

measure of convenience. No doubt the fate of the telescope will ultimately be determined not merely by the desirability of moving it to Sutherland but by the feasibility of such an undertaking, and much will depend on whether it is considered that the driving mechanism would need to be replaced.

Observing conditions at the Cape have for several years required that observation should be confined to the brighter objects in the sky. The Cape Observatory, built in a way that shows quite clearly its Victorian naval origins, will remain in use as a base for observers working at Sutherland as well as an experimental station for the department of astronomy on which the University of Cape Town has set its heart. The university is clearly anxious to exploit in every way it can the opportunities which the new arrangements will provide, and it has already begun to scour the world for just the right man to fill the chair.

The Republic Observatory in Johannesburg has also fallen a victim to city light, but Johannesburg is more than three times as far away as is the Cape from Sutherland. Moreover, it must have been plain for several years to those in charge that the future for an observatory in or near Johannesburg would always be restricted and indeed the observatory has been without a permanent director for some time.

The joint observatory at Sutherland is only one of several smaller observatories maintained by other organizations from outside South Africa. The site of the Republic Observatory's annexe 40 miles north of Johannesburg also houses a southern station maintained by the Leiden Observatory, there is a 60-inch reflector at the Boyden Observatory maintained by the Harvard College Observatory near Bloemfontein as well as a 36-inch Baker-Schmidt telescope and a 27-inch refractor maintained by the University of Michigan at another site in Bloemfontein. In the past few years there has also been some useful development in radio astronomy, partly stimulated by the construction of the NASA tracking station at Hartebeesthoek (which is used in its spare time for radio astronomy), while a number of universities such as Rhodes University, Grahamstown, have established useful experimental groups in this field. South Africa nevertheless must still regret the decision of the consortium of European nations operating the European Southern Observatory to settle not in South Africa but in Chile.

NUCLEAR FUEL

Enrichment Up the Sleeve

THE announcement in June this year by the Prime Minister of South Africa that the Atomic Energy Board is developing a novel technique for the enrichment of uranium has left a great many scientists in South Africa as puzzled as their colleagues abroad about the potential of the claim. Some are openly sceptical. What follows is an account, culled from authoritative sources, of what has been happening.

First, the enrichment process, whatever it is, is based on the use of gaseous UF₆. The project has been under way since 1959, when the Atomic Energy Board first set out to investigate what seemed a potentially promising alternative to the then standard method of

enriching uranium—the building of a diffusion plant. By their own accounts, the people concerned seem at first to have been unwilling to believe their good luck in having found such a promising route to enriched uranium, and now regret the wasted years from 1963 to 1966 when it would have been possible to launch a more intensive study of the process. Since then, however, experimental studies have been carried out which have justified the decision to build a pilot plant.

The year 1966 is held to be significant, for then the Atomic Energy Board announced the abandonment of work on the reactor concept which had until then been its chief public pride and joy—a reactor operating with natural uranium (of which South Africa has plenty) and liquid sodium as coolant. In retrospect, this decision is said to be a necessary redeployment of skilled labour. But as things are, however, the scale of activity at the main research establishment at Pelindaba has grown slowly over the years (and cost R5.28 million in 1969). The study of sodium loops continues, and there are some who hold that the new enrichment process will make it economical to return once more to the PELINDUNA reactor concept, for the inconveniently large power output of the original concept may now be avoidable.

The development of the enrichment process, whatever it is, is rigorously separated both geographically and financially from the public work of the Atomic Energy Board. One of the reasons given for the decision to make public the existence of the pilot plant is the fear that the growing scale of activity associated with it would soon inevitably leak out. Although the Prime Minister said that “under South African conditions, a large-scale plant can be competitive with existing plants in the West”, it does also appear that the expected saving of cost is likely to be a comparatively small fraction and certainly less than 50 per cent of the current American price for enrichment—at present rather less than \$30 per unit of separated work. In short, it looks very much as if there is a good idea on which the builders of the pilot plant can chew, but that development has not yet reached the point at which the production costs can be accurately predicted, which in turn implies that the operation may yet be frustrated by economics if not by technology.

One of the obvious advantages of a process for enriching uranium indigenously is that South African uranium suppliers would enjoy a larger slice of the profits to be obtained from nuclear power. The political leverage provided by a supply of enriched uranium is also evident. One of the difficulties with which the government of South Africa is now faced, however, is that of knowing how to exploit the process without also making it available to potential competitors. By all accounts, the process, whatever it is, could be replicated in a comparatively short time by any comparable organization worth its salt.

But what is the process? The statement that the South African process “is unique in its concept” is held to exclude the use of centrifuges. For what it is worth, Dr A. J. A. Roux, the chairman of the board, accepted a bet of £5 that chromatography is somehow involved with such alacrity that attempts are now being made to hedge the bet with an investment in one other frequently mentioned process—a combination of a cyclone and gas diffusion.