

## SULTANATE OF OMAN

*By a Special Contributor*

**T**he Sultanate of Oman covers an area of some 212,000 km<sup>2</sup> and has a population of 2.9 million (including more than half a million non-nationals). It is strategically situated at the eastern extremity of the Arabian Peninsula and shares its western border with Yemen, Saudi Arabia and the United Arab Emirates. Oman is bounded to the north by the Gulf of Oman and to the east by the Arabian Sea. There is a central desert plain flanked to the north and south by rugged, mountainous terrain.

Since 1970, Oman has been ruled by Sultan Qaboos bin Said Al Said, chief of state and head of government. There is a bicameral legislature and the monarch appoints the 48 members of the upper house and has the final say in the selection of the elected 83-member lower house. There is no written constitution. Nevertheless, the Sultan has been keen to modernise and open Oman to the outside world, and the country is regarded as one of the more moderate Arab states. The coastal city of Muscat, located on the Gulf of Oman, is the capital.

Natural resources include oil and natural gas, copper, chromium and industrial minerals such as gypsum and limestone, but oil is of greatest importance and the economy is closely tied to the price of oil. In 2003, GDP grew by 1.1% to an estimated US\$37 billion. Industry (chiefly oil production and refining, and natural gas production) contributed about 42% of GDP, services 55% and agriculture 3%. Exports, mainly oil, were worth about US\$11.7 billion, and imports cost around US\$5.7 billion.

According to the BP Statistical Review of World Energy, Oman's oil production fell by 8.6% in 2003, to 40.7 Mt, equivalent to 1.1% of the world total. Its proven reserves amounted to 800 Mt (0.5% of the world total). Natural gas production jumped by 10%, to 16.5 billion m<sup>3</sup>, and proved reserves are sufficient to last for 57 years at current production rates.

Oman is pursuing a plan to diversify the economy, focusing on non-oil resources, such as agriculture, fisheries, tourism, and metals and minerals. The most ambitious project in the metals sector is the proposed aluminium smelter at Sohar on the Gulf of Oman. A 330,000 t/y capacity smelter is envisaged plus an adjacent 1,000 MW gas-fired power plant. Total project costs are estimated at some US\$2.0 billion. Alcan has agreed to be a partner in the project and the Abu Dhabi Water Authority is expected to contribute equity to the power plant. An investment bank will advise on project financing.

In July 2004, Alcan Inc signed a memorandum of understanding with Oman Oil Co and the Abu Dhabi Water and Electricity Co to take a 20% equity interest in the smelter, and also secured an option to take up to a 60% interest in a second 330,000 t/y potline. The MoU provides for Alcan to

license its AP30 technology for use in the project and for the company to take a leading role in the construction. Subject to the successful completion of project approvals and financing, construction is expected to start in the second half of 2005 with the first metal produced by the end of 2007.

The exploration and the development of mineral resources in Oman is actively promoted by the Ministry of Commerce and Industry, which has long pursued an ambitious and systematic programme of developing and exploiting the mineral wealth of the Sultanate.

There is a substantial mineral resource base. Some resources are being exploited on a commercial scale, while the rest are waiting either detailed exploration or development. The Sultanate possesses extensive ophiolites, which have the potential to host copper, nickel, chromite, iron ore, gold and silver.

Within the Ministry of Trade and Commerce, the Directorate General for Minerals (DGM) is responsible for overseeing the minerals sector. Within the DGM, the Geological Survey carries out the basic geological studies, preparation of geological maps on various scales and prospecting for minerals (both metallic and non-metallic). It also undertakes collaborative research projects on Oman's geology and mineral exploration with various foreign countries. The Department of Mineral Exploration (also within the DGM) is mainly concerned with activities related to the detailed work after a prospect has been discovered during geological surveys. It undertakes detailed exploration, including detailed mapping, sampling and drilling and, sometimes, prefeasibility studies. The DGM's Department of Mines and Quarries is responsible for issuing the various types of permits and leases for the exploration and exploitation of minerals, and for implementing the Mining Law, rules, permits and safety regulations.

The various geological formations that make up the Sultanate of Oman show a significant degree of mineralisation. It is in the Oman mountains, however, particularly in the Samail Ophiolite, that the greatest mineral potential is found.

However, among the metallic minerals, only copper, chromite and gold are known to exist in commercial quantities. State-owned Oman Mining Co (OMC) has responsibility for copper and gold mining, and Oman Chromite Co mines chromite for export.

Most exploration for metallic minerals has been carried out by the DGM or its contractors, or through collaboration with Japan International Co-operation Agency, (JICA). The DGM has, however, prepared six concession blocks for copper and gold in the north of Oman for bidding by private companies. According to the DGM, there is potential for diamonds in the Haushi-Huqf area, brought to light by an airborne magnetic survey.

Oman's current mineral production includes: gold (from gossan); chromite; quarrying aggregate for construction; limestone, gypsum, shale, quartzite and

iron ore for cement; clay for ceramic tiles; salt for oil-well drilling and table salt; limestone for lime and silica-lime bricks; and marble for slabs, tiles, chips and powder.

The most publicised exploration project is being pursued by National Mining Co (NMC), a subsidiary of Muscat-based MB Petroleum, which has discovered a group of massive sulphide zones carrying copper and gold in volcanogenic rocks in northern Oman. NMC was set up in 1997 to explore for copper and gold in Oman's ophiolites. The main zones of mineralisation are at the Shina and Hatta prospects, part of the Block 1 exploration licence area north of the former copper mine at Sohar. Block 1 covers an area of 364 km<sup>2</sup> within the northern portion of the major copper/gold-bearing Samail ophiolite belt, which extends north from the Batinah coastal region to the UAE border near Shinas. NMC has spent about US\$2.5 million on copper exploration mainly on this project, and in the three years to September 2003, it completed 82 diamond drill holes totalling 5,808 m in defining a series of new volcanic massive sulphide (VMS) deposits totalling 3.5 Mt averaging 3% Cu.

Exploration initially focused on possible vein-breccia gold-copper mineralisation associated with high-level intrusive complexes. Reconnaissance failed to find evidence of epithermal or breccia-hosted gold mineralisation, so the focus was then switched to traditional VMS exploration because gold caps are a feature of these deposits in Oman.

The copper deposits are hosted in submarine basalts within the Oman Ophiolite, a sheet of Cretaceous Tethyan seafloor that was thrust over basement rocks of the Arabian Shield. The VMS deposits are of the Cyprus-type and occur in clusters with pyritic copper-rich mounds and gold-bearing gossans overlying lower-grade feeder systems within the footwall basalts.

The Sohar region has a history of copper mining dating back to the Bronze Age, with more recent exploitation being carried out by OMC on the Lasail VMS deposits west of Sohar. Since 1970, the Oman Ophiolite has been subject to considerable regional multinational exploration and, according to NMC, this has resulted in the discovery of more than 44 Mt at 1-2% Cu in three deposit groups, including Lasail.

NMC has discovered five outcropping deposits, the largest being 2 Mt at 2% Cu at Shinas and 1.5 Mt at 3.5% Cu in three closely-related deposits at Hatta. A feasibility study envisages the transport of 1 Mt/y of ore to OMC's Lasail plant where an upgraded concentrator would produce saleable copper concentrates. The proposed capital spending required is US\$6 million.

Copper deposits in the vicinity of Sohar were mined by OMC during the 1980s and early 1990s, and a smelter was constructed adjacent to the mine site. The deposits were depleted in 1994 and the mine subsequently closed. In 2001, a feasibility study of mine pollution control in the abandoned Sohar mine area was completed with the technical and financial assistance of the Japanese Government. Remedial measures assessed and agreed with the concerned ministry are being implemented. Japan has also provided

assistance in the form of a techno-economic study of all the discovered copper and gold deposits in the Yanqul, Khabborah and Ghazain areas.

OMC has continued to operate the smelter, treating imported concentrates on a toll basis. Imports have amounted to around 80,000 t/y of concentrate for the production of some 24,000 t/y of copper. The company's gold processing plant has also continued to produce gold doré from gold-bearing gossans at Rakah near Yanqul. The gossans at Rakah have been depleted and it was reported that production from a new gossan at Bishara is under consideration.

Oman Chromite Co (OCC), a public limited company, mines modest quantities of chromite in small, open-pit operations. The ore is beneficiated to produce chips and fines, and both refractory and metallurgical grades are exploited and marketed. Annual production is of the order of 30,000 t. Consideration has been given to the construction of a ferrochrome and ferrosilicon plant, in which the company would have an equity stake. Such a project, however, would require OCC to increase its capacity to 100,000 t/y and could cost around US\$80 million. It would use natural gas and export all of its output. The plant would have a capacity of 50,000 t/y of ferrochrome and 19,500 t/y of ferrosilicon.

In the industrial minerals sector, Oman produces gypsum in sufficient quantity to meet its domestic needs and also exports gypsum to the UAE. It also produces clay for a developing indigenous ceramics industry.