
Israel and the South African Bomb

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One of the more impenetrable questions in nuclear proliferation history is the extent and nature of covert Israeli-South African nuclear weapons collaboration in the 1970s and 1980s. Speculation about their nuclear dealings has been fueled by the two nations' potential nuclear synergies, their extensive conventional military partnership dating to the mid-1970s, indications that a nuclear test occurred over the South Atlantic in 1979, their collaboration on rocket development and testing in the 1980s, and the 1993 revelation of bilateral trade in uranium oxide and tritium in the late 1970s. Perhaps the most shocking allegation was first leveled by investigative journalist Seymour Hersh, whose 1991 *Samson Option* reported Israeli promises to furnish nuclear weapons, off the shelf, to South Africa. Hersh also reported Israeli efforts to negotiate access to nuclear testing grounds in South Africa.¹ Hersh's claim about the weapons offer was recently corroborated by a former high-level South African naval officer.²

Beside these reports and South African acknowledgments on the uranium and tritium transactions and—in the 1980s—missile codevelopment, Israeli and South African officials have steadfastly denied that collaboration took place on nuclear weapons technology or testing. Because of the lack of hard evidence about the allegations of testing and weapons transfer, the difficulty of obtaining new evi-

dence about them, and their gravity, nonproliferation scholars and experts have barely acknowledged the reports, much less analyzed their significance, in the professional literature.³

However, a newly released nuclear policy document from the South African archives—the first ever to reach the public—calls for a renewed look at these allegations.⁴ Addressed to the Commandant-General of the South African Defence Force from the Chief of Staff, the three-page March 1975 memorandum recommended the acquisition of Jericho missiles. The memorandum stated that nuclear warheads would be either “acquired elsewhere” or built indigenously, and at one point referred to acquiring the “Jericho Weapon System,” as if it were an integrated, nuclear-tipped missile.⁵ Although it appears that no such transfer was ever made, the document provides “smoking gun” evidence that Israel had at least offered to sell off-the-shelf Jericho missiles to South Africa by early 1975. It also lends some credibility to participant reports of an Israeli warhead offer and Israeli interest in testing in South Africa around this time.

In addition, the 1975 memorandum sheds light on South African nuclear decision making and thinking. It indicates greater and earlier military interest in nuclear weapons than has been previously recognized. The rationale for acquisition differs from that which justified later decisions to move South Africa’s indigenous nuclear weapons program forward. Instead of being presented as a deterrent against Soviet-backed conventional armies threatening South Africa’s borders, nuclear weapons were conceived as a deterrent against black nationalist “terrorist organizations” armed with Chinese-supplied nuclear weapons. That this alarum was seriously advanced by the Chief of Staff suggests the South African military’s potential for threat inflation at the time.

The memorandum also may provide a clue to the controversy over when the South African political leadership resolved to acquire nuclear weapons.⁶ As an argument for going nuclear, it assumes a decision to do so had not already occurred. But the fact that Israel had offered missiles useful only for nuclear delivery could indicate that it had observed prior signs of Pretoria’s interest in a nuclear capability.

Finally, this new evidence of South African-Israeli nuclear weapons dealings supports the plausibility of the hypothesis that Pretoria was emulating Israel in its pursuit of a nuclear deterrent.

This article takes stock of the accumulating evidence on the highly secretive South African-Israeli nuclear partnership. The first section describes the 1975 memorandum in detail and reviews the scattered and fragmentary evidence of collaboration on nuclear weapon transfers, nuclear materials and technology, delivery systems, and testing.⁷ The second section analyzes the memorandum's clues about the timing and extent of South African military and political interest in acquiring nuclear weapons. The third section provides an analysis of the memorandum's strategic rationale for acquiring the Jericho weapon system, and what it indicates about Pretoria's threat perception and strategic thinking. The article concludes with a brief discussion of the theoretical and policy lessons bearing on the spread of nuclear weapons, and reviews some of the more pressing questions for future research on this still murky strategic partnership.

ISRAELI-SOUTH AFRICAN NUCLEAR DIPLOMACY AND COOPERATION

The newly declassified South African document (see Appendix 1), while proving that Israel had, by March 1975, offered nuclear-capable Jericho Missiles to South Africa, does not by itself provide convincing evidence of other forms of nuclear collaboration. But the document should be read in the context of other pieces of evidence, some newly available, about Israeli-South African nuclear dealings. A missile transfer agreement dating to that period was recently disclosed by a former South African naval official, Dieter Gerhardt, who furthermore had reason to think the missiles would be nucleararmed. Seymour Hersh had earlier reported the claims of an Israeli informant, Ari Ben-Menashe, that Israel had promised nuclear weapons to South Africa and sought nuclear testing grounds there. The document bolsters Gerhardt's credibility, whose claim about a warhead offer in turn bolsters Ben-Menashe's credibility. These pieces of the puzzle

thus reinforce each other, and combine into a portrait of a major—albeit never consummated—proliferation deal.

Seymour Hersh's source on the warhead offer, Ben-Menashe, was a former Israeli military intelligence employee. According to Ben-Menashe, Defence Minister Ezer Weizman traveled to South Africa to discuss the state of the Israeli-South African alliance shortly after taking office in 1977. He had not been briefed by his predecessor, Shimon Peres, because of extreme antipathy between the Labor and Likud parties at the time. When Weizman returned from South Africa, he told a surprised staff, "We've promised these guys nuclear warheads."⁸ Ben-Menashe's account, however, has hardly been discussed in the expert nonproliferation literature. Aside from the gravity of the allegation, and the seeming implausibility that Israel would risk its special relationship with the United States by transferring nuclear weapons, there were reasonable doubts about the credibility of Hersh's sole source on this point. Aside from the Israeli government's attempts to discredit him—claiming that he had been nothing more than a low-level employee—Hersh himself acknowledged Ben-Menashe's tendency "to embellish constantly." But Hersh also found independent verification for many of Ben-Menashe's claims, suggesting he had in fact had access to highly classified Israeli state secrets.⁹

More recently, former South African Navy Commodore Dieter Felix Gerhardt described an Israeli offer of nuclear-armed missiles, part of a top-secret accord between Israel and South Africa, signed in November 1974 by Israeli Defense Minister Shimon Peres and South African Prime Minister John Vorster.¹⁰ According to Gerhardt, "The document...dealt with a mutual defence pact between the two countries, according to which each would assist the other in wartime by supplying spare parts and ammunition from its emergency stocks."¹¹ This pact included an agreement for strategic cooperation, to which hundreds of pages of detailed annexes were then negotiated by the military and arms industries. The entire document was circulated by then-Defense Minister P.W. Botha for review by senior officers, including Gerhardt. According to Gerhardt,

An additional project, a very central one in the agreement, included the supply of Jericho [1] missiles, off the shelf, from Israel to South Africa. There was another project, code named 'Burglar,' which dealt with the joint development of a long-range ballistic missile. The bulk of the funding was supposed to be Israeli. The [project] that outraged me most in the agreement was called 'Chalet.' Within its framework, Israel agreed to arm eight Jericho [1] missiles with what were described as 'special warheads.' I asked the chief of staff what that meant, and he told me what was obvious: atomic bombs.¹²

Gerhardt had been a high-ranking South African naval officer serving as a liaison between Armscor, South Africa's arms procurement agency, and the General Staff. Although never formally involved in the nuclear weapons program, Gerhardt's position gave him a good vantage point from which to observe advanced weapons development, including the guided glide bomb that would later serve as the primary nuclear delivery platform, the preparation of the South African nuclear test site, and burgeoning military cooperation between Israel and South Africa. Gerhardt was also spying for Moscow, copying and conveying vast quantities of information about South African and allied military capabilities.¹³

The 1975 memorandum confirms Gerhardt's story of a missile offer, somewhat supports Gerhardt's and Ben-Menashe's stories that warheads were also offered, and hence lends general credibility to these two sources. Addressed to the Commandant-General of the South African Defence Force (SADF), Admiral Hugo Hendrik Biermann, and signed by Lt. General Raymond Fullarton Armstrong, formerly Chief of the Air Force and at that time SADF Chief of Staff, the memorandum opens with the following introduction:

In considering the merits of a weapon system such as that offered, certain assumptions have been made:

- a. That the missiles will be armed with nuclear warheads manufactured in the RSA [Republic of South Africa] or acquired elsewhere.
- b. That the missiles have an acceptable rack life, i.e. that they will remain stable and operational while in storage for a considerable number of years.¹⁴

The memorandum proceeds to justify the need for a nuclear deterrent and to discuss alternative nuclear delivery systems, finally concluding:

In spite of the considerable cost involved in acquiring even a limited number of missiles with the JERICHO weapon system, in view of the potential threat which faces the RSA in the foreseeable (sic) future, the possession of such a system will greatly add to our ability to negotiate from a position of strength.¹⁵

The source of the offered missile, though not named in the memorandum, is obviously Israel, which had the only known missile named "Jericho." The 500-kilometer (-km) range specified in the memorandum matches the estimated range of Israel's Jericho 1, as it came to be called when follow-on versions appeared. Israel first deployed the Jericho 1 around 1970.¹⁶ The memorandum's references to the "considerable cost" and "the quotation given" indicate that the Israeli government had made a specific proposal rather than just an exploratory suggestion.¹⁷

The mention of the option of arming the missiles "with nuclear warheads manufactured in the RSA" suggests an awareness of South Africa's nuclear explosives research program. But there is surprisingly no additional discussion of issues that would be critical in the indigenous production of warheads for imported missiles, such as an expected timetable for their completion or warhead mass and size. South African Prime Minister John Vorster in 1973 or 1974 had authorized the development of peaceful nuclear explosives, purportedly for civilian mining applications, and the drilling of an underground test site in the Kalahari desert. But the head of the uranium enrichment program recalls that at the time there was still uncertainty about whether the program would ultimately be successful.¹⁸ In early 1975, South Africa's uranium enrichment program was still three years from producing any highly enriched uranium at all, and over four years from producing enough for a bomb.¹⁹ It would seem rather risky and premature to recommend procuring an expensive nuclear delivery system without confidence in the near-term availability of a warhead.

The alternative option of acquiring warheads “elsewhere” did not specify a source. But there were no other plausible suppliers of nuclear weapons to South Africa besides Israel. Moreover, reference in the quotation above to the desired nuclear *warhead* as “the JERICHO weapon system” strongly implies a warhead already identified with the Jericho missile.²⁰ The memorandum does not specifically discuss the “Chalet” proposal of Israeli “special warheads” for the Jericho, described by Gerhardt. But it is plausible that the reference to warheads “acquired elsewhere” reflects Armstrong’s awareness of this offer. Armstrong’s mention of domestic or foreign warheads might have stemmed from uncertainty about either the relative cost of Israeli versus domestically produced warheads, or uncertainty about whether the offer would stand.

To sum up, the March 1975 memorandum makes it clear that Israel offered Jericho 1 missiles to South Africa, probably in late 1974 or by March 1975 at the latest. The evidence about a warhead offer is less conclusive: Ben-Menashe’s claim, Gerhardt’s report about Project Chalet’s “special warheads,” and the 1975 memorandum’s references to a “JERICHO weapon system” warhead that could be either built at home or “acquired elsewhere.” Gerhardt’s memory appears very sharp, so I would judge it highly probable that such an offer was made, even if no Israeli warheads were ever transferred to South Africa.

It remains much less clear whether Israeli nuclear technology was ever transferred to South Africa. In 1993, President F.W. de Klerk declared that “at no time did South Africa acquire nuclear weapons technology or materials from another country, nor has it provided any to any other country, or cooperated with another country in this regard.”²¹ Waldo Stumpf, the top atomic energy official who directed the dismantlement effort, recalls a prior internal discussion in which the longtime defense minister, Gen. Magnus Malan, informed de Klerk that this was indeed the case. In numerous subsequent interviews, South African nuclear officials involved in the program have consistently denied any deliberate technological collaboration. In the words of a particularly knowledgeable and forthright scientist/manager,

...the technical team had no contact with any foreigners, neither Israelis nor other nationals. We also had no knowledge of any nuclear explosives/weapons cooperation with any other nation.... It was only when the space program was launched in the 1980s that Armscor's missile development program personnel had contact with people in Israel (and other countries). But right up to the termination of the nuclear weapons program we never cooperated with outsiders on nuclear weapons design and development.²²

Program rules allowed only South African-born citizens access to nuclear weapons facilities. The plutonium-based Israeli weapon technology, moreover, would not have been relevant for South Africa's simple highly enriched uranium design.²³ South African revelations in 1993 of a dismantled nuclear weapons program apparently satisfied the IAEA and most other foreign experts that the program and arsenal, while relying on a host of sensitive dual-use imports, was not deliberately aided by foreign nations or scientists.²⁴

The question should not be regarded as closed however, as the program's "need to know" security policies could well have compartmentalized technology or scientific transfers. Sharing technology would have been no more egregious a violation of nonproliferation norms than offering missiles or warheads. In addition, various intelligence assessments and participant acknowledgments—albeit fragmentary and vague—suggest something further. A partially declassified 1979 Central Intelligence Agency (CIA) report states that "Israelis... participated in certain South African nuclear research activities over the last few years," although another from 1983 acknowledges:

...little confirmed information about South African-Israeli nuclear cooperation. Given Israel's overall technical expertise and South Africa's uranium resources and enrichment technology, each side could contribute to the nuclear weapons program of the other. [Brief passage redacted.] Nonetheless, we have no confirmed reports of equipment or technology transfer.²⁵

Herman J. Cohen, Africa Director in the National Security Council, 1987-1988, and Assistant Secretary of State for Africa, 1989-1993, recently recalled, "When I was asked about Israeli cooperation

with the nuclear program” in closed congressional hearings “I answered that we had received good intelligence that it was taking place.”²⁶ The deputy chief of mission at South Africa’s Washington embassy admitted in 1993 that Israel and South Africa had nuclear, as well as conventional, weapons cooperation agreements still in force.²⁷ Former SADF Chief (1980-1985) Gen. Constand Viljoen acknowledged to a reporter that “we wanted to get nuclear knowledge from whoever we could, also from Israel.”²⁸

In 1994, a leaked secret court judgment revealed that South Africa had in 1977 secretly imported from Israel 30 grams of tritium, code named “tea leaves” (*teeblare* in Afrikaans), while exporting 600 tons of uranium oxide. The trial, held in camera, concerned a retired South African Air Force pilot who had ferried the shipments and was later accused (and cleared) of blackmailing the Minister of Mines, Dr. S.P. “Fanie” Botha, for payments he believed were his due. According to the judgment, the deals were orchestrated by intelligence chief General Hendrik Van den Bergh and Fanie Botha, with the approval of Prime Minister Vorster and of Atomic Energy Board chief Dr. A.J. “Ampie” Roux.²⁹ The judgment identifies the Israeli contact as “Benjamine, a member of the Israeli Council for Scientific Liaison.” This was probably Binyamin Blumberg, who headed LAKAM (a Hebrew acronym for the Defense Ministry’s Scientific Liaison Bureau) from the late 1950s until 1981. LAKAM was responsible for technological espionage and providing security for Israel’s nuclear weapons program.³⁰

While not mentioned in the judgment, South Africa’s Secretary of Information Eschel Rhoodie, who had helped the Vorster government cement ties with Israel (see footnote 10), was also privy to the “tea leaves” deal. Rhoodie later recalled that while in exile in Paris in 1979, he received an urgent visit from Gen. Van den Bergh, worried that Rhoodie might disclose sensitive information. Van den Bergh “was particularly concerned with the purchase of certain cases of ‘tea leaves’ to which reference was made in a top secret document signed by [Secretary of Foreign Affairs] Brand Fourie, approved by Vorster,

and of which I had knowledge... I remember being on the same aircraft which brought the 'tea leaves' to South Africa."³¹

Leaks on the Israeli side on nuclear dealings with South Africa have been more rare and ambiguous. Mordechai Vanunu, a nuclear technician who disclosed secret technical information about Israel's Dimona reactor (and was imprisoned in 1986 for 18 years for doing so) claimed that Dimona employees had been to South Africa, and that South African nuclear scientists had visited Dimona.³² And in an unguarded moment, Israeli Major General Avraham (Abrasha) Tamir recalled discussions with a South African military exchange mission in 1977:

In the same way that we would describe the existential dangers facing Israel due to the Soviet Union's involvement and control over Arab states, they also talked about the Soviet footholds around South Africa. Their conclusion was identical to ours: to defend against these dangers it was necessary to develop an extremely potent offensive capability, including nuclear capability. Obviously *we had deep cooperation with them in all spheres*. We were looking for a country that could invest enough in our projects so that they could be pursued independently. That [cooperation] increased hugely with South Africa after the fall of the Shah of Iran. Shimon Peres was the progenitor of this conception, which eventually covered a great many areas.³³ [emphasis added]

Although Pretoria never did acquire the Jericho missile or nuclear warheads off the shelf from Israel, it clearly did rely heavily on Israeli technology for its nuclear delivery systems. The primary delivery system adopted for the nuclear weapons built by Armscor in the 1980s was a television-guided air-to-surface glide bomb known as the H2. This was apparently based on an Israeli system called "Blue Bat."³⁴ Meanwhile South African-Israeli missile collaboration in the 1980s progressed toward the development of an intermediate-range ballistic missile. In 1987 Armscor informed the South African Cabinet it could build a missile, based on an Israeli design, which "could hit a target in Nairobi within 300 yards," about 2,500 km from South Africa.³⁵ A test rocket was launched in July 1989 from the southern cape that flew 1,800 km over the Indian Ocean.³⁶ A partially declassified 1989

CIA report stated that “signs of preparation for ballistic missile developments were observed” in South Africa in the early 1980s. “Ample evidence exists linking Israel to South African initiary programs; therefore, the possibility of a direct transfer of missile components from Tel Aviv to Pretoria cannot be discounted. However, analysis [text redacted] suggests that South Africa may have produced the solid motors used for the July launch.”³⁷

Nuclear testing is another long-suspected dimension of South African-Israeli nuclear cooperation and might help explain the early 1970s Israeli offer to sell Jericho missiles to Pretoria. Although the diplomatic risks were very high, Israel had a military-technological motive to conduct nuclear testing, which was required for gaining confidence in advanced low-yield battlefield nuclear weapons and thermonuclear triggers. Some experts on Israel’s nuclear posture have argued that the shock of near defeat in the 1973 Yom Kippur War led Tel Aviv to seek a tactical nuclear option.³⁸ A low-yield Israeli test in or near South Africa might go undetected, or at worst be claimed as the handiwork of South Africa’s “peaceful nuclear explosives” program.

Ben-Menashe, whose charge about an Israeli offer of nuclear weapons has been subsequently reinforced by Gerhardt and the 1975 memorandum, also claimed that Israel sought nuclear testing grounds in South Africa. As reported by Hersh, Ben-Menashe held that two Israeli defense ministers, Moshe Dayan in 1974 and Shimon Peres in 1976, made secret trips to Pretoria to discuss the possibility of an Israeli nuclear test in South Africa. Peres, he says, obtained a commitment in principle to conduct joint nuclear tests. To the extent that Ben-Menashe’s story of a warhead offer is bolstered by Gerhardt’s, his claims on testing are also strengthened. Hersh also quoted another unnamed former Israeli official with “firsthand knowledge of Israel’s nuclear policy” specifying South African natural resources and nuclear “testing grounds” as incentives for military collaboration.³⁹

A question for future research is whether Pretoria had considered allowing Israeli use of the Kalahari test site. According to South African official accounts, the test site had been chosen and approved in 1974 for the sole purpose of testing South Africa’s peaceful nuclear

explosives technology then under development. The disclosure of the test site occurred as the Atomic Energy Board was preparing for a “dummy run (a simulation of all the activities for a test explosion) on site in August 1977, during which the instrumentation trailers, instrumentation cables and all other equipment would be installed.”⁴⁰ Although this exercise took place two full years before sufficient highly enriched uranium would be ready to conduct an actual nuclear test, it seems unlikely that this could instead have been preparation for an actual Israeli test, which would have been hard to conceal from South African personnel present.⁴¹ However, some media reports of Israeli presence at the test site raise the question of whether Israel might have been an intended customer for the Kalahari test site.⁴²

If so, offshore testing would have been a natural fallback option for Israel after the United States and other powers discovered the South African underground test site in the Kalahari and pressured Pretoria to abandon it in August 1977. A U.S. Vela satellite observed a double flash just before dawn on September 22, 1979, over the ocean south of South Africa, indicative of a 2- to 4-kiloton nuclear atmospheric explosion. Although a White House–commissioned expert panel judged that the Vela data was probably a malfunction or “zoo event,” the U.S. CIA, the Defense Intelligence Agency, Los Alamos National Laboratories, and the Naval Research Laboratory (which detected consistent hydroacoustic signals) argued that a nuclear test had in fact occurred. South Africa had not yet produced enough fissile material to detonate a nuclear device and lacked the technological capability to fabricate such a “clean” and low-yield bomb. Since no other known nuclear power or threshold state had both the incentive and the capability to conduct such a test, suspicion has fallen largely on Israel.⁴³

Besides securing uranium and testing grounds, another motive for Israel to offer nuclear missiles to Pretoria might have been financial. This goal is suggested by Tamir in the quotation above, as well as by Armstrong’s reference to the “considerable cost involved” of acquiring the Jericho weapon system. Selling sophisticated weapon systems or technology could have compensated Israel for its development costs.

By dangling a nuclear transfer option, even disingenuously, Israel could have enticed South Africa into buying the Jericho missile or other weapon systems and technology. Arms deals following the 1974 alliance amounted to billions of dollars in Israeli military exports to South Africa.⁴⁴

Of course, disclosure of the transfer of nuclear weapons technology or of nuclear testing would have posed serious risks to the special relationship between Tel Aviv and Washington. Although the Nixon administration was rather blasé about nuclear proliferation, the U.S. Congress, and later the Ford and Carter administrations, adopted a more forceful nonproliferation stance following the April 1974 Indian “peaceful nuclear explosion” (PNE) test, evident in Congress’ June 1976 Symington Amendment, 1977 Glenn Amendment (which cut off foreign aid to non-nuclear-weapon states that conduct nuclear tests), and 1978 Nuclear Nonproliferation Act.⁴⁵ The August 1977 contretemps over the Kalahari test site might also, by precluding an underground test in South Africa, have altered Israel’s calculations. If Israel had in fact seriously offered nuclear missiles to South Africa in 1974, it might have backtracked in light of shifting winds from Washington. This would have been an important success story for U.S. nonproliferation policy. It is also possible, however, that Pretoria may have found the Israeli price too high as South Africa’s indigenous capability approached fruition.

ORIGINS OF POLITICAL AND MILITARY INTEREST IN ACQUIRING NUCLEAR WEAPONS

Armstrong’s 1975 memorandum is the earliest clear piece of evidence of interest from the armed services, or indeed the rest of the South African government, in acquiring nuclear weapons per se. In 1971, the South African minister of mines had approved a research program on peaceful nuclear explosives, ostensibly for commercial purposes such as digging harbors, carving out underground oil storage cavities, and shattering solid rock to facilitate mining. With theoretical research complete, Prime Minister Vorster in 1974 authorized the de-

velopment of a nuclear device and a test site. But the nuclear scientists, generals, and cabinet members who have written or granted interviews on this matter report being unaware of any explicit weapons goal until 1977. The South African nuclear official tasked by F.W. de Klerk to review the program in 1989-1990 could find no documentary evidence of an official decision to weaponize it before then.⁴⁶ Indeed, the March 1975 document probably survived the systematic destruction of nuclear policy documents in the early 1990s because it predated the official launch of the nuclear weapons program.⁴⁷ It is possible, of course, that the top leadership had resolved to acquire nuclear weapons earlier, before committing a formal decision to paper and informing their subordinates, and that the PNE project was a convenient fig leaf. This would explain the otherwise puzzling tight secrecy surrounding an ostensibly commercial PNE program. But the secretive and personalized nature of Voster's nuclear decision making has made it difficult to identify an earlier turning point.

The 1975 Armstrong memorandum provides some new clues to this historical enigma. The evidence is indirect and ambiguous, however. On the one hand, in arguing for acquiring a nuclear weapons capability, the memorandum implicitly assumes that the government had not yet decided to do so. The SADF Chief of Staff had obviously not been informed by March 1975 of any prior decision to go nuclear, whether or not one had been made. Indeed, the fact that the memorandum was apparently sparked by the Jericho offer, and nowhere mentions South Africa's nuclear infrastructure, suggests that the authors may have had little or no prior knowledge South Africa's own nuclear explosives program.

On the other hand, Israel's offer of nuclear-capable missiles to Pretoria suggests that Vorster and/or Defense Minister P.W. Botha had already developed a serious interest in a nuclear weapon capability by that time. It is difficult to imagine Israel offering nuclear-tipped missiles, or even unarmed ones with no real alternative use, to South Africa without any prior hint of interest on the part of the South African government. A leak of an offer of nuclear-capable missiles with "special warheads" would have been too diplomatically damag-

ing for Israel to risk without any reason to expect Pretoria to be receptive. More likely, Vorster and/or Botha had already indicated to their Israeli counterparts an interest in nuclear weapons and then (as Gerhardt has described) asked the SADF leadership for a response to the ensuing Israeli offer.

The memorandum also indicates earlier high-level interest in the SADF in nuclear weapons than has been recognized. In addition to the Chief of Staff, the Director of Strategic Studies was a nuclear advocate. The memorandum's argument for "the need for a nuclear deterrent" is explicitly based upon another, still-unreleased "recent study made by the Director of Strategic Studies" in which "the conclusion was reached that a direct and/or indirect nuclear threat against the RSA has developed to the point of being a real danger...in the relatively short term."⁴⁸

It is unclear how much beyond Armstrong and the Director of Strategic Studies this interest went in 1975. In a major 1972 strategy speech, Admiral Biermann had alluded obliquely to the need for nuclear deterrence in Southern Africa: "...it is a prerequisite for the successful defence of the Southern Hemisphere that the deterrent strategy based on nuclear terror and the fear of escalation should also be applicable in this region." Overlooked in U.S. global containment efforts, "...[i]t is only southern Africa and the surrounding oceans that are deprived of this deterrent umbrella and where there is a vacuum in Western prior presence." Biermann concluded that "we must persuade the West that Communist penetration into the Southern Hemisphere is a direct threat to Western Europe and the rest of the Free World," but an alternative conclusion to his argument would have been that South Africa needed its own nuclear weapons.⁴⁹ It remains unknown whether Biermann advocated acquiring a nuclear deterrent within the SADF or to Cabinet.⁵⁰

Even so, other top generals apparently did not lobby the government to acquire nuclear weapons. Gen. Jack Dutton, who succeeded Armstrong as SADF Chief of Staff in mid-1976, did not recall any discussion of the 1975 memorandum, Jericho missiles, or nuclear weapons at the time.⁵¹ Gen. Magnus Malan, SADF chief from 1976 to

1980, and other top generals have claimed they were not consulted in Vorster's decision to acquire nuclear weapons.⁵² Still, the Armstrong memorandum indicates that there was greater and earlier support in the military, at least from a few politically connected officers, for a nuclear weapons program than had been previously thought.

THREAT PERCEPTIONS, STRATEGY, AND STRATEGIC EMULATION

Armstrong's rationale for acquiring nuclear missiles differed from the arguments used later to justify the program. The main scenario that preoccupied later strategists was an attack by Soviet-backed Angolan and Cuban troops on the Angolan-Namibian border, or a Soviet-backed invasion of South Africa from Mozambique. A South African nuclear capability was intended to deter such threats from materializing, and if the deterrent failed, South African strategists aimed to try to blackmail the United States into intervening to halt the conflict by threatening to disclose, test, or utilize its nuclear capability.⁵³

In contrast, the Armstrong memorandum did not refer to any Soviet or Soviet proxy threat. Soviet arms were just arriving for the first time in Angola in March 1975, perhaps unbeknownst to Armstrong, and it would be several more months before Cuban forces were deployed there. Rather, the threat envisaged was of a nuclear attack by a liberation organization or army, and the strategy one of pure deterrence. "There is a danger that an enemy assuming an African identity such as terrorist organizations, or a OAU 'liberation army' could acquire and launch against us a tactical nuclear weapon. China appears to be the most likely nuclear power to associate herself with such an adventure."⁵⁴ Moreover, aid could not be counted on from Western powers, whose solidarity had been undermined by East-West détente, multipolarity, nuclear proliferation (marked by the April 1974 Indian nuclear test), and "divergent interests and political systems."⁵⁵

The memorandum's strategic rationale for acquiring nuclear weapons, in contrast to the subsequent emphasis on leverage, focused on direct deterrence: "Should it become generally known that the RSA possesses a nuclear weapon and that we would use it if we were sub-

jected to a nuclear attack, such a deterrent strategy could be used as a positive weapon in our defence.”⁵⁶ Accompanying the memorandum was a map showing the Jericho missile’s striking range if launched from Rhodesia or Namibia (then under South African control), including the capitals of Angola and Mozambique. The memorandum, however, neglected to explain how South African nuclear weapons would deter “terrorists,” who would have been difficult to locate and target for nuclear retaliation. Presumably, the aim would be to deter host nations from harboring “terrorist” forces that might consider attacking South Africa with nuclear weapons.⁵⁷ Nuclear deterrence would have been more effective against frontline states than against the Soviet Union, since nuclear use against the latter would have been suicidal. Indeed, the memorandum’s author may have had some coercive uses of the nuclear capability in mind when referring to negotiating “from a position of strength.”

While the discussion of strategy was cursory, the threat assessment can only be described as paranoid. Besides a claim that “the psychology underlying terrorism, modern revolutionary theory and Red Chinese doctrine would not preclude the use of nuclear weapons against the RSA,” the memorandum provided no explanation of why China would transfer nuclear weapons, nor why black South African nationalists would consider using such devastating weapons against their own country.⁵⁸ Admiral Biermann had, a few years earlier, expressed concerns over Chinese support for anticolonialism and development in Central and East Africa since the early 1960s.⁵⁹ But, although the memorandum described the threat as one developing in the “relatively short term,” South African military intelligence had not reported a Sino-African nuclear threat against Pretoria.⁶⁰ I have been unable to find a single published analysis of South African nuclear weapons or security policy that even considered the idea, though some in the South African leadership did later fear the possibility of Cuban or Soviet chemical, biological, or nuclear threats or use against South African troops or soil.⁶¹ There was no sign of Armstrong’s concerns in the Defence Minister’s reports to Parliament in either 1973 or 1975.⁶²

According to former Armscor official Dr. André Buys, who supported Pretoria's nuclear acquisition after the deployment of Cuban troops in Angola and who helped develop the formal leverage strategy in the early 1980s, the idea in 1975 of a nuclear threat against South Africa in the "relatively short term" was "crazy."⁶³ Other Armscor officials characterize this notion as "a typical example of the extreme paranoid frame of mind of some individuals in the Defence Force at the time."⁶⁴ It is also curious that while the memorandum emphasizes "a real danger...in the relatively short term," it begins with the explicit premise that "the missiles have an acceptable rack life, ie that they will remain stable and operational while in storage for a considerable number of years."⁶⁵ Unless this premise reflects purely budgetary concerns, it demonstrates an awareness that the threat envisaged was indeed a very remote one. The implausibility of the threat and unexamined questionable assumptions reveal a generally poor quality of strategic analysis by high-ranking individuals in the SADF at the time.

The lack of a real threat and the lacunae in strategic calculation in motivating acquisition of nuclear weapons in 1975 raises the question of whether there were unstated incentives or logics for going nuclear, at least on the part of Armstrong. If Armstrong saw an opportunity for the SADF to wrest control of South Africa's nuclear explosives research program from the Atomic Energy Board, he did not betray much knowledge about this program in the memorandum. SADF leaders would have faced organizational incentives to resist a new program so far removed from their traditional counter-insurgency missions and potentially entailing a large drain on their budgets. This interpretation is consistent with the apparent lack of knowledge and support within the SADF for this proposal beyond Armstrong and the Director of Strategic Studies.⁶⁶

As mentioned earlier, the Israeli Jericho proposal implies that the Defense Minister had already developed an interest in nuclear weapons acquisition. We have today still no direct evidence about nuclear thinking in this period on the part of the prime minister or defense minister. But a number of factors make plausible the hypothesis that their interest in nuclear weapons was reinforced by an impulse to

emulate Israel. I review these factors briefly below, not to argue conclusively that emulation occurred, but to argue that there is enough circumstantial evidence for this issue to warrant further research.

International emulation is an understudied phenomenon, but prior research has elucidated conditions conducive to it. In accordance with structural realism, states face strong security incentives to emulate foreign military models of success. This explains, for instance, the importation in the late 19th century by Meiji Japan and Latin American nations of European military technologies and organizational models.⁶⁷ Emulation is especially likely to occur in states lacking strong indigenous expertise, or in those having recently suffered major policy failures. States are likely to emulate the policies of “role models” that are viewed as similar and as successful, and those with whom they have frequent interactions.⁶⁸ Prestige-seeking can also prompt emulation, as weaker and poorer states seek the status symbols—whether inefficient national airlines or nuclear arsenals—identified with stronger and richer ones.⁶⁹ But nuclear prestige does not appear to have been a strong attraction for Pretoria, which—like Israel—kept its bombs hidden away in the basement where they could impress neither domestic nor foreign audiences.⁷⁰ Rather than being badges of prestige, nuclear weapons may have been regarded as a security talisman, the value of which was decided as much by an isolated state’s admiration for a successful military innovator and ally as by rigorous strategic calculation.

The conditions for South African emulation of Israel’s nuclear posture were ripe in the mid-1970s. Insulated for decades by white-ruled colonies to the north, South Africa lacked both real security threats and, as a consequence, lacked a substantial community of strategic studies experts. Magnus Malan, Defense Minister from 1980 to 1993, had some exposure to nuclear strategy during a foreign officer course at Fort Leavenworth, but says he was neither particularly interested in nor expert on the subject, nor was he consulted in the decision to acquire nuclear weapons.⁷¹ Dr. L.D. “Niel” Barnard, chief of National Intelligence from 1980 to 1992, had written a dissertation on nuclear strategy and describes himself as the only person in South

Africa who had studied it. But he did not join the government until the program was already under way, and even then was not involved in high-level nuclear discussions or decision making until the mid-1980s.⁷²

Thus it is not surprising that South African leaders tended to look abroad for sources of strategic expertise and theory. One influential source was the prolific French Army General and writer André Beaufre. His “total strategy” for counterrevolutionary war, based on the French experience in Indochina and Algeria, was introduced to South Africa in the late 1960s by SADF lecturers (with future Defence Minister Magnus Malan in attendance), and by the mid-1970s they permeated military college courses.⁷³ Defense Minister (and later Prime Minister) P.W. Botha avidly read Beaufre’s works and met with him several times. He incorporated Beaufre’s terminology into his public speeches and into the Defence Ministry’s official strategy statements increasingly from 1973 onward.⁷⁴

Israel was a model of military success, having by 1973 repeatedly defeated more numerous Arab armies. South African elites also viewed Israel as being similar to South Africa in key respects. Conservative white South Africans viewed themselves and the Israelis as culturally civilized outposts in remote, backward, and predominantly hostile regions. Both states had emerged in the 20th century from brutal wars of independence. Both had limited military manpower, lacked a superpower patron, and faced international criticism over their domination of disenfranchised ethnic groups.⁷⁵ P.W. Botha expressed his empathy with Israel on numerous occasions. For instance, in an August 1977 National Party congressional speech the defense minister argued that South Africa was “moving more and more in the direction in which the state of Israel has already been since 1948.”⁷⁶ At the end of a 1999 interview about South Africa’s reasons for acquiring nuclear weapons, he spontaneously raised the subject of Israel and emphasized his great admiration and past support for it.⁷⁷

Secrecy is an obvious impediment to emulation, and although Israel’s nuclear capability was common knowledge by the mid-1970s, Israel’s policy of opacity limited public information about its program. However, the new security alliance between South Africa and Israel

involved high-level confidential talks over nuclear missiles and fissile materials (tritium for uranium), and apparently nuclear warheads and testing as well, along with a wide range of conventional military deals. Covert meetings between the heads of state and defense ministers offered the opportunity for the transmission of strategic ideas from Israeli to South African leaders. Defense Minister Shimon Peres, who had negotiated the military alliance with Vorster and P.W. Botha in November 1974, and who had been a prime mover behind Israel's nuclear weapons program, would have been a likely conduit of nuclear advice.⁷⁸ Tamir's recollection of frank discussions about nuclear deterrence with his South African counterparts in 1977, quoted above, appears to indicate the presence of nuclear matters on the agenda between the two states.⁷⁹

Israeli leaders may even have hyped nuclear deterrence to their South African counterparts, as they appear to have been seeking customers for the Jericho missile, nuclear test sites in or near South Africa, and a source of uranium ore. A bit of circumstantial evidence for the Israeli leadership in this role is an anecdote about South Africa's acquisition of Israeli tritium. Reportedly, the idea for importing Israeli tritium came not from the Atomic Energy Board, but from the minister of mines and from an intelligence chief with extensive dealings in Israel. Since these individuals were unlikely to have independent knowledge of tritium's military and scientific applications, they might have been informed of its value by Israeli officials.⁸⁰

Three additional aspects of South Africa's nuclear decision making are suggestive of emulation processes. The first known official South African proposal for acquiring a nuclear deterrent, the Armstrong memorandum, occurred in response to Israel's offer of the "JERICHO weapon system" and the advent of the Israeli-South African alliance. In addition, the formal nuclear strategy that was adopted by South Africa in the early 1980s, which envisioned using the threat of nuclear disclosure, testing, or use to leverage U.S. and British assistance, resembles Israel's reported nuclear blackmail of the United States in order to obtain aid in the 1973 war. Even if the story of Israeli nuclear blackmail is apocryphal, it was widely believed abroad.⁸¹ South Afri-

can nuclear officials were aware of it, and it may have influenced their strategy.⁸² Third, South Africa followed in Israel's footsteps by developing a nuclear missile option in the 1980s, even though such a capability was of marginal use for the nuclear leverage strategy ultimately adopted.

IMPLICATIONS AND QUESTIONS FOR FUTURE RESEARCH

There are valuable lessons to be drawn here, both for supply-side and demand-side theories of nuclear proliferation. On the supply side, the Israeli offer of the Jericho missile, based on French technology, highlights the problem of second-tier suppliers of unconventional weapons. The 1975 memorandum provides the first hard confirmation that Israel offered Jericho missiles to South Africa, apparently off the shelf. It also provides support for participant accounts claiming that Israel either offered to furnish nuclear warheads along with them, or dangled the possibility of such a deal. A state widely thought in the West to be a responsible nuclear power turns out, probably, to have seriously contemplated becoming a nuclear supplier.

This is just one, though apparently abortive, instance of a broader set of cases of proliferation assistance. In the mid-1950s, Canada sold a plutonium-producing reactor to India, which the United States furnished with heavy water.⁸³ The Soviet Union provided important initial assistance to China's quest for nuclear weapons.⁸⁴ France sold the Dimona nuclear reactor and a reprocessing plant to Israel.⁸⁵ Second-tier and third-tier nuclear weapon states have continued to share nuclear weapons technology: China to Pakistan (including warhead designs) and Pakistan to Iran, North Korea, and Libya.⁸⁶

Motives have varied, but export profits are a common incentive. By noting the costliness of the weapons, the 1975 Armstrong memorandum suggests this was a significant incentive for Israel. Israel would not have had the kind of balance-of-power incentives for aiding South Africa that motivated Soviet assistance to China and Chinese assistance to Pakistan.⁸⁷ Shimon Peres also arranged in April 1977 to sell Jericho 1 missiles to Iran, in a deal that was derailed by the 1979

overthrow of the Shah.⁸⁸ As discussed earlier, Israel's interest in secret nuclear tests might also explain its readiness to sell Jerichos to Pretoria.

If it is true, as Ben-Menashe and Gerhardt have claimed, that Israeli nuclear warheads were offered to Pretoria as well, this raises important questions as to why the offer never came to fruition. Was the possibility of a warhead transfer disingenuously dangled to whet Pretoria's appetite for a costly Jericho deal? Or, if it was it a serious offer, did South Africa take a pass because it found the cost too high, particularly as its own indigenous nuclear weapons capacity developed. A quest for self-reliance is evident in Pretoria's decision to develop its own missile production capability using Israeli technology, rather than acquire off-the-shelf missiles as recommended in the 1975 Armstrong memorandum. Alternatively, Israel might have retracted the offer as it observed growing U.S. opposition to nuclear proliferation from the mid-1970s, which might have jeopardized U.S. aid had the deal been exposed. This would underline the historical importance of the nonproliferation regime, and the ongoing value of U.S. and other pressure on potential nuclear suppliers.

The realist security demand-side explanation for why states seek nuclear weapons does not gain new support here, due to the remoteness of the threat envisaged in the 1975 memorandum and the flimsiness of its security arguments. The April 1974 collapse of the Portuguese government, with prompt ramifications for the dissolution of white colonial rule in Angola and Mozambique, could well have concerned some South African policy makers, despite the unlikelihood that these states could ever project significant military power against South Africa.⁸⁹ The memorandum also indicates a somewhat greater receptivity to nuclear deterrence on the part of the South African military than previously realized. However, the fact that Armstrong's successor as chief of staff and most other generals at the time appear not to have taken much interest in nuclear weapons suggests this effect was very limited.

The fact that the offer of advanced, foreign-supplied missiles prompted high-level officials to recommend nuclear acquisition, in the absence of a realistic threat, suggests two additional historical hy-

potheses. One is that technological opportunity triggers proliferation decisions; this would be consistent with Pretoria's formal decision to build nuclear weapons in 1977, when the capability to do so was just within reach. An alternative is that emulation played a role in South Africa's interest in nuclear deterrence. The policy lessons of such an effect are obvious: that nuclear proliferation has an even greater tendency to snowball than balancing incentives would imply. The evidence for these interpretations remains circumstantial—unsurprising considering the paucity of information about the South African decision to build nuclear weapons. But they deserve further attention by researchers.

The analysis presented here raises several additional questions about South African decision making. Did the April 1974 Portuguese coup, which initiated the independence of Angola and Mozambique, send waves of panic through the military leadership? Did the November 1974 negotiations with Israel include discussions about nuclear deterrence, and did these heighten high-level South African interest in nuclear weapons? What was the impact of the Armstrong memorandum; in particular, how did Admiral Biermann, Defense Minister Botha, and Prime Minister Vorster react to it? The missing pieces of the puzzle remain far more numerous than the ones that have fallen into place.

Research on these questions will not be easy. The status of its nuclear weapons program, not to mention possible proliferation ventures, remains a taboo subject in Israel, due to its potential impact on Israel's special relationship with the United States and on threat perceptions on the part of its neighbors. The new democratic South Africa has much less to lose from disclosing additional details about its nuclear diplomacy and decision making. But South African nuclear policy making was so closely held that few individuals alive today have a clear understanding of it. Old secrecy laws, originally imposed by a state determined to conceal the existence and location of a covert nuclear arsenal, remain on the books, discouraging former officials from discussing their historical knowledge. Moreover, the systematic destruction of records after the program was dismantled

limit the potential fruitfulness of future archival research. Despite a new freedom of information law, the government has been somewhat hesitant to review and declassify Apartheid-era documents. The shortage of resources committed by the government has hampered this process as well, though the release of the 1975 Armstrong memorandum should encourage researchers to continue to seek new information.⁹⁰

¹ Seymour M. Hersh, *The Samson Option: Israel's Nuclear Arsenal and American Foreign Policy* (New York: Vintage Books, 1992), pp. 264-276.

² Ronen Bergman, "Treasons of Conscience," *Ha'aretz*, April 7, 2000.

³ The main works providing and analyzing new information about the program are David Albright, "South Africa and the Affordable Bomb," *Bulletin of the Atomic Scientists* 50 (July-August 1994); Mark Hibbs, "South Africa's Secret Nuclear Program: From a PNE to Deterrent," *Nuclear Fuel* 18 (May 10, 1993); Mark Hibbs, "South Africa's Secret Nuclear Program: The Dismantling," *Nuclear Fuel* 18 (May 24, 1993); Peter Liberman, "The Rise and Fall of the South African Bomb," *International Security* 26 (Fall 2001); Frank V. Pabian, "South Africa's Nuclear Weapon Program: Lessons for Nonproliferation Policy," *Nonproliferation Review* 3 (Fall 1995); Mitchell Reiss, *Bridled Ambition: Why Countries Constrain Their Nuclear Capabilities* (Washington, D.C.: Woodrow Wilson Center Press, 1995), pp. 7-44. The key participant accounts are Hannes Steyn, Richardt van der Walt, and Jan van Loggerenberg, *Armament and Disarmament: South Africa's Nuclear Weapons Experience* (Pretoria: Network Publishers, 2003); Waldo Stumpf, "South Africa's Nuclear Weapons Programme," in Kathleen C. Bailey, ed., *Weapons of Mass Destruction: Costs versus Benefits* (Delhi: Manohar, 1994).

⁴ The document had been requested, as part of a larger nuclear history project, by the South African History Archive (SAHA) under the Promotion of Access to Information Act (PAIA) of 2000. SAHA is based at the University of the Witwatersrand in Johannesburg; particulars about SAHA and its nuclear history program can be accessed at <<http://www.wits.ac.za/saha/>>.

⁵ The document was released in September 2003 to SAHA, which had requested nuclear policy documents under the PAIA of 2000.

⁶ For example, Helen E. Purkitt, Stephen F. Burgess, and Peter Liberman, "Correspondence: South Africa's Nuclear Decisions," *International Security* 27 (Summer 2002).

⁷ In addition to the published literature, this article draws on interviews and correspondence with former South African officials.

⁸ Quoted in Hersh, *Samson Option*, p. 276.

⁹ Hersh, *The Samson Option*, pp. 322-324. In 1997 Hersh was quoted as saying that Ben-Menashe "lies like people breathe"; Ian MacLeod, "Agent Ari," *Ottawa Citizen*, April 6, 2002.

¹⁰ Gerhardt reports the agreement being signed in Geneva; see Bergman, "Treasons of Conscience." In a November 22, 1974, letter (marked "top secret") from Peres to Eschel Rhoodie, South Africa's Secretary of Information, Peres thanked him "for the great efforts you employed to ensure the success of the meetings which took place in Pretoria on the 13th and 14th of this month." He goes on to say "that a vitally important cooperation between our two countries has been initiated. This cooperation is based not only on common interests and on the determination to resist equally our enemies, but also on the unshakeable foundations of our common hatred of injustice....I am convinced that the new links which you have helped to forge...will develop into a close identity of aspirations and interests which will turn out to be of longstanding benefit to both our countries." The letter is reproduced in Eschel Rhoodie, *The Real Information Scandal* (Pretoria: Orbis, 1983), p. 117.

¹¹ Quoted in Bergman, "Treasons of Conscience." Hersh reports, citing an anonymous Israeli

official, that “Weizman signed an agreement before the 1979 tests calling for the sale to South Africa of low-yield 175mm and 203mm nuclear artillery shells...trigger[ing] an internal dispute with senior nuclear officials.” Hersh, *Samson Option*, p. 276.

¹² Bergman, “Treasons of Conscience.” I have made a few corrections to the *Ha'aretz* article text, based on a September 2000 interview with Gerhardt. Gerhardt told me that Bergman confused “Jericho 2” with “Jericho 1,” and he also stated that Chalet was a separate proposed “project” rather than a “clause” of the Israeli-South African alliance. Gerhardt also suspected some kind of nuclear application of a 155-millimeter (-mm) artillery cannon, developed by Israel and South Africa (using a patent held by the Canadian scientist Gerald Bull). To gain some additional information, Gerhardt states that he “sent an ostensibly innocent letter to the chief of staff, suggesting that the Defence Force turn the Bull project to non-conventional use. But he replied that this has already been taken care of by the Israelis and South Africans.” Bergman, “Treasons of Conscience.” Hersh describes Israeli development of this capability in the early 1970s; Hersh, *The Samson Option*, pp. 216-217, 220.

¹³ Gerhardt was arrested by the U.S. CIA in 1983, convicted of treason, and imprisoned in South Africa, but released by F.W. de Klerk in 1990 and subsequently pardoned by Nelson Mandela; Bergman, “Treasons of Conscience.”

¹⁴ Memorandum dated March 21, 1975, Lt. Gen. R.F. Armstrong, “The Jericho Weapon System,” SADF HS/11/4/34, top secret, declassified September 25, 2003 (SAHA reference no. AL 2878, A 3.1.1, 1975), p. 1. The memorandum is in English, which is not uncommon as South African government records alternated in this period between English and Afrikaans. There is a barely legible, unsigned Afrikaans annotation on the first page of the document, which appears to be “Begrotings,” or budgets.

¹⁵ *Ibid.*, pp. 1, 3.

¹⁶ “The accuracy indicated by the supplier is acceptable if the missile is armed with a nuclear warhead (500m at 500km),” *Ibid.*, p. 3. On the Jericho1 and 2, see Seth Carus and Dov Zakheim, “North Africa/Israel,” in Commission to Assess the Ballistic Missile Threat to the United States, ed., *Report, Appendix III: Unclassified Working Papers*, (Washington DC: GPO, 1988); Non-Proliferation Project Carnegie Endowment for International Peace, *Missile Proliferation/World Missile Chart/Israel*, <<http://www.ceip.org/files/nonprolif/numbers/israel.asp>>; Intelligence Resource Program Federation of Atomic Scientists, *Missile Proliferation/Israel*, <<http://fas.org/nuke/guide/israel/missile/index.html>>; Dinshaw Mistry, *Containing Missile Proliferation: Strategic Technology, Security Regimes, and International Cooperation in Arms Control* (Seattle: University of Washington, 2003), pp. 110-113.

¹⁷ Armstrong, “Jericho Weapon System,” p. 3.

¹⁸ W.L. Grant, interview by author, Pretoria, January 28, 1999; Liberman, “Rise and Fall of the South African Bomb,” p. 52.

¹⁹ David Albright, “South Africa’s Secret Nuclear Weapons,” *ISIS Report 1* (May 1994), p. 7; Stumpf, “South Africa’s Nuclear Weapons Programme,” p. 70; Reiss, *Bridled Ambition*, pp. 8, 11.

²⁰ In the one other instance the phrase “JERICHO weapon system” appears, besides in the title and the above quotation, it is less clear whether it refers to a missile, a warhead, or both. There is also a reference to “JERICHO missiles.”

²¹ F.W. de Klerk, “Speech on the Nonproliferation Treaty to a Joint Session of Parliament, March 24, 1993,” Joint Publications Research Service, *Proliferation Issues*, March 29, 1993.

²² Dr. André Buys, correspondence with author, April 2004; in the late 1970s Buys was Head of the Nuclear Engineering Sub-division of the Reactor Engineering Division (responsible for the Peaceful Nuclear Explosives Program) of the Atomic Energy Board. Buys has also been a proponent of controlled declassification of South African nuclear history; see his “Statement on Secrecy and Disclosure About South Africa’s Past Nuclear Weapons,” Conference on Unlocking South Africa’s Nuclear Past, University of the Witwatersrand, July 31, 2002,” <<http://www.wits.ac.za/saha/nuclearhistory/conf/contrib.htm>>. Similar statements were made by the top South African atomic energy and armaments officials after the disclosure of the program; for example, in “S. Africa

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Denies Nuclear Cooperation with Israel,” Reuters, July 13, 1994.

²³ Although, South Africa did conduct basic research into more advanced thermonuclear designs until 1986; Reiss, *Bridled Ambition*, p. 25.

²⁴ Some of the imports are described in Pabian, “South Africa’s Nuclear Weapon Program.”

²⁵ U.S. Central Intelligence Agency, Director of Central Intelligence, *The 22 September 1979 Event*, December 1979, secret document partially released July 1990; U.S. Central Intelligence Agency, Directorate of Intelligence, *New Information on South Africa’s Nuclear Program and South African-Israeli Nuclear and Military Cooperation*, March 30, 1983, secret document partially released May 7, 1996, <<http://www.foia.ucia.gov>>.

²⁶ Herman J. Cohen, correspondence with author, November 9, 1999.

²⁷ *Ibid.*, p. 26.

²⁸ From a *Ha’aretz* article discussed in “S. African Officials Confirm Nuclear Arms Aid in the ‘80s,” *Chicago Tribune*, April 21 1997, p. 7. This article also reported a more ambiguous statement by South African Deputy Foreign Minister Aziz Pahad about Israeli-South African military-scientific cooperation. Gen. Viljoen subsequently decided not to give additional interviews concerning the South African nuclear weapons program.

²⁹ Court of South Africa, Cape Province Division (Judge J. Friedman), *The State versus Johann Philip Derk Blaauw*, Case no. 270/87, Top Secret, September 9, 1988, pp. 16-25.

³⁰ Albright, “South Africa’s Secret Nuclear Weapons,” p. 5; William E. Burrows and Robert Windrem, *Critical Mass: The Dangerous Race for Superweapons in a Fragmenting World* (New York: Simon & Schuster, 1994), pp. 450-452; Hersh, *The Samson Option*, 205.

³¹ Rhoodie, *The Real Information Scandal*, pp. 522-524. While Rhoodie’s book was published in 1983, the meaning of “tea leaves” became clear only with the leak of the Blaauw judgment. Rhoodie also recalled that, together with only five to six people in South Africa, he “knew most, if not all of the country’s strategic secrets and its secret programmes concerning other states.” These secrets were sensitive enough that, when informed by French police that foreign agents were looking for him, Rhoodie observed that “now some of these countries, and perhaps even South Africa, had apparently sent a ‘hit team’ to get me because they were afraid I might talk about top secret matters.” *Ibid.*, p. 551. Rhoodie died in 1993, Van den Bergh in 1997.

³² Vanunu did not claim to have been informed of the purpose of the Israelis’ visits to South Africa; Yoel Cohen, *Whistleblower of Dimona: Israel, Vanunu, and the Bomb* (New York: Holmes & Meier, 2003), pp. 200, 81, 306, cf. also p. 4. In this context it is worth noting the report that Wouter Basson, the head of the South African chemical and biological warfare program (“Project Coast”), told U.S. investigators that he learned a method of breeding a “stealth” anthrax strain from Israeli government scientists and that he and a colleague had made extended trips to Israel in the 1980s. See Joby Warrick “Biotoxins Fall Into Private Hands: Global Risk Seen In S. African Poisons,” *Washington Post*, April 21, 2003; Page A1.

³³ The exchange mission included Dieter Gerhardt, who was the focus of Tamir’s interview; Bergman, “Treasons of Conscience.”

³⁴ Dieter Gerhardt, interview with author. See also Bergman, “Treasons of Conscience”; Liberman, “Rise and Fall of the South African Bomb,” p. 54; Steyn, et al., *Armament and Disarmament*, p. 74.

³⁵ W.N. Breytenbach, deputy defense minister 1987-1990, interview by author, Fish Hoek, South Africa, August 18, 1999.

³⁶ On the South African rocket series and its origins, see Albright, “South Africa’s Secret Nuclear Weapons,” pp. 15-16; Liberman, “Rise and Fall of the South African Bomb,” p. 54; Mistry, *Containing Missile Proliferation*, pp. 84-88; Steyn, et al., *Armament and Disarmament*; U.S. Central Intelligence Agency, Directorate of Intelligence, *Africa Review-South Africa: Igniting a Missile Race?*, secret document, December 8, 1989, partially released April 27, 1997, <<http://www.foia.ucia.gov>>; L.J. Van der Westhuizen and J.H. le Roux, *Armscor: A Will to Win* (Bloemfontein: Institute for Contemporary History, University of the Orange Free State, 1997), pp. 179-180; Mark Wade, “RSA-3,” *Encyclopedia Astronautica*, <<http://www.astronautix.com/lvs/rsa3.htm>>.

³⁷ U.S. Central Intelligence Agency (Directorate of Intelligence), *Africa Review-South Africa*. See

also R. Jeffrey Smith, "Israel Said to Help S. Africa on Missile," *Washington Post*, October 26, 1989. The deputy defense minister at the time recalls that it was an Israeli missile, one of several tested; Breytenbach, interview by author.

³⁸ Avner Cohen, "Nuclear Arms in Crisis Under Secrecy: Israel and the Lessons of the 1967 and 1973 Wars," in Peter R. Lavoy, Scott D. Sagan, and James J. Wirtz, eds., *Planning the Unthinkable: How New Nuclear Powers Will Use Nuclear, Biological, and Chemical Weapons* (Ithaca: Cornell University Press, 2000), pp. 121-122.

³⁹ Hersh, *The Samson Option*, pp. 264-265. A South African press report attributed additional information about the Vela incident to Gerhardt, but Gerhardt says he was incorrectly named as the source. Gerhardt, interview by author; Albright and Gay, "A Flash from the Past."

⁴⁰ Steyn, et al., *Armament and Disarmament*, p. 41. See also Stumpf, "South Africa's Nuclear Weapons Programme," pp. 67-70.

⁴¹ On South Africa's HEU production, see Memorandum of March 21, 1975, pp. 1, 3. Cold laboratory tests were conducted by mid-1977; Steyn, et al., *Armament and Disarmament*, p. 41.

⁴² Hersh claims the CIA had intelligence that "Israeli military personnel, in civilian clothes, were all over the Kalahari test site." Hersh, *The Samson Option*, pp. 268, 271. Another journalist reported that kosher meals were frequently prepared for visitors there; Peter Hounam, *The Woman from Mossad: The Story of Mordechai Vanunu and the Israeli Nuclear Program* (London: Vision, 1999), pp. 115-116.

⁴³ David Albright and Corey Gay, "A Flash from the Past," *Bulletin of Atomic Scientists* 53 (November-December 1997); U.S. Central Intelligence Agency, Director of Central Intelligence, *The 22 September 1979 Event*; Reiss, *Bridled Ambition*, pp. 10-11. Hersh also cited unnamed former Israeli government officials, saying that the flash Vela detected was a test of an Israeli low-yield artillery shell, actually the third in a series of tests observed by Israeli military men and nuclear experts, accompanied by a South African naval contingent. Hersh, *The Samson Option*, p. 271.

⁴⁴ Bergman, "Treasons of Conscience"; Gerhardt, interview with author.

⁴⁵ Peter Clausen, *Nonproliferation and the National Interest: America's Response to the Spread of Nuclear Weapons* (New York: HarperCollins, 1993), pp. 100-154; Hersh, *The Samson Option*, pp. 209-215. On the laxity of U.S. nonproliferation pressure on other democracies, see Glenn Chafetz, "The Political Psychology of the Nuclear Nonproliferation Regime," *Journal of Politics* 57 (August 1995). For analyses of probable U.S. reactions to various potential Israeli nuclear disclosures, see Yair Evron, *Israel's Nuclear Dilemma* (Ithaca: Cornell University Press, 1994), pp. 163-170; Shai Feldman, *Israeli Nuclear Deterrence: A Strategy for the 1980s* (New York: Columbia University Press, 1982), pp. 211-233; Shai Feldman, "U.S. Nuclear Nonproliferation Policy: Implications for U.S.-Israeli Relations," *Israel Affairs* 2 (Spring-Summer 1996).

⁴⁶ Stumpf, "South Africa's Nuclear Weapons Programme," p. 69. On the question of dating weaponization, see Liberman, "Rise and Fall of the South African Bomb," pp. 50-53; Purkitt, et al., "Correspondence," pp. 191-192. According to Steyn et al., the new prime minister, P.W. Botha, "established a cabinet committee to oversee the military aspects of nuclear devices. At a meeting held on 31 October of [1978], it was decided that Armscor, the Defence Force and the Atomic Energy Board should start to work together intimately and prepare a program to initiate a nuclear weapons program." But the authors also state that after international pressure compelled the dismantling of the Kalahari test site in August 1977, "it was now obvious that the testing of nuclear devices for civil applications could no longer be executed...and this led to the appreciation that a full scientific program was nearing its end." Steyn, et al., *Armament and Disarmament*, pp. 42-43. Nevertheless, the Atomic Energy Board immediately began working on a smaller device that could be tested at short notice, a capability that would only make sense as a means to bolster deterrent credibility.

⁴⁷ Dr. A. J. Buys, correspondence with the author, November 3, 2003.

⁴⁸ Memorandum of March 21, 1975, p. 1. The Director of Strategic Studies at the time was General Robbertze, who was the first director of this new office. His successor, Brigadier John Huyser, while of relatively modest rank, would later author a memorandum recommending nuclear acquisition

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that, while full of internal contradictions and ambiguities, was officially approved by Prime Minister P.W. Botha in 1978. South African nuclear officials who had close contact with Huyser find the language of the Armstrong memorandum similar to Huyser's style, and thus suspect he might have had a hand in it. Huyser was a close associate of P.W. Botha (Defense Minister, 1966-1980, and Prime Minister, 1978-1989) and of General Magnus Malan (SADF Chief, 1976-1980). Malan and Huyser together served on the defense committee of the secret nationalist society, the Afrikaner Broederbond. Gerhardt and A.J. Buys, interview with author, Pretoria, August 25, 1999; A.J. Buys, correspondence with author; Liberman, "Rise and Fall of the South African Bomb," pp. 53, 63-68; Ivor Wilkins and Hans Strydom, *The Super-Afrikaners* (Johannesburg: Jonathan Ball, 1978), pp. A52, A70.

⁴⁹ Quoted in Admiral Hugo Hendrik Biermann, "The South African Response," in Patrick Wall, ed., *The Southern Oceans and the Security of the Free World* (London: Stacey International, 1977), p. 89. Cf. Robert Scott Jaster, *South Africa's Narrowing Security Options*, Adelphi Papers no. 159 (London: International Institute for Strategic Studies, 1980), p. 12.

⁵⁰ Biermann, now in his mid-80s, apparently cannot recall anything about South African nuclear weapons policy in the 1970s; Verne Harris telephone interview with Biermann, November 11, 2003.

⁵¹ General Jack Dutton, telephone interview with author, November 3, 2003. Armstrong died in the early 1990s.

⁵² Gen H. de V. du Toit, interview with author, January 27, 1999; Gen. Jan Geldenhuys, interview with author, August 25, 1999; Gen. Magnus Malan, interview with author, August 27, 1999. LOCATION?. A top nuclear scientist and manager on the uranium enrichment side, Dr. W.L. "Wally" Grant, recalled vaguely that "defense people" began to become involved in 1975; Dr. W.L. Grant, interview with author, Pretoria, January 28, 1999; see also Liberman, "Rise and Fall of the South African Bomb," pp. 63-68.

⁵³ Liberman, "Rise and Fall of the South African Bomb," pp. 58-63. For further analysis of South Africa's security environment and perceptions in that period, see Jaster, *South Africa's Narrowing Security Options*; Robert Scott Jaster, *The Defence of White Power: South African Foreign Policy under Pressure* (New York: St. Martin's Press, 1989).

⁵⁴ Memorandum of March 21, 1975, p. 1.

⁵⁵ *Ibid.*, pp. 1-2.

⁵⁶ *Ibid.*, p. 2.

⁵⁷ This would be similar to a strategy to deter conventional attack from frontline states, imputed to Pretoria by Jack E. Spence, "South Africa: The Nuclear Option," *African Affairs* 80 (October 1981), pp. 445-446.

⁵⁸ Memorandum of March 21, 1975, p. 2. It is possible these assumptions were justified further in the above-mentioned study of the nuclear threat written by SADF Director of Strategic Studies.

⁵⁹ Quoted in Biermann, "South African Response," p. 77. Some attribute the notion that China, and before that India, wanted to colonize Africa, to Apartheid rulers' preoccupation with race issues; Jaster, *South Africa's Narrowing Security Options*, pp. 6, 11. For a review of Chinese involvement in Africa, see Philip Snow, "China and Africa: Consensus and Camouflage," in Thomas W. Robinson and David Shambaugh, eds., *Chinese Foreign Policy: Theory and Practice* (Oxford: Clarendon Press, 1994).

⁶⁰ H. de V. du Toit, telephone interview with author, October 2003.

⁶¹ Studies prior to the 1993 disclosure include John Davey Lewis Moore, *South Africa and Nuclear Proliferation* (Basingstoke: Macmillan, 1987); Robert Scott Jaster, "Politics and the 'Afrikaner Bomb,'" *Orbis* 27 (Winter 1984); Richard K. Betts, "A Diplomatic Bomb? South Africa's Nuclear Potential," in Joseph A. Yager, ed., *Nonproliferation and U.S. Foreign Policy* (Washington, D.C.: Brookings Institution, 1980); Michele A. Flournoy and Kurt M. Campbell, "South Africa's Bomb: A Military Option?" *Orbis* 31 (Summer 1988); Spence, "South Africa: The Nuclear Option"; Ronald Walters, *South Africa and the Bomb: Responsibility and Deterrence* (Lexington, Mass.: Lexington Books, 1987). For post-1993 analyses, see the sources cited in Hersh, *The Samson Option*. Studies of South African foreign and security policy in that era include James Barber and John

Barratt, *South Africa's Foreign Policy: The Search for Status and Security* (Cambridge: Cambridge University Press, 1990); Chester A. Crocker, *South Africa's Defense Posture: Coping with Vulnerability* (Beverly Hills: Sage, 1981); Geldenhuys, *Diplomacy of Isolation*; Jaster, *South Africa's Narrowing Security Options*. Concerns about a WMD threat from Soviets or Cubans were mentioned in interviews with Breytenbach and Malan.

⁶² Department of Defence, Republic of South Africa, *White Paper on Defence and Armament Production, 1973*; Department of Defence, Republic of South Africa, *White Paper on Defence and Armament Production, 1975*.

⁶³ Email correspondence from A.J. Buys to author, November 3, 2003.

⁶⁴ Paraphrased account of reactions recounted by A.J. Buys, email correspondence to author, November 3, 2003.

⁶⁵ Memorandum of March 21, 1975, p. 1.

⁶⁶ And while the Atomic Energy Board would have had stronger vested interests in expanding their own nuclear program, they had little to gain from a costly investment in foreign-supplied missiles and potentially much to lose if the warheads were imported as well. For a discussion of the organizational politics of South Africa's nuclear weapons program, see Liberman, "Rise and Fall of the South African Bomb," pp. 63-68.

⁶⁷ Emily O. Goldman, "The Spread of Western Military Models to Ottoman Turkey and Meiji Japan," in Theo Farrell and Terry Terriff, eds., *The Sources of Military Change: Culture, Politics, and Technology* (Boulder, Colo.: Lynne Rienner, 2002), pp. 41-67; Joao Resende-Santos, "Anarchy and the Emulation of Military Systems: Military Strategies and Organizations in South America, 1870-1914," *Security Studies* 5 (Spring 1996); Emily O. Goldman and Leslie C. Eliason, eds. *The Diffusion of Military Technology and Ideas* (Stanford: Stanford University Press, 2003).

⁶⁸ Goldman, "Spread of Western Military Models," pp. 43-44; Benjamin E. Goldsmith, "Imitation in International Relations: Analogies, Vicarious Learning, and Foreign Policy," *International Interactions* 29 (July 2003).

⁶⁹ Itty Abraham, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Postcolonial State* (London: Zed Books, 1998); Scott D. Sagan, "Why Do States Build Nuclear Weapons? Three Models in Search of a Bomb," *International Security* 21 (Winter 1996/97).

⁷⁰ The covert nature of South Africa's nuclear weapons program does not preclude the possibility that initial ambitions were for an overt nuclear posture, ambitions that may have been subsequently dampened by the adverse international reaction in 1977 to the Kalahari test site. The 1975 memo implies an overt "generally known" capability, but makes no mention of prestige as an attraction.

⁷¹ Magnus Malan, interview by author, Pretoria, August 1999.

⁷² Barnard was apparently unaware of the strategy working group convened by Armscor in the early 1980s; Dr. L.D. Barnard, interview by author, Cape Town, January 1999 and Dr. André Buys, interview by author, Pretoria, August 1999.

⁷³ Chris Alden, *Apartheid's Last Stand: The Rise and Fall of the South African Security State* (New York: St. Martin's Press, 1996), pp. 41-44; Philip H. Frankel, *Pretoria's Praetorians: Civil-Military Relations in South Africa* (Cambridge: Cambridge University Press, 1984), pp. 46-70.

⁷⁴ Alden, *Apartheid's Last Stand*, pp. 45-46.

⁷⁵ Eschel Rhoodie, a South African Information Ministry official who helped initiate the 1974 negotiations between South Africa and Israel, recalled that "we argued that at a time when the West (Free World) was lacking in strong and determined leadership, Israel and South Africa formed the two pillars supporting the Free World's strategic interest in Africa and the Middle East. We argued, further that Israel was surrounded by a hundred-million hostile Arabs and that South Africa was confronted by more than twice that number of Blacks, most of them politically hostile to South Africa and the West. Should one of Israel or South Africa succumb, the chances were great that the Black and Arab states would gang up against the remaining one with disastrous results..." Rhoodie, *Real Information Scandal*, pp. 110-11.

⁷⁶ Quoted in Jaster, "Politics and the 'Afrikaner Bomb,'" p. 837. See also Benjamin M. Joseph, *Besieged Bedfellows: Israel and the Land of Apartheid* (New York: Greenwood Press, 1987), p. 17 and

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chap. 10. On commonalities in international diplomacy, see Deon Geldenhuys, *Isolated States: A Comparative Analysis* (Cambridge: Cambridge University Press, 1990); Robert E. Harkavy, "The Pariah State System," *Orbis* 21 (Fall 1977) and "Pariah States and Nuclear Proliferation," *International Organization* 35 (Winter 1981).

⁷⁷ P.W. Botha, interview with the author, *Wilderness*, April 1999.

⁷⁸ On Peres's role in the Israeli program, see Avner Cohen, *Israel and the Bomb* (New York: Columbia University Press, 1998), pp. 17-21.

⁷⁹ Tamir had participated in a 1960's working group to develop a nuclear strategy for Israel and had tried to engage Pentagon officials in discussions on nuclear issues in the 1970s; *Ibid.*, pp. 236, 239; Hersh, *The Samson Option*, pp. 269-270.

⁸⁰ This anecdote was related third-hand from Waldo Stumpf, who heard it from his predecessor as AEB chief, J.W. de Villers. However, it does conflict with the assertion in the *State vs. Blaauw* court judgment that the AEB chief at the time, Dr. A.J. "Ampie" Roux, had approved of the shipments. Liberman, "Rise and Fall of the South African Bomb," pp. 62-63.

⁸¹ Francis Perrin of the French Commissariat à l'Énergie Atomique observed, "We thought the Israeli bomb was aimed against the Americans, not to launch it against America but to say 'If you do not want to help us in a critical situation we will require you to help us, otherwise we will use our nuclear bombs.'" quoted in Daryl Howlett and John Simpson, "Nuclearization and Denuclearization in South Africa," *Survival* 35 (Autumn 1993). The 1973 story is questioned by Evron, *Israel's Nuclear Dilemma*, pp. 71-72.

⁸² Liberman, "Rise and Fall of the South African Bomb," pp. 62-63. Beaufre could be another source. A proponent of small state nuclear deterrence, he had written that nuclear weapons are useful for drawing the assistance of allies, even loose allies or former allies; André Beaufre, *Deterrence and Strategy*, R.H. Barry, trans. (New York: Praeger, 1965). Nuclear deterrence was also viewed as a psychologically valuable component of the kitchen-sink "total strategy" described earlier. One justification for acquiring nuclear weapons, according to Deputy Defense Minister Kobie Coetsee (1978-1980), was that "every option had to be pursued as part of the total strategy." Kobie Coetsee, interview by author, Cape Town, August 1999.

⁸³ George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 29-31.

⁸⁴ Victor Gobarev, "Soviet Policy toward China: Developing Nuclear Weapons, 1949-1969," *Journal of Slavic Military History* 12 (December 1999), pp. 17-31; John Wilson Lewis and Xue Litai, *China Builds The Bomb* (Stanford: Stanford University Press, 1988), pp. 41-44, 60-65; Sergei Goncharenko, "Sino-Soviet Military Cooperation," in Odd Arne Westad, ed., *Brothers in Arms: The Rise and Fall of the Sino-Soviet Alliance, 1945-63* (Stanford: Stanford University Press, 1998), pp. 157-59. The United States collaborated with Britain during World War II on nuclear weapons research, but then cut off cooperation until the mid-1950s; Avery Goldstein, *Deterrence and Security in the 21st Century: China, Britain, France, and the Enduring Legacy of the Nuclear Revolution* (Stanford: Stanford University Press, 2000), pp. 155-62.

⁸⁵ Cohen, *Israel and the Bomb*, chaps. 2-5; Binyamin Pinkus, "Atomic Power to Israel's Rescue: French-Israeli Nuclear Cooperation, 1949-1957," *Israel Studies* 7 (Spring 2002).

⁸⁶ T. V. Paul, "Chinese-Pakistani Nuclear/Missile Ties and Balance of Power Politics," *Nonproliferation Review* 10 (Summer 2003); William J. Broad, David Rohde, and David E. Sanger, "Inquiry Suggests Pakistanis Sold Nuclear Secrets," *New York Times*, December 22, 2003; Burrows and Windrem, *Critical Mass*, passim.

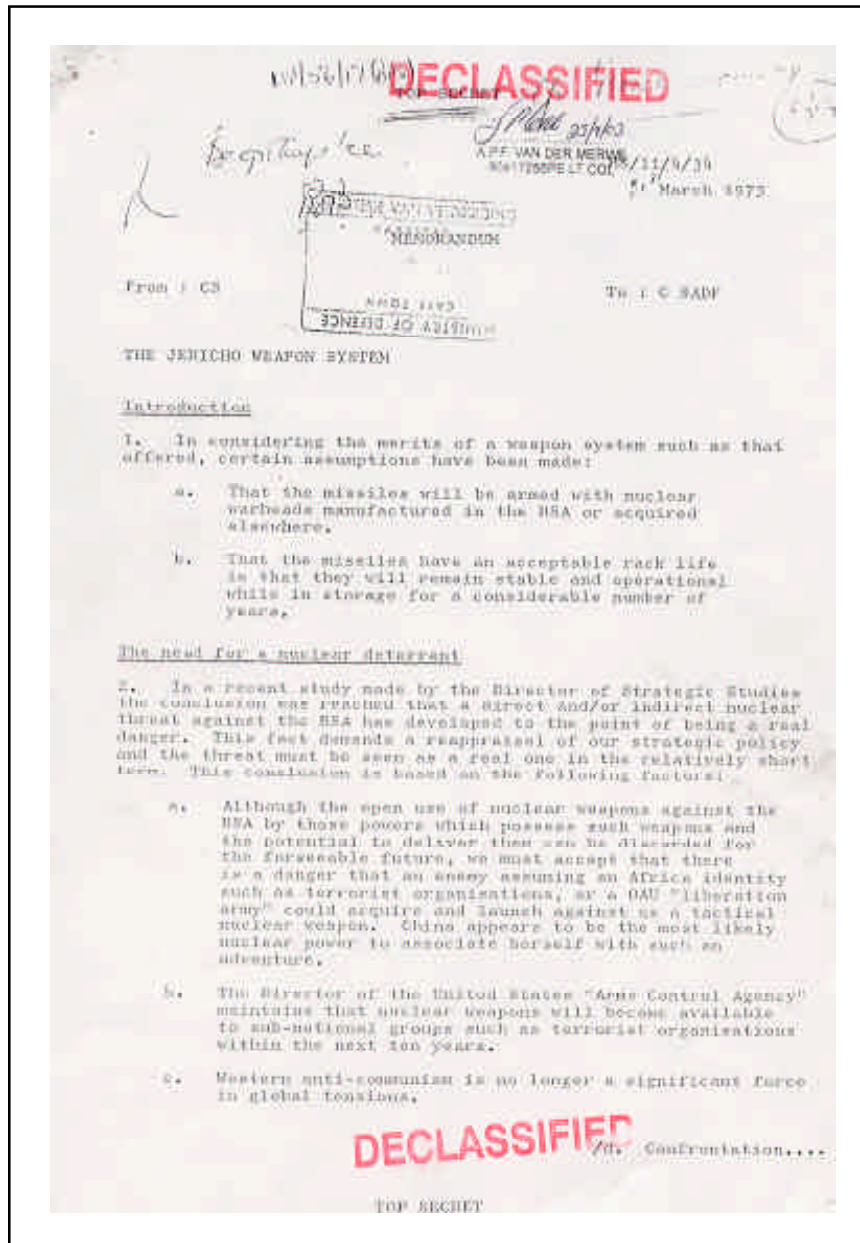
⁸⁷ Gobarev, "Soviet Policy toward China"; Paul, "Chinese-Pakistani Nuclear/Missile Ties."

⁸⁸ Burrows and Windrem, *Critical Mass*, pp. 452-453.

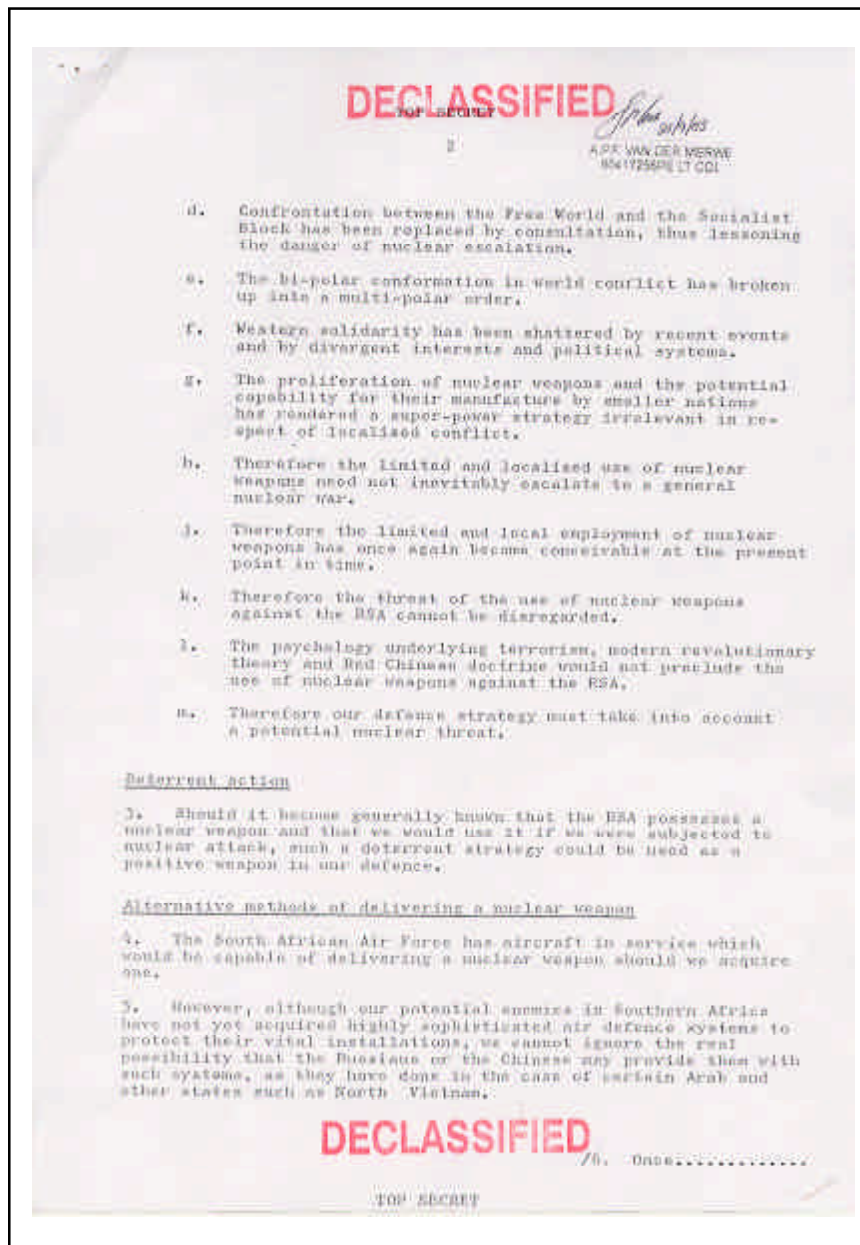
⁸⁹ The political leadership did not appear particularly alarmed at the time, as evident in the defense department's 1975 *White Paper on Defence and Armament Production*, though it authorized an abortive intervention into Angola in 1975 against the Marxist regime. Department of Defence, *White Paper on Defence and Armament Production*.

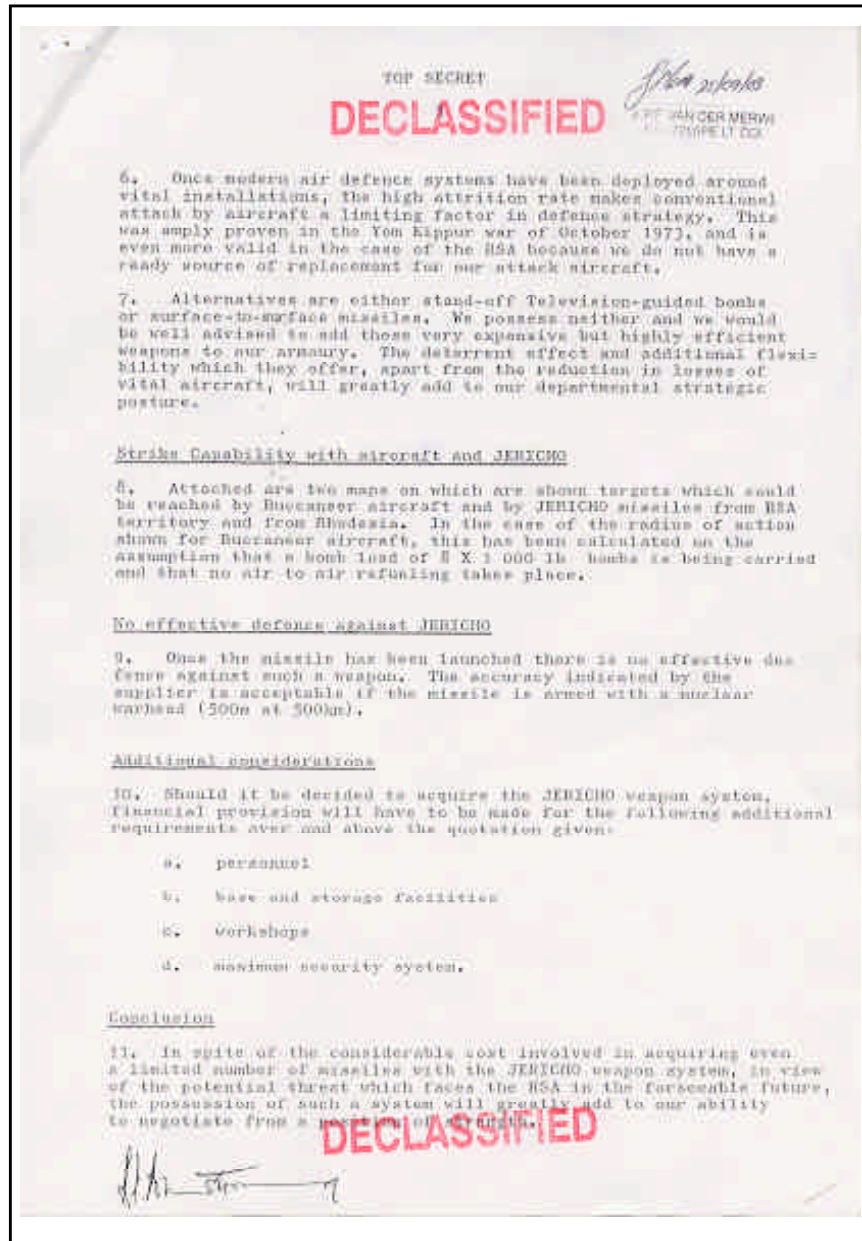
⁹⁰ Verne Harris, Sello Hatang, and Peter Liberman, "Unveiling South Africa's Nuclear Past," *Journal of Southern African Studies* 30 (forthcoming 2004).

APPENDIX 1
MEMORANDUM OF MARCH 1975



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