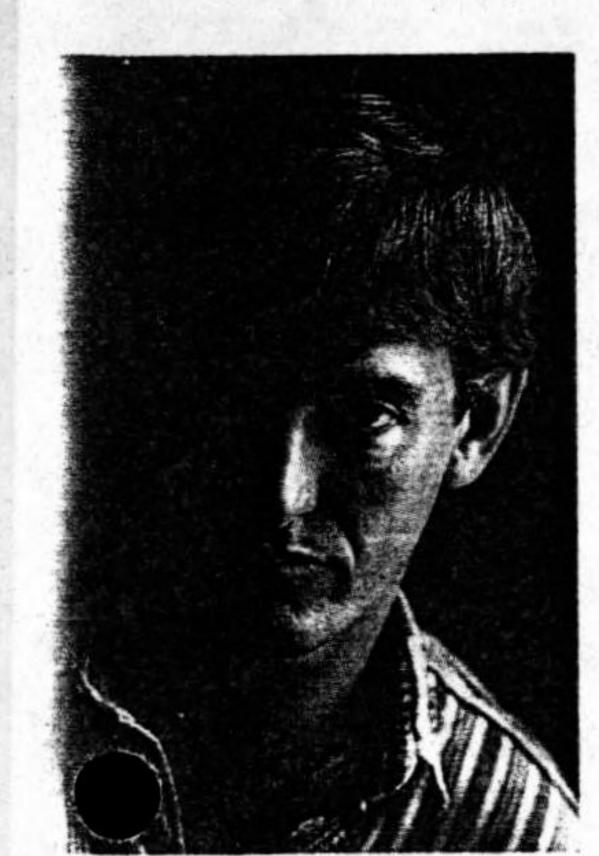
EADERS HIP UCLEAR POWERS

# THE OTHER INDABA

## Michael Cherry



ichael Cherry is a
iduate student at
illiol College, Oxford,
i a regular contributor
he scientific journal

At the end of September South Africa again faces possible expulsion from the International Atomic Energy Agency (IAEA), when the organisation meets for its annual general assembly. This follows the continued refusal by South Africa to sign the Nuclear Non-proliferation Treaty (NPT), and the breaking off of IAEA negotiations with South Africa in December 1986 over safeguards at the new commercial uranium enrichment plant at Valindaba, outside Pretoria. Last year in June the agency's board of governors recommended that South Africa be suspended, but on the eve of the general assembly in September, a statement by State President PW Botha announced that South Africa was prepared to commence negotiations about signing the NPT.

The first visible development in this direction came in early August this year when foreign minister Pik Botha headed a delegation to Vienna for exploratory talks. Afterwards it was announced that South Africa was insisting on being guaranteed full participation in the treaty, specifically including the right to trade in uranium internationally, as a precondition for signing the international accord. This precondition is unlikely to materialise, as the US ban on the import of South African uranium, imposed in January 1987, stands little chance of being revoked in the current political climate.

South Africa's demand is likely to be perceived as a red herring in view of the fact that it refused to sign the NPT for almost 20 years prior to the implementation of the ban. If South Africa persists in refusing to sign and is expelled from the agency, it faces almost certain forfeiture of the expansion of its peaceful nuclear power programme.

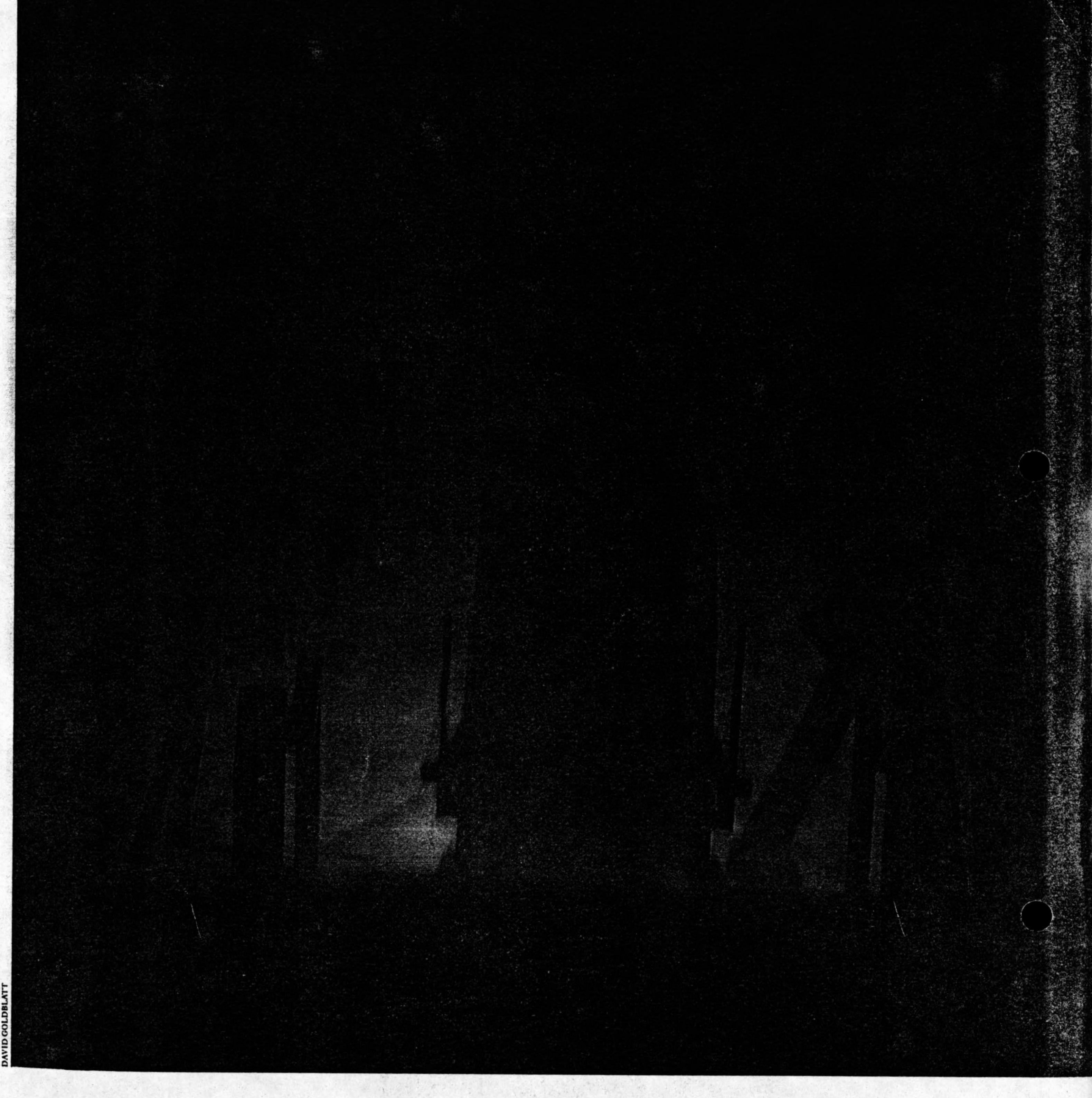
Botha's statement last year declared that Pretoria's attitude would depend on the outcome of the assembly, and it was successful in stalling a Nigerian bid to expel South Africa on the grounds of persistent but unconfirmed reports that she was developing nuclear weapons. Interestingly, the US secured the co-operation of the Soviet Union in thwarting South Africa's expulsion, arguing that the agency was able to exercise more control over the country's nuclear programme if it remained a member. Instead a compromise solution was adopted, agreeing to renew attempts to expel South Africa in a year's time, giving it a period of grace in which to realise its stated intentions. Proposed by the Mexican delegation, and seconded by Algeria, this resolution was adopted by 60 votes to 28 (with four abstentions), the US, EEC and other Western countries voting against it.

Richard Kennedy, deputy head of the US delegation and a member of the agency's board of governors, criticised the failure of the resolution to take note of "the potential substantial development" reflected in Botha's statement. Kennedy was referring to the fact that South Africa had never before publicly countenanced acceding to the NPT. If voting follows a similar pattern this year, however, the necessary two-thirds majority required to ensure South Africa's expulsion could be narrowly achieved.

The IAEA is the United Nations organisation responsible for both promoting the peaceful use of atomic energy, and for preventing the proliferation of nuclear weapons worldwide. The chief mechanism for implementing non-proliferation is the NPT, formulated in 1968. It is the international treaty by which the weapon countries (the US, the USSR, France, the UK and China) undertake not to help any non-weapon country obtain nuclear weapons or explosives. The non-weapon countries, in turn, agree not to make or acquire them. All signatories are required to accept IAEA safeguards and inspection of their nuclear material, excluding uranium ore itself. Much of the work of the IAEA is concerned with the inspection of the nuclear facilities in the non-weapon states to ensure that material is not diverted for the manufacture of weapons.

Plutonium and highly-enriched uranium are the two alternative sources used in building nuclear weapons. The Hiroshima bomb was built using highly-enriched uranium, while plutonium was used to fuel the bomb which destroyed Nagasaki. Naturally-occurring uranium contains only 0,7% of the fissile isotope, uranium-235; the balance comprises the more stable isotope uranium-238. Natural uranium is enriched so that it contains approximately the 2-4% of uranium-235 necessary to fuel a nuclear power station. For nuclear weapons, uranium needs to be enriched to a far greater degree; typically 90%, although, as a safeguard, enrichment over 20% is regarded as highly-enriched. Enrichment can be performed using one of three different processes: gaseous diffusion, gas-centrifuge or jetnozzle separation. All these technologies are expensive (particularly the last two, which require massive supplies of power), and costs rise rapidly as the uranium is enriched to a higher extent. Plutonium, by contrast, is a product of fission and has to be extracted from the spent fuel rods from a nuclear reactor. This is a technologically very complex procedure, and is performed at a reprocessing plant.

Of the weapon countries, the US, the USSR and



the UK have accepted the NPT, while France and China have not. To date, more than 130 countries have joined the NPT (including almost all the industrial countries), but four developing countries operating unsafeguarded plants that can make nuclear weapons material have declined to do so: India, Israel, Pakistan and South Africa. A further six (Chile, Cuba, Spain, Argentina, Brazil and North Korea), while refusing to sign the NPT, have placed all their significant nuclear installations under IAEA safeguards, and are thus largely above suspicion as weapons manufacturers. Of the first four, India is the only nation to have laid its cards on the table by

exploding a nuclear device (in 1974), but nowadays, it is no longer considered necessary to test a nuclear weapon by exploding it. Two years ago the Israeli nuclear technician Mordechai Vanunu revealed that the Israelis have a secret reprocessing plant at their nuclear facility at Dimona, in the Negev desert, and confirmed its status as the world's prime suspect weapons state. The remaining suspects are Pakistan and South Africa.

South Africa, as a major supplier of uranium, was a founder member of the IAEA, and its existing three reactors, two at its only nuclear power station at Koeberg, and its research reactor Safari 1 at Pelin-

The heart of Safari 1 nuclear reactor, Pelindaba.

will be required in order to ensure that Soweto remains a home for those who have contributed their labour and consumer power to the development of the Johannesburg-Soweto urban economy.

It is extremely unlikely that an "affordable service charge" will work without cross-subsidisation within the Johannesburg-Soweto urban economy.

### 4.5. The Urban Economy: One Tax Base

A single tax base for Johannesburg and Soweto must be established. This is the only long-term basis for the sound development of Soweto.

A more short-term measure would involve transfer payments from Johannesburg's rate account to the Soweto Community Trust Fund in terms of Section 79(15) of the Local Government Ordinance, No. 17 of 1939.

### 4.6. Conclusion: Towards Democratic Planning

The five policy positions proposed here constitutes the most constructive basis for a negotiated settlement to the Soweto rent boycott. These positions are:

- \* the arrears amounts must be written-off;
- \* the housing stock must be transferred to the ownership of the residents of Soweto;
- \* Soweto's infrastructural services must be upgraded to an acceptable standard;
- \* an affordable service charge formula must be designed;
- \* a single tax base for Johannesburg and Soweto must be established.

If these policy positions are adopted in principle, then the discussion can proceed to operational processes that relate to two questions:

- a) how can a coherent development plan be formulated that deals with all these issues?
- b) what will be required to ensure that decision-making is democratised to the point where the community can be involved in all levels of the policy-making process?

Answers to these questions will directly determine how the policy positions are translated from principle into practice.

EADERSHIP **UCLEAR POWERS** 

The refusal to ign the NPT as proved to e both xpensive and rconvenient or South Africa.

daba, have all been under IAEA safeguards since their inception. Despite this, government has persistently refused to sign the NPT, claiming that it might enable IAEA inspectors to learn too much about the "unique" uranium enrichment process used at its two unsafeguarded plants at Valindaba. The name Valindaba, derived from Sotho, means "about this we do not talk", and secrecy surrounds South Africa's uranium enrichment process, which was hailed as a breakthrough by Pretoria when first announced in 1970. However, it is now widely regarded as merely a variation of the jet-nozzle process.

In 1977, there was an international outcry about South Africa's alleged intention to build nuclear weapons when the Soviet news agency, Tass, warned that South Africa was about to explode a nuclear device. A few days later, Tass claimed more specifically that plutonium for South Africa's nuclear weapons would come from the two Koeberg reactors France had agreed to supply. This second claim was regarded with scepticism by the international community, since Koeberg was not due to become operational until 1982 (in fact, it became operational only in 1984) and because a condition of the French sale was that the spent fuel from the reactors be reprocessed in France, with the extracted plutonium remaining in French hands.

The first claim, however, that South Africa was about to explode a nuclear device, was corroborated by both France and the US, reportedly on the basis of satellite pictures of extensive construction work in the Kalahari desert. The French Foreign Minister at the time, Dr Louis Guirangaud, warned that such an explosion would have grave consequences for South Africa, including the cancellation of the French sale. Following two weeks of frenetic diplomatic activity, President Carter announced that an assurance had been obtained from Pretoria that South Africa did not have and did not intend to develop nuclear devices, that the Kalahari test site was not designed to test nuclear explosives, and that no nuclear explosive test would be undertaken in South Africa either then or in the future. The Kalahari test site has subsequently been dismantled.

On September 22 1979, an American Vela satellite detected a double flash in the vicinity of Marion and Prince Edward Islands. Such signals are commonly indicative of a nuclear explosion, but South Africa again denied this possibility. Later, a team of US civilian experts concluded that the signal was too different from known blast signals to be taken as sole confirmation of a blast. The American journal Science remarked wryly: "The explanation is not satisfying, but it is clearly more palatable to the Administration than leaving the mystery utterly unsolved." The US military, however, were convinced that a nuclear explosion had taken place. The incident took place the same week as South Africa was signing the final communique of the tenth meeting of the Antarctic Treaty in Washington, which specifically prohibited nuclear explosions or the disposal of nuclear waste in Antarctica.

The refusal to sign the NPT has proved to be both expensive and inconvenient for South Africa. In 1974 Eskom concluded an agreement with an American contractor for the enrichment of uranium for Koeberg. In terms of this contract, South Africa was to supply uranium which would be enriched in the US, before being sent on to France to be transformed into fuel rods, and then returned to South Africa. But in 1978 the US Nuclear Non-Proliferation Act was passed, preventing the export of enriched fuel to any non-weapon country that did not maintain IAEA safeguards over its nuclear activities. Thus, by 1981, South Africa found itself in a classic Catch-22: if it did not supply the uranium to its American contractor it would be in breach of contract and have to pay huge penalties; if it did supply the uranium, the enriched product could not, in terms of American law, be returned to South Africa.

Eskom chose to supply the uranium, but the contract (valued at R116 384 000) was suspended in 1984. Eskom had to dispose of the uranium (some of which had already been enriched) on the world market and buy new material from a Swiss company at black-market prices. But by 1984 the spot-price of uranium had fallen drastically and Eskom's income from sales was only R59 602 000; R56 782 000 was written off. This could have been averted had South Africa been prepared to sign the NPT, and led to speculation that the reason for refusing to sign was more than just a matter of principle.

After the Vienna talks, Pik Botha disclosed that South Africa is able to produce a nuclear bomb "if we want to". This was the highest level of confirmation of this country's nuclear capability since David Fisher, a consultant to and former assistant directorgeneral of the IAEA, aroused suspicions three years ago by claiming in the journal Optima that the country is capable of producing enough enriched uranium to make two nuclear weapons each year. Although this claim attracted some attention in the international media, it received scant mention in the South African Press, coming as it did at the time of the collapse of the rand, the debt crisis and the closure of the Johannesburg Stock Exchange. Of many claims in the past few years about South Africa's nuclear capability, few have come from a source as impeccable as Fisher, himself a South African diplomat before resigning to follow a career in the IAEA. It is based on the assumption that these weapons could be manufactured using highlyenriched uranium produced at the pilot enrichment plant at Valindaba. This plant was commissioned in 1975, but became fully operational only in March 1977. It has never been subject to safeguards, and it is capable of producing highly-enriched uranium, as it has been used to produce reloads for the Safari 1 reactor. It could have produced one or two nuclear weapons by the time of the Kalahari incident in August 1977, and several more two years later when the Vela flash was detected. A report in 1986 by the UN's Commission on Transnational Corporations



E A D E R S H 1 P UCLEAR POWERS

Pretoria faces
difficult
hoice, the
ature of
which
lepends on
whether the
ountry has
cquired
uclear
weapons.

estimated that the full-scale commercial plant, once in operation, could be modified to produce between 40 and 100 nuclear bombs in a year.

The only plausible reason why South Africa would want to develop nuclear weapons is their psychological value both as a deterrent and in terms of general intimidation in the sub-region. Presumably it is on these grounds that Dr Neil Barnard, head of the National Intelligence Service (NIS) and a member of the powerful State Security Council, has openly advocated South African development of nuclear weapons. An uncompromising hawk, he believes such a step would not add to South Africa's already considerable isolation in the world.

The Department of Foreign Affairs, however, has so far adopted a far more sophisticated strategy, in denying nuclear intentions but refusing to sign the NPT, and stalling negotiations on safeguards for the commercial enrichment plant. There are only seven other main enrichment facilities worldwide (one in the US, one in the USSR, one in Brazil and four in the European Community). Now that South Africa's plant has become operational, pressure to negotiate safeguards for it has increased and the era of this policy has ended. Pretoria faces a difficult choice, the nature of which depends on whether the country has in fact acquired nuclear weapons. This choice has to be made bearing in mind the possibility of a Democratic administration governing the US next year, with a renewed commitment to nuclear non-proliferation (predictably, this has not been a feature of the Reagan administration).

If South Africa does already possess nuclear weapons and last year's statement by President Botha was just yet another case of leading the West up the garden path, then South Africa has little option but not to sign the NPT. If this is what happens, South Africa may well try to stave off expulsion yet again by offering to place either its commercial enrichment plant or possibly both it and its pilot enrichment plant under IAEA safeguards, while still refusing to sign the NPT. In the first instance, this would require little sacrifice on South Africa's part, as it would forfeit only the possibility of sabotaging the non-proliferation regime by exporting highlyenriched uranium without IAEA safeguards in the future. At one time the fear of this materialising was thought to be a considerable bargaining chip, but as the commercial enrichment plant is unlikely to reach full capacity for some time, the possibility of South Africa becoming an exporter of highly-enriched uranium, as originally intended, now appears slim. Indications are that although it will be capable of supplying the two reactors of the country's existing nuclear power station at Koeberg when current stocks of imported highly-enriched uranium run out, it may even have difficulty supplying South Africa's planned second nuclear power station, depending on when and if that materialises. With regard to the pilot plant, South Africa could already have stockpiled about 20 nuclear weapons from this facility, and could thus place it under safeguards as

well, while in no way undermining the possibility of having nuclear capability.

If SA does not possess nuclear weapons, then it could sign the NPT, but is likely to continue to delay doing so as long as possible to keep the world guessing about its intentions. This decision, however, has to be weighed against the fact that, should it be expelled from the IAEA, no government is likely to approve a contract for its second nuclear power station. Although construction was planned to have started in the mid-Nineties, Eskom chairman John Maree last year stated that "it is highly unlikely we will see another atomic power station after Koeberg much before 2025".

This could be interpreted as a sign of South Africa being prepared to forfeit its nuclear power programme on account of it having nuclear weapons, and therefore not being able to sign the NPT. Equally well, it could reflect both the possible difficulty of supplying a further power station with highly-enriched uranium and the exorbitant cost of Koeberg (5,6 cents per kilowatt-hour, as compare to 1,89 cents for electricity produced by the Transvaal coal-fired power stations).

Worldwide, there has been a decline in the popularity of nuclear power as a source of energy in the face of the rapidly-escalating costs associated with it, as the accompanying table on the decline in projections for worldwide nuclear power generating capacity shows. Even if it is in a position to sign the NPT, South Africa may well have decided that the advantages of its nuclear weapons status remaining uncertain outweigh the disadvantages of not continuing its nuclear power programme.

#### Projections of Worldwide Nuclear Power Generating Capacity for 1980, 1990, and 2000

Source and Year of Projection	Projections for		
	1980	1990	2000
	(thousand megawatts)		
International Atomic			
Energy Agency			
1972	315	1 300	3 500
1974	235	1600	4 450
1976	225	1 150	2 300
1978	170	585	1 400
1980	137	458	910
1982		386	833
1984		382	605
1986	_	372	505
Worldwatch Institute			
1987		325	380

Sources: International Atomic Energy Agency, Annual Reports (Vienna: 1972-80); IAEA, "Reference Data Series No. 1," Vienna, September 1982; IAEA, Nuclear Power: Status and Trends (Vienna: 1984-86); Worldwatch Institute.