

leverage over neighboring black African states, and imposing — perhaps with the imprimatur of the United Nations — a naval blockade interdicting shipments of South African raw materials to the Western capitalist economies. It has also been noted that if the Kremlin could somehow control the whole of southern Africa, it could then put in place a "strategic materials supercartel," since over half of global output of up to fifteen key strategic minerals is accounted for by the Soviet bloc and this area of Africa together.

Another possibility that portends serious supply difficulties for chromium and manganese involves the imposition of a United Nations embargo of South Africa and/or other types of economic and diplomatic sanctions. In a recent *Resources For the Future* study of minerals availability, this was judged the most likely cause of a prolonged interruption in chromium and manganese supplies to the West. In spite of their marked dependence on South Africa's mineral wealth, Canada and other Western nations may eventually conclude that their wider interests are best served by cooperating with a sanctions policy against an unpopular "pariah state." However, the history of UN sanctions against Rhodesia after 1965 strongly suggests that ingenious importers can find ways of purchasing a desired commodity from an embargoed state. The United States of course explicitly decided with the passage of the "Byrd Amendment" in 1971 simply to ignore the UN embargo and import chrome from Rhodesia; but other countries — including the Soviet Union, which resold Rhodesian chromium on the world market at a premium — also continued trade with the white régime. Western governments would have enormous incentives to look the other way if business firms and brokers continued to import minerals from South Africa in the event that some type of embargo were in effect.

Policy choices

Countries concerned about their vulnerability to interruptions in deliveries of essential mineral raw materials theoretically can pursue a number of policies designed to lessen such vulnerability. Perhaps the best long-term strategy for nervous mineral importers is to encourage the development of additional mineral deposits throughout the world, for dispersal of sources of supply will, *inter alia*, moderate the impact of disruptions in any single exporting country and make more difficult the establishment of effective cartels. However, the success of this strategy is constrained by the geographic concentration of certain minerals; this is especially marked in the case of chromium, but somewhat less so for manganese. In addition, it is

unclear what Canada can do to encourage discoveries and exploitation of minerals elsewhere. Finally, supply diversification cannot solve the immediate problems posed by threats of supply interruption.

Governments can also attempt to increase recycling of scarce minerals and can encourage research aimed at improving substitution possibilities. For example, the National Materials Advisory Board of the US National Academy of Sciences recently suggested that the US government should provide funds to support research on chromium substitution. Another option is to exploit sub-economic domestic reserves of particularly vulnerable minerals. Chromite ore in the Eastern Townships area of Quebec was mined during World War Two, and low grade manganese deposits exist in Nova Scotia, New Brunswick and British Columbia. Exploitation of sub-economic Canadian reserves would require stiff barriers against imports and perhaps government subsidies as well, and once again years would lapse before actual mine production. The thorny problem of short-term vulnerability would thus remain.

Short-term solution

The only workable strategy to reduce immediate vulnerability appears to lie in the establishment of some kind of stockpile. The US has long had a massive strategic stockpile program designed to ensure that the material needs of its military can be met in the event that foreign supplies of certain minerals are unavailable. Washington is also considering the development of economic stockpiles of several minerals of vital importance to industry. France and Sweden have for several years been stockpiling cobalt, chromium, platinum and other minerals obtained from perceived high risk suppliers; and Britain, West Germany and Japan are also studying various economic stockpile options for these and other minerals.

In Canada the federal Department of Energy, Mines and Resources is currently examining the issue of Canadian mineral import vulnerability, and it recently estimated that about seventy million dollars would be required to purchase a one-year supply of chromium and manganese, with additional expenses being incurred through the provision of stockpile facilities. It is unlikely that such a significant public expenditure is warranted in the eyes of policy-makers faced with a host of competing spending demands. However, a major interruption in mineral supplies might encourage the government to take a close look at what can be done to address what seems to be an increasingly serious problem. □