
South Africa: How Valid the Claim for a Uranium Process?

London. Considerable skepticism has been aroused by South Africa's claim to development of a "unique" and "competitive" process for enriching uranium, the implication of which would be self-sufficiency in all things nuclear for that country.

Though the two key adjectives may merit some discount, the claim, contained in a statement 20 July by Prime Minister B. J. Vorster, is possibly not at all outlandish. A shortage of friends and an abundance of uranium as a byproduct of gold mining, give South Africa good reasons for going into the enrichment field. And there is no reason to believe that the objective is beyond South Africa's resources. She has plenty of money, and whatever talent is lacking at home can probably be trained or hired abroad; that is the way the rest of South African industry gets along. Once production was under way, South Africa would have many more aces in its already well-stacked hand. Western Europe is desperately concerned about U.S. dominance of uranium enrichment, and Great Britain, West Germany, and the Netherlands have combined forces to build a gas centrifuge enrichment system in anticipation of rapid growth in nuclear power later in this decade. But France, Italy, Japan, and many other nations, possibly even those in the centrifuge consortium, constitute a vast potential market if present nuclear expectations are fulfilled. Moreover, if worse comes to worst, which is a reasonable prognosis for the way things are going between South Africa and the rest of Africa, enrichment facilities open the way to nuclear weapons. South Africa strenuously denies any such intentions, and at present it is difficult to see any threat to her that cannot easily be handled by her conventional forces, but long-term planning for national security makes the development of enrichment facilities a plausible move.

Worldwide doubt and surprise arise simply from the fact that South Africa's nuclear industry is, at least on the face of it, a relatively drowsy effort by international standards. A national plan calls for some 20,000 megawatts produced by nuclear power within 30 years, but outside of test and pilot facilities there is no known nuclear power in South Africa at present; the first power plant is scheduled to go into operation near Cape Town in 1977, but still lacking is a decision on what type of reactor to employ.

Vorster said nothing about process, location, or time scales, but did state that "the process is presently developed to a stage where it is estimated that under South African conditions, a large-scale plant can be competitive with existing plants in the West." He added that a pilot plant is now under construction.

Experts in this business rule out the gaseous diffusion process because of the vast cost and scale that are involved, as well as the need for huge amounts of electric power, something that at present is not abundant in South Africa. Of the publicly known processes, this leaves gas centrifugation, which, though closely guarded by the several nations working on it, is apparently a feasible, though difficult, route. Based on rotors continuously operating at incredibly high speeds, the centrifuge process offers the advantage of infinite flexibility of scale—from just a few rotors up to as many as are desired; there is no need for a gigantic plant at the outset, in contrast to the gaseous diffusion method. But the high and

continuous speeds that are required present engineering problems of great magnitude. Britain, Germany, and the Netherlands were not simply huddling for warmth when they joined up in this venture. They needed each other's talents. Another possibility is the so-called jet-nozzle method, in which a uranium stream is accelerated to high speeds, and then bent to produce a separating centrifugal effect. West Germany is known to be experimenting with this process, but little information is available on the results so far.

It is possible, of course, that South Africa has devised a "unique" system, but if so, it would be a departure from the style of South African science and technology. In many fields, South Africa has demonstrated itself to be skillful at adapting known technologies to its own needs. But it is not a notably inventive land, and evidence of this is to be found in its balance of payments on patent royalties. South Africa, like many other small but well-developed countries, imports a great deal more technology than it produces at home.

If it is heading for independence in enrichment, what are the likely sources of talent? Here, it must be emphasized, it is only possible to speculate, and, in doing so, France comes up as a likely candidate for supplying skills. The French government is not at all pleased about Britain, West Germany, and the Netherlands going their own way in developing enrichment facilities. France has indicated that it would like to get into the consortium, but so far is yet to receive a favorable sign.

Finally, it is interesting to note that just as surplus soldiers have long ranged the world, offering their services for hire without political or ideological preference, there are now a great many well-trained scientists and engineers doing the same. The process is considerably more dignified, and those involved would shudder at the word "mercenary." But given the surplus of talent over the availability of suitable jobs in many fields around the world today, can there be any doubt about the drawing power of a well-worded advertisement with a proper price tag?—D. S. GREENBERG

South Africa Affirms Development

In response to skeptical reactions in Britain and elsewhere, the chairman of South Africa's Atomic Energy Board last week insisted that his country had indeed developed a new process for enriching uranium. In an interview with the Johannesburg newspaper *Dagbreak*, Dr. A. J. A. Roux called the process "a phenomenal achievement of world dimension. Our method is based on an entirely new principle. No one else in the world except ourselves possess the secret."

Roux gave no details in discussing the process but said, "It is not the gas diffusion process, as many think. Neither is it the gas centrifugal system. It is an entirely new principle. And we have thought it out and worked it out ourselves—every calculation and every little step in the process. From the basic theory to the first small plant to produce enriched uranium, it is all the work of South Africans."—J.W.