



# 2008 Minerals Yearbook

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## ISRAEL

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# THE MINERAL INDUSTRY OF ISRAEL

By Thomas R. Yager

In 2008, 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 41%; potash, 7%; magnesium metal, 4%; and phosphate rock, 2%. Israel accounted for between 40% and 50% of the world's production of monopotassium phosphate and 37% of global potassium nitrate production, which are types of fertilizer. In 2007 (the latest year for which data were available), Israel accounted for 12% of the value of the world's polished diamond production (Even-Zohar, 2008; Apodaca, 2009; Gabison, 2009; Israel Chemicals Ltd., 2009, p. 44; Jasinski, 2009a, b; Kramer, 2009). Other domestically significant mining and mineral processing operations included aggregates, cement, 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 2007, the mining and quarrying and nonmetallic mineral products sectors each accounted for about 0.5% of the gross domestic product (GDP), and the manufacture of iron, steel, and other metals, about 0.3%. The remainder of the manufacturing sector (which included diamond cutting and polishing, fertilizer production, and petroleum refining) accounted for 15.9% of the GDP. The nonmetallic minerals sector employed about 9,300 workers, and the mining and quarrying sector, about 3,300. Israel's total exports amounted to \$45.9 billion in 2007, of which diamond accounted for 23.9%; mining and quarrying, 1.8%; and nonmetallic mineral products, 0.7% (Central Bureau of Statistics, 2008, p. 614, 675, 704, 760, 765, 767).

## Production

In 2008, natural gas production increased by 26%, and magnesium metal, by an estimated 18%. Triple superphosphate production decreased by an estimated 17%; monoammonium phosphate, by an estimated 15%; phosphoric acid, by an estimated 14%; and cut diamond, by an estimated 12%. In 2007, the production of lime increased by 78%. Gypsum output declined by 25%; sulfur, 19%; sand, 14%; and marble, 10% (Oren Gofin, Mines Department, Ministry of National Infrastructures, written commun., September 2, 2008).

## 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.**—In September 2007, Altos Hornos de México S.A. de C.V. (AHMSA) started a pilot mining project at the Timna copper mines. AHMSA planned to reopen the mines, which had been shut down for more than 20 years, and to build a new solvent extraction and electrowinning plant. The company planned to produce and export 22,000 metric tons per year (t/yr) of refined copper; full production was expected by 2010. The cost of the project was estimated to be nearly \$200 million (Kliger, 2008).

**Magnesium.**—Dead Sea Magnesium Ltd. (DSM) [Israel Chemicals Ltd. (ICL), 65%, and Volkswagen AG of Germany, 35%] was producing at its full capacity of 35,000 t/yr of magnesium metal in 2008. The company had the ability to increase capacity by between 2,000 and 3,000 t/yr by removing bottlenecks. In May 2008, DSM announced that it had no plans to increase capacity. In December, Volkswagen announced that it had exercised its option to sell its share back to ICL. The sale was rejected by ICL; the company was considering legal action against Volkswagen (McDonell, 2007; Metal Bulletin, 2008).

### Industrial Minerals

**Bromine.**—Brines and carnallite from the Dead Sea were extracted by Dead Sea Bromine Group (DSBG) (a subsidiary of ICL). In 2008, DSBG produced 164,000 metric tons (t) of bromine compared with 159,395 t in 2007. The company consumed about 70% of its bromine for the manufacture of bromine compounds. DSBG planned to complete its capacity expansion to 280,000 t/yr of bromine from 240,000 t/yr at the beginning of 2009 (Israel Chemicals Ltd., 2009, p. 77, 86).

**Diamond.**—Israel did not produce rough diamond, but the country was one of the world's leading diamond cutting and trading centers. In 2008, cut and polished diamond exports decreased to \$6.24 billion from \$7.1 billion in 2007; the decline was particularly severe in December. In the fourth quarter of 2008, most diamond companies reduced employment by about 25%. The downturn in Israel's diamond cutting and trading was attributable to the global economic crisis (Krawitz, 2009).

**Magnesium Compounds.**—Dead Sea Periclase (DSP) (a subsidiary of ICL) used brines from the Dead Sea to produce specialty grades of magnesium carbonate, magnesium hydroxide, and magnesium oxide at Mishor Rotem. In February 2008, the rated capacity of DSP's plant was 35,000 t/yr; the company was producing at a rate of 40,000 t/yr. DSP planned to expand its capacity to 70,000 t/yr through debottlenecking operations in 2008 and the installation of new equipment by mid-2009 (Industrial Minerals, 2008a).

**Phosphate Rock.**—Mining of phosphate rock by Rotem Amfert Negev Ltd. (a subsidiary of ICL) remained nearly

unchanged at about 3.09 million metric tons (Mt) in 2008. Rotem consumed 84% of its output for the manufacture of phosphate fertilizers and phosphoric acid; fertilizer output was about 1.54 Mt in 2008 compared with 1.77 Mt in 2007. Lower fertilizer production was attributable to decreases in worldwide demand. By the end of 2012, the company planned to complete debottlenecking operations that could increase fertilizer capacity by 250,000 t/yr (Israel Chemicals Ltd., 2009, p. 51, 57).

**Potash.**—Dead Sea Works (DSW) (a subsidiary of ICL) used carnallite from the Dead Sea as raw material for its potash plants. In 2008, DSW increased its production capacity by 250,000 t/yr 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 2011; higher capacity would be attributable to removing bottlenecks and improving technology at existing plants. By 2016, DSW planned to increase potash capacity by an additional 1 million metric tons per year (Industrial Minerals, 2008b; Israel Chemicals Ltd., 2009, p. 56).

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

### **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 2008, Noble increased its production of natural gas to about 3.46 billion cubic meters from 2.76 billion cubic meters in 2007. Demand for natural gas increased because of higher consumption by gas-fired powerplants, a desalinization plant, and a paper mill. In the fourth quarter of 2008, Noble started drilling an exploration well on the Tamar prospect (Noble Energy, Inc., 2009, p. 11, 34, 36).

### **Outlook**

Production of bromine and potash is likely to increase in 2009, and copper production is expected to be restarted. Further increases in potash output are expected by 2011, and in phosphate fertilizers, by 2013. The production trends for the cement, crushed stone, and sand industries will depend on the strength of the domestic economy.

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

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2004	2005	2006	2007	2008 <sup>e</sup>	
<b>METALS</b>						
Iron and steel, steel, crude <sup>c</sup>	370,000	480,000	480,000	480,000	480,000	
Lead, refined secondary	27,000	28,000	25,000	25,000	25,000	
Magnesium metal	28,000	27,853	24,581	29,618	35,000	
<b>INDUSTRIAL MINERALS</b>						
Bromine, elemental	202,000	207,048	179,493	159,395	164,000 <sup>3</sup>	
Cement, hydraulic	thousand metric tons	4,494	5,093	5,089	5,000	
Clays:						
Brick clay	65,732	54,586	54,925	29,474	30,000	
Common clay	850,000	1,072,491	1,003,169	982,000	980,000	
Flint clay	--	2,200	6,761	--	--	
Diamond <sup>4</sup>	thousand carats	578 <sup>r</sup>	807	642	526	460
Gypsum	124,678	106,798	110,754	82,974	83,000	
Lime	113,102	165,894	158,264	282,000	280,000	
Magnesium chloride	137,000	134,370	114,333	103,023	100,000	
Phosphate:						
Phosphate rock, mine output:						
Beneficiated	thousand metric tons	3,290	3,236	2,949	3,069	3,088 <sup>3</sup>
P <sub>2</sub> O <sub>5</sub> content	do.	900	890	810	840	850
Phosphatic fertilizers, P <sub>2</sub> O <sub>5</sub> equivalent: <sup>c</sup>						
Monoammonium phosphate	12,000 <sup>3</sup>	12,000	11,000 <sup>r</sup>	13,000 <sup>r</sup>	11,000	
Triple superphosphate	170,000 <sup>3</sup>	160,000	160,000 <sup>r</sup>	180,000 <sup>r</sup>	150,000	
Phosphoric acid, P <sub>2</sub> O <sub>5</sub> equivalent <sup>c</sup>	543,000 <sup>3</sup>	520,000	520,000 <sup>r</sup>	570,000 <sup>r</sup>	490,000	
Potash, K <sub>2</sub> O equivalent	thousand metric tons	2,138 <sup>r</sup>	2,224	2,187 <sup>r</sup>	2,182	2,300
Salt, marketed	do.	385	406	434	400	400
Sand:						
Silica sand	196,330	196,254	204,190	220,000	220,000	
Other <sup>c</sup>	thousand metric tons	6,000	7,000	7,000	6,000	6,000
Stone: <sup>c</sup>						
Crushed	do.	41,000	38,000	43,500	42,000	42,000
Dimension, marble	30,935 <sup>3</sup>	70,000	83,000	75,000	75,000	
Sulfur:						
Byproduct from petroleum	thousand metric tons	42	44	42	34 <sup>r</sup>	34
Sulfuric acid: <sup>c</sup>						
Gross weight	do.	1,789 <sup>3</sup>	1,700	1,700	1,700	1,700
S content	do.	581 <sup>3</sup>	550	550	550	550
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Gas, natural:						
Gross	million cubic meters	1,193	1,655	2,313	2,758	3,460
Dry	do.	498	686	960	1,145	1,437 <sup>3</sup>
Petroleum:						
Oil shale	439,200	428,900	452,000	450,000 <sup>e</sup>	450,000	
Crude	42-gallon barrels	23,135	21,798	24,510	8,200	8,200
Refinery products:						
Liquefied petroleum gas	thousand 42-gallon barrels	6,170	5,650	5,461	5,500 <sup>e</sup>	5,400
Gasoline	do.	21,046	21,114	22,108	22,100 <sup>r,e</sup>	22,400
Naphtha	do.	3,722	4,066	3,430	3,400 <sup>e</sup>	3,300
Kerosene	do.	8,555	9,549	9,041	9,000 <sup>e</sup>	9,600
Distillate fuel oil	do.	20,516	22,185	24,104	24,100 <sup>r,e</sup>	26,900
Residual fuel oil	do.	21,098	21,827	21,463	21,500 <sup>r,e</sup>	21,500
Other	do.	1,835	1,696	1,700	1,700 <sup>e</sup>	1,700
Total	do.	82,942	86,087	87,300	87,300 <sup>r,e</sup>	90,800

<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 August 12, 2009.

<sup>2</sup>In addition to the commodities listed, caustic soda, copper, magnesia, secondary refined zinc, semimanufactured steel, such fertilizers as potassium nitrate, and a variety of crude construction materials 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 2008

(Thousand metric tons unless otherwise specified)

Commodity		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 <sup>e</sup>
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	240
Cement		Nesher Israel Cement Enterprises Ltd. (Clal Industries and Investments Ltd., 75%)	Plants at Haifa, Har Tuv, and Ramla	6,000
Copper		Altos Hornos de México S.A. de C.V. (AHMSA)	Timna	NA
Flint clay and quartz		Negev Industrial Minerals Ltd. (subsidiary of Doraz D.R.)	Mactesh Ramon	25
Lead, refined, secondary		Harkunas Lead Works	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., (ICL) 100%]	do.	35
Magnesium, refined		Dead Sea Magnesium Ltd. (DSM) [Israel Chemicals Ltd. (ICL), 65%, and Volkswagen AG, 35%]	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		Oil Refineries Ltd. (Israel Corp., 45.1%)	Haifa	65,700
Do.		Paz Oil Company Ltd.	Ashdod	32,900
Phosphate:				
Phosphate rock		Rotem Amfert Negev Ltd. [Israel Chemicals Ltd. (ICL), 100%]	Arad, Oron, and Zin	4,500
Phosphatic fertilizers		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. (ICL), 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.