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REPLACES FORM 36-8
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6 February 1978

MEMORANDUM FOR:

[Redacted]

Associate NIO for Africa

SUBJECT

: OER Contribution to the Draft
of IIM: South Africa's Nuclear
Options and Decision-Making Structures

Attached is OER's contribution to IIM: South
Africa's Nuclear Options and Decision Making Structures.

[Redacted]

[Redacted]

If you have

further questions, please call

[Redacted]

[Redacted]

Office of Economic Research

[Redacted]

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II. Organization and Decision Making

D. How is the program financed?

Energy Expenditures

Reported expenditures by government and industry on nuclear development and operations have totaled about \$1.4 billion since South Africa began producing uranium oxide in 1952 [redacted]. Industry expenditures for mining and processing are estimated at \$850-\$900 million, or about 60-65 percent of the total. Nuclear expenditures reported in government budgets have totaled \$540-\$550 million.

Spending by private industry on mining and processing more than doubled in 1977 to \$85 million, reflecting increased investment in response to new export contracts. Production is rising sharply, reaching about 3,700 tons in 1977 compared to 2,800 tons in 1975 [redacted].

Nuclear spending by the government is listed in the public budget under allocations for the Ministry of Labor and Mines. About three-fourths (\$340 million) during 1971-77 funded construction and operation of the pilot enrichment plant at Valindaba. Allocations

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Table 1



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Table 2



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in the same period for the Atomic Energy Board (AEB) totaled \$120 million. About one quarter of AEB funding was for capital construction and equipment and the remainder for administration and operating expenses.

The AEB operates the National Research Center at Pelindaba and is tasked with development of processes to produce nuclear material, electric power, and radioisotopes. It also is responsible for licensing, safety, nuclear waste disposal, and library and computer services for nuclear researchers. AEB employees numbered 1,732 at the end of FY 1976.

Total government nuclear spending increased rapidly during FY's 1971-76, reflecting construction outlays for the pilot enrichment plant. Spending then leveled off at \$70-80 million a year in FY's 1977 and 1978.

Weapons Expenditure

None of the expenditures that are openly identified as being for nuclear programs are flagged for weapons development or construction. Pretoria either masks such expenditures under other budget allocations or withholds reporting on them altogether.

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There is no doubt that South Africa can afford to develop and test a nuclear explosive if it chooses. The pilot enrichment plant at Valindaba is believed to be capable of producing weapons-grade enriched uranium. Given the enriched charge, the cost of constructing and testing a crude explosive would be almost insignificant. Intelligence estimates, for example, put [] direct cost for plutonium and the actual detonation of a 15 kiloton device in May 1974 at only about \$3 million. Adding a portion of the capital costs of the materials production facilities would have brought the cost to about \$10 million.

Inflation since 1974 plus added technical costs if South Africa were planning a more sophisticated device [] would raise the costs considerably. Even \$100 million, however, would be easily handled in South Africa's \$11 billion budget (FY 1978).

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IV. Nuclear Politics and Economics

B. Role of Economics in Nuclear Decisions

Nuclear Weapons

The small direct costs of producing a device would not be a deterrent to developing and testing nuclear explosives. Much more important would be the certain heightening of international pressures for economic sanctions. Pretoria's unwillingness to liberalize apartheid or to push through faster change in Namibia or Rhodesia already have raised substantial pressures for sanctions.

Nevertheless, positions on nuclear explosive issues by major policy officials in the South African government probably are influenced as much by political or personal feelings as by economic concerns. Almost all key economic figures in the government are Afrikaners and long time members of the inner circles of the Nationalist Party. Most share the general Afrikaner belief in the desirability of the country to go it alone rather than yield to outside pressures. The sole English-descended Cabinet member, Finance Minister Horwood, has openly expressed his defiance

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and anger against foreign pressures on South African nuclear affairs.

Although concerned about possible economic consequences, many officials probably feel that broad sanctions are unlikely, given the importance of South African minerals to Western countries. Stockpiling and other precautions have created confidence that the country could withstand sanctions for a number of years. Official statements have cited options that Pretoria might take in case of sanctions rather than concessions that might relieve the pressures for sanctions.

Nuclear Energy

Economic considerations are the driving force behind nuclear energy development. Taking advantage of its abundant uranium resources, South Africa has been a major uranium oxide exporter since the early 1950's. Exports in 1977 are estimated at about \$200 million, fifth among South Africa's total exports.

Pretoria is steadily developing nuclear energy into a major facet of an economy-wide program to ease the country's heavy dependence on gold sales for foreign exchange earnings. Long the mainstay of the balance

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of payments, gold production and sales have decreased by almost one-third since 1970 as the mines have moved into lower grade ores. To help fill the gap, nuclear energy is being developed in three ways; 1) uranium mining is being rapidly expanded and exports are projected to double by 1980, 2) a commercial enrichment plant is planned for completion in 1984 to take advantage of the large export price advantage of the enriched product over uranium oxide, and 3) two 1,000 MW reactors are under construction to ease the consumption of coal in electricity production, freeing coal resources to take the place of expensive imported oil.

Pretoria has not admitted any motivation for weapons construction in its development of uranium mining and construction of a pilot plant for enrichment. The government also has given only economic reasons for its \$2 billion investment in the commercial enrichment plant and the two reactors. These reasons are valid whether or not weapons are built. Nuclear energy is highly profitable in terms of foreign exchange earnings and mining profits and jobs, and promises to become a key contributor to the balance of payments if production and exports of enriched uranium can be established.

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Policy at Loggerheads

The conflict between the positive economic contribution of energy development and the possible negative economic consequences of weapons construction represents a serious policy dilemma for Pretoria. The entire nuclear energy program is dependent on foreign trade and highly vulnerable to sanctions. Both the enrichment plant and reactors require imported equipment and technology. Uranium oxide exports could be stopped by sanctions if France, Western Germany, Japan, and other major customers made a strong commitment to enforcement.

Vorster and other officials have acknowledged their vulnerability, publicly expressing fears that the US will withhold enriched fuel for the reactors and proposing to broaden the South African enrichment program if necessary to include fabrication of enriched fuel elements. These concerns presumably have had an important influence on decisions about nuclear weapons (as well as policy on apartheid and the Rhodesian and Namibian issues).

The danger to the nuclear energy program, however, is very unlikely to be a critical deterrent to developing

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or testing weapons. Nuclear energy is only one of a number of economic and political considerations that Pretoria would have to take into account. Equally important are factors such as the vulnerability of oil supplies and consumer and capital goods.