THE MINERAL INDUSTRY OF

NEW ZEALAND

By Travis Q. Lyday

The economy of New Zealand was based on extensive manufacturing and service sectors that complement an export-oriented agricultural sector, which accounts for about one-half of all goods exported (Far Eastern Economic Review, 2002a). Its largest export markets were, in decreasing order, Australia, the United States, Japan, and the United Kingdom (Resource Information Unit, 2002, p. 16). Owing to a diverse geology and dynamic tectonic history, New Zealand has a wide variety of economic mineral deposits. Gold, however, continued to dominate the mining sector in 2002 (Resource Information Unit, 2002, p. 14).

Although gold was the first metal discovered in New Zealand in the early 19th century by early European visitors, it was not until European settlement began in earnest in mid-century that hard-rock gold was discovered (in 1852) in the Coromandel region of North Island (New Zealand Mineral Industry Association, 2003§[1]).

By the end of the 1860s, copper, iron, lead, and silver, in addition to gold, deposits had all been discovered and worked, and occurrences of antimony, arsenic, chromium, zinc, and other minerals had been located. The potential of the Buller and Greymouth coalfields on South Island and the Waikato coalfield on North Island also had been identified, and coal mines were operational throughout the country. Shortly after World War II, aggregate, industrial minerals, and stone production grew steadily, coal mining fluctuated, and gold output declined. Extensive exploration that involved the public and private sectors during the late 1950s to early 1960s was successful for natural gas and gas condensate, iron ore (in the form of ironsand), and geothermal energy (Ministry of Economic Development, 2001g, p. 36-41).

New Zealand's mining industry (excluding oil and gas) contributed less than 1% to the country's gross domestic product (GDP) of about $58.4 billion in 2002. Mining provided about 4,000 jobs directly to the country's workforce and another 8,000 jobs indirectly as suppliers of goods and services (Australia's Paydirt, 2002; New Zealand Mineral Industry Association, 2003§). In 2002, mining activities in New Zealand included the mining of gold, often with silver as a byproduct; the production of iron ore from titanomagnetite iron sands; the quarrying of industrial raw materials, such as clays (bentonite, brickmaking, and halloysite), sand and gravel (usually called aggregate) for road building, dimension stone, dolomite, limestone, and serpentinite for use primarily in the construction and agricultural industries; the production of salt by solar evaporation of seawater; and the extraction of coal by open cast and underground methods. Natural gas, natural gas liquids, and petroleum also were produced offshore and onshore.

The mineral-processing sector consisted chiefly of producing primary aluminum, manufacturing concrete and fertilizers, refining petroleum, and producing crude steel. These and other products, many of which were produced from imported raw materials, provided an estimated 2% to 3% to the GDP, thus increasing the value of the minerals industry to the country by as much as 4% of the GDP.

Government Policies and Programs

State-owned "Crown minerals," which are based on the British legal system, are owned and regulated by legislation passed by Parliament, namely the New Zealand Crown Minerals Act 1991 and the Crown Minerals Amendment Act (No. 2), which was passed in 1997. Crown-owned minerals (meaning on behalf of all New Zealanders) include all in-ground gold and silver in New Zealand. The Crown also owns all gas and petroleum and approximately one-half of the in-ground coal; nonmetallic minerals; other metallic minerals, which include uranium; industrial rocks; and building stones. Crown Minerals, Ministry of Economic Development, is the New Zealand Government agency that manages these state-owned coal, mineral, and petroleum resources known as the Crown mineral estate (Ministry of Economic Development, 2003, p. 2). The Crown mineral estate extends over the land, the Exclusive Economic Zone (to 200 nautical miles from the land of New Zealand), and New Zealand's continental shelf beyond this. Minerals not designated as part of the Crown mineral estate are privately owned.

Environmental matters that relate to exploration, prospecting, and mining of Crown or privately owned minerals were governed under the Resource Management Act 1991, which became effective on October 1, 1991. The purpose of the act was to promote sustainable management of natural and physical resources. This meant that people and communities could provide for their own well-being within a sustainable environment. The regional and local councils that administer the Act may grant resource consents for all activities. For mining, which is treated no differently than other activities, the main types of resource consents were as follows:

- Water permits for taking or diverting water;
- Discharge permits for discharges into water, the air, or onto land;
- Land use consents for excavations and disturbances of land or the habitats of plants and animals; and
- Coastal permits for activities on or near the coast (New Zealand Mineral Industry Association, undated§).

[1]References that include a section mark (§) are found in the Internet References Cited section.

Commodity Review

Metals

Aluminum.—New Zealand Aluminum Smelters Ltd. operated the Tiwai Point smelter at Bluff on South Island. The smelter was owned by Rio Tinto Plc of the United Kingdom (79.36%) and Sumitomo Chemical Co. of Japan (20.64%) and was operated by Comalco (NZ) Ltd. (a Rio Tinto subsidiary). The smelter ran four potlines with a total capacity of about 320,000 metric tons per year (t/yr) of primary aluminum. Although a low-grade resource of bauxite (the ore of aluminum) was identified about 300 kilometers (km) north of Auckland on North Island, no bauxite has been mined in New Zealand. All the bauxite used in the smelting process at Tiwai Point was mined at Weipa in northern Queensland, Australia, and refined into alumina at the Queensland Alumina Ltd. refinery at Gladstone for use in the production of primary aluminum at the Tiwai Point Smelter. More than 90% of the aluminum produced at Tiwai Point was exported chiefly to Japan, the Republic of Korea, and other Asian markets (Ministry of Economic Development, 2001a, p. 72).

Gold.—New Zealand's long history of gold production dates back to the early 19th century when European sealers and whalers were first exploring the country. In 2002, gold was mined at two large hard-rock mines—the Martha Hill Mine at the base of the Coromandel Peninsula at Waihi, which is located 120 km southeast of Auckland on North Island, and the Macraes Mine, which is located 55 km north of Dunedin on South Island. Alluvial gold also was produced from three dredging operations on South Island—Grey River, Quinns Terrace, and Waikaka Valley.

In July, L&M Mining Ltd. received resource consents for its proposed small-scale [600-kilogram-per-year (kg/yr)], 8-year hydraulic excavation mining of high-grade gold-bearing gravels that feed a floating gold recovery plant in the Clutha River, which is located 60 km southeast of Queenstown on South Island. Mining was planned to begin in 2002; about 40 people would be employed. Since beginning operations in 1980, L&M has operated 20 alluvial mines in the Otago, Southland, and West Coast regions of New Zealand, as well as a mine in Bolivia (Gold Mining Journal, 2001).

In December, Perth, Australia-based Gold and Resource Developments NL (GRD) approved the development of its Globe-Progress Mine in the Reefton goldfield, which is located 6 km south of Reefton on the western coast of South Island, by GRD Macraes Ltd. (its wholly owned subsidiary). New Zealand's Department of Conservation had given its approval to develop the mine in November. Development was to begin in January 2002 (Mining Journal, 2001b). The Government initially denied licensing for the mining operation in August for unspecified reasons but reversed itself following severe public criticism, which included that from some conservation consulting groups (Australia's Paydirt, 2001). The mine was expected to produce about 2,200 kg/yr of gold (Mining Journal, 2001a). Normandy Mining Ltd. announced that it was planning a new underground mine at Waihi to develop the high-grade 15,550-kilogram Favona gold-silver deposit that is positioned almost directly beneath the present gold-silver-processing plant of the Martha Hill open pit mine. Initial indications suggest that the Favona operation could produce an average gold content of about 10 grams per metric ton ore mined and have a life of 5 to 10 years (Gold Gazette, 2002). The mine would be accessed through a decline from a portal near the existing processing plant, and the underground operation could mesh with the projected closure of the Martha Hill Mine in 2007 (Mining Journal, 2001c).

GRD Macraes' Macraes Mine, which is located 55 km north of Dunedin at Macraes Flat on South Island, was New Zealand's largest gold mining operation and accounted for more than 50% of the country's production. In March, following the successful commissioning of the pressure oxidation autoclaves for treating refractory ores, an expansion of throughput to 4.5 million metric tons per year (Mt/yr) was approved; completion was expected by midyear 2002, with a portion of the expansion expected to accommodate additional feed from the new Globe-Progress Mine (Resource Information Unit, 2002, p. 97-98). The plan was for Globe-Progress to mill up to 1 Mt/yr and send about 65,000 t/yr of concentrate to the Macraes Mine's pressure oxidation plant for treatment. The first gold pour from the revived Reefton goldfield, which had closed in 1951, was expected in December 2002 (Australia's Paydirt, 2001/2002a).

Iron Ore.—Iron ore in the form of titanomagnetite-rich sand derived from the coastal erosion of the Mount Taranaki volcanics was mined from beach and dune sands and concentrated at two sites along the western coast of North Island. Mining was by BHP New Zealand Steel Ltd. (NZ Steel) (a wholly owned subsidiary of Australia's BHP Billiton Ltd.). The Taharoa operation is located 150 km south of Auckland, and the Waikato North Head operation is located 30 km south of Auckland.

The Taharoa ironsand site was leased by its Maori owners to NZ Steel from 1968 until 2038. The ironsand was mined by a conventional cutter-suction dredge in dredge ponds. The heavy minerals were concentrated at the pond site by magnetic and gravity separation to produce a titanomagnetite ironsand concentrate of 57% iron. The product was pumped through twin 3-km-long slurry pipelines onto stockpiles near the ship-loading facility at the port of Taharoa where it was exported to steel mills in China and Japan (Resource Information Unit, 2002, p. 141).

NZ Steel had an exclusive license with the Government to mine the ironsand at its Waikato North Head site from 1996 until 2096. Mining was done by two bucket-wheel excavators supported by a track-shiftable conveyor system. Processing of the ore was by the same methods used at Taharoa, but the resulting concentrate was about 59% iron. All Waikato North Head's production was piped to NZ Steel's 450,000-t/yr integrated steel plant at Glenbrook by an 18-km-long high-pressure slurry pipeline (Resource Information Unit, 2002, p. 141).

Iron and Steel.—The Glenbrook steelworks, which specialized in flat and coated products, produced hot-rolled

coils, sheet and plate for pipemaking, heavy and light construction slabs; cold-rolled steel for tubing; hollow sections for agricultural products, commercial construction, and reticulation; and coated steels for construction (Ministry of Economic Development, 2001a, p. 71).

Platinum-Group Metals.—Considerable potential for platinum and platinum-group metals (PGM) from hard-rock deposits and alluvial concentrations exists in New Zealand. The Longwood Range in Western Southland was considered to be the most prospective hard-rock area, and alluvial deposits in Nelson, Otago, Southland, and Westland are known to contain PGM. New exploration, however, was not the only way to achieve a PGM industry in New Zealand. By using improved gravity and flotation recovery methods, increased recovery of PGM and gold from alluvial deposits was becoming more attractive (Ministry of Economic Development, 2001a, p. 17).

Industrial Minerals

New Zealand has a diverse range of industrial minerals, some of which have abundant estimated resources. Mining these commodities continued to contribute significantly to the country's economy. New Zealand's industrial minerals production included clays (bentonite, kaolinite, and halloysite), dolomite, ironsand (discussed in the "Metals" section), limestone, marble, perlite, pumice, salt, serpentinite, silica sand and amorphous silica, quartzite, sulfur, and zeolite. Perlite, serpentinite, and sulfur were produced intermittently (Industrial Minerals, 2000).

Although New Zealand continued to have substantial export commerce in its industrial minerals sector, most output was for domestic use because the distances to overseas markets limits most exports to the high-value commodities (for example, metals and fuels) or products with unique applications or specifications (for example, amorphous silica sand for pozzolan cement and ferrosilicon manufacture) (Industrial Minerals, 2000). The main exports were, in decreasing quantity, ironsand, halloysite clay, limestone, cement, salt, sulfur, and pumice (Ministry of Economic Development, 2001a, p. 20).

Cement.—New Zealand had two cement manufacturing plants—at Cape Foulwind, which was located on South Island's western coast near Westport and was operated by Milburn New Zealand Ltd. (a wholly owned subsidiary of Switzerland-based Holderbank Group), and at Portland, which was located on North Island's eastern coast near Whangarei and was operated by Golden Bay Cement Co. Ltd. (a wholly owned subsidiary of Fletcher Challenge Ltd.) (Industrial Minerals, 2000). The Cape Foulwind plant produced about 470,000 t/y, and the Portland plant produced about 490,000 t/yr. Both plants used domestic high-grade crystalline limestone mixed with argillaceous marl for their feed (Ministry of Economic Development, 2001a, p. 20).

Clays.—Halloysite clay was produced by New Zealand China Clays Ltd. from two deposits at Mataura Bay, which is located about 100 km north of Whangarei. The halloysite was exported to more than 20 countries for the manufacture of high-quality ceramics, which were principally porcelain but also fine bone china and technical ceramics (Ministry of Economic Development, 2001a, p. 64). About 40,000 t/yr of raw clay was mined from each pit (Industrial Minerals, 2000).

Kaolinite clays were used for domestic brick, ceramics, pipe, pottery, and tile manufacture. Some kaolinite was used as a filler in adhesives, bitumen, and rubber. Higher purity kaolinite was used by the paper industry for paper coating and filling (Industrial Minerals, 2000).

Salt.—Dominion Salt Ltd. produced about 60,000 t/yr of premium salt products for a variety of domestic industries, which included markets in agriculture, chlorine manufacture, dairy, edible salt, pharmaceutical, tanning, and water treatment. The salt was produced by solar evaporation of seawater pumped into Lake Grassmere near Blenheim on North Island (Ministry of Economic Development, 2001a, p. 74). The evaporation ponds were constructed in low-lying areas and separated into paddocks with gates to admit and retain seawater. Low rainfall, many hours of sunshine, and adequate wind facilitated the process (Resource Information Unit, 2002, p. 95, 106).

Stone.—Limestone deposits are widespread throughout New Zealand. Limestone that contains more than 70% calcium carbonate was used for agricultural fertilizer and road aggregate. Higher grade limestone is used to manufacture industrial grade lime and hydrated lime and in cement-manufacturing plants in addition to road aggregate and agriculture use (Industrial Minerals, 2000).

Large deposits of marble occur in South Island—at Fiordland, which is located on the southwestern coast, and on Takaka Hill in Northwest Nelson, which is located on the northwestern coast. Main production has been from quarries on Takaka Hill for use as building stone and in industry and agriculture.

Pumice was quarried from very large pyroclastic deposits in the Taupo volcanic zone and dredged along with sand from alluvium in the lower reaches of the Waikato River on North Island. The main uses for pumice were as fill for road construction, sand in concrete block manufacture, and foundations and drainage (Ministry of Economic Development, 2001a, p. 20).

Mineral Fuels

Coal.—In 2001, about 45 coal mines were operating in New Zealand; of those, 20 mines each produced at least 10,000 t/yr. New Zealand coalfields are grouped by region (Ministry of Economic Development, 2001a, p. 52). Coal production in New Zealand increased by 9.1% in 2001, thus reaching a record-level of almost 4 million metric tons (Mt). Production increased owing to substantial increases in production in the Waikato Coal Region coalfields of North Island and the continuing growth in demand for export coals from the West Coast Region coalfields of South Island (Ministry of Economic Development, 2002). The Waikato Region comprises 13 coalfields that extended from Drury, which is located 30 km south of Auckland, to Mangapehi in the west-central part of the North Island. The West Coast

Region comprises 13 large and small coalfields in the range-and-basin province of South Island's West Coast (Ministry of Economic Development, 2001a, p 58-59).

All New Zealand's bituminous coal production was mined from the West Coast Region, and its high quality has been the principal factor in the success of the West Coast Region coal operations; most of the coal was exported. Production was dominated by state-owned Solid Energy New Zealand Ltd., which operated on a competitive, commercial basis, and produced about 70% of the country's coal. Solid Energy also was New Zealand's only significant coal exporter (Asian Mining Yearbook, 2000, p. 131).

Exports by Solid Energy reached a record high of 1.65 Mt for the fiscal year that ended June 30, 2001; this was a 16% increase compared with 1.42 Mt during the corresponding 2000 period. The previous record export year was that of fiscal year 1996-97 when 1.46 Mt was exported. The majority of export coals come from the company's Stockton open cast mine and the Strongman No. 2 underground mine, which are located in the West Coast Region coalfields (Solid Energy New Zealand Ltd., 2001). Solid Energy predicted near yearend 2001 that export coal would increase by about 10% to 1.8 Mt for the 2001-02 sales year (Mining Journal, 2001d).

Solid Energy exported specialized coals to 15 countries and sent trial shipments to Kawasaki Heavy Industries Ltd., which was Japan's third largest steel manufacturer, and to Iscor Ltd., which was South Africa's largest steel producer. Another trial shipment went to Rotterdam, the Netherlands, for distribution to three European silicon metal manufacturers. Domestic consumption of Solid Energy's coal was dominated by NZ Steel's Glenbrook steelworks (55%, or 700,000 t/yr). State-owned Genesis Power Ltd.'s Huntly electricity-generating plant on the Waikato River consumed 16%, or 200,000 t/yr (Australia's Paydirt, 2001/2002b).

Although New Zealand's first petroleum well was drilled in 1865, with successful oil discovered in 1866 and continuous production from about 1900, domestic hydrocarbons have been of significance to the country's economy and fuel needs only since the 1960s. The modern era of exploration and production began in 1959 with the discovery of the onshore gas condensate field at Kapuni on the Taranaki Peninsula. The huge offshore Maui gas condensate field was discovered in 1969 by the third offshore well ever drilled in New Zealand. In 2001, oil and gas was produced from nine fields on and offshore; all were in the Taranaki Basin (Ministry of Economic Development, 2001c§). Domestic production of oil and gas condensate was from the Maui (76%), McKee (10%), Kapuni (5.4%), and Kaimiro, Ngatoro, Tariki/Ahuroa, and Waihapa/Ngaere (8.6% combined) fields (Ministry of Economic Development, 2001a§). The majority of oil in New Zealand was exported to the Australasian region as crude and refined product (Oil & Gas Journal, 2001).

About 68% of condensate, crude, and naphtha production was exported with the balance used as partial feedstock for the Marsden Point Refinery near Whangarei (Ministry of Economic Development, 2001a§). The dominant crude oil for the refinery feed is of Middle Eastern and Far Eastern origin. Although the refinery began operating in 1964, a 1986 modernization and expansion made New Zealand self-sufficient in all refined products. About two-thirds of the refinery's products, which included exports and domestic disbursements, was distributed by sea. The remaining production traveled 170 km by pipeline to the Wiri terminal in Auckland for further distribution by tanker trucks to Auckland and nearby regions. A pipeline to distribute jet fuel ran from the Wiri terminal to Auckland International Airport (New Zealand Refining Co. Ltd., 2001).

The other seven recognized petroleum basins in New Zealand are, from north to south, Northland, Wanganui, East Coast, West Coast, Canterbury, West Southland, and Great South Basin (Ministry of Economic Development, 2001e§). All have been explored to some degree; most have an exploration history that began in the early 20th century. Many feature oil seeps and exploration has revealed structural traps suitable for possible hydrocarbon reservoirs. Petroleum exploration was at a record high level during 2001 with 24 wells drilled. About 60 exploration permits were valid in 7 of the country's petroleum basins (Ministry of Economic Development, 2001c§).

The Taranaki Basin had onshore production stations at Kapuni, McKee, Oanui, and Waihap; gas treatment and methanol plants; oil and gas pipeline networks; and a port city with petroleum production, storage, and transportation facilities, which included a liquid and gas pipeline network (Ministry of Economic Development, 2001f§). The Northland Basin had an oil refinery at Whangarei, which has well-developed port facilities (Ministry of Economic Development, 2001d§). The Wanganui and East Coast Basins have gas pipeline systems in place (Ministry of Economic Development, 2001g§). The infrastructure available to the remaining basins consisted only of port facilities.

The following four international companies dominated petroleum distribution and retailing in New Zealand: Great Britain's BP Plc, Caltex New Zealand Ltd. (originally a 50-50 joint venture with Chevron Corp. and Texaco Inc. of the United States that became a wholly owned part of the ChevronTexaco Corp. formed by an October 9, 2001, merger of Chevron and Texaco), Mobil Exploration and Producing Australia Pty. Ltd. (a wholly owned subsidiary of ExxonMobil Corp. of the United States), and Shell Petroleum Mining Co. Ltd. (a subsidiary of Shell New Zealand Ltd.). These companies have stakes in New Zealand Refining Co. Ltd., which operated the Marsden Point Refinery at Whangarei, which was New Zealand's only refinery, and among them, they own the bulk storage facilities and most of the retail gas stations (Ministry of Economic Development, 2001a§). The following companies dominated oil and gas exploration in New Zealand: Australia's Bligh Oil and Minerals NL, Canada's Indo-Pacific Energy Ltd., New Zealand's Shell Petroleum Mining Co. Ltd., and Todd Petroleum Mining Co. Ltd.

Fletcher Challenge Energy Ltd. commissioned its small Mangahewa gasfield production facility in early September. The gas was piped to the nearby Methanex Motunui methanol complex in north Taranaki (New Zealand Petroleum News, 2001a).

In December, Swift Energy New Zealand Ltd. paid Shell New Zealand $55 million for a 96.76% stake in the Tariki, Ahuroa, Waihapa, and Ngaere fields (locally known as the TAWN fields) in onshore Taranaki Basin. The payment was the first of the

divestments that Shell committed to when it purchased the New Zealand assets of Fletcher Challenge in March 2001 (New Zealand Petroleum News, 2001b).

The transportation infrastructure of New Zealand was well developed. International shipping ports included Auckland, Christchurch, Dunedin, Tauranga, and Wellington. The merchant marine fleet of nine ships included two petroleum-oil-lubricant tankers. Pipelines included 1,000 km for natural gas, 160 km for refined petroleum products, and 150 km for liquefied petroleum gas (U.S. Central Intelligence Agency, 2001§).

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Major Source of Information

Ministry of Economic Development, Crown Minerals
33 Bowen St., Commerce Building
P.O. Box 1473
Wellington, New Zealand
Telephone: +64 4 472 0030
Fax: +64 4 499 0968
E-mail: crown.minerals@med.govt.nz
Internet: http://www.crownminerals.govt.nz/

TABLE 1
NEW ZEALAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1998[e]	1999	2000	2001[e]	2002
METALS						
Aluminum metal, smelter:						
Primary		317,540 [2]	326,738	328,400	322,300 [2]	335,000 [e]
Secondary[e]		21,400 [2]	21,400	21,500	21,500	21,500
Total		338,940 [2]	348,138	349,900 [e]	343,800 [2]	356,500
Gold, mine output, Au content	kilograms	7,544 [2]	8,577 [r]	9,880	9,885 [r, 2]	9,770 [e]
Iron and steel:						
Iron sand, titaniferous magnetite, gross weight	thousand tons	2,120 [2]	2,303	2,692	1,636 [r, 2]	1,740
Pig iron	do.	609 [2]	620	600 [e]	600	600 [e]
Steel, crude	do.	756 [2]	744	765	770 [r, 2]	750 [e]
Lead, refinery output, secondary[e]		6,000	6,000	10,000	10,000	10,000
Silver, mine output, Ag content	kilograms	22,642 [2]	24,308	22,886 [r]	27,120 [r, 2]	28,720
INDUSTRIAL MINERALS						
Cement, hydraulic[e]	thousand tons	950	960	950	950	950
Clays:						
Bentonite		14,000	12,300	9,800	10,000	7,800
Kaolin, pottery		26,000	16,700	16,300	15,000	17,200
For brick and tile		27,000	50,700	69,800	70,000	47,500
Diatomaceous earth		20	25	15	15	20
Lime[e]		20,000	20,000	20,000	20,000	20,000
Marble[e]		15,000	15,000	15,000	15,000	15,000
Nitrogen, N content of ammonia		93,700 [2]	110,100	105,300	116,900 [r, 2]	109,200
Perlite[3]		5,000	1,900	2,200	2,200	7,050
Pumice		190,000	124,300	68,000	68,000	203,700
Salt[e]		65,000	65,000	60,000	70,000 [r, 2]	70,000
Sand and gravel:						
Silica sand, glass sand		25,000	41,200	47,400	47,500	60,150
Other industrial sand		500,000	816,100	660,300	660,000	575,700
For roads and ballast	thousand tons	15,000	16,377	18,336	18,000	18,522
For building aggregate	do.	8,000	6,547	7,499	7,500	8,026
Stone:						
Dolomite		20,000	57,920	47,800	47,500	28,400
Limestone and marl:						
For agriculture	thousand tons	1,500	1,993	2,029	2,000	2,732
For cement	do.	1,500	1,582	1,603	1,600	1,697
For other industrial uses	do.	450	482	527	500	865
For roads[e, 4]	do.	550	550	550	550	550
Serpentine		15,000	91,400	51,500	51,500	61,300
Dimension		15,000	20,600	28,700	29,000	30,200
Rock for harbor work[e]	thousand tons	1,500	1,500	1,500	1,500	1,500
MINERAL FUELS AND RELATED MATERIALS						
Carbon dioxide, liquefied[e]		10,000	10,000	10,000	10,000	10,000
Coal, all grades	thousand tons	3,035 [2]	3,505	3,586	3,911 [r, 2]	4,459
Gas:[e]						
Manufactured, from gasworks	thousand cubic meters	11,000	11,000	11,000	11,000	11,000
Natural:						
Gross production	million cubic meters	5,013 [2]	5,559 [2]	5,870	5,000	5,000
Marketed production	do.	4,596 [2]	4,050	4,100	4,500	5,000
Natural gas liquids:[e]						
Liquefied petroleum gas	thousand 42-gallon barrels	1,500	2,000	2,000	2,000	2,100
Natural gasoline	do.	500	700	700	700	750
Total	do.	2,000	2,700	2,700	2,700	2,850
Peat	cubic meters	90,000	89,500	97,200	95,000	90,000

See footnotes at end of table.

TABLE 1--Continued
NEW ZEALAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1998[e]	1999	2000	2001[e]	2002
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum:						
Crude	thousand 42-gallon barrels	17,160 [2]	14,960	13,160	12,000	13,000 [e]
Refinery products:						
Gasoline	do.	8,395 [2]	8,500	8,500 [e]	8,500	9,000 [e]
Distillate fuel oil	do.	13,140 [2]	13,000	13,000 [e]	13,000	14,000 [e]
Residual fuel oil	do.	3,285 [2]	3,500	3,500 [e]	3,500	4,000 [e]
Other	do.	3,650 [2]	3,500	3,500 [e]	3,500	4,000 [e]
Refinery fuel and losses[e]	do.	2,190 [2]	2,000	2,000	2,000	3,000
Total	do.	30,660 [2]	30,500	30,500 [e]	30,500	34,000 [e]

[e]Estimated. [r]Revised.
[1]Table includes data available through July 18, 2003.
[2]Reported figure.
[3]Includes zeolite.
[4]Includes dolomite.