

Chapter 4 Emergence of a Military Nuclear Program

The 1970s witnessed a steady movement in the South African government to deciding to create deliverable nuclear weapons. This movement was motivated primarily by South Africa's worsening security situation in Southern Africa, growing isolation internationally, and the opportunities offered by a steadily growing nuclear weapons capability. The process was greatly accelerated by the discovery and international condemnation of South Africa's nuclear test site in 1977.

Kalahari Nuclear Test Site

In 1970 PNE program leaders told senior government officials that a full-scale test would be necessary to be certain that the nuclear device design would work. Since PNEs were planned, a full-scale underground test also made sense as a way to better understand the effects of a nuclear explosive. As a result, the government approved the construction of an underground test site that needed to be ready by 1977, when it was originally believed there would be enough highly enriched uranium.

In 1973 as work progressed on the gun-type device at the Pelindaba and Somerset West sites, the AEB started intensively looking for a suitable test site to conduct underground nuclear tests. In 1974 an acceptable remote site under the control of the military north of Upington in Upper Cape Province was selected. Additional land was purchased to expand the size of the test site, which was named the Vastrap site. The military controlled and developed the site, since any AEB presence at such a remote site would immediately raise suspicions.

By 1976 the first test shaft was drilled to a depth of 385 meters and 0.9 meters in diameter. The shaft was drilled by a renovated mining drill. A second shaft with a depth of 216 meters was finished in 1977. As scheduled, all facilities at Vastrap were ready by the middle of 1977. South African officials thought that they had made the conspicuous drilling equipment to look like it was part of creating an underground military munitions depot.¹

In mid-1977, the AEB produced a gun-type device without an HEU core. The device was large--4.4 meters long, 0.61 meters in diameter, and weighed 3,450 kilograms. It was so large in part to accommodate numerous scientific and engineering studies, some of which would have taken place in side tunnels off the vertical shafts, according to a former senior member of the nuclear weapons program.

As discussed earlier, the Y Plant was operating by this time, but it had not yet produced enough weapons-grade uranium for a device. As has happened in nuclear weapons programs in other nations, the development of the devices outpaced the production of the fissile material.

A "cold test," namely a test of an identical nuclear explosive device, except with a core made out of depleted or natural uranium instead of HEU, was planned for August 1977. The test was to be

¹ Hannes Steyn, Richardt van der Walt, and Jan van Loggerenberg, *Armament and Disarmament: South Africa's Nuclear Weapons Experience* (Pretoria: Network Publishers, 2003), p. 41.

a fully instrumented underground test, albeit one without a nuclear explosive yield. Its major purpose was to test the logistical plans for an actual detonation. All the instrumentation trailers, instrumentation cables, and all other equipment were installed by early August.² However, the mock device had not yet been delivered from Pelindaba, although it was being readied for shipment to the site.

How that test was detected in 1977 has been well publicized. The Soviet Union was closely watching South Africa's growing nuclear capabilities. It had placed a spy high in the South African Defense Force (SADF), Commodore Dieter Gerhardt, commander of the Simonstown Naval Base near Cape Town. The naval barrel for the initial tests at Somerset West came from this naval base, according to a former member of the effort at Somerset West. Gerhardt was arrested as a Soviet spy in 1982 and went to prison. In an interview after his release, he said that the Soviets had expressed their concern about South Africa's nuclear program to the United States a year earlier.³ A Russian contact told him that the Soviet Union and the United States met about the South African weapons program in 1976. During this meeting, the Soviets presented evidence of South Africa's nuclear program and asked for US cooperation in stopping it. Gerhardt said that one of several options mentioned by the Russians was a preemptive military strike on the Y Plant. He said the United States rejected that option.

By the summer of 1977, Soviet intelligence detected test preparations and, in early August, alerted the United States. Although the South Africans were trying to conceal their activities at the test site, they admitted later that certain aspects were distinctive to a nuclear test and could not be camouflaged.⁴ US intelligence quickly confirmed the existence of the test site. The *Washington Post* quoted a US official: "I'd say we were 99 percent certain that the construction was preparation for an atomic test."⁵ All the major powers assumed that South Africa was preparing for a full-scale nuclear test, evidently unaware that it still did not have enough HEU.

During August 1977, the Western nations pressed South Africa not to test. The United States presented some of its evidence about the test site to the South African government. An August 19, 1977 letter from the Secretary of State Cyrus Vance to R.F. Botha, Minister of Foreign Affairs, provided the geographic coordinates of the test site and key features of the test site, based on imagery.⁶ According to the letter, the site consisted of:

- A drill rig and associated facilities;
- A square lattice tower in a cleared area enclosed by a wall, about one kilometer from the drill rig;
- An area, about 3 kilometers from the square tower, containing a pad; this area is connected to the tower area by power or communications lines;

² *Armament and Disarmament*, op. cit., p. 41.

³ Interview with Dieter Gerhardt, March 9, 1994.

⁴ *Armament and Disarmament*, op. cit., p. 42.

⁵ Murray Marder and Don Oberdorfer, "How West, Soviets Acted to Defuse S. African A-Test," *Washington Post*, August 28, 1977, p. A1.

⁶ Letter from Cyrus Vance to R.F. Botha, August 19, 1977. Letter available in Nic von Wielligh and Lydia von Wielligh-Steyn, *Die Bom* (South Africa: Litera Publikasies, 2014) and at <http://digitalarchive.wilsoncenter.org/document/114153>

- A secured housing area 15 kilometers from the tower area, containing approximately ten buildings; and
- A hard-surface airstrip approximately 1,600 meters long and three kilometers from the housing area. In addition, the entire area is surrounded by an outer patrol road.

The French foreign minister warned on August 22 of grave consequences for French-South African relations. Although he did not elaborate, his statement implied that France was willing to cancel its recent contract to provide South Africa with the Koeberg nuclear power reactors.

The international reaction startled the South African government. It had led itself to believe that its testing program would not "lead to excessive international reaction," according to J. W. de Villiers, the past President and Chairman of the Board of the AEB.⁷ This belief was based on the muted reaction to India's 1974 nuclear explosive test.

One of the biggest surprises was that the United States insisted on inspecting the Kalahari site, causing panic in the PNE program.⁸ To prevent such an inspection revealing the activities at the site, the program launched "a crash program to dismount and remove critical equipment that could not be explained for military use."⁹ The site was cleared within a few days and the two test shafts sealed. Ironically, an inspection did not take place. However, according to three former leaders of the nuclear weapons program mentioned earlier, Hannes Steyn, Richardt van der Walt, and Jan van Loggerenberg, "It was now obvious that the testing of nuclear devices for civil applications could no longer be executed even in secret."¹⁰ Any hope for a civil PNE program ended that August. By this time, however, the PNE program had gained enough knowledge to realize that a full-scale test was not necessary to prove the design, as it had believed in 1970.

Growing Military Interest and Perceived Threat

In parallel to the test site preparations, the mid-1970s witnessed the military's increased interest in the nuclear program. As discussed, P.W. Botha, the then Defense Minister, said that he started secret discussions about obtaining nuclear weapons in 1975 and had further conversations in 1976, during which the need for tactical weapons came to the forefront."¹¹ In 1976 the South African air force publicly announced that Buccaneer bombers had practiced nuclear weapon delivery techniques, characterizing one exercise as employing "computerized techniques to deliver nuclear bombs and escape the effect of the resulting explosion."¹² In July 1977, right before the discovery of the test site, Botha ordered the development of national strategic

⁷ Quoted in Mitchell Reiss, *Bridled Ambition: Why Countries Constrain Their Nuclear Capabilities* (Washington, D.C.: Woodrow Wilson Center Press, 1995), pp. 9-10.

⁸ *Armament and Disarmament*, op. cit., p. 42. For the US request to inspect the site, see August 19th letter from Vance to Botha, op. cit.

⁹ *Armament and Disarmament*, op. cit., p. 42.

¹⁰ *Armament and Disarmament*, op. cit., p. 42.

¹¹ Prime Minister P.W. Botha, *Draft Speech for the Opening of Kentron Circle*, May 4, 1981, in Afrikaans. Original in Nic von Wielligh and Lydia von Wielligh-Steyn, *Die Bom* (South Africa: Litera Publikasies, 2014), Appendix, translated by Schreiber Translations, Inc. for Institute for Science and International Security, July 7, 2015.

¹² Quoted in Director of Central Intelligence, *Trends in South Africa's Nuclear Security Policies and Programs*, National Intelligence Estimate, October 5, 1984, declassified version.

guidelines for nuclear weapons.¹³

A number of factors appear to have motivated this increased military interest, including the government's growing perceived threat to apartheid South Africa posed by Angola and Mozambique, which were receiving Soviet backing; pressure on Namibia (which was then controlled by South Africa) by black African nationalists; and diminishing military confidence in the Atomic Energy Board's handling of the PNE program.

The South African government's security situation was seriously aggravated following Portugal's hasty departure from Mozambique and Angola in 1974-1975.¹⁴ In 1975 the Russian and Cuban militaries intervened in Angola and helped to install a Marxist-oriented regime with close ties to Mozambique, Zambia, and two anti-apartheid movements, the South West African People's Organization (SWAPO) and the ANC. Pretoria feared that these former colonies would become staging areas for a direct Soviet-backed invasion, perhaps involving both Cuban and black African military forces. The stage was set for military clashes across southern Africa that would last until 1988.

Regardless of the merits of South Africa's position at the time, South African government officials often expressed bitterness and disillusionment with the actions of the US government following the withdrawal of Portugal from Angola. At the time, South Africa saw itself as aligned with the West against what it perceived to be communist expansion in southern Africa, and in 1975, had intervened militarily in Angola with covert support from the US Central Intelligence Agency (CIA). Meanwhile, the US Senate, in the wake of investigations into controversial CIA activities and critical media reports revealing the covert Angolan aid, voted to ban US military aid to any Angolan party.¹⁵

South African leaders felt betrayed. According to Chester Crocker, former Assistant Secretary of State for African Affairs, "Pretoria blasted what it saw to be Western flakiness, if not perfidy, and pulled out of Angola [in 1976] after cutting a side deal" with Angola.¹⁶ The Angolan episode, according to Crocker, had a traumatic effect in South Africa, prompting a "sentiment of revenge for past humiliation and an abiding suspicion of Western diplomacy."¹⁷

The South African military, in particular, reportedly felt strongly betrayed by the sudden halting of US covert assistance during the Angolan crisis.¹⁸ The shift in US policy against what South Africa viewed as a well-orchestrated communist threat, strengthened the hand of those who believed that South Africa needed nuclear weapons to protect its security. To Pretoria, South Africa was standing virtually alone against a "total onslaught" by black insurgents and radical black African states supported by the Soviet Union and its allies.¹⁹

¹³ *Draft Speech for the Opening of Kentron Circle*, op. cit.

¹⁴ The Portuguese military seized power in Lisbon in April 1974 and decided to abandon Portugal's colonies, Angola and Mozambique, after more than a decade of failing to subdue indigenous nationalist forces.

¹⁵ Christopher Andrew, *For the President's Eyes Only* (New York: HarperCollins Publishers, 1995), p. 417.

¹⁶ Chester Crocker, *High Noon in Southern Africa* (New York: W. W. Norton & Company, 1992), p. 50.

¹⁷ Crocker, *High Noon in Southern Africa*, op. cit., p. 56.

¹⁸ Interviews with former members of the South African nuclear weapons program, February 1994.

¹⁹ Director of Central Intelligence, *Trends in South Africa's Nuclear Security Policies*, op. cit.

The hostile international reaction to the August 1977 disclosure by the Soviet Union and the United States that South Africa was preparing to conduct a nuclear explosive test in the Kalahari Desert shifted the focus of the PNE program and further contributed to the push for a military nuclear program. Although members of the PNE program worried that the discovery of the test site would lead to the cancellation of the entire program, the government decided to delay the test for an undetermined period and continue the refinement, miniaturization, and transportability of the existing nuclear device.²⁰ It began to see a nuclear test as a way to demonstrate a political and military message to further South Africa's national security goals. South Africa's political leadership tended to have a confrontational attitude to resolving political conflicts, according to a former senior member of the nuclear weapons program.

Soon after the test site was closed, Johan Slabber, the leader of the nuclear explosive program, was ordered to design a smaller, lighter device.²¹ According to Slabber, he and his colleagues received an order to develop a device that could be tested in 24 hours after receiving notice.²² The implication was that a redesigned device would be small enough to be weaponized. Despite not knowing the exact intentions of the leadership, the team was reportedly energized by this order and stopped thinking just in terms of a peaceful nuclear explosive program.²³ The team finished a smaller device in 1978 that was about half the size and weighed about one-fifth less of the first device (see figure 1).

The initial rationale for a smaller device was to allow for its rapid transportation to the test site and its detonation underground. Thus, the reaction to the international pressure was not to convince South Africa to forgo testing, but to be able to test successfully before the international community could intervene to stop it. In essence, the government wanted to control the initial military and political message of a test.

²⁰ *Draft Speech for the Opening of Kentron Circle*, op. cit.

²¹ Interview with a senior official close to the IAEA knowledgeable about Slabber's and other South Africans statements to the IAEA in 1993 following President de Klerk's announcement.

²² Timothy McDonnell, "International Conference: the Historical Dimensions of South Africa's Nuclear Weapons Program" (Washington, D.C.: The Wilson Center, January 4, 2013).
<https://www.wilsoncenter.org/article/international-conference-the-historical-dimensions-south-africas-nuclear-weapons-program>

²³ Interview with a senior official close to the IAEA knowledgeable about Slabber's and other South Africans statements, op. cit.

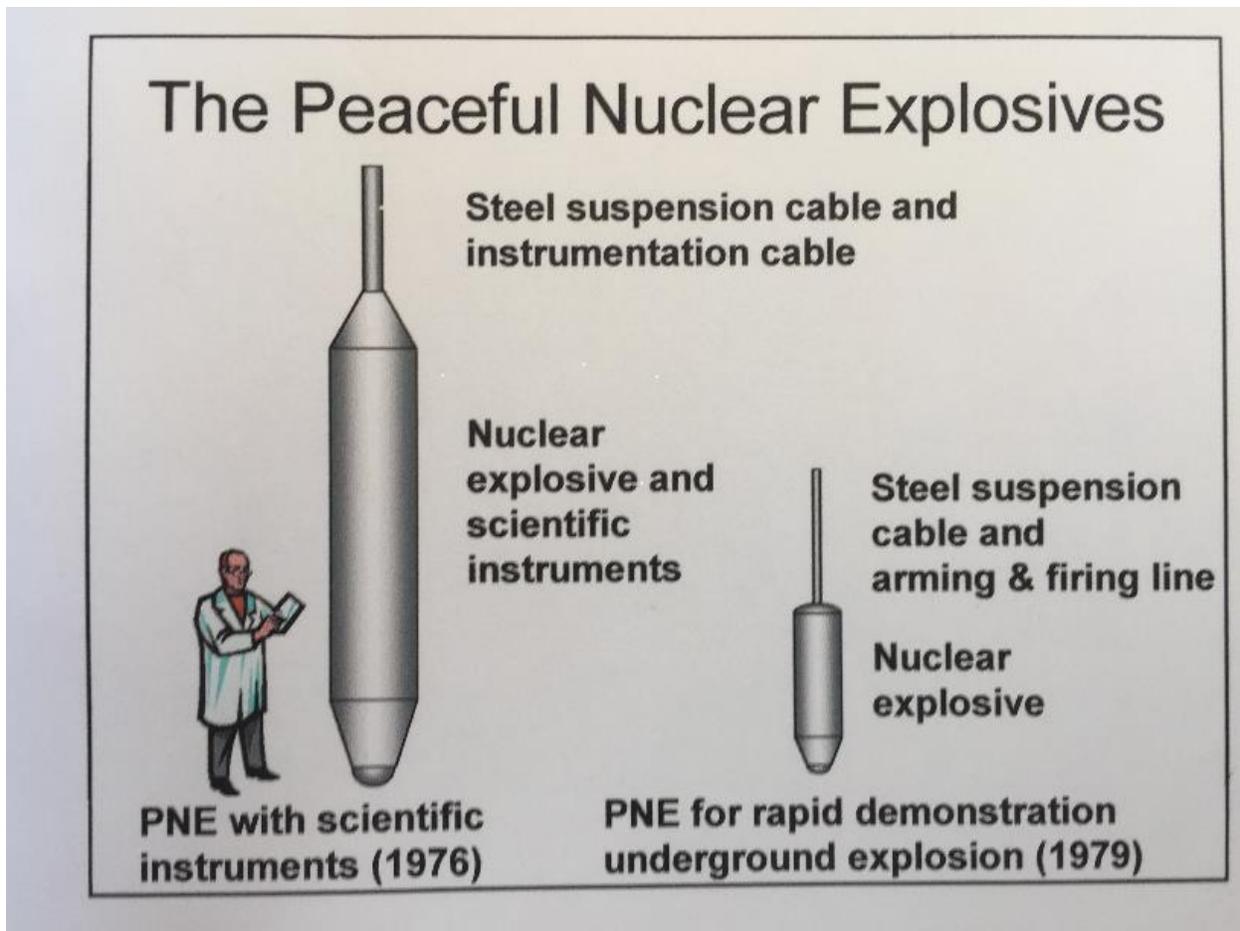


Figure 1 Comparison of the relative size of the two nuclear test devices developed by South Africa in the 1970s. Source: André Buys

The only data collected from the test would be the device’s explosive yield and radioactive releases.²⁴ The heavy gear over the shafts, the instrumentation cable trenches, and the instrumentation site were eliminated.²⁵

The yield of the second device was lower than the first one.²⁶ This reduction in yield may have resulted from its miniaturization.

If a test had occurred in the 1970s (and 1980s), it may have released a substantial amount of radiation into the atmosphere, based on a recently declassified South African document. This document uses the codename Gardenia for the combination of this first device and the placement and control systems, characterizing the test as “dirty.”²⁷ What this means is not clear in the document, although the document discusses that backfilling the shafts was not possible, implying

²⁴ *Armament and Disarmament*, op. cit., p. 43.

²⁵ *Armament and Disarmament*, op. cit., p. 42

²⁶ *Armament and Disarmament*, op. cit., p. 41.

²⁷ *Presentation to Witvlei Committee: Kramat Capability: Current Status and Further Developments*, by Lt. Gen. F.E.C. van den Berg, Chairman, Coordinating Sub-Committee, September 3, 1987, in Afrikaans, Original in *Die Bom*, op. cit..

that the radioactive material would be blown out the top of a shaft. Moreover, the South African decision makers in 1987 wanted to replace this device with a new one and a renovated test shaft that would be “capable of being used for a refilled clean underground demonstration test.” Moreover, the document states: “The Gardenia system was engineered for an OPEN (caps in original) underground test explosion. This means that there would be a considerable radioactive release into the atmosphere during such a test.” The level of expected radioactive releases is not quantified in the document, and may have been relatively small. By the 1980s, when the document was prepared, any venting from the test site would likely be viewed as worrisome. However, the document appears to contradict that benign assessment.

Looking back, it would not be surprising to conclude that the PNE program was less sensitive about potential radioactive fallout from its use of nuclear explosives than nuclear programs today, or even a decade later. After all, if the program had ever deployed a nuclear explosive to make, for example, a mine, the ensuing blasts would have released a large amount of radioactive materials into the environment. In fact, such expected releases were a key reason PNE programs were cancelled worldwide.

Growing Public Awareness of Nuclear Weapons Capability

The revelations about the test site exposed to the South African public and the rest of the world what was thought to be a secret program. This awareness led to widespread debate about what was generally perceived as a South African nuclear weapons program, although the government publicly and diplomatically denied the existence of any such program. This public and international debate served the purpose of creating ambiguity, and this ambiguity became one of the nuclear weapon program’s cornerstones.

In South Africa, the exposure led to increased public and academic discussions about the potential role of South African nuclear weapons, albeit with disclaimers that the exact status of the nuclear weapons program was unknown. For example, analyses of the relative pros and cons of building nuclear weapons by M. Hough and Denis Venter, two South African political scientists, tended to conclude that nuclear weapons offered limited strategic and few political advantages.²⁸ In their view, the possession of nuclear weapons could provoke a strong Russian reaction. On the other hand, if South Africa's conventional superiority eroded and the military situation on South Africa's borders intensified, a South African bomb could help equalize any conventional imbalance against South Africa. Because such a possibility appeared unlikely in the foreseeable future, however, these authors opposed a South African nuclear weapon. Nevertheless, they also argued that South Africa should keep its options open and not sign the Nuclear Non-Proliferation Treaty.²⁹

²⁸ Denis Venter, "South Africa and the International Controversy Surrounding its Nuclear Capability," *Politikon*, Vol. 5, No. 1, June 1978; and M. Hough, "Deterrence and Deterrence Interaction with Reference to the South African Situation," *Politikon*, Vol. 5, No. 1, June 1978.

²⁹ This type of opposition to signing the NPT was also expressed in a secret May 14, 1981 memorandum from the South African embassy in Washington, D.C., which was leaked to the US-based non-governmental organization Trans Africa: "It must be realized that South Africa is threatened by the USSR and its associates and by certain African countries with Soviet support and encouragement. South Africa has no hope of any assistance from the UN in case of attack. On the contrary, it is continually being threatened with action under Chapter VII of the Charter of the United Nations. While this state of affairs continues, South Africa cannot in the interest of its own security sign

In one of the best known articles of that time, Dr. Lukas Daniel Barnard, then a professor at the University of the Orange Free State and later head of the National Intelligence Service argued that South Africa should acquire nuclear weapons.³⁰ Barnard concluded that South Africa could no longer depend on the West for its security. Citing Western opposition to apartheid and weak leadership, he said that it would be wise to obtain nuclear weapons. Nuclear weapons would not add significantly to South Africa's international isolation but could bolster its security, both as a back up to the country's conventional forces and as a deterrent to invasion. Because the deterrence value of nuclear weapons depended on the perception of that capability, Barnard advocated that South Africa build nuclear weapons and ensure that the world knew that it had them. Moreover, since South Africa could be expected to face a growing threat to its security, it should build the weapons immediately, because it probably would be too late to build them when a "nuclear crisis really lands on our doorstep." Even a small nuclear arsenal would suffice, as the French "force de frappe" demonstrated: "Even mighty nuclear powers are only too aware of the phenomenal destructive power of a single nuclear warhead in industrial heartlands or urban centers." While key officials may have shared Barnard's views of the need for nuclear weapons, Botha in particular did not believe openness would serve South Africa's interests.

As support for nuclear weapons was growing among South Africa's white elite and military, the international community was becoming increasingly alarmed by the revelations. In response, the United Nations took additional steps to impose sanctions on South Africa.

In November 1977, the UN Security Council approved unanimously a resolution to make mandatory a military arms embargo on South Africa that had been voluntary since 1963.³¹ While citing apartheid as a reason for this action, this resolution also expressed "grave concern that South Africa is at the threshold of producing nuclear weapons" and declared that all states "shall refrain from any cooperation with South Africa in the manufacture and development of nuclear weapons." One year later, the UN General Assembly recommended that the Security Council impose an oil embargo on South Africa, which depends heavily on oil imports. Although the Security Council refused, the General Assembly endorsed a voluntary oil embargo in 1979.

Despite opposition from many nations, including the United States, Japan, and Canada, the IAEA Board of Governors in June 1977 voted to remove South Africa from the list of candidates for the Board and replace it with Egypt. Two years later, South Africa was denied participation in the International Atomic Energy Agency's (IAEA's) General Assembly. Both actions resulted from South Africa's apartheid policies and its refusal to submit all of its nuclear facilities to IAEA inspection.

the NPT and thus set the minds of its would-be attackers at rest, allowing them to proceed freely with their plans against us."

³⁰ Lukas Daniel Barnard, "Die Afskrikkingsstrategie van Kernwapens" ("The Deterrent Strategy of Nuclear Weapons"), *Journal for Contemporary History and International Relations*, Vol. 2, No. 2, Sept 1977, pp. 74-97 (translated into English).

³¹ UN Security Council, "The Question of South Africa," S/RES/418 (1977), November 7, 1977.

There were a range of efforts in the mid-to-late 1970s to deny South Africa sensitive nuclear goods. Most significantly, the United States cut off nuclear assistance for the Safari-1 research reactor in 1976 and enrichment services for the Koeberg nuclear power reactors in 1978³²

According to Waldo Stumpf, the former head of the Atomic Energy Corporation (the successor organization to the AEB), the cutoff of US nuclear assistance in the 1970s was viewed very negatively since these specific reactors already were subject to IAEA safeguards.³³ The cutoff of US and other countries' nuclear aid did not disrupt the nuclear explosive effort, however. These actions were perceived within the South African government as motivated primarily by opposition to apartheid, reinforcing the view within the government that South Africa had little to gain from stopping its nuclear weapons program or joining the NPT, unless it first ended apartheid and made other fundamental domestic changes. More importantly, according to Tielman de Waal, former managing director of Armscor, "These circumstances led to the conviction that in the event of a direct threat to its territorial integrity, the Government would not be able to rely on international assistance. The option of developing a nuclear deterrent became increasingly attractive."³⁴ The military embargo also empowered those in South Africa that wanted to intensify indigenous military industries and couple those efforts with an active sanctions busting program to acquire necessary goods aboard.

The Decision to Create a Nuclear Weapons Program

The South African government's shift to a more formal military emphasis occurred in 1977 and 1978. In 1977 the government ordered the creation of national strategic guidelines, as mentioned above, which were first discussed by the government in August 1977; however, they were not approved formally until April 1978.³⁵

The growing militarization of the nuclear device coincided with a change in government. In September 1978, Prime Minister Vorster resigned because of a financial scandal, and he was replaced by P.W. (Pieter Willem) Botha, who had been Defense Minister since 1966, a portfolio he maintained for two years after becoming head of government. Botha was a proud nationalist who had presided over the build-up and modernization of the South African Defense Forces and the growing Armscor military-industrial complex that supported it.

According to a declassified 1979 CIA assessment, he had:

Advocated more than any other Cabinet officer the military components of South Africa's strategy for coping with possible external threats. He has regarded the West as unwilling to support South Africa against foreign threats that he has perceived to be growing. Moreover, he has probably sympathized with views that nuclear weapons might

³² During the Reagan administration, certain limited nuclear assistance occurred.

³³ Waldo Stumpf, "South Africa's Nuclear Weapons Program," undated, p. 9. An edited version of this paper is in Kathleen C. Bailey, *Weapons of Mass Destruction: Costs versus Benefits* (New Delhi: Manohar Publishers and Distributors, 1994), pp. 63-81.

³⁴ Tielman de Waal, "South Africa's Past Nuclear Program," Paper presented at a press briefing in South Africa, April 6, 1995.

³⁵ Stumpf, "South Africa's Nuclear Weapons Program," op. cit.; and Interviews with former members of the nuclear weapons program.

ultimately be needed. However, he probably has not foreseen any imminent military requirement for nuclear weapons or any political advantages to disclosing particular elements of South African nuclear weapons capabilities at this time [1979].³⁶

Botha was a strong supporter of building nuclear weapons but also of not revealing them. In October 1978, one month after taking office, Botha appointed a cabinet committee to oversee the military aspects of nuclear devices that quickly decided that Armscor, the Defense Force, and the AEB should work together and prepare a program to start a nuclear weapons program.³⁷ Armscor officials state that the resulting "Action Committee," chaired by a senior defense official and composed of Armscor, the Defense Force, and the AEB, recommended future plans for producing nuclear weapons, based on the AEB designs.³⁸

Faced with an enormous challenge, the Action Committee established several working groups to evaluate in detail the needs of a military nuclear program. One group developed a national nuclear strategy, which is discussed in chapter 6. Other working groups focused on:³⁹

- The test site and possible tests;
- Security;
- The integration of the work forces of the three different institutions;
- Safety issues; and
- Possible delivery systems for the nuclear devices.

Botha approved the Action Committee's proposal of the intended weapons and facilities on July 4, 1979.⁴⁰ The nuclear weapons program was codenamed Project Festival.

Armscor believed it could do this task more effectively and economically than the AEB. Armscor officials viewed the AEB program as essentially a scientific exercise. The AEB for its part did not believe it had a mandate to weaponize the devices, the critical new mandate. As a result, the government assigned Armscor the task of turning the device into weapon systems.⁴¹ Its subsidiary Kentron, which made advanced weapons and missiles, took responsibility for building the nuclear weapons.

³⁶ Director of Central Intelligence, *The 22 September 1979 Event*, Interagency Intelligence Memorandum, December 1979, Declassified version obtained through Freedom of Information Act by Natural Resources Defense Council and released July 10, 1990.

³⁷ *Armaments and Disarmament*, op. cit., p. 43.

³⁸ Armscor officials, personal interviews 1994 and 1995; and Reiss, *Bridled Ambition*, op. cit., p. 9. These discussions involved only senior officials. The AEB personnel involved in the nuclear explosive program were told of the formal shift to a military emphasis in November 1978. See also *Draft Speech for the Opening of Kentron Circle*, op. cit.

³⁸ *Armament and Disarmament*, op. cit., p. 43.

³⁹ Armscor officials, personal interviews 1994 and 1995; and Reiss, *Bridled Ambition*, op. cit., p. 9. These discussions involved only senior officials. The AEB personnel involved in the nuclear explosive program were told of the formal shift to a military emphasis in November 1978. See also *Draft Speech for the Opening of Kentron Circle*, op. cit.

³⁹ *Armament and Disarmament*, op. cit., p. 43.

⁴⁰ *Draft Speech for the Opening of Kentron Circle*, op. cit.

⁴¹ Interview with a former member of nuclear weapons program, Spring 1994.

Significantly, Armscor believed that a nuclear weapon was a combination of the nuclear device and a delivery system. According to senior Armscor officials, they did not refer to the nuclear device as a nuclear weapon.

The decision to make nuclear weapons required the three groups to coordinate, and fulfill specific responsibilities:

- Armscor would make the deliverable nuclear devices, focusing initially on the development and production of a number of deliverable gun-type devices. It also conducted studies of implosion and thermonuclear technology, including “boosted” devices.
- The Atomic Energy Board would provide the nuclear explosive materials health physics support, theoretical studies, and contribute to the development of more advanced nuclear weapons technologies. The AEB was also given the new responsibility for evaluating methods to produce and recover plutonium and tritium and produce lithium used in making tritium and in thermonuclear weapons. The Atomic Energy Corporation focused on the design of a 150-megawatt pressurized-water research and development reactor to be built at Gouriqua, near Mosselbay in the Cape Province, to make plutonium and tritium. It also planned to build a facility at Pelindaba to handle tritium, a difficult to handle radioactive material. In essence, the Reactor Development Division returned to its original mandate of building a reactor. Only this time, it was to support a nuclear weapons effort.
- The South African Defense Force was responsible for providing the delivery vehicles, logistical arrangements, communications, and the deployment of the nuclear weapons. In practice, this task went to the Air Force, which was developing a television-guided long-range glide bomb, called the H2 and later the Raptor, which would become the delivery system for the nuclear device. The Air Force developed special logistics facilities at its bases for the storage, handling, maintenance, and support of nuclear weapons.⁴²

Representatives of the SADF, AEB, and Armscor coordinated their efforts through a senior level management committee, most likely the Action Committee or its successor. The government controlled the entire nuclear weapons program through a special Committee of Ministers, chaired by the Prime Minister and later the State President.

This shift to Armscor’s making of the nuclear devices saw the phase out of the AEB’s PNE program and the closure of most of its buildings and activities. Most of the PNE personnel went back to civil nuclear pursuits at the main Pelindaba site or joined the new reactor project. One exception was that building 5100 continued to house the nuclear weapons program's small theoretical group until 1988 or 1989.

The transfer of the program to Armscor in essence "froze" the design of the nuclear core of the gun-type device. Armscor concentrated on turning the device into a qualified military weapon at

⁴² *Armament and Disarmament*, op. cit., pp. 74-80. The authors describe the South African nuclear weapons program more broadly and include other SADF units, in particular the ballistic missile units. As will be discussed later, South Africa planned on building nuclear warheads for a ballistic missile.

a new facility to be called Circle, the name perhaps signifying South Africa “circling the wagons.”