

THE MINERAL INDUSTRY OF

ALGERIA

By Bernadette Michalski

Hydrocarbons remained by far the leading mineral sector, providing \$9.4 billion¹ in export earnings in 1995 and accounting for 97% of the nation's hard currency earnings. The nation also sustained a modest production of metals and industrial minerals. The Algerian Finance Ministry has projected export earnings of \$10.4 billion in 1996. With an accumulated external debt of \$32 billion, any decline in oil prices has serious implications for the Government's domestic finances. However, the recovery of global oil prices since 1994 has brought improved export earnings and an improved environment for international debt rescheduling. The spot price for Algeria's Saharan Blend crude oil was 7.7% higher at an average of \$17.42 per barrel in 1995 compared to an average of \$16.18 per barrel in 1994.

The Government continued to focus priorities on the following: expanding exploration activities; improving the recovery rate of oil and gas; augmenting hydrocarbon reserves; and increasing hydrocarbon production, transport, and export capacities. The stipulation that the Government's Société Nationale pour la Recherche, la Production, le Transport, la Transformation, et la Commercialisation des Hydrocarbures (SONATRACH) was to hold a 51% interest in all associations with foreign partners was relaxed except for equity holding in existing fields where SONATRACH retained at least 51%. The Government offered foreign companies minority equity interest in producing fields, an area from which they were excluded previously. Atlantic Richfield Co. of the U.S. (Arco) signed a production sharing contract with SONATRACH to rehabilitate the Rhourde el-Baquel Oilfield, Algeria's second largest. The company intends to drill additional wells and use gas injection techniques to boost production from 25,000 barrels per day (bbl/d) to a peak of 125,000 bbl/d. Arco is to receive up to 49% of the fields output. Argentina's Pluspetrol signed a 3-year exploration agreement in mid-1995. Its concession partners on block 237A and 246A are Argentina's recently privatized Yacimientos Petroliferos Fiscales and Sasol of South Africa. Anadarko Petroleum Corp. of the United States discovered oil and gas at its HBNS 3 delineation well at the Hassi Berkine South Field, which it is preparing to develop. The oil is of 42° API gravity. Partners in the concession are the United Kingdom's Lasmo and Maersk Oil & Gas of Denmark.

Total SA of France and Repsol of Spain signed an agreement with SONATRACH to develop the Tin Fouye

Tabankort natural gas field in the southeastern part of the country. Production from the field is expected to reach 18 million cubic meters (Mm³) of dry gas per day, 7 million barrels per year (Mbbbl/yr) of natural gas liquids (NGL), and 10 Mbbbl/yr of condensate. The private partners will receive a share of NGL and condensate, while SONATRACH will take all dry gas produced. The British Petroleum Co. concluded a contract for the joint development with SONATRACH of seven known fields of nonassociated gas near the In Salah Field. British Petroleum is to finance 65% of the \$3.5 billion venture.

Crude oil production in 1995 was 766,000 bbl/d, up from 742,000 bbl/d in 1994. A variety of nonfuel minerals were produced in minor amounts; but only iron ore, mercury, and phosphate rock production was significant. The entire output of iron ore was consumed by the national iron and steel industry. Phosphate rock production was exported. Mercury was produced entirely for export. While the Algerian production of this commodity has fluctuated widely with the price of mercury in the world market, the 1995 production was reportedly reduced because of technical difficulties as reported by Entreprise Nationale des Nonferreux et Substances Utiles. (*See table 1.*)

Natural gas and liquid fuels accounted for about 97% of Algeria's export earnings. Other exports, by order of value, were metals and metal products, phosphates, and iron ore. Helium and nitrogen exports commenced in 1995 with Europe as the principal market for helium while both liquid and gaseous nitrogen were marketed domestically and in other North African countries.

In 1995, more than 250 Mbbbl of Algerian crude oil and refined products was exported to Western Europe, followed by nearly 86 Mbbbl of Algerian crude oil and refined products exported to the United States. Algerian exports of natural gas totaled 37.7 billion cubic meters (m³) in 1995. Algerian natural gas exports via pipeline totaled 19.45 billion m³ exceeding for the first time liquefied natural gas (LNG) exports, which totaled 18.25 billion m³. Italy continued as the principal market for Algerian natural gas, importing approximately 17.45 billion m³; followed by France at 7.53 billion m³; Spain at 4.9 billion m³; Belgium at 3.97 billion m³; and Tunisia, Slovenia, and the United States at 1 billion m³ or less each. In August 1994, SONATRACH delivered the first shipment of Algerian LNG to Turkey. Total shipments for that year were 38 Mm³

increasing to 1.20 billion m³ in 1995. Algeria has become a major supplier of natural gas in southern Europe. Algeria's share of the European gas market ranks third behind the Netherlands with 26% and Russia with 36%.

Local parastatal mining companies and agencies were amalgamated into the Office de Recherche Géologique & Minières (ORGM) with the objective of centralizing the promotion of international investment in the Algerian mineral industry. Working with local and international companies, ORGM is responsible for information distribution relating to the mining sector, as well as for the publication of geological maps and the evaluation and development of deposits. ORGM has identified several exploitable mineral deposits; however, their location is in remote areas devoid of any infrastructure.

The bulk of Algeria's iron ore output was extracted from the mine at Ouenza. Mining operations were spread over 17 square kilometers, with the main seam 2 kilometers (km) long and 500 meters wide. Iron ore also was mined at Bou Khadra and shipped with Ouenza ore by rail to the El Hadjar processing plant, near Bejaia, a distance of 170 km. Both mines are operated by Entreprise Nationale de Fer et de Phosphates.

The production of helium commenced in 1994 from the Helios Co.'s Bethious plant, near Arzew. SONATRACH enjoys a 51% equity in the company, while Air Products & Chemicals, Inc. of the United States and L'Air Liquide of France share the remaining equity. The plant's capacity is 16 million cubic meters per year (Mm³/yr) of liquid helium, accounting for 20% of world output and 33,000 metric tons per year of liquid and gaseous nitrogen. Helium exports were destined for Europe. The nitrogen was sold to domestic and other north African markets.

Gross production of natural gas was 140 billion m³, and more than 50% was reinjected to maintain petroleum reservoir pressure. Liquefaction of natural gas for the export market averaged about 90,000 cubic meters per day.

Most of Algeria's crude oil production was derived from Hassi Messaoud-Haoud el Hamra Fields in the Sahara; the Zarzaitine-Edjeleh Field near Ohanet; and the In Amenas Field, near the Libyan border. The Government predicts that income from crude and condensate exports will rise from \$3,400 million in 1995 to 4,500 million in 1999. The driving force behind this increase will be additional production from the Rhourde el-Baguel Field and the development of the Hassi Berkine and Berkine East Fields by the Anadarko Petroleum Corporation of the United States.

Petroleum refining capacity has been stabilized since the early 1980's when the 323,000-bbl/d-capacity Skikda refinery and the 6,500-bbl/d-capacity In Amenas refinery entered production, elevating national refining capacity to 474,500 bbl/d.

Hydrocarbon reserves in January 1996 as reported by the Ministry of Mines and Industry were 3.6 trillion m³ of natural gas. Unassociated natural gas accounted for 85% of these

reserves. Recoverable petroleum reserves were reported at 9.98 billion bbl. Iron ore reserves were reported at 35 Mt averaging 53% iron; however, an estimated additional 970 Mt of ore grading 53% iron was identified at the undeveloped Gara Djebilit deposit.

Algeria's railroad system, which totaled 4,060 km of track, and its road network, which spread over 90,000 km, are in the northern section of the country supporting long-established mining and other export-oriented industries. The existing infrastructure was too distant to lend support to the development of commercial mineral deposits reported in the southern desert.

More than 11,400 km of pipeline served the hydrocarbon industries within Algeria. The center of the crude oil pipeline network was Hassi Messaoud, in the southeast of the country, from which three crude lines ran north to Skikda, Bejaia, and Arzew. The center for the natural gas pipeline network was Hassi R'Mel, with pipelines connecting to liquefaction facilities at Arzew and Skikda. Hassi R'Mel was also the source for natural gas exports to Southern Europe via the 24-billion-cubic meter-capacity Trans-Mediterranean pipeline and, when completed in 1996, the 8-billion-cubic meter-capacity Maghreb-Europe pipeline. The Transmed natural gas export pipeline extended for 2,340 km from Algeria northeastward through Tunisia and under the Mediterranean to Sicily and the Italian mainland. Natural gas exports to Slovenia were achieved through a 35-km spur line near the Italian end of the Trans-Mediterranean pipeline. The 1,845-km Maghreb-Europe pipeline was under construction traversing Algeria northwestward through Morocco and the Straits of Gibraltar to Seville, Spain. The pipeline was scheduled for completion by 1996 at the initial capacity of 8 billion cubic meters per year. The second phase of the Maghreb-Europe pipeline construction will include extensions to Portugal, France, and Germany.

Algeria used seven marine terminals for the export of hydrocarbons, including La Skhirra in Tunisia. The largest terminal was Arzew-Bethioua, which accommodated 40% of all hydrocarbon exports. Port capacity at Skikda was limited to 90,000-m³ LNG carriers. Efforts were underway to augment facilities to permit the accommodation of 125,000-m³ LNG carriers.

Stimulating foreign investment interest in Algeria's aging energy industries was vital to the economy because the nation did not have cash or access to sufficient credit to sustain economic activity. In pursuing this course of action, the Algerian Government has not only encouraged exploration agreements but has offered a portion of production rights in existing oilfields and gasfields to private companies with capital and enhanced recovery capabilities. This action represented the most significant change in oil policy since nationalization in 1971. The Atlantic Richfield Co., Agip, Anadarko, British Petroleum, Cepsa, Petro-Canada, Repsol, and Total SA were among those under contract with SONATRACH. Without foreign capital to refurbish the

hydrocarbon extraction and processing facilities, as well as the supporting transport infrastructure, Algeria may be unable to satisfy demand within a few years. The World Bank extended a \$150-million economic rehabilitation support loan. Specific reform requirements of the World Bank include the following: preparing legislation for privatization, selling public enterprises, and restructuring major public enterprises such as the steel and fertilizer industries.

In the hydrocarbon sector, there have been some delays in the execution some oil and gas projects as a result of difficulties in raising the necessary funding. SONATRACH is pursuing a policy of upstream capacity expansion in oil, natural gas, and gas liquids production simultaneously.

Although the Islamic Salvation Front activities have been growing in violence since 1992, some international confidence in the political stability of the nation was restored with the elections conducted in November 1995.

¹Where necessary, values have been converted from Algerian dinars (AD) to U.S. dollars at the rate of AD42.7=US\$1.00 in 1995.

Major Sources of Information

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TABLE 1
ALGERIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1991	1992	1993	1994	1995 e/
METALS					
Cadmium, refined	78	75	75 e/	75 e/	75
Iron and steel:					
Iron ore, gross weight	2,344	2,523 r/	2,311 r/	2,047 r/	2,200
Metal:					
Pig iron	877	930 r/	925 r/	919 r/	940
Steel, crude	838 r/	842 r/	865 r/	808 r/	827 3/
Lead:					
Lead, concentrate, Pb content	1,147 r/	920 r/	1,538	1,500 r/ e/	1,383 3/
Lead, refined	4,500	4,500	6,000 r/	8,000 r/	8,000
Mercury	431,000	476,000	459,100 r/	414,000 r/	292,000
Silver e/	2,000 r/	1,900 r/	2,200 r/	3,000 r/	3,000
Zinc:					
Concentrate, Zn content	7,900	7,500	6,800	6,800 e/	7,174 3/
Metal, smelter output	24,917	31,500 r/	33,400 r/	30,000 r/	30,000
INDUSTRIAL MINERALS					
Barite, crude	44,361	51,159	47,232	20,584 r/	29,838 3/
Cement, hydraulic	6,319	6,400	6,400 r/	6,060 r/	6,200
Clays:					
Bentonite	25,806	31,019 r/	20,833	20,215 r/	17,088 3/
Fuller's earth	4,526	3,656 r/	3,229	4,550 r/	4,500
Kaolin	21,460	20,844 r/	12,586	16,984 r/	24,068 3/
Diatomite	3,629	2,671 r/	3,471	3,500 r/	3,700
Gypsum 4/	332 r/	355 r/	225 r/	225 r/	250
Lime, hydraulic	61,635 r/	62,000 e/	62,000 e/	62,000 e/	62,000
Nitrogen, N content of ammonia	269,000	438,000	380,000	380,000 r/	400,000
Phosphate rock:					
Gross weight	1,090	1,136	718 r/	730 r/	1,596
P2O5 content	374 r/	389 r/	245 r/	251 r/	500
Salt: Brine and sea salt	207,000 r/	180,000 r/	179,000 r/	178,000 r/	178,000
Sodium compounds, caustic soda e/	700	700	700	700	700
Strontium minerals, celestite, gross weight e/	5,400	5,400	5,400	5,400	5,400
Sulfur, elemental e/	20,000	20,000	20,000	20,000	20,000
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross	126,270	128,000 r/	133,700 r/	131,100 r/	140,000
Dry 5/	53,900 r/	53,200 r/	53,900 r/	51,100 r/	58,100
Natural gas plant liquids	55,000	52,855	52,925 r/	51,500 r/	53,000
Petroleum:					
Crude including condensate	448,900 r/	443,110 r/	424,130 r/	430,700 r/	436,905
Refinery products:					
Liquefied petroleum gas	10,700	10,000	9,000 r/	9,500 r/	9,500
Gasoline	18,980	19,272 r/	20,988 r/	18,900 e/	19,000
Naphtha e/	28,000	30,000	30,000 r/	31,000 r/	31,000
Kerosene	3,100	3,869 r/	3,723 r/	3,500 e/	3,500
Distillate fuel oil	56,400	57,378 r/	54,530 r/	56,000 r/	56,000
Lubricants	835	825	800 r/	825 e/	825
Residual fuel oil	37,376	37,630 r/	37,700 r/	37,400 e/	37,500
Other e/	3,000	2,900 r/	2,700 r/	3,500 r/	3,500
Total	158,391	161,874 r/	159,441 r/	160,625 r/	160,825

e/ Estimated. r/ Revised.

1/ Table includes data available through June 1, 1996.

2/ In addition to the commodities listed, secondary aluminum, secondary lead, and secondary copper may be produced in small quantities; and crude materials are produced for local consumption. But output is not reported, and available information is inadequate to make estimates of output levels.

3/ Reported figure.

4/ Includes approximately 50,000 tons of plaster each year.

5/ Excludes gas used in reinjection, flaring, venting, transmission losses, and natural gas liquids extraction.