

# **2009 Minerals Yearbook**

# ISRAEL

## THE MINERAL INDUSTRY OF ISRAEL

#### By Thomas R. Yager

In 2009, Israel played a significant role in the world's production of bromine, magnesium metal, phosphate rock, and potash. The country's share of the world's bromine production amounted to 38%; potash, 8%; magnesium metal, 5%; and phosphate rock, 2%. Israel was also a leading producer of several types of fertilizer. The country's share of the world's output of monopotassium phosphate was between 40% and 50%; potassium nitrate, 37%; and monoammonium phosphate, about 10%. In 2009, Israel accounted for 11% of the value of the world's polished diamond production (Gabison, 2009; Apodaca, 2010; Even-Zohar, 2010; Israel Chemicals Ltd., 2010, p. 10; Jasinski, 2010a, b; Kramer, 2010). Other domestically significant mining and mineral processing operations included the production of cement, crushed stone, natural gas, and petroleum products. Israel consumed substantial amounts of bromine and phosphate rock in downstream processing operations; most of the final products of these operations were exported.

#### **Minerals in the National Economy**

In 2008 (the latest year for which data were available), the mining and quarrying and nonmetallic mineral products sectors accounted for about 0.7% of the gross domestic product (GDP), and the manufacture of iron, steel, and other metals, about 0.2%. The remainder of the manufacturing sector (which included diamond cutting and polishing, fertilizer production, and petroleum refining) accounted for 12.2% of the GDP. The nonmetallic minerals sector employed about 9,600 workers; diamond cutting and polishing, about 3,900; and mining and quarrying, about 3,600. Israel's total exports amounted to \$51.3 billion in 2008, of which diamond accounted for 18.8%; mining and quarrying, 3.9%; and nonmetallic mineral products, 0.7% (Central Bureau of Statistics, 2009, p. 570, 616, 700, 720, 786, 788).

#### Production

In 2009, the production of phosphoric acid decreased by an estimated 41%; triple superphosphate, by an estimated 40%; monoammonium phosphate, by an estimated 36%; bromine, by 22%; crude steel, by an estimated 21%; dry natural gas, by 18%; sulfuric acid, by an estimated 16%; cut diamond, by an estimated 15%; and phosphate rock, by 13%. The production of many other minerals was estimated to have decreased by about 10%.

#### **Structure of the Mineral Industry**

Most of Israel's mining and mineral processing operations were privately owned, including the producers of aggregates, bromine, cement, lime, magnesium, natural gas, phosphate rock, potash, and salt. The state-owned petroleum refineries at Ashdod and Haifa were privatized in 2006 and 2007, respectively.

#### **Commodity Review**

#### Metals

**Copper.**—Altos Hornos de México S.A. de C.V. (AHMSA) planned to reopen the Timna copper mines near Eliat and to build a new solvent extraction and electrowinning plant. In August 2008, the Ministry of Finance denied a grant of \$37 million to AHMSA after deciding to disqualify mining companies from grants available under the Law for the Encouragement of Capital Investment. AHMSA decided to suspend work at Timna in early 2009. After the Government reversed its policy, AHMSA decided to renew work at Timna in December. The company planned to produce 22,000 metric tons per year (t/yr) of refined copper starting in 2011; the life of the mine was estimated to be 20 years (Coren, 2009; Nasr, 2009).

**Iron and Steel.**—Domestic rebar demand amounted to about 750,000 t/yr, of which about 500,000 t/yr was produced domestically by three companies. In 2009, demand decreased by between 10% and 15% because of the worldwide economic crisis. Israeli steel producers also faced higher prices for scrap steel because of competition with foreign electric arc furnace-based steel producers. In 2009, Hod Assaf Industries suspended its crude steel and rebar operations and Yehuda Group shut down one of its rebar plants (Antonioli, 2009).

**Magnesium.**—Dead Sea Magnesium Ltd. (DSM) [Israel Chemicals Ltd. (ICL), 65%, and Volkswagen AG of Germany, 35%] was a producer of magnesium metal and magnesium alloys. Volkswagen decided to withdraw from DSM in 2008 and transferred its ownership share in the company to ICL in July 2009 (Jennemann, 2009).

#### Industrial Minerals

**Bromine.**—Brines and carnallite from the Dead Sea were extracted by Dead Sea Bromine Group (DSBG) (a subsidiary of ICL). In 2009, DSBG completed its capacity expansion to 280,000 t/yr of bromine from 240,000 t/yr. Bromine production, however, decreased to 128,000 metric tons (t) in 2009 compared with about 164,000 t in 2008 because of the worldwide economic crisis. Demand for bromine-based drilling liquids in the petroleum industry and bromine-based flame retardants in the automotive, construction, and electronics industries declined in 2009. DSBG consumed about 77% of its bromine for the manufacture of bromine compounds in China, Israel, and the Netherlands. Domestic consumers accounted for 3% of the value of the company's sales in 2009 (Israel Chemicals Ltd., 2010, p. 63, 65-66, 68, 71).

**Diamond.**—Israel did not produce rough diamond but the country was one of the world's leading diamond cutting and trading centers. In 2009, cut and polished diamond exports decreased to \$3.9 billion from \$6.2 billion in 2008; the value of Israel's cut and polished diamond exports produced from

domestic cutting and polishing operations decreased to \$1.4 billion from nearly \$1.9 billion. The downturn in Israel's diamond cutting and trading was attributable to decreases in demand resulting from the worldwide economic crisis (Rapaport Diamond Report, 2010).

**Phosphate Rock.**—Mining of phosphate rock by Rotem Amfert Negev Ltd. (a subsidiary of ICL) decreased to about 2.7 million metric tons (Mt) in 2009 from 3.09 Mt in 2008. Rotem consumed 73% of its output for the manufacture of phosphate fertilizers and phosphoric acid; fertilizer output was about 0.92 Mt in 2009 compared with 1.54 Mt in 2008. Lower fertilizer production was attributable to decreases in demand resulting from the worldwide economic crisis (Israel Chemicals Ltd., 2010, p. 48).

**Potash.**—Dead Sea Works (DSW) (a subsidiary of ICL) used carnallite from the Dead Sea as raw material for its potash plants. In 2009, DSW increased its production capacity by 250,000 t/yr of potash by using fewer of its brine ponds for salt precipitation and more for carnallite precipitation. The company planned to increase capacity by an additional 250,000 t/yr by 2013 by removing bottlenecks and improving technology at existing plants. Production decreased in 2009 because production equipment was temporarily unavailable (Israel Chemicals Ltd., 2010, p. 47).

Haifa Chemicals was the leading consumer of ICL's potash production. The company consumed between 275,000 t/yr and 300,000 t/yr of potash in the production of about 500,000 t/yr of potassium nitrate (Gabison, 2009).

**Sulfur.**—Most of Israel's sulfur demand was met by imports from sources that included Canada, Germany, Kazakhstan, and Russia; sulfur was also recovered domestically by petroleum refineries. In 2009, ICL purchased 522,000 t of sulfur for use in fertilizer manufacturing compared with about 620,000 t in 2008 (Israel Chemicals Ltd., 2010, p. 49).

#### Mineral Fuels

**Natural Gas.**—Noble Energy Inc. of the United States operated the Mari-B gasfield in the Mediterranean Sea through its subsidiary Samedan Mediterranean Sea, Inc. In 2009, Noble decreased its production of dry natural gas to about 1.18 billion cubic meters from 1.44 billion cubic meters in 2008. The company discovered about 180 billion cubic meters of natural gas resources at the Tamar prospect in 2009 (Noble Energy, Inc., 2010, p. 15).

#### Outlook

Production of potash is likely to increase in 2010, and further increases in potash production are expected by 2013. The production trends for the cement, crushed stone, and sand industries will depend on the strength of the domestic economy. The outlook for bromine, diamond, and phosphate rock and fertilizers will depend on market conditions in the world economy.

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# TABLE 1 ISRAEL: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2005	2006	2007	2008 <sup>e</sup>	2009 <sup>e</sup>
METALS					
Iron and steel, steel, crude <sup>e</sup>	480,000	480,000	480,000	480,000	380,000
Lead, refined secondary	28,000	25,000	25,000	27,000 r, 3	24,000
Magnesium metal	27,853	24,581	29,618	32,051 <sup>r, 3</sup>	29,000

See footnotes at end of table.

#### TABLE 1—Continued ISRAEL: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2005	2006	2007	2008 <sup>e</sup>	2009 <sup>e</sup>
INDUSTRIAL MINERALS					
Bromine, elemental	207,048	179,493	159,395	164,042 <sup>r, 3</sup>	128,000
Cement, hydraulic thousand metric tons	5,093	5,089	5,000	4,819 <sup>r, 3</sup>	4,300
Clays:					
Brick clay	54,586	54,925	29,474	30,000	27,000
Common clay	1,072,491	1,003,169	982,000	1,017,000 <sup>r, 3</sup>	920,000
Flint clay	2,200	6,761			
Kaolin				151 <sup>3</sup>	140
Diamond <sup>4</sup> thousand carats	807	642	526	450 <sup>r</sup>	382
Gypsum	106,798	110,754	82,974	9,975 <sup>r, 3</sup>	9,000
Lime	165,894	158,264	282,000	480,554 <sup>r, 3</sup>	430,000
Magnesium chloride	134,370	114,333	103,023	108,852 r, 3	98,000
Phosphate:					
Phosphate rock, mine output:					
Beneficiated thousand metric tons	3,236	2,949	3,069	3,088 3	2,697
$P_2O_5$ content do.	890	810	840	850	740
Phosphatic fertilizers, $P_2O_5$ equivalent. <sup>e</sup>					
Monoammonium phosphate	12,000	11,000	13,000	11,000	7,000
Triple superphosphate	160,000	160,000	180,000	150,000	90,000
Phosphoric acid, $P_2O_5$ equivalent <sup>e</sup>	520,000	520,000	570,000	490,000	290,000
Potash, K <sub>2</sub> O equivalent thousand metric tons	2,224	2,187	2,182	2,170 <sup>r, 3</sup>	2,100
Salt, marketed do.	406	434	400	421 <sup>r, 3</sup>	380
Sand:	400	-5-	400	721	500
Silica sand	196,254	204,190	220.000	147,328 <sup>r, 3</sup>	130.000
Other <sup>e</sup> thousand metric tons	7,000	7,000	6,000	6,000	5,400
Stone: <sup>e</sup>	7,000	7,000	0,000	0,000	5,400
Crushed do.	38,000	43,500	42,000	46,000	41,000
Dimension, marble	70,000	83,000	75,000	75,000	68,000
Sulfur:	70,000	05,000	75,000	75,000	00,000
Byproduct from petroleum thousand metric tons	44	42	34	50 <sup>3</sup>	47
Sulfuric acid: <sup>e</sup>		72	54	50	7/
Gross weight do.	1,870 <sup>r</sup>	2,000 r	2,050 r	1,900 <sup>r</sup>	1,600
S content do.	610 <sup>r</sup>	660 r	670 r	620 r	520
MINERAL FUELS AND RELATED MATERIALS	010	000	070	020	520
Gas, natural:					
Gross million cubic meters	1,655	2,313	2,758	3,436 <sup>r, 3</sup>	2,800
Dry do.	686	960	1,145	1,437 <sup>3</sup>	1,178
Petroleum:	000	900	1,145	1,457	1,170
Oil shale	428,900	452,000	450.000 °	450,000	410,000
Crude 42-gallon barrels	21,798	24,510	8,200	15,715 <sup>r, 3</sup>	14,000
Refinery products:	21,790	24,510	0,200	15,715	14,000
Liquefied petroleum gas thousand 42-gallon barrels	6,686 <sup>r</sup>	5,593 <sup>r</sup>	6,218 <sup>r</sup>	6,000 <sup>r</sup>	6,400
Gasoline do.	23,278 <sup>r</sup>	22,110 <sup>r</sup>	25,172 <sup>r</sup>	25,500 r	25,000
Naphtha     do.	4,066	3,430	3,905 <sup>r</sup>	3,800 r	4,100
Kerosene do.	10,046 <sup>r</sup>	8,074 <sup>r</sup>	10,296 <sup>r</sup>	10,900 <sup>r</sup>	4,100 9,600
Distillate fuel oil do.	22,711 <sup>r</sup>	24,122 <sup>r</sup>	27,438 <sup>r</sup>	30,400 <sup>r</sup>	29,000
Residual fuel oil do.	18,231 r	24,122 22,683 <sup>r</sup>	27,438 24,435 <sup>r</sup>	24,300 r	29,000
Other do.	8,438 <sup>r</sup>	13,347 <sup>r</sup>	24,433 6,313 <sup>r</sup>	6,000 r	6,300
0000 UU.	0,430	13,347	103,777 r	0,000	0,500

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. do. Ditto. -- Zero. <sup>1</sup>Table includes data available through October 4, 2010.

<sup>2</sup>In addition to the commodities listed, caustic soda, magnesia, secondary refined zinc, semimanufactured steel, fertilizers, and a variety of crude construction materials, including aggregates, are produced, but available information is inadequate to make reliable estimates of output. <sup>3</sup>Reported figure.

<sup>4</sup>Imported diamond cut in Israel.

### TABLE 2 ISRAEL: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

#### (Thousand metric tons unless otherwise specified)

С	ommodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aggregates		Lime & Stone Production Company Ltd. (Housing & Construction Holding Company Ltd., 50%, and Readymix (Israel) Ltd., 50%)	Modiim	6,000°
Do.		do.	Dragot, Ein Harod, Eliat, Golani Junction, Kadarim, Revivim, Segev, and Shefar'am	5,000 <sup>e</sup>
Bromine		Dead Sea Bromine Group (DSBG) (Israel Chemicals Ltd. (ICL), 100%)	Sdom	280
Cement		Nesher Israel Cement Enterprises Ltd. (Clal Industries and Investments Ltd., 75%)	Plants at Haifa, Har Tuv, and Ramla	6,000
Lead, refined, seconda	ary	Hakurnas Lead Works Ltd.	Ashdod	25
Lime		Lime & Stone Production Co. Ltd.	Shefeya	100
Do.		Negev Industrial Minerals Ltd.	Mishor Rotem	90
Magnesium:				
Magnesia		Dead Sea Periclase Ltd. (DSP) (Israel Chemicals Ltd., 100%)	do.	35
Magnesium, refined	d	Dead Sea Magnesium Ltd. (Israel Chemicals Ltd., 100%)	Sdom	35
Natural gas	million cubic meters	Samedan Mediterranean Sea Inc. (Noble Energy Inc., 100%)	Mari-B gasfield	6,200
Petroleum:				
Crude	thousand 42-gallon barrels	Lapidoth Israel Oil Prospectors Corp.	Heletz-Brur	8
Do.	do.	do.	Kochav	3
Refined	do.	Oil Refineries Ltd. (Israel Corp., 45.1%)	Haifa	71,900
Do.	do.	Paz Oil Company Ltd.	Ashdod	32,900
Phosphate:				
Phosphate rock		Rotem Amfert Negev Ltd. (Israel Chemicals Ltd., 100%)	Arad, Oron, and Zin	4,500
Phosphatic fertilize	rs	do.	Rotem	1,800
Do.		Haifa Chemicals Ltd.	Haifa	NA
Phosphoric acid <sup>1</sup>		Rotem Amfert Negev Ltd.	Rotem	640
Do.		Haifa Chemicals Ltd.	Haifa	NA
Potash		Dead Sea Works (DSW) (Israel Chemicals Ltd., 100%)	Sdom	3,200
Salt		do.	do.	700
Do.		Israel Salt Industries Ltd. (subsidiary of Danker Group)	Eliat	150
Do.		do.	Kalia	60
Do.		do.	Atlit	16
Sand		Negev Industrial Minerals Ltd.	Mactesh Htira	300
Steel:				
Crude		Hod Metal Products & Manufacturing Co. Ltd.	Akko	300
Do.		Yehuda Steel Ltd.	Ashdod	180
Billet		do.	Bene Ayish	200
Do.		do.	Ashdod	180
Do.		Hod Metal Products & Manufacturing Co. Ltd.	Akko	300
Rebar		Yehuda Steel Ltd.	Bene Ayish	200
Do.		do.	Ashdod	120
Do.		Hod Metal Products & Manufacturing Co. Ltd.	Kiryat Gat	300
Sulfur		Oil Refineries Ltd.	Ashdod	40
Do.		Paz Oil Company Ltd.	Haifa	33
Sulfuric acid		Rotem Amfert Negev Ltd.	Rotem	NA
Zinc		Numinor Chemical Industries Ltd.	Maalot	NA

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

<sup>1</sup>P<sub>2</sub>O<sub>5</sub> equivalent.