CHAPTER 2

"I at Least Want to Be Guilty"

Coercing South Africa into a Corner

This chapter explains the South African apartheid regime's decision-making about its nuclear program when it was subject to coercive pressure from the international community. From 1975 onward, the United States and others sought with varying intensity to compel South Africa to sign the NPT and submit all of its nuclear facilities to comprehensive safeguards. Save for Pretoria's decision to back down from a "cold" nuclear test in 1977, the effort failed. South Africa defied coercive demands and built six nuclear bombs. In 1989 the government dismantled its nuclear weapons ahead of the impending end of apartheid rule, and South Africa became the only country to have manufactured and fully destroyed a nuclear arsenal.

The assurance dilemma proves a powerful lens when passed over the South African case. South African leaders defied compellent demands because they perceived a lack of credible coercive assurance, not because they perceived compellent threats to be insufficiently credible or painful (see table 2.1). A short-lived bargain in 1977 came about through a strategy of sharing knowledge gathered through intelligence collection, but it was rapidly undermined by the perception of coercers' entanglement of nuclear and antiapartheid demands linked to economic sanctions. An opportunity to disentangle the two issues in Washington was thwarted by the US Congress acting as a spoiler. Coercers struggled with the assurance dilemma as South African leaders perceived coercive punishments to be credible and severe but chose to defy because they did not think that they could avoid pain by signing the NPT. I show this by examining three critical junctures in Pretoria's nuclear decision-making about how to respond to international pressure: in August and September 1977, September 1985, and 1986–88. Finally, examining South Africa's ultimate decision in 1989 to disarm ahead of the end of apartheid reveals the importance of information management to a target fearful of admitting its guilt. It does not, however, overturn

Table 2.1 South Africa

Date	*Concessions*	*Threat credibility*	*Threat severity*	*Assurance credibility*	*Consistent with assurance dilemma?*
1977	Partial	High	Low	Medium	✓
1985	No	High	High	Low	✓
1986–88	No	High	High	Low	✓
1989–93	Yes	High	High	High	~[a]

[a] While the assurance dilemma is not invalidated, South Africa gave up its nuclear arsenal and signed the NPT for reasons largely unrelated to coercive assurance.

conventional wisdom on the proximate cause of South Africa's nuclear disarmament: the end of apartheid.

This chapter relies on primary documents from the South African government and the IAEA to explain South African behavior. The IAEA was a crucial interlocutor for coercive bargaining between the international community and Pretoria. To give in to IAEA demands was often to give in to US demands. I supplement these documents with the recollections and writings of South African policymakers, military leaders, and nuclear scientists—Prime Minister John Vorster, Minister of Defense and later Prime Minister and then President P. W. Botha, Minister of Foreign Affairs R. F. "Pik" Botha, President F. W. de Klerk, and scientists and engineers such as Andre Buys, Nic von Wielligh, and Waldo Stumpf. It is essential to understand their own perceptions of the credibility of coercive threats and assurances, even with selective memory in their reporting.

Improving Existing Explanations

Established accounts provide good evidence for the security drivers of proliferation in South Africa and the end of apartheid as the cause of its nuclear dismantlement. Governed by a small circle of "securocrats" who were hypersensitive to the minority ruling class's internal and external security threats,[1] the former Dutch and British colony was acutely fearful of the Soviet Union and its regional proxies in Africa. Its fortunes in the war in Angola soured with the loss of Central Intelligence Agency (CIA) backing in 1975 and the sudden arrival of Cuban forces. Its regional security situation remained fraught throughout the 1980s.[2] With no security patron, Pretoria sought a nuclear insurance policy that saw it through the rest of the terrifying Cold War. These security drivers explain South Africa's nuclear acquisition.

Furthermore, at the end of the Cold War, South Africa disarmed because of a unique confluence of factors, chief among them the end of apartheid

rule and a transition to democratic government. The December 1988 Brazzaville Protocol (a.k.a. the New York Accords) saw to the withdrawal of Cuban forces.[3] The subsequent collapse of the Soviet Union was a significant boon to South Africa's security and reduced its need for a nuclear deterrent. Most importantly, President De Klerk saw the writing on the wall for South Africa's apartheid government, the ire for which was only growing because of a transnational human rights campaign of naming and shaming.[4] In anticipation of a transition to democratic government and Black majority rule, racist South African leaders dismantled their nuclear arsenal rather than hand it over to the African National Congress (ANC) and Nelson Mandela.[5] Other factors included De Klerk's personal moral aversion to nuclear weapons and the disintegration of bureaucratic or technical-scientific consensus in support of an expensive nuclear program in the late 1980s.[6]

These established accounts emphasize the lens of threat credibility in the history of apartheid South Africa's defiance of coercive counterproliferation.[7] Its intense demand for nuclear protection made Pretoria resistant to external pressure, the argument goes, and that it was an anticommunist bulwark in Africa was enough to water down opposition to its nuclear proliferation. Neither of these factors is sufficient to answer the key questions of coercion at the heart of this case: Why did South Africa not give in to pressure to sign the NPT? Why did coercion fail for so long?

This chapter begins by reaching back to the origins of South Africa's nuclear program and motivation to acquire the bomb. It then describes the start of coercion against Pretoria and how it began to perceive the entanglement of two issues—nuclear proliferation and apartheid. The chapter subsequently examines the Kalahari crisis of 1977 and South Africa's construction of nuclear weapons, explains South Africa's decision-making when sanctions were hurting in the 1980s, and reviews its negotiations with the IAEA about safeguards. The chapter concludes with an explanation of South Africa's decision to dismantle the arsenal in 1989 and the tacit collusion that followed.

South Africa's Nuclear Program

NUCLEAR AMBITIONS

South Africa joined the ranks of capable nuclear states quickly.[8] Upon discovering abundant natural uranium deposits, it established an Atomic Energy Board (AEB) in 1948. The country developed into a major uranium producer after it signed purchasing agreements with the United States and the United Kingdom in 1950.[9] At the time the US and the UK thought uranium was scarce and that they needed to secure their access.

The United States and South Africa subsequently signed a nuclear cooperation agreement in 1957 as part of the Atoms for Peace program.[10] Under the deal, the United States supplied South Africa with a research reactor, Safari-1, safeguarded since 1965. The sharing arrangement did not set any coercive red lines on South African nuclear ambitions. Later, however, South Africa refused to sign the NPT, and the US nuclear fuel supply proved to be a source of leverage. Nuclear research also began at the Pelindaba Nuclear Research Center in 1961, overseen by South Africa's AEB.[11]

South Africa began a secret effort to develop an indigenous uranium-enrichment capacity in the 1960s. By 1967 South African scientists at the Pelindaba Nuclear Research Center had tested at laboratory scale a vortex-tube method for uranium enrichment.[12] The process was soon expanded to a pilot enrichment facility called the Y-plant. The first stage of the enrichment cascade was completed by the end of 1974, and the whole cascade was operational by March 1977.[13] Set up right next to Pelindaba, the Y-plant was built in a location aptly named Valindaba, a compound Sotho word meaning "we don't talk about this."[14]

For some time, the indigenous enrichment capability was merely motivated by economic factors—a desire to exploit the commercial potential of South Africa's abundant uranium deposits. Soon, the enrichment capacity became a clear hedge and then more.

Prime Minister John Vorster made the political decision to explore nuclear weapons technology in 1969 when he established through the AEB a committee to investigate the feasibility of building "peaceful nuclear explosives" (PNEs) for mining applications.[15] In March 1971 Carl de Wet, the minister of mines, approved the committee's recommendations to develop PNEs.[16] Then, in 1974 Vorster seamlessly shifted the objectives of this research from PNEs to a nuclear deterrent,[17] at the same time approving a plan to develop a nuclear test site in the Kalahari Desert.[18]

A DETERIORATING REGIONAL SECURITY SITUATION

What motivated South Africa to pursue nuclear weapons? In the mid-1970s South Africa faced a deteriorating regional security situation. Mozambique and Angola won independence from Portugal in 1975, and Pretoria watched as white colonists fled. The Soviet Union moved to fill the vacuum left by Portugal, and Black African nationalism expanded as minority rule ended in Southern Rhodesia (which became Zimbabwe) and put pressure on South African–controlled Namibia.

With the clandestine backing of the United States under President Gerald Ford, South Africa intervened against rebels in the Angolan Civil War in October 1975. When the secret US aid was exposed, however, the US, at the behest of Congress, withdrew its support.[19] Cuba took advantage and sent troops to Angola to support the rebels. (Cuban military advisers had

already been involved in the conflict.) Soon Soviet weapons and logistical support followed. A lonely South Africa found itself with multiple enemies and few friends.[20] On March 27, 1975, P. W. Botha announced that the defense budget would increase by 36 percent, accounting for a total of 20 percent of the overall national budget.[21] Nuclear weapons took their place within this strategic picture.[22] During this time, South Africa also began to face the opprobrium of the international community.

Hydra-Headed Compellence over Apartheid and the NPT

White minority–ruled South Africa had institutionalized the separation of races after the surprise election of the National Party in 1948. Under the guise of equal development, the brutal policies of apartheid, meaning "apartness," required South Africans to register their ethnicities with the government, prohibited intermarriage and socialization, and forcibly removed "black," "colored," and "Indian" populations from white areas, among other iniquities. The descendants of European (mostly Dutch) settlers championed the racist policies as a method of preserving their Afrikaner identity.[23]

For a long time, the United States did not take action to oppose apartheid. It served US interests that South Africa's proapartheid National Party was fiercely anticommunist. When the government in Pretoria banned the ANC and the Pan Africanist Congress opposition parties from political participation in 1960 and imprisoned their leaders in 1963, the John F. Kennedy administration vetoed punitive United Nations (UN) resolutions and supported only a voluntary arms embargo against South Africa.[24]

Coercers came down harder in the 1970s. International coordination to condemn Pretoria for apartheid began in the UN. On October 24, 1970, the UN General Assembly (UNGA) passed Resolution 2627, calling apartheid "a crime against the conscience and dignity of mankind"; on October 5, 1973, it rejected the South African delegation's credentials; on November 28, 1973, Arab states imposed oil sanctions on South Africa; and on November 30, 1973, the UNGA ratified the International Convention on the Suppression and Punishment of the Crime of Apartheid in Resolution 3068.[25] An October 1974 motion to remove South Africa from the UN failed only because it was vetoed by the United States, France, and the United Kingdom, who while vetoing finally made clear their opposition to apartheid and expressed their desire that continued membership in the UN would result in changes to the state.[26]

At this time, too, coercers began to be warier of South Africa's nuclear intentions. Pretoria refused to sign the newly in force NPT and continued to make progress on enrichment technology. Observers feared that little could stop them from indigenously enriching uranium to weapons grade.

The United States began to engage in compellence against South Africa in 1975. There had been no mention of nuclear weapons or an end to US nuclear cooperation when the Kennedy administration took the half measure of supporting a voluntary arms embargo in 1963.[27] But in 1975 and 1976 the Ford administration imposed sanctions and discontinued the supply of fuel for the Safari-1 reactor, even refusing to reimburse South Africa its payments for the fuel.[28] These punishments were not yet severe but would grow over time. South Africa thus became the world's first target of US nonproliferation-related sanctions in 1975.[29]

Compellent demands to end apartheid also intensified in 1976 after a brutal state crackdown on the Soweto riots drew international public outrage.[30] The Jimmy Carter administration accelerated US compellent efforts. In a January 1977 meeting with Pik Botha, then the South African ambassador to the United States, US national security adviser Zbigniew Brzezinski warned that "the U.S. will never intervene in the conflict on the side of a white minority government, even if communists were involved."[31] Carter further labeled apartheid "a threat to international peace and security" in an October 25, 1977, speech and subsequently backed mandatory UN arms sanctions.[32] The UN Security Council (UNSC) voted in favor of this binding arms embargo on November 4.

South Africa was also voted off the IAEA board of governors in 1977.[33] On September 28, 1976, the IAEA general conference had formally requested that the board of governors consider the removal of South Africa from its seat on the board representing the region of Africa. And the IAEA board of governors took up the resolution at its meeting on June 16, 1977.[34] Jo-Ansie van Wyk, a scholar of South African–IAEA relations, writes that the IAEA's actions aimed "to persuade the South African government to terminate its nuclear weapons programme."[35] Nonetheless, the resolution cited "flagrant violations by the apartheid regime" of the UN Charter, asserting that "the apartheid regime of South Africa totally lacks any claim to be representative of the legitimate interests and aspirations of the area of Africa."[36] At the meeting, members, save South Africa itself, universally condemned the practice of apartheid, though some (including the US) sought to maintain South Africa's seat in accordance with the IAEA Statute. Article VI of the statute originally allotted thirteen seats on the board of governors to the member states "most advanced in the technology of atomic energy including the production of source materials" and included a provision to ensure representation from every geographic region.[37] South Africa was the obvious member to fill the African seat and had done so since 1957. Nevertheless, the board voted to remove South Africa and replace it with Egypt, a state with less advanced nuclear technology.[38] The compellent move was seen in Pretoria as humiliating.[39] South Africa began to perceive the two issues—nuclear and apartheid—as becoming linked.

The Kalahari Crisis of 1977

In August 1977 the United States and South Africa came head to head in a crisis over the latter's nuclear ambitions. South African leaders reflected on the Kalahari crisis as a "watershed moment" in South Africa's pursuit of nuclear weapons. In terms of testing theories of coercion, 1977 was a crucial moment at which Pretoria stared down Washington on nuclear proliferation and carefully considered whether to defy its compellent demands.

The assurance dilemma took center stage. During this episode, South Africa judged compellent threats to be credible. The threatened pain was also quite severe, though South Africa had not yet suffered the bulk of international sanctions that would later be placed upon it. Nonetheless, the primary driver of South African defiance was a perceived lack of coercive assurance.

THE KALAHARI CRISIS

As part of its clandestine pursuit of nuclear weapons technology South Africa dug two test shafts in the Kalahari Desert. They were hundreds of feet deep. With a flimsy cover story of drilling for water, the first shaft was completed in 1976 and the second in 1977. Local farmers referred to them as "the atom shafts," as "everybody knew there was no water in those parts."[40]

The secrecy did not hold long. In July 1977 two Soviet satellites photographed suspicious drilling equipment and boreholes in the Kalahari.[41] On August 6 the Soviets passed news of their discovery to the United States in a message from Soviet leader Leonid Brezhnev to President Jimmy Carter.[42] "According to incoming data on the South African Republic," Brezhnev wrote, the South Africans "are completing work on building nuclear weapons and on carrying out the first nuclear test. In the desert of Calabari [Kalahari] they have built a testing site which is practically ready."[43] US intelligence analysts verified the evidence and concluded that indeed "the Kalahari facility could have no military purpose other than nuclear testing."[44]

Only two days later, the Soviet Union announced publicly in a news item by TASS (the state-owned news agency Telegrafnoye agentstvo Sovetskogo Soyuza) that South Africa intended to test a nuclear weapon, without saying how or where.[45] The next day, another TASS announcement accused the West (NATO and Israel, in particular) of aiding South African nuclear weapons development.[46] Finally, on August 18 the Soviets slipped details about the Kalahari location into an additional news item.[47] The US embassy in Moscow cabled Washington with a quick translation.[48]

As the Soviets had wished, the United States and others brought coercive pressure to bear on Pretoria. Brezhnev's letter indeed specifically called out the United States' coercive leverage, saying that the Americans have "at

their disposal the necessary channels and possibilities for the rendering of a direct restricting influence on this state."[49] UN ambassador Andrew Young, a Carter confidante, sent a cable to the president and the secretary of state warning that South Africa's intransigence regarding the NPT and safeguards "leaves us holding the bag before the international community on the question of South Africa's nuclear plans."[50] The US would have to confront Pretoria.

On August 18, the US ambassador to South Africa, William Bowdler, threatened South African foreign minister Pik Botha: "In light of the grave implications President Carter has instructed me to make clear that the detonation of a nuclear device . . . or any other further steps to acquire or develop a nuclear explosive capability would have the most serious consequences for all aspects of our relations and would be considered by us as a serious threat to peace."[51] Bowdler repeated the not-so-implicit sanctions threat by reiterating that Botha "should also be aware of the possibility that the issue may arise in the United Nations Security Council on short notice with unforeseeable results."[52] Other démarches came pouring in, threatening diplomatic rifts and sanctions, including a threat from France to cut off fuel it supplied for South Africa's Koeberg nuclear power station.[53]

Evidence from the coercive bargaining reveals the importance of shared knowledge to the South African target, which was loath to admit anything its coercers did not already know about its nuclear weapons program. Initially, Pik Botha and others reacted with outrage and denial, demanding evidence. Brand Fourie, the secretary of foreign affairs who later entered the meeting between Bowdler and Botha, issued further denials and asked for "proof of the assertion."[54] US secretary of state Cyrus Vance followed up and in an August 19, 1977, letter confronted the South Africans with evidence. "We are prepared to show you photographs," wrote Vance, who referred to specific coordinates in the desert of a drilling rig, lattice tower, power and communication lines, secured housing, an airstrip, and an outer patrol road—all consistent with a nuclear test site.[55] In an oral history, Pik Botha recalled the US ambassador placing on his desk "10–12 photographs" of "a drill in an arid region."[56]

The two sides shared knowledge of South Africa's plans, and both Pretoria and Washington knew it. Carter scrawled in the margins of a memo from Brzezinski: "Zbig—what we want is: no test. If they have to lie about what their plans were, let them do so—Let them save face. J. C."[57] And next to Brzezinski's recommendation that "our primary aim must be to get as much information about what the South Africans are really doing," Carter scrawled, "no—Assure no test."[58]

Botha took the information to Vorster, who agreed not to conduct a planned cold test.[59] After an exchange of diplomatic cables,[60] South Africa further agreed to make three pledges to end the crisis:[61] (1) that South Africa did not intend to develop nuclear explosive devices, (2) that the Kalahari

test site was not designed for use to test nuclear explosives, and (3) that no nuclear explosive tests would be taken in South Africa.[62] President Carter announced the pledges at a press conference on August 23.[63] In a message to Vance, Botha further expressed South Africa's willingness to "enter into discussions with the United States on all aspects of South Africa's nuclear policy including the question of South Africa's accession to the Non-Proliferation Treaty."[64] Behind the scenes, South African leaders had no intention of honoring these pledges.

KALAHARI COMPELLENCE BACKFIRES

The Kalahari episode merely pushed the South African nuclear program underground. What a post hoc CIA assessment concluded was successful coercion had actually backfired.[65] South Africa interpreted the Kalahari testing fiasco as a "watershed" moment.[66] The United States had sought an end to South Africa's clandestine proliferation activities and to get Pretoria's signature of the NPT to prove it. But after 1977, in the words of Frank Pabian, the South African government believed that it had "no alternative but to develop a nuclear deterrent."[67] Pretoria doubled down on its nuclear ambitions.

The threat credibility lens struggles to explain this episode of coercion. Compellent threats from the United States and others were perceived as credible by South Africa. An August 31, 1977, dispatch from the South African embassy in Washington reported back to Pretoria that "the thesis that South Africa poses a threat to world peace is immensely reinforced and will be exploited in the UN"; thus, "the prospect of a chapter VII sanctions resolution is thus brought measurabl[y] nearer."[68] Furthermore, the pressure was great. An anonymous US official reported of the interactions, "We were pretty severe in private."[69] Speaking more broadly of foreign relations in the 1970s, Pik Botha recalled, "During the whole protracted period, there was severe pressure on us from Washington."[70]

But South Africa did not buckle under the pressure. Its leaders did not see abandonment of their nuclear weapons program as an option that would avoid punishment. Rather, they perceived inevitable pain. The embassy in Washington assessed that acquiescence to international pressure would not yield positive results. "United States policy vis-à-vis black Africa in general and vis-à-vis white ruled Southern Africa in particular," assessed the embassy, "has developed a momentum of its own to which it would now be difficult to apply a brake, even in the unlikely event of the Carter administration undergoing a change of heart."[71] Andre Buys, future chairman of the state-owned Armaments Corporation (Armscor) working group on nuclear strategy, later described the choice: "We must either terminate the program now, or we must go for nuclear weapons ourselves. If

I have to take the punishment, I at least want to be guilty."[72] Buys also referred to the Kalahari episode as a "watershed moment."[73] And a 1977 policy paper by Neil Barnard concluded that "the acquisition of nuclear weapons will not necessarily isolate South Africa any further."[74] This evidence is consistent with the absence of coercive assurance.

Despite the crisis abating, South African policymakers now expected an escalation of economic sanctions. The embassy assessed that the Carter administration was likely to use the moment to increase pressure on South Africa—the Kalahari episode being "further substantiation of the thesis of the Carter administration that pressure on South Africa is more productive" and that the latest crisis only provided "incentive to step up the pressures."[75] In this environment, they reasoned, South Africa should expect even less harbor from potential friends—"supporters (in Western Europe for example) will be able in future to offer less effective resistance to proposals for economic sanctions."[76] "South Africa is far more exposed than ever before," a cable concluded.[77] "Whether or not South Africa does in fact have the bomb"—it did not yet—"the overall effect . . . has been to make the international community believe that South Africa has manufactured a nuclear device. . . . Nothing can be the same again."[78]

Coercive assurance was undermined by Pretoria's perception that the world was "mad already" at South Africa. The two compellent demands of Pretoria—that it sign the NPT and end apartheid—merged in the minds of South Africans. Such an entangled web of compellent punishments and threats of more pain to come undermined the coercive assurance of either individual demand. According to the nuclear scientist Von Wielligh, "these events finally persuaded the South Africans that the sanctions against the country were of a political nature and that they had nothing to gain from joining the NPT."[79] Another lead scientist, Waldo Stumpf, also reports that at the end of the 1970s "these events convinced the South African government that the various sanctions were clearly politically inspired, and that Pretoria's accession to the NPT without fundamental political reform at home would not gain South Africa international acceptance."[80] Nuclear sanctions and demands to join the NPT lacked coercive assurance. Capitulation would not credibly make the punishment subside.

In this context, the leaders of the nuclear program decided that they faced a choice between giving in—remaining at the threshold of a bomb—or continuing to develop weapons in secrecy. When, in the wake of the Kalahari crisis, Andre Buys sought clarification from Minister of Defense P. W. Botha on the purpose of the nuclear program, he asked, "Do you have nuclear weapons in mind, or is just the ability to demonstrate that we have this knowledge sufficient?" He recalled, "The answer came back, firmly: nuclear weapons."[81]

COMPELLENCE CONTINUES

South Africa's coercers doubled down, exacerbating their assurance dilemma. In November 1977, after the Kalahari crisis, the UNSC issued its arms embargo in Resolution 418. It set a red line explicitly at nuclear weapons development, saying, "All states shall refrain from any cooperation with South Africa in the manufacture and development of nuclear weapons."[82] In the mind of Von Wielligh, "this offensive resolution brought home even more clearly to the South African government the fact that they were on their own." Armscor grew to indigenously fill an increased arms production demand.[83]

To their credit, US Department of State officials after Kalahari seemed to diagnose the correct problem with US strategy. The State Department internally debated what to do about the South African nuclear program after 1977 and lamented that Pretoria did not respond to US proposals for renewed cooperation and its signature of the NPT because Pretoria "considers us unreliable on fuel supply and on our commitment to veto UN sanctions; it regards the Administration and elements of the Congress as hostile."[84] Even more prophetic, they seemed aware of the entanglement of apartheid and nuclear issues but deemed them inseparable. "We cannot divorce the nuclear issue from political problems, but we should try to get it dealt with in a less highly charged framework than is now the case," Andrew Young wrote in a memo for the president and the secretary of state that was passed to Zbigniew Brzezinski.[85] Of course, US policy was not up to the State Department alone or even its branch of government.

In 1978 Congress passed the Nuclear Non-Proliferation Act (NNPA), which became the Carter administration's chief cudgel of compellence against South Africa. The full credible cutoff of any further nuclear cooperation with the United States was made clear with the passage of the NNPA, which outlawed US nuclear assistance to any country that had not signed the NPT and accepted full-scope safeguards. The NNPA did not mention apartheid, but congressional interest in reining in South Africa's human rights abuses was growing. As Peter Liberman writes, "anti-apartheid domestic sentiment would have made it difficult for a U.S. president to restore cooperation with South Africa even had it joined the NPT."[86]

Despite contracts to supply the fuel for South Africa's Koeberg nuclear facility, Carter refused to supply the fuel without Pretoria's signature of the NPT and continued the policy of denying reimbursement of the funds already paid for Safari-1 fuel.[87] South Africa was particularly upset by this means of US pressure because both Safari-1 and Koeberg were subject to IAEA safeguards.[88] In their eyes, these were their legitimate facilities, and even they were not free from US interference.

Pretoria further perceived the addition of insult to injury when the South African delegation was denied participation in the 1979 IAEA general conference in India. South Africa's nuclear program had become a standing item of concern on the IAEA general conference's agenda.

SOUTH AFRICA BUILDS ITS ARSENAL

Nothing its coercers did pushed South Africa off its path to the bomb after the Kalahari affair. In July 1977 Minister of Defense P. W. Botha had requested "national strategic guidelines" for the production of nuclear weapons and, after Kalahari, approved those plans on April 4, 1978. Botha then became prime minister in October 1978 and appointed the Witvlei Committee to guide the nuclear program. On July 4, 1979, Botha approved the committee's recommendations to building seven nuclear weapons and transferred responsibility to Armscor, which built a new facility dedicated to the production of nuclear weapons—the Kentron Circle facility (a.k.a. Advena), fifteen kilometers east of Pelindaba.[89] By November 1979 the Y-plant had produced enough highly enriched uranium (HEU) to arm a nuclear device with a fissile core.[90] South Africa's first device, code-named Melba, was completed by the end of 1979.[91] And its first aircraft-deliverable nuclear weapon, code-named Cabot, was completed in December 1982.[92] The rest of the weapons in South Africa's arsenal—all gun-type bombs with two spherical halves—were produced at the pace of HEU production.[93]

US intelligence struggled to follow the developments of South Africa's indigenous enrichment program after the 1977 Kalahari crisis. A 1978 CIA assessment acknowledged South Africa's ability to produce weapons-grade HEU but noted "we have little doubt about South Africa's ability to produce a device, but we have little evidence that they have yet developed a deployable weapon."[94] The more sobering conclusion: "We are still far from certain what the South Africans are up to. We do not know precisely what their capabilities are, or how they got there."[95] US intelligence agencies likewise suspected but could not prove that South Africa had built nuclear weapons in the early 1980s.[96] The CIA never did seem to know of the Kentron Circle facility, which housed the nuclear weapons in vaults.[97]

This ambiguity was central to South Africa's chosen nuclear posture. Pretoria's nuclear strategy was simple and relied only on the ability to detonate a nuclear device, not necessarily to deliver it. It planned to rattle its nuclear saber and even test a nuclear weapon openly to catalyze US support in a crisis.[98] In the words of President P. W. Botha, "Once we set this thing off, the Yanks will come running."[99] The nuclear strategy began with opacity. South Africa continued to refuse to sign the NPT.

Pretoria Confronts the Bite of Sanctions

During the next episode, South Africa judged compellent threats to be credible and even more painful. Sanctions were hurting the economy, and Pretoria wanted to end the pain. Nonetheless, South Africa remained opposed to signing the NPT because its leaders still perceived a lack of coercive assurance. They did not believe that signing the NPT would remove the compellent sanctions.

A LACK OF US COERCIVE CONTROL

In the 1980s the Ronald Reagan administration set out to pursue a more accommodating strategy with South Africa—a policy of "constructive engagement."[100] When President Reagan met with Minister of Foreign Affairs Pik Botha on May 15, 1981, he communicated for the first time a willingness to disentangle the two issues of nuclear weapons and apartheid. "The President, in welcoming the Minister, made it clear that he was no advocate of what he called 'one man, one vote once,'" read the meeting notes, "the inference clearly being that he had no illusions about democratic rule in Africa."[101] Reagan was in essence taking one demand off the table—fundamental political reform—that was complicating compellence over signing the NPT.

But Reagan also backed off on demands for a change in South African nuclear behavior. In the same meeting, Botha expressed South Africa's unwillingness to sign the NPT lest it "terminate the speculation about South Africa's possession of the bomb," which was a "deterrent of major psychological value."[102] Reagan was "particularly struck by this last argument which had not occurred to him before" and communicated his desire to break with the "previous administration's policy in this [nuclear] field."[103] In the May 1981 meeting, in exchange for Reagan supplying reactor fuel for Koeberg, Botha committed to "not execute an explosive test without first consulting the American Government."[104] The White House followed through.[105]

As the Reagan administration eased open US–South African relations, strong objections emerged from public interest groups and the antiapartheid faction of the US Congress. The small window of accommodation rapidly began to close. Sanctions legislation had been introduced in 1982, and by the end of 1984 comprehensive sanctions "appeared inevitable."[106] The window shut completely by 1985, as the US Senate overwhelmingly passed (80 to 12) a sanctions bill on July 11, totally banning nuclear commerce with South Africa.[107] The House had passed a sanctions bill earlier in June, so a conference committee set to work on writing compromise legislation.[108] To preempt an embarrassing policy defeat, Reagan signed an executive order on September 9, 1985, prohibiting the transfer of any materials or

technologies that would support South Africa's nuclear enterprise.[109] But any hopes for exerting coercive control by managing spoilers departed when both houses of Congress passed the Comprehensive Anti-Apartheid Act (CAAA) in 1986, overriding the president's veto. The veto had lamented, in part, that the CAAA "discards our economic leverage, constricts our diplomatic freedom, and ties the hands of the President of the United States."[110] The CAAA came into effect on January 1, 1987.

At this point, the compellent demands of signing the NPT and abandoning apartheid were perceived by South Africa to be as entangled as ever. The CAAA now officially combined antiapartheid and nuclear demands in a single piece of legislation. Aimed primarily at compelling changes to apartheid, the act also outlawed any further nuclear cooperation with South Africa until it signed the NPT.[111] The "prohibitions on nuclear trade with South Africa" were listed as "measures by the United States to undermine apartheid."[112]

A lack of coercive control over domestic spoilers exacerbated the strategic problem. In a 1986 meeting with the US ambassador-at-large for nuclear affairs, Richard T. Kennedy, Pik Botha indicated some willingness to bargain over joining the NPT with "serious reservations." Kennedy rejected any conditional accession and "warned Botha that due to congressional pressure, relief from broader sanctions would be contingent on South Africa's progress on internal political reforms."[113] The coercive assurances of US compellent demands were undermined by the perception of entangled demands and domestic spoilers.

PRETORIA CONDUCTS A CRITICAL APPRAISAL

By the mid-1980s, sanctions were biting in South Africa. Creditors called in loans, and Pretoria resorted to capital controls to fight capital flight.[114] From 1975 to 1991, South Africa experienced about 1.6 percent annual GDP growth,[115] compared to a population growth rate of 3 percent and a recent historical experience of 5 percent annual growth.[116] A report on the effect of sanctions in South Africa found that financial sanctions had cost South Africa $15 billion to $27 billion.[117] Inflation was over 15 percent by the end of the decade.[118] The economy withered.[119]

In this context, the government held an ad hoc cabinet committee meeting on September 3, 1985. The purpose was to discuss South Africa's response to international compellence. Sanctions were hurting. According to Von Wielligh, "the committee had to reconsider the existing nuclear weapons programme and the additional materials and facilities that would have to be provided in future."[120] The meeting's participants were the president, the minister of defense, the minister of finance, the minister of foreign affairs, the minister of mineral and energy affairs, the director-general of mineral and energy affairs, the chairman of Armscor, and the chairman

of the Atomic Energy Corporation (AEC).[121] This was a key decision moment for a target of coercion. The committee was "juggling a number of issues simultaneously and had to strike a balance between funding restrictions, international and American sanctions, the war in Angola, the internal state of emergency, and the scope and purpose of the nuclear weapons programme."[122]

Pretoria again chose to defy compellence. The ad hoc committee decided to keep the number of nuclear weapons limited to seven—consistent with the modest initial goals of the South African nuclear program. Enriched uranium and lithium-6 production would continue as required for the seven weapons, but plans to produce plutonium were scrapped.[123] The committee also agreed to upgrade the Kentron Circle facility and added a new facility—Advena Central Laboratories—for the total cost of R 36 million, about three to four times the annual budget of the weapons program in the early 1980s (R 10 million). Despite the cost-cutting pressure, the nuclear program budget also continued to increase; by the end of the 1980s the annual budget was R 20 million to R 25 million.[124] Missile research would also continue apace. And the catalytic nuclear strategy was reaffirmed. The ad hoc committee also chose to play for time on the question of IAEA inspections for a semicommercial enrichment plant (called the Z-plant), under construction at the time. At no point was the committee willing to consider signing the NPT.

Not by coincidence, Botha delivered his famous "Rubicon" speech just weeks earlier, on August 15, 1985. Widely anticipated to be an announcement of political reforms, including the release of Nelson Mandela, Botha instead recommitted Pretoria to the apartheid status quo to a live audience of two hundred million listeners.[125] "We have had to contend with escalating violence within South Africa, and pressure from abroad in the form of measures designed to coerce the government into giving in to various demands," argued Botha. "We have never given in to outside demands and we are not going to do so now." He declared, "We are today crossing the Rubicon. There can be no turning back."[126]

The nuclear program was no different. In the words of Waldo Stumpf, "in September 1985 the entire nuclear weapons effort was reviewed once again and President Botha reconfirmed that the program would be limited to seven fission devices."[127] The program remained as envisioned in 1979. Pretoria would not sign the NPT.

Negotiating Safeguards with the IAEA

Throughout the 1980s, South Africa also negotiated with the IAEA over accepting safeguards at all its nuclear facilities. The purpose of these meetings to Pretoria was cosmetic—a modest release valve for international

pressure. Nevertheless, the records of these negotiations are an important window into the minds of the South African leadership. The IAEA was a significant interlocutor for coercive bargaining with South Africa over its nuclear program. While the IAEA had little coercive power of its own, it was a venue through which South Africa could communicate its positions and willingness or unwillingness to compromise. To defy the IAEA was to defy coercers. Accepting full-scope safeguards required working with the IAEA. Through communications with Pretoria and the deliberations of the IAEA board of governors, scholars can observe the tangled compellent demands of nuclear safeguards and apartheid and South African fears of concessions on inspections leading to greater punishment over its bad faith. South Africa judged compellent threats to be credible and costly. Yet South Africa continued to refuse to give in to compellence and sign the NPT because its leaders perceived a lack of coercive assurance.

The primary subject of communications was the safeguarding of the Z-plant. In August 1976 Pretoria had informed the IAEA of its intention to build a commercial uranium-enrichment plant and submit it for safeguarding. The IAEA responded with proposed text for such a safeguards agreement. In response, South Africa requested a delay until the plant's capacity and design were settled. Years went by until a January 1984 AEC press release included a reference to its willingness to restart Z-plant negotiations.[128] Rounds of talks were held in August 1984, February 1985, and April 1986.

As the historian Robin Möser shows, the South Africans had no intention of accepting full-scope safeguards in the mid-1980s.[129] The Witvlei Committee in the early 1980s had decided already that they would not accept full-scope safeguards and later that "negotiations with the IAEA should be delayed and dragged for as long as possible . . . [and, if feasible] . . . an attempt should be made to derail the negotiations at such a late stage and in such a way that South Africa suffers as little political damage as possible."[130] Allowing inspection of the semicommercial Z-plant would have revealed to the IAEA the extent of Pretoria's foreign technology procurement, leading to even more foreign restrictions. "Therefore, by 1985, leading figures in the nuclear-weapon program believed that the South African government was better off facing yet even more sanctions and a threat to their continued IAEA membership than it would have been after in-plant inspections by IAEA staff," concludes Möser. Indeed, "South Africans engaged in discussions with US nonproliferation officials and the IAEA Secretariat primarily to reduce international criticism and to limit the impact of additional sanctions, such as the blocking of IMF loans."[131]

To drag out negotiations, South Africa insisted on three special exceptions to safeguards: (1) to allow the diversion of fissile material for "military non-explosive purposes," (2) that the agreement would terminate if South African rights to participate in the IAEA were ever curtailed,

suspended, or withdrawn (something very much debated at the agency), and (3) the right to terminate the agreement if it ever jeopardized the "supreme interests" of South Africa.[132] In a series of letters, IAEA director general Hans Blix repeatedly told South African representatives that the terms would not be acceptable to the IAEA. And Pretoria effectively called off the negotiations in a February 25, 1987, letter, in which it complained about a lack of credible coercive assurance.[133] Regarding the demand that it sign the NPT, the letter said, "The South African Government has also declared that it remains willing to consider accession to the NPT, provided its basic requirements could be met. Under the present international situation where punitive sanctions and boycotts are being imposed on South Africa by the international community, its basic requirements are certainly threatened." The letter further called for an end to negotiations with the IAEA "in view of the prevailing intransigent attitude towards South Africa."[134]

South African representatives were not wrong in their perception. As the nuclear program became a recurring item on the agenda of the IAEA board of governors and general conference, meeting records reveal a strong tangling of the nuclear issue with apartheid. In 1981 South Africa was removed from the IAEA's Committee on Assurance of Supply (the US abstaining in the vote). The resolution blended nuclear and apartheid issues, citing both that South Africa was a "racist regime" and that "the nuclear programme of the racist regime of South Africa constitutes a grave danger to international peace."[135] Many ambassadors in board of governors meetings, including from major powers, regularly referred to South Africa as a "racist regime" or prefaced their remarks with a reiteration of their country's abhorrence for apartheid when discussing the nuclear safeguards issue.[136] While members demanded that South Africa sign the NPT, they simultaneously condemned Pretoria for its bigoted domestic politics.[137] For example, it was a problem that "South Africa's nuclear programme was directed towards military ends and that its discriminatory and aggressive policies had aroused much concern," argued the ambassador from Cuba.[138] The Chinese ambassador lamented that "the South African regime continued to apply apartheid and to persecute the South African people and was expanding its nuclear capability," demanding that both practices end.[139] And the Indian ambassador concluded a lengthy diatribe against South Africa's "racist policies and present rulers" by saying that both "apartheid could not be reformed but had to be abolished . . . [and] the progressive building up of South Africa's nuclear capability posed a threat to peace."[140] Overall, it became nearly universal practice, including by the United States, to begin remarks about the South African issue with a statement of opposition to apartheid.[141]

This entanglement was even more prevalent in IAEA general conference discussions. The general conference indeed remained committed to

compellence. On multiple occasions, it passed resolutions formally demanding that South Africa "submit all its nuclear installations and facilities to inspection by the Agency."[142] Nevertheless, its assurance was no more credible. The resolution adopted at the October 1986 general conference plenary meeting, ostensibly to condemn the South African nuclear program, contained multiple references to apartheid. One key sentence articulating the resolution's purpose reads, "acquisition of nuclear weapon capability by the racist regime constitutes a very grave danger to international peace and security."[143] The human rights and nuclear weapons issues were obviously linked.

CRACKS EMERGE IN PRETORIA

When the last round of safeguards negotiations collapsed in 1987, the IAEA moved to suspend South Africa's membership. The board of governors voted in favor of removal 22 to 12, with one abstention.[144] All that was left was for the general conference to concur. Pretoria showed real concern for such a punishment and averted it through a well-timed public announcement in September 1987: P. W. Botha declared that he was prepared to negotiate Pretoria's signature of the NPT. His ploy for a stay of execution worked. The following day, the Soviet and US delegations cited Pretoria's announcement as reason not to expel it from the body, and the board deferred its decision.[145]

Negotiations to join the NPT were now hung up on two issues. First, Pik Botha did not perceive that the IAEA actually wanted South Africa as a member, saying in August 1988 that he remained unconvinced that the NPT "would be applied to [South Africa] in a non-discriminatory manner" if Pretoria joined.[146] Second, those whose voices mattered most in Pretoria knew that South Africa still had a small nuclear arsenal hidden away. Signing the NPT presented South Africa with a problem of having to accept IAEA inspectors at all its nuclear facilities, where naturally they would find that it had produced nuclear weapons.

In the late 1980s South African obstinacy was showing signs of cracking internally. The South African Department of Foreign Affairs produced a memo on September 1, 1988, dissenting against AEC and Armscor positions on the South African catalytic nuclear strategy of calculated ambiguity and recommending the signature of the NPT. In addition to several other arguments, the department wrote that "foreign boycotts and sanctions and increasing political and physical isolation are evidence of the inappropriateness of reliance on a nuclear deterrent to secure our future." The authors questioned the benefits of possessing a nuclear arsenal. "The deterrence strategy has in fact led to increased pressure on SA and greater international condemnation of our nuclear policy."[147] But the department could not muster a winning coalition to wage this internal fight until

months later. Others in Pretoria disagreed, remained committed to the nuclear program, and stuck by their weapons until late 1989.

By this point, Pretoria seemed eager for a way out of isolation yet continued to invest in its nuclear arsenal. Coming out of the September 1985 decision to maintain the nuclear weapons program, more research was required to miniaturize implosion warheads for missile delivery. South Africa followed through on funding the construction of two new facilities to conduct this research in 1988 and 1989.[148] It also built an additional warhead as late as 1989.

Dismantling the Arsenal

DE KLERK AND THE DECISION TO CONCEDE

Upon suffering a stroke, President P. W. Botha resigned as the leader of his party on February 2, 1989. After a general election on September 6, 1989, F. W. de Klerk assumed the presidency on September 20.[149] De Klerk managed to navigate these contentious internal party politics because of his reputation as a conservative committed to maintaining Afrikaner rule.[150] But he was about to break the mold.

De Klerk sought to end South Africa's international isolation by both ending apartheid and signing the NPT. He knew international sanctions were linked to both demands. Neither alone could bring economic relief.[151] Waldo Stumpf recalls that

> F. W. de Klerk's opening remarks to a few ministers and officials whom he convened in September 1989, shortly after he assumed office as the new state president, were: "In my term of office I am going to lead this country back to a position of an internationally respected member of the world community and this means two things: We are going to turn the political system round to a fully democratic system by unbanning the ANC and releasing Nelson Mandela, and secondly we are going to dismantle our nuclear arsenal and accede to the NPT." From this broad vision his instructions to me were to "garner the maximum amount of international credibility from our accession to the NPT."[152]

De Klerk perceived an opportunity to end the isolation of South Africa. At a cabinet retreat on December 3–5, 1989, responding to an economic briefing detailing how "sanctions were biting, oil was in short supply and the repayment of foreign debt was dragging the economy down," De Klerk said, "We can hold out for another ten or fifteen years, but there will be sanctions, sabotage and terror. Do we want that? We must avoid negotiating at a point where we have to yield under pressure. We must use this golden opportunity."[153] De Klerk indeed knew that he was already under

coercive pressure but sought to avoid continued punishment. And at a meeting that same month with NPT depository states—the United States, the United Kingdom, and the Soviet Union—the South Africans found the NPT still entangled with apartheid. "With apartheid still in place, there was little they could offer" by way of access to international markets or technical exchanges or assistance, writes Möser.[154] De Klerk and his cabinet thus set out to acquiesce on both the nuclear and apartheid issues. The only question was how to do so in a manner that assured they would not be punished because of their concessions. They did not know how their coercers would react to an admission of having built a secret nuclear arsenal.

DOUBLE ACQUIESCENCE AND SANCTIONS RELIEF

The first step was to acquiesce to both demands at the same time, overcoming the hydra-headed compellence that had frustrated the coercive assurance perceived by earlier leaders unwilling to budge on domestic reform. De Klerk correctly concluded that both needed to be addressed to see any sanctions relief. Waldo Stumpf concurs that at the end of the 1980s, "as the progress of domestic political reform became better understood abroad, accession to the NPT assumed distinct advantages for South Africa internationally and especially on the African continent."[155] De Klerk announced on February 2, 1990, the steps his government would take to end apartheid: releasing Nelson Mandela, unbanning political parties, and negotiating a new democratic constitution.[156] The same month, South Africa secretly began to implement a nuclear dismantlement plan approved by De Klerk in November 1989.[157]

Sanctions relief followed, although not until the full extent of Pretoria's acquiesce was credibly communicated. In the wake of De Klerk's February 1990 speech announcing his intention to usher in a South African political system "in which every inhabitant will enjoy equal rights," sanctions were not immediately lifted.[158] In September 1990 De Klerk was invited to meet with President George H. W. Bush at the White House. The meeting was cordial. De Klerk complained that CAAA sanctions remained in place, but Bush noted that South Africa had to meet all five of the prerequisites for CAAA sanction relief to take effect: (1) the release of all political prisoners (including Mandela), (2) the end of the state of emergency, (3) the unbanning of political parties, (4) the repeal of the Group Areas Act and the Population Registration Act, and (5) the beginning of negotiations on true democratic governance. Conditions 1, 2, and 4 had not yet been fully met. De Klerk returned home and met the rest of the conditions by June 1991.[159] Pik Botha then signed the NPT on behalf of South Africa on July 8, 1991, and his signature was ratified on July 10. That same day, on July 10, 1991, President Bush signed an executive order lifting the CAAA sanctions. Washington was surprised by the rapid turnaround in South African policy.

On January 20, 1989, a CIA estimate titled "South Africa in the 1990s" had concluded that Pretoria "has weathered more than four years of unprecedented domestic and international pressure," with no changes imminent.[160]

Additional relief followed. The apartheid era ended on April 27, 1994, when Nelson Mandela won the presidency in the nation's first democratic elections. South Africa subsequently participated in the September 1994 IAEA general conference, rejoined the Committee on Assurance of Supply, and resumed its seat on the IAEA board of governors in September 1995.[161]

HESITATING TO REVEAL NEW INFORMATION TO COERCERS

Soon after his election, De Klerk had formed a committee to make recommendations about joining the NPT. According to Waldo Stumpf, an attendee of the first committee meeting, De Klerk said, "The nuclear devices would be a liability in South Africa gaining international acceptance in the process. . . . There was no debate about the decision but rather how it should be implemented."[162] At an ad hoc cabinet meeting in November 1989, De Klerk accepted the committee's recommendations and instructed the AEC and Armscor to terminate nuclear material production and dismantle the existing nuclear weapons.[163]

Pretoria hesitated, however, to reveal the extent of its nuclear weapons program out of fear that providing new information about its guilt to its coercers would only invite further pain. Here coercers' reputations also played a role, as recently observed US foreign policy undermined coercive assurance. "The heads of the AEC and Armscor were not sure whether the UN cowboys, who had unceremoniously blown up Saddam Hussein's facilities and physically destroyed all the enrichment equipment, might not arrive in South Africa with similar intentions," writes Von Wielligh.[164] Stumpf, concurred, writing that the South African government had been afraid of coming fully clean after witnessing "the confrontational verification process then unfolding between Iraq and the IAEA," which "convinced South Africa that it could easily have been branded as a second nuclear outlaw nation."[165] Years later Stumpf reiterated that "in 1991 when we signed the NPT, that would have been the right moment to say 'yes, there was such a program.' But the world was fighting Saddam in the first Gulf War, and although Saddam had signed the NPT, the general public would not have recognized the difference—it would have been 'another Iraq, another Saddam Hussein.' Obviously it wasn't the same, but newspapers wouldn't have recognised that."[166] They feared that concession would provide new information to justify further punishment.

Instead of coming clean, South Africa dismantled and destroyed evidence of its nuclear weapons program. A November 17, 1989, letter from Richard Carter (of the Department of Foreign Affairs) to Herbert Beukes

(deputy director general of foreign affairs), summarizing an AEC meeting to discuss possible accession to the NPT, makes this plan plain. It highlights that "decontamination is a major problem."[167] Inspectors allowed into the Y-plant were certain to detect traces of weapons-grade uranium. "Even a major, 3 year decontamination program will be unlikely to completely eradicate all traces. . . . IAEA inspectors using sensitive equipment will be able to detect the prior existence of 95% enriched product."[168] Instead, the AEC suggested a cover-up. It advised that the uranium metal in nuclear weapon cores be "reduced to highly enriched [UF6] gas." South Africa could "'come clean' and admit that it has enriched uranium to weapons grade, but that it has not made weapons."[169] While "some records would have to be destroyed," the process could be completed in twelve to eighteen months. "If we came clean on the 95% enriched product," the memo further explained the deniability, "we would have to do very little arguing over safeguards. The 'secret' would be out. Manufacture of weapons however need never be admitted."[170] De Klerk accepted this strategy in November 1989. It was part and parcel of the decision to sign the NPT. Delaying accession to the NPT until July 1991 and the signing of a safeguards agreement with the IAEA until September 16 bought South Africa time to execute the plan.

Through these efforts, South Africa was navigating a concession strategy that permitted full transparency about its nuclear future while denying its nuclear past—admission of which it feared would provoke further punishment. The explicit "main objective" of the dismantlement effort, as described in the February 1990 official AEC document, was "to dismantle the present 5 [*sic*[171]] nuclear weapons devices together with half-completed devices, components and material in an orderly and controlled manner, melt down the highly enriched uranium they contain and store it safely and perform the necessary cleaning operations to attach credibility to the statement that the RSA did manufacture highly enriched uranium but did not undertake the final step of manufacturing nuclear weapons."[172] Under orders of President De Klerk, the AEC was thus not to admit the production of nuclear weapons.[173]

The weapons dismantlement process was "essentially completed" by the end of June 1991, and the last of the HEU from the weapons was returned to the AEC by September 1991.[174] Only after its dismantlement program was completed did South Africa conclude a comprehensive safeguards agreement with the IAEA.[175] The IAEA conducted twenty-two inspections missions from October 1991 to September 1993.[176]

The inspections process turned out to be nothing like Iraq's. Throughout, South Africa was allowed some leeway in admitting its past nuclear sins.[177] The IAEA focused on nuclear materials accountancy and did not force admissions from Pretoria that it had built a nuclear arsenal. For instance, in its initial report to the IAEA, Pretoria admitted that it had produced

weapons-grade uranium. However, the report made no mention of nuclear weapons, the conversion of UF6 HEU into uranium metal, or the existence of facilities to do so.[178] At the first official meeting between the South African AEC and the IAEA inspections team, Von Wielligh writes that "the Initial Report remained lying on the table like the corpse with a dagger in its back but all eyes were averted and nobody asked the obvious question. It was stated on the first page that South Africa had declared a few hundred kilograms of weapons-grade uranium, but the IAEA team asked no questions and the AEC team volunteered no information."[179] As former AEC head Waldo Stumpf recalled, "They never asked us, so we never had to lie. . . . One of those funny things."[180]

Instead, the IAEA's primary task was to "ensure that no significant quantity was missing from the declared inventories" of fissile material.[181] Substantial work went into matching uranium input and output at each declared facility,[182] estimating ranges of enriched product produced, and checking against declared amounts. In the end, inspectors attributed any discrepancies to uncertainty of measurements used in the material accounting system, since "no formal measurement control programme had existed for the depleted uranium product which was a major component of the U-235 balance."[183] That is, the missing U-235 (the isotope uranium-235) was likely in waste drums, whose U-235 contents had been estimated with average ratios instead of cumbersomely measured individually. It was not until 2010 that the IAEA could confirm that there was no missing significant quantity in South Africa—reaching its "broader conclusion" that "all nuclear material remained in peaceful activities." It took a decades-long, painstaking process of opening, measuring, and categorizing the material in every single waste drum to prove this negative.[184]

After the inspections mission was complete, Demetrius Perricos and two IAEA colleagues explained their thinking:

> The inventory of HEU declared by South Africa in its initial report was substantial. The IAEA recognized that this material could have been taken to indicate that a significant component of the HEU inventory had been recovered from an abandoned nuclear weapons programme or, less likely, had been accumulated to supply a planned nuclear weapons programme which had been abandoned prior to its implementation. South Africa had no obligation to declare what had been the past purpose of this material. Equally, the primary task of the IAEA was to ascertain that all nuclear material had been declared and placed under safeguards; priority was given to this task during 1992.[185]

Only much later, on March 24, 1993, did De Klerk finally announce that South Africa had dismantled an arsenal of six nuclear weapons.[186] The venue was a speech to a joint session of Parliament, but he was really

speaking to the whole world.[187] He explained that South Africa "did, indeed, develop a limited nuclear deterrent capability" but dismantled it because it was "an obstacle to the development of South Africa's international relations."[188] De Klerk emphasized that as it had joined the NPT as a nonnuclear weapons state, South Africa had technically not broken any rules. "We were not, in terms of the NPT itself, obliged to tell them," De Klerk asserted in a postspeech press conference.[189] After South Africa came fully clean about its nuclear weapons program, the IAEA mission, now supplemented with additional weaponization experts, expanded to confirming the arsenal's dismantlement and establishing measures to detect its reconstruction.[190]

Three IAEA inspectors visited the Kentron Circle / Advena facility on March 25, 1993. And inspectors witnessed the "rendering useless" of the Kalahari test shafts July 26–30, 1993.[191] Most importantly, the IAEA audited the records of material transfers between the AEC and Armscor and concluded that "HEU originally supplied to ARMSCOR/Circle had been returned to the AEC and was subject to Agency [IAEA] safeguards at the time of entry into force of the safeguards agreement."[192] It was all declared. The IAEA officially confirmed the dismantlement of South Africa's nuclear weapons on August 14, 1994.

The Assurance Dilemma in South Africa

The South African case yields clear evidence of an assurance dilemma that hindered effective coercion. The fear of unconditional punishment drove South African leaders to defy compellence from 1975 to 1989. Pressure on the regime to sign the NPT failed for so long not because threats were not credible or punishments were not painful but because South African leaders concluded that acquiescence on the nuclear issues would not end punishments that they perceived were also tied to their racist apartheid policies. Coercers, chiefly the United States, struggled to assure because they were unable or unwilling to disentangle punishments tied to both demands. In aggregating issues to bolster their threats and squeeze South Africa harder, they undermined their coercive assurance not to punish Pretoria if it signed the NPT.

South African leaders explicitly perceived external pressure through such a lens. Sanctions were imposed, escalating, and, in the 1980s, hurting. But still they defied. South African behavior and speech evidence corroborates the assurance dilemma, especially at three key decision points—1977, 1985, and 1986–88. South African policymakers justified not signing the NPT with assessments that punishments would be applied whether or not Pretoria signed.

A lack of coercive control also exacerbated the problem of entangled demands. When the Reagan administration attempted to disentangle US demands and reduce the severity of US economic pressure in the mid-1980s, Congress overrode the president's veto and imposed comprehensive sanctions. The administration did not manage spoilers domestically, and Reagan could not be bargained with. The US government overall was unwilling to accept the brutality of apartheid to get South Africa to sign the NPT. A similar dynamic played out within the IAEA, where feeble attempts failed to disentangle calls to sign the NPT and accept comprehensive safeguards from member state opposition to apartheid. The South African case also reveals how targets of compellence fear admitting to coercers new information about their misbehavior when complying. Pretoria tried to avoid coming clean about what its coercers did not know—that it had actually constructed a small nuclear arsenal.

Overall, the case is a convincing instance of how a lack of coercive assurance explains failed coercion in the 1970s and 1980s. But Pretoria had additional reasons for nuclear reversal in 1989—most clearly racist fears of handing over nuclear weapons to a Black-majority government and concern for nuclear command and control during a period of internal political upheaval.[193] The Soviet Union's collapse also improved South Africa's security situation. Deciding to give in to both demands—nuclear and apartheid—did not overcome the fundamental issue of entanglement of multiple demands. This ultimate compliance was due to domestic political changes within the target state, not a change in coercer strategy.

This chapter has chiefly validated the assurance dilemma in coercion. The following chapters build on it to offer more constructive solutions for mitigating the assurance dilemma and identifying when targets that face even more severe threats of military coercion are willing to gamble on concession.