroom (Norsk Hydro, July 1997, Third quarter report, accessed August 11, 1997, at URL http://www.hydro.com/konsem/finance/quarterly/1997/eng/lm.html).

Outokumpu Oyj's Grong Mine at Royrvik ceased production on May 29 owing to depletion of reserves. The Grong Mine had been in production for 26 years and yielded 148,500 t of copper and 125,000 t of zinc in concentrates. The produced copper concentrates were transported to Outokumpu's Harjavalta copper smelter in Finland. Zinc concentrates were sold in Norway (Outokumpu Oyj, 1998, Production ceased at Outokumpu' Grong copper-zinc mine in Norway, Press release, June 8, 1998, accessed July 7, 1999, at URL http://www.outoku mpu.fi/corporat/I...28d7ac225661e004671b7?OpenDocument).

Norzink A/S was due to complete prefeasibility and feasibility studies for a 100,000-t/yr expansion next year at its Odda zinc smelter. The expansion was scheduled for startup in 2002. Norzink sources of zinc concentrates were Europe, North America, and Peru (Metal Bulletin, 1998).

The gold exploration projects by Viking Gold Corp. were continuing. Viking was exploring the Bindal Gold Project that included three properties—Kolsvik, Reppen, and Royskattendalen. The deposit occurs in early Silurian age rocks of the Caledonides and is located 300 kilometers (km) north of Trondheim. The project constituted 185 claims covering 4,630 hectares. The Bindal Project was reported to have "drillingbased inferred resources" of 18,100 kilograms (kg) (13,900 kg at Kolsvik and 4,200 kg at Reppen). Royskattendalen was considered to be an exploration target in a similar host environment (Viking Gold Corp., 1998, [untitled], News release, accessed August 1999, at URL http://www.vikinggold.com/s/ background.asp).

The Kells Creek gold prospect of Consolidated Logan Mines Ltd. of Canada consisted of 12 claims covering about 3.5 square kilometers near Oppdal within Precambrian gneisses of the Highlands of central Norway. There was interest in the area after several blocks of mineralized gneiss containing chalcopyrite and copper stains, which proved to carry gold values, were located in 1992. The geologic history of the area has been interpreted as providing a setting for precious and base metal mineralization. A hydrothermal system was thought to have deposited ores and was subsequently metamorphosed. The system deposited copper, followed by gold, in faults, leach cavities, and veins. The Caledonian Orogeny likely created open space fractures. Remobilization and introduction of gold into brecciated rock may have taken place during metamorphism.

Logan has completed diamond drilling of 14 geophysical anomalies that had been outlined by the NGU. The company reported the discovery of minor gold values. The next stage of exploration at Kells Creek will focus on four drift-covered zones through a program of overburden drilling, hand trenching, and soil surveying (Consolidated Logan Mines Ltd., 1998, [untitled], News release, accessed December 2, 1998, at URL http://www.infomines.com/logan/kells.html).

A/S Sydvaranger was a major producer of iron ore, with most of the production exported to Germany and the United Kingdom. Rana Gruber A/S's mine at Mo I Rana was preparing for low-cost underground mining because open pit areas were expected to be exhausted in about 2 years.

Elkem A/S entered into an agreement to sell its manganese business to Eramet of France for \$200 million. The agreement covered Elkem's Porsgrunn and Sauda plants in Norway, as well as Elkem's plant in Marietta, Ohio. Elkem's decision to sell follows the cancellation of its contract with BHP of Australia for the supply of manganese ores. Although Elkem had been in discussions with potential ore suppliers, the company stated that the best long-term solution was to sell its plants to Eramet (MetalNet, 1999, Eramet acquires Elkem's Mn division, MB editorial, accessed March 1, 1999, at URL http://www.metal netco.uk/cgi2/W3Vlibrary/MO=3/CT=B/RI=00004703).

Titania A/S was one of two hard-rock ilmenite producers in the world. The mine in Tellnes averaged about 2.5 Mt of crude ore from which about 800,000 t of concentrate was produced with a 44.7% titanium oxide content and a small amount of pyrite concentrate. Also, Titania produced about 25,000 t of magnetite as a byproduct of its ilmenite production.

North Cape Mineral A/S was one of the world's major producers of nepheline syenite. The rock consists of 56% potassium feldspar, 34% nepheline, and about 10% other minerals (biotite and pyroxenes). Three main products were produced—glass-grade Altafloat, ceramic-grade Altaflux, and amber- and filler-grade Minex 10, 20, and 30 (Karlsen, 1998, p. 76).

Some of the world's largest resources of high-quality olivine are in the Sunnmøre-Nordfjord area on the southwestern coast of Norway. With mines and plants at Åheim and Stranda, A/S Olivin was the world's leading producer of olivine products and celebrated its 50th anniversary in 1998. Olivine's 2.5-millionmetric-ton-per-year capacity open pit mine was 4 km from the plant and the port. The olivine ore was transported in a tunnel by conveyor belt to the processing plant. About 85% of Olivin's production was sold as raw olivine sand, and 15% was sold as refractory bricks. The primary application of olivine sand is as slag conditioner in the iron-making industry and the main application area for the refractories was in the metallurgical industry. Almost all production was exported (Karlsen, 1998, p. 73).

Production of stone, particularly dimension stone, has been steadily increasing as the industry, constituting many small firms, has been expanding. The most sought-after stone was larvikite, a syenite with a feldspar lamellar structure that gives it a special luster. Also, banded dolomite from the Fauske area was highly regarded.

Offshore hydrocarbon production was expected to remain the principal economic activity for the next several decades. Norway produced an average of about 3.03 million barrels per day of crude oil and was ranked sixth in world production. The country maintained its position as the world's second largest oil exporting country after Saudi Arabia.

To counter an anticipated decline in production during the next decade, the Government has been encouraging the discovery of new resources. Exploration has been focused on finding resources near existing infrastructures. Offshore fields under development or scheduled for development have grown considerably in the last year. It was estimated that fields likely to be brought on-stream in the next 5 years have total reserves of 6.4 billion barrels of petroleum and 25.7 trillion cubic feet of natural gas (Oil & Gas Journal, 1998).

References Cited

- Karlsen, T.A., 1998, Nordic minerals review—Norway: Industrial Minerals, no. 374, November, p. 73-76.
- Metal Bulletin, 1998, Norzink concentrates on the future: Metal Bulletin, no. 8305, August 27, p. 5.
- Oil & Gas Journal, 1998, Norway's development prospect list grows: Oil & Gas Journal, v. 96, no. 33, August 17, p. 80.

Major Sources of Information

Norwegian Geological Survey P.O. Box 3006 Lade 7002 Trondheim, Norway Royal Ministry of Petroleum and Energy P.O. Box 8148 Dep 0033 Oslo, Norway

TABLE 1 NORWAY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1994	1995	1996	1997	1998 e/
METALS						
Aluminum:						
Primary		856,967	846,794	863,002	918,558	995,619 2
Secondary		47,994	55,685	59,702 r/	58,635 r/	62,000
Cadmium, smelter		288	317	274	290 r/	270
Cobalt		2,823	2,804	3,098	3,417	3,851 2/
Copper:						
Mine output:						
Concentrate		31,116	28,561	30,000	28,000	11,000
Cu content		7,412	6,799	7,400	6,671	2,698 2/
Metal, primary and secondary, refined		34,332 r/	34,322	33,900 r/	32,639 r/	31,658 2
Gold e/	kilograms	200				
Iron and steel:						
Iron ore and concentrate:						
Fe content	thousand tons	1,650	1,348	1,118	1,100 e/	1,100
Metal:						
Pig iron e/	do.	70	70	70	70	70
Ferroalloys:						
Ferrochromium	do.	120	148	110	145 e/	170
Ferromanganese	do.	249	213	215	215 e/	215
Ferrosilicomanganese e/	do.	197 2/	210	210	210	210
Ferrosilicon (75% basis)	do.	456	474	462	470 e/	470
Silicon metal	do.	92	101	110	110 e/	110
Other e/	do.	14	15	15	15	15
Total	do	1,128	1,161	1,122	1,165	1,190
Steel, crude	do.	456	503	511	510 e/	500
Semimanufactures, rolled e/	do.	300	300	300	300	300
Lead, mine output:	<u>uo.</u>	500	500	500	500	500
Concentrate		5,953	2,505	2,600	2,600 r/	
Pb content		3,096	1,462	2,000	2,000 r/	
Magnesium, primary		27,635	28,000 e/	2,080	2,000 l/ 28,000 e/	26,000
		27,055	28,000 8/	28,000	28,000 8/	26,000
Nickel:						
Mine output:		26.470	24.027	22.000 /	20.000 /	20.000
Concentrate		26,470	24,927	23,000 e/	20,000 e/	20,000
Ni content		3,328	3,386	3,135	2,454	2,500
Metal, primary		67,955	53,237	61,582	62,702	70,200 2
Platinum-group metals e/ 3/	kilograms	1,500	1,500	1,200	1,000	1,000
Titanium:						
Ilmenite concentrate	thousand tons	826	833	750 e/	750 e/	800
TiO2 content e/	do.	320	325	340	340	360
Zinc:						
Mine output:						
Concentrate		30,117	18,995	19,000	9,000 e/	
Zn content		15,869	9,877	9,880	4,500 e/	
Metal, primary		131,921	121,576	134,900	137,400 e/	128,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	1,444	1,613	1,664	1,724 r/	1,700
Feldspar		62,905	75,397	76,000	75,000 e/	75,000
Graphite e/		5,566	2,588	2,600	2,600	2,600
Lime, hydrated, and quicklime e/	thousand tons	100	100	100	100	100
Mica, flake e/		3,000	3,000	2,500	2,500	2,500
Nepheline syenite	thousand tons	279	294	300	300 e/	300
Nitrogen, N content of ammonia	do.	271	289	295	279	245 2
Olivine sand	do.	3,109	3,517	3,600	3,600 e/	3,600
Pyrite	do.	1	5,517	5,000	5,000 e/	5,000
Stone, crushed:	<u>uo.</u>	1	5	0	5.0	5
Dolomite	do.	743	797	800	800 e/	800
Limestone	do.	4,357	4,675	4,600	4,500 e/	4,500
Quartz and quartzite	do.	4,337	4,073 963	4,000 960	4,300 e/	4,300
See footnotes at end of table.	u0.	071	705	200	1,000 6/	1,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity		1994	1995	1996	1997	1998 e/
INDUSTRIAL MINERAL	LSContinued					
Sulfur: e/						
Pyrite, S content	thousand tons	1				
Byproduct of:						
Metallurgy	do.	75	80	80	60	50
Petroleum	do.	15	20	20	50	18 2
Total	do.	91	100	100	110	68
Talc, soapstone, steatite e/	do.	28	30	28	28	26
MINERAL FUELS AND RELA	ATED MATERIALS					
Coal, all grades	do.	301	343	261	260 e/	250
Gas, natural:						
Marketed 4/	do.	26,800	27,800	37,400	42,600 e/	43,600
Peat: e/						
For agricultural use	do.	30	30	30	30	30
For fuel use	do.	1	1	1	1	1
Petroleum:						
Crude 5/	thousand 42-gallon barrels	956,369	979,104	1,104,096	1,105,584	1,100,000
Natural gas liquids e/	do	24,500	40,560	41,600	42,000	42,000
Refinery products:						
Naphtha e/	do.	20,000	22,100	26,350	26,000	26,000
Gasoline	do.	27,149	24,470	25,000	25,000 e/	25,000
Kerosene	do.	9,068	8,378	9,000 e/	9,000 e/	9,000
Distillate fuel oil	do.	50,832	45,140	45,000	45,000 e/	45,000
Residual fuel oil	do.	11,255	12,361	12,000 e/	12,000 e/	12,000
Other e/	do.	4,000	4,000	4,000	4,000	4,000
Refinery fuel and losses e/	do.	4,000	4,000	4,000	4,000	4,000
Total e/	do.	126,304	120,449	125,350	125,000	125,000

e/ Estimated. r/ Revised.

1/ Table includes data available through June 1999.

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 IN 1998

(Thousand metric tons unless otherwise specified)

			Annual
Commodity	Major operating companies and equity owners	Location of main facilities	capacity
Aluminum	Hydro Aluminium ANS (Norsk Hydro A/S 70%)	Smelters at Årdal, Hoyanger, Karmoy, and	600
		Sunndalsora	
Do.	Elkem Aluminium (Elkem A/S 50% and Alcoa 50%)	Smelters at Farsund and Mosjoen	250
Do.	Sor-Norge Aluminium A/S (Alusuisse 50%	Smelter at Odda	50
	and Hydro Aluminium 49%)		
Cadmium	Norzink AS (Boliden AB 50% and Rio Tinto Minerals	Smelter at Eitrheimsneset	0
	Development Ltd.)		
Cement	Norcem A/S	Plants at Brevik and Kjopsvik	2,150
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 Royrvik (closed) 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%)	Ferrochromium 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

See footnote at end of table.

TABLE 2--Continued NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 1998

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
FerroalloysContinued:	Elkem Salten (Elkem A/S, 100%)	Ferrosilicon plant at Straumen	85
Do.	Elkem Bjolvefossen (Elkem A/S, 100%)	Ferrosilicon plant at Alvik	60
Do.	Elkem Thamshavn (Elkem A/S, 100%)	Ferrosilicon plant at Orkanger	140
	Finnfjord Smelterverk, Rana Metal (Fesil 100%)	Ferrosilicon plant at Mo I Rana	140
Do.			
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
ron, metal	Ulstein Jernstoperi A/S	Hordvikneset	10
ron ore	Rana Gruber A/S (Norsk Jernverk Holding A/S, 100%)	Mine at Mo I Rana	2,000
Do.	A/S Sydvaranger (Government, 87.45%)	Bjornevatn 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.	Breivik Kalkverk A/S	Alesund Mine at Larsnes	20
Do.	Mjoendalen Kalkfabrik	Plant at Asen/Drammen	7
Limestone	Norcem A/S	Dalen, Bjorntvedt, and Kjopsvik Mines	1,600
Do.	Vardelskalk A/S (Franzefoss Burk A/S, 100%)	Sandvika Mine	800
Do.	Breivik Klakverk A/S	Visnes and Glaerum Mines	500
			50
Magnesium	Norsk Hydro A/S (Government, 51%)	Plants at Porsgrunn and Sauda	50
Natural gas million cubic meters			10.070
	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 A/S	Frigg, Heimdal, and Ost-Frigg Fields	5,750
Do.	Norsk Hydro Produksjon A/S	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
Vickel:			
Ore, Ni content	Nikkel og Olivin A/S (Norsulfid A/S, 100%)	Mine at Narvik	3
Do.	Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	1
Metal	Nikkelverk A/S (Falconbridge Nickel Mines Ltd., 100%)	Smelter at Kristiansand	85
	× 5	0	
Dlivine	A/S Olivin	Åheim Mine and plant	2,500
Do.	do.	Stranda Mine and plant	300
Do.	Franzefoss Bruk A/S	Lefdal Mine at Bryggja	500
Petroleum barrels per day	Den Norske Stats Oljeselskap A/S	Gullfaks, Statfjord, Tommeliten, and	1,069,300
		Veslefrikk Fields	
Do.	Norsk Hydro Produksjon A/S	Brage, Mime, and Oseberg Fields	566,200
Do.	Phillips Petroleum Company Norway	Ekofisk Field	237,500
Do.	Saga Petroleum A/S	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 Hjerkinn	10
Juartzite	Elkem Tana (Elkem A/S 100%)	Mine at Tana	540
•	, , ,		
Do.	Elkem Marnes (Elkem A/S 100%)	Mine at Sandhornoy	200
De		Mine at Nordland	150
Do.	Vatnet Kvarts A/S		
Do.	Snekkevik Kvartsbrudd	Mine at Kragero	110
Do.	Snekkevik Kvartsbrudd Fundia AB (Norsk Jenverk 50% and Rataruukki 50%)	Plants at Christiania, Spigerverk, Mandal Stal, and Mo I Rana	600
Do. teel	Snekkevik Kvartsbrudd	Plants at Christiania, Spigerverk, Mandal Stal,	600
Do. Steel	Snekkevik Kvartsbrudd Fundia AB (Norsk Jenverk 50% and Rataruukki 50%)	Plants at Christiania, Spigerverk, Mandal Stal, and Mo I Rana Mine/plant at Altermark/Knarrevik and Framfjord	600 90
Do. Steel Falc Do.	Snekkevik Kvartsbrudd Fundia AB (Norsk Jenverk 50% and Rataruukki 50%) A/S Norwegian Talc (Pluess-Staufer AG 51%) Kvam Minerals A/S	Plants at Christiania, Spigerverk, Mandal Stal, and Mo I Rana Mine/plant at Altermark/Knarrevik and Framfjord Mine/plant at Kvam	600 90 6
Do. Steel Falc Do. Fitanium, concentrate	Snekkevik Kvartsbrudd Fundia AB (Norsk Jenverk 50% and Rataruukki 50%) A/S Norwegian Talc (Pluess-Staufer AG 51%)	Plants at Christiania, Spigerverk, Mandal Stal, and Mo I Rana Mine/plant at Altermark/Knarrevik and Framfjord	600 90
Do. Steel Falc Do. Citanium, concentrate Zinc:	Snekkevik Kvartsbrudd Fundia AB (Norsk Jenverk 50% and Rataruukki 50%) A/S Norwegian Talc (Pluess-Staufer AG 51%) Kvam Minerals A/S Titania A/S (Kronos Norge A/S 100%)	 Plants at Christiania, Spigerverk, Mandal Stal, and Mo I Rana Mine/plant at Altermark/Knarrevik and Framfjord Mine/plant at Kvam Mine at Tellnes 	600 90 6 800
Do. Steel Falc Do. Stanium, concentrate Zinc: Ore, Zn content	Snekkevik Kvartsbrudd Fundia AB (Norsk Jenverk 50% and Rataruukki 50%) A/S Norwegian Talc (Pluess-Staufer AG 51%) Kvam Minerals A/S Titania A/S (Kronos Norge A/S 100%) Grong Guber A/S (Norsulfid A/S 100%)	Plants at Christiania, Spigerverk, Mandal Stal, and Mo I Rana Mine/plant at Altermark/Knarrevik and Framfjord Mine/plant at Kvam Mine at Tellnes Mines at Royrvik and Gjersvik	600 90 6 800 10
Do. Steel Falc Do. Fitanium, concentrate Zinc:	Snekkevik Kvartsbrudd Fundia AB (Norsk Jenverk 50% and Rataruukki 50%) A/S Norwegian Talc (Pluess-Staufer AG 51%) Kvam Minerals A/S Titania A/S (Kronos Norge A/S 100%)	 Plants at Christiania, Spigerverk, Mandal Stal, and Mo I Rana Mine/plant at Altermark/Knarrevik and Framfjord Mine/plant at Kvam Mine at Tellnes 	600 90 6

1/ Closed May 1998.