Director of
Central
Intelligence

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Trends in South Africa's Nuclear Security Policies and Programs

National Intelligence Estimate

WARNING: The material in this document is sensitive. Distribution of this Estimate should be strictly limited to those officials who require access to the subject matter for the performance of their duties.

~~Top Secret~~

NIE 73/3-84/CX
SC 03101-84
3 October 1984

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KEY JUDGMENTS

We believe that South Africa has the capability to produce nuclear weapons on short notice. We believe [redacted] that South Africa has already stockpiled the components for several test devices or first-generation nuclear weapons that use enriched uranium. [redacted]

[redacted] Given the size of its nuclear program, South Africa could stockpile annually enough highly enriched uranium for two to four nuclear explosives, depending on the design. (S-NF-NG-OC)

Since the furor that accompanied the discovery of the Kalahari test site in 1977, South Africa has followed a policy of calculated ambiguity with respect to its nuclear options by intimating that it has the capability to produce nuclear weapons while disavowing any interest in doing so. Such a policy allows it to avoid the intensified pressures for safeguards and the sanctions that would inevitably follow any revelation of a weapons capability. At the present time, Pretoria appears satisfied with that policy and is likely to adhere to it through the five-year time frame of this Estimate. [redacted]

There is no hard evidence about the degree to which South Africa has incorporated nuclear strategy into its military planning. The South African defense force's clear-cut conventional military superiority in the region makes a nuclear strike capability unnecessary. Nuclear weaponry would have little effect against the principal military threats—guerrillas operating from domestic or border-state rural bases and insurrection in black urban areas. Moreover, the sense of urgency that prevailed in the 1970s, largely because of the perceived Soviet threat, appears to have diminished. [redacted]

Much of the South African capability is based on work carried out in the mid-1970s [redacted] However, it is reasonable to assume that research and development has continued, with the possibility that emphasis may have shifted more toward fabrication and delivery systems rather than continued stockpiling of uranium and components. Although South Africa already has several types of aircraft capable of delivering nuclear explosives, those aircraft are aging and are becoming

[redacted]

increasingly vulnerable to the air defense systems being provided its adversaries by the Soviet Union. (S NF NC OC)

[redacted]

We believe that South Africa is not likely to test a nuclear explosive device during the next five years. The increase in tensions on the continent and with the West that would accrue from a test of a nuclear device would be greater than the political/military gains to be derived. However, growing tensions between the United States and the Soviet Union, if accompanied by perceptions that the United States was losing ground to Moscow in Africa, or was losing interest in Africa, might provide incentive to test as a caution to the Soviets. Any attempted intimidation by Moscow on behalf of its African clients might provoke the South Africans to conduct a test as a warning that Pretoria will not be bullied. (c)

There is still considerable disagreement within the Intelligence Community as to whether the flash in the South Atlantic detected by a US [redacted] satellite in September 1979 was a nuclear test, and if so, by South Africa. If the latter, the need for South Africa to test a device during the time frame of this Estimate is significantly diminished. (S NF)

Revelation that South Africa possessed nuclear weaponry would immediately exacerbate the tensions that exist in southern Africa. Black African states, supported by the Soviet Union, would seek stricter sanctions against Pretoria and raise the specter of South African nuclear blackmail to achieve regional domination. They might seek some form of protective guarantee from their patron. Although Moscow would almost certainly not offer any explicit nuclear commitment, it might provide more sophisticated air defense systems and step up arms and advisory assistance. (c)

Revelation would put the United States in an awkward position. Black African states would hold the United States at least partially responsible for Pretoria's nuclear status and the United States would be criticized for not restraining South Africa's nuclear progress. Conversely, strong US denunciations of South Africa's nuclear weapons capability would be perceived as evidence to Pretoria that the United States has taken an anti-South African position. We do not believe that a harsh US reaction would provoke Pretoria to cut off important minerals exports to the United States, as some observers have contended. (c)

South African testing of a nuclear device would weaken the international nonproliferation regime and encourage the acquisition of nuclear weapons by other countries by demonstrating that indigenous development of nuclear weapons can be accomplished. Several states of proliferation concern might feel fewer inhibitions about developing nuclear weapons or openly publicizing their nuclear capabilities if South Africa suffered no serious international repercussions. (c)

South Africa's resumption of discussions with the IAEA concerning safeguards for the semicommercial enrichment facility at Valindaba and its commitment to request safeguards for its own nuclear exports may be designed to mitigate future attacks on its IAEA membership.

[redacted]

NF NC

(c)

[redacted]

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DISCUSSION

Introduction

The Search for Security

1. The rapid—and largely unforeseen—escalation of conflict in southern Africa following Portugal's withdrawal in the mid-1970s had a traumatic impact on South Africa. Until that time, the Portuguese colonies of Angola and Mozambique were the furthest extensions of the so-called "white redoubt" and, along with the white minority regime in Rhodesia, constituted a buffer against those liberation groups seeking black majority-rule in South Africa and Namibia. By and large, South Africans felt secure within their borders and confident of their ability to contain black dissidence. (c)

2. South Africa's intervention in the Angolan civil war of 1975-76 failed, however, to turn the tide in favor of pro-Western liberation groups, and this sparked a major reassessment of the country's military capabilities and policies. The intervention showed that South Africa lacked the resources to wage a protracted military campaign. In addition to having been overwhelmed by the magnitude of the Soviet and Cuban involvement in Angola, military officials also identified serious deficiencies in materiel, communications, and logistics. (c)

3. Those deficiencies, set against the emergence in Angola and Mozambique of Marxist-oriented, anti-apartheid regimes heavily dependent on Soviet and Cuban support, generated fears in Pretoria that those former colonies would become staging areas for a direct Soviet-backed invasion, perhaps involving Cuban as well as black African forces. A subsequent rise in guerrilla activity in both South Africa and Namibia by guerrillas operating out of Angola and Mozambique and an upsurge in racial demonstrations in South Africa added to a sense of beleaguerment. (c)

4. Thus, by the late 1970s, South Africa saw itself as standing virtually alone against a "total onslaught" being waged against it by black insurgents and radical black African states supported by the Soviet Union and its allies. In response, South African leaders adopted a "total national strategy" aimed at creating a self-sufficient, flexible defense force capable of deterring conventional as well as guerrilla threats. In a crash effort to redress the military imbalance, top priority was given to building up the conventional capabilities of the armed forces and to developing an indigenous arms industry capable of reducing—and eventually eliminating—dependence on foreign sources of supply (see inset on page 6). (c)

5. The transfer of power to a black majority regime in Rhodesia in 1980 came as another blow to South Africa's sense of security. By then, however, the South African military had adopted a "forward defense" strategy based on increasingly aggressive conventional and covert military operations against guerrilla bases and local defense positions in neighboring states, particularly Angola and Mozambique. As a result, South Africa has reasserted itself as the dominant military power in southern Africa. It has forced Mozambique to accept a mutual nonaggression pact and is exerting pressure on Angola to send home the more than 30,000 Cuban troops stationed there. In addition, it has convinced those governments to place restrictions on guerrillas operating from their territories. (c)

The Nuclear Option

6. [redacted] By 1977, South Africa had constructed a nuclear test site in the Kalahari Desert and appeared well on its way toward testing a nuclear explosive device. ~~(S NF NC OC)~~

7. The international outcry that followed the discovery of the Kalahari site persuaded Pretoria to abandon any plans it may have had for a test and to impose tighter security over its nuclear explosives programs. A mysterious flash in the South Atlantic Ocean in 1979 raised fears in the international community that Pretoria finally had tested an explosive device, although there is still strong disagreement within the Intelligence Community as to whether a test actually took place (see annex B). (c)

The Regional Military Balance

In relation to its neighbors South Africa is a superpower, although it falls far short of that status by Western or Soviet standards. The South African defense force is made up of 76,500 active-duty personnel including 28,000 regular forces. In all, South Africa probably could muster a force of approximately 400,000 soldiers when ready reserves, home guard units, and older males liable for service in case of national emergency are added in. (c)

The government-controlled Armaments Corporation of South Africa, with assets now estimated at $1.2 billion, currently meets the bulk of the military's requirements for ground force equipment. It produces small arms and ammunition, artillery and rockets, armored vehicles, tactical communications equipment, and landmines. It also modifies and upgrades aging equipment such as the British-supplied Centurion tank of World War II vintage. Pretoria still faces serious problems, however, replacing its aging fleet of fighters, bombers, and reconnaissance aircraft. (c)

In contrast, the black armies in the region are ill-trained, inadequately supported, and poorly led. Making the transition from bush fighter to conventional soldier has been extremely difficult. Angola has some 30,000 to 35,000 men under arms, and Mozambique has close to 22,000. The majority in both countries, however, are engaged in counterinsurgency operations, for which they are inadequately prepared, or in local law enforcement. (c)

Zimbabwe's armed forces, once second in ability only to those of South Africa, now number about 45,000 but have been weakened since independence in 1980 by the loss of white professionals, desertions, political interference, and the inevitable frictions arising from tribalism and the largely failed integration of rival guerrilla elements. (c)

While South Africa has an indigenous arms industry, Angola and Mozambique must depend on Soviet-supplied weaponry. Both countries have more battle tanks than South Africa and together have more (and more advanced) jet fighter aircraft. However, neither country has the personnel trained to operate or maintain the equipment, and the flow of spare parts is unreliable. (c)

The only weaponry in the Angolan inventory that limits South African operations within Angola are the sophisticated SA-8 and SA-9 surface-to-air missiles provided by the Soviet Union in mid-1983. This modern air defense system is manned by Soviet and/or Cuban personnel at bases 150 to 200 miles north of the Angola-Namibia border. (c)

8. The Soviet Union's projection of power into southern Africa in the mid-1970s may well have been the key factor in Pretoria's decision to step up its nuclear explosives research and development. South Africa's leaders long have identified the Soviet Union as their country's major adversary. With Moscow having once again (as it did elsewhere in Africa in the 1960s) brought the great-power rivalry to the continent—and with it the perceived threat of an invasion of South Africa—the added protection of a credible nuclear deterrent took on a new urgency.[1] (~~S NF NC OC~~)

9. South Africa's readiness to move ahead with both conventional military buildup and nuclear explosives development has also been motivated by the belief that it cannot depend on the West. That belief—along with the Soviet threat—will dominate South African defense thinking through the 1980s and probably beyond. (~~S NF NO OC~~)

10. Prior to the 1970s, South Africa's leaders extolled the idea that their country was of strategic importance to the West given its location and mineral resources. Because of that importance, they argued, it was a major Soviet target. Thus, South Africa could count on Western assistance in the event of Soviet-inspired aggression, Western criticism of apartheid notwithstanding. In 1976, however, following the ill-fated intervention in Angola, Defense Minister (now Prime Minister) Botha, warned that realities had changed and that South Africa no longer could count on such assistance. That warning was based to a large degree on the widespread belief among South African military planners that their intervention in Angola could have succeeded if the West had been willing to support it. (c)

11. Uneasiness over the West's reliability was reinforced by its outcry over the Kalahari test site and the mandatory arms embargo against South Africa passed by the United Nations. In addition to calling for an embargo against conventional military assistance, the embargo also called for a ban against UN member states cooperating with South Africa in developing nuclear weapons. The West's refusal to veto the embargo deepened South African suspicions. (c)

[1] The present director of the National Intelligence Service, Dr. Barnard, wrote extensively on the strategy of nuclear deterrence while a university professor in the 1970s. He urged that South Africa develop a nuclear weapons capability and demonstrate it to the world. He justified his position by observing that Moscow would have few reservations about using nuclear weapons against South Africa. (c)

12. Since then, South Africa's defense policy—including nuclear policy—has been driven by a strong desire for self-sufficiency and a fear of Western interference. At the same time, it follows a policy of calculated ambiguity by which it intimates that it has a nuclear weapons capability while disavowing any interest in testing a nuclear device. (c)

South Africa and Nonproliferation

13. South Africa, which has been a charter member of the International Atomic Energy Agency (IAEA) since 1957, has been reluctant to make major international legal commitments that would restrict its freedom to develop nuclear technology. It is probable that its refusal to adhere to the Non-Proliferation Treaty (NPT) is in large part due to the fact that the treaty requires signatories to place all fissile material under IAEA safeguards. (c)

14. Pretoria's unwillingness to bend to outside pressure from Western supplier states concerning safeguards requirements was perhaps best illustrated in the early 1980s when the South Africans had to secure nuclear fuel for the first of the two Koeberg power reactors. Faced with a joint US-French strategy designed to force them to accept comprehensive safeguards in return for guaranteed fuel supply, the South Africans canvassed the uranium market and succeeded in obtaining a sufficient supply of low enriched uranium from a number of alternative sources, [redacted]

15. Pretoria's position concerning IAEA safeguards on specific South African nuclear facilities has been more flexible. It has acceded to requests from supplier states for such controls involving imported nuclear materials, equipment, and technology. For example, the country's only research reactor at the Pelindaba nuclear research center has been under IAEA safeguards since 1965 because it utilizes US-origin enriched uranium. (US supplies were discontinued in the mid-1970s.) Likewise, the two French-built Koeberg power reactors are open to IAEA inspection. (c)

16. In January 1984 South Africa announced that it would be willing to resume discussions with the IAEA concerning safeguards for the indigenous semicommercial uranium enrichment facility at Valindaba. The motives behind this announcement are not clear. This gesture was not the first time Pretoria has shown a cooperative attitude. On a number of occasions between 1973 and 1977, the South Africans demonstrated an interest in sharing knowledge about their unique aerodynamic enrichment process with other countries and a willingness to place the projected commercial facility under IAEA safeguards.[1] However, persistent and successful efforts by the black African states and India after 1977 to restrict South Africa's ability to participate in IAEA activities reinforced a South African proclivity toward a siege mentality. As a result, Pretoria saw no incentive to cooperate on safeguards issues with an international organization that appeared to have become captive of South Africa's enemies. (c)

17. The controversy with regard to South Africa's status within the IAEA has become less intense in recent years but the problem still remains. It is possible that Pretoria's strategy is to head off future attacks on its IAEA membership. There have been several UN resolutions introduced during the past year calling on the IAEA to terminate all contact with South Africa until it accepts comprehensive safeguards. Several Western nations, including the United States, have urged that no action be taken in view of the resumption in early August of South African–IAEA discussions concerning the possible application of IAEA safeguards to the semicommercial enrichment facility at Valindaba. (c)

18. Pretoria's public commitment in the January 1984 announcement to request IAEA safeguards for all of its own nuclear exports can be viewed as another positive development justifying a more restrained approach in dealing with the South African problem.[1] (c)

19. The actual technical difficulties in reaching a safeguards arrangement for the enrichment facility are considerable and will ensure that discussions will

[redacted] (c)

[1] In that announcement, Dr. J. W. L. DeVilliers stated that, "South Africa will conduct and administer its nuclear affairs in a manner which is in line with the spirit, principles, and goals of the Non-Proliferation Treaty (NPT) and the Nuclear Suppliers Group Guidelines. . . . This would specifically include: I. South Africa will not sell uranium to nonnuclear weapons countries without International Atomic Energy Agency or Euratom safeguards; II. South Africa will not make available sensitive technology to any other country without Agency or Euratom safeguards; III. South Africa will not sell enriched uranium or nuclear equipment without Agency or Euratom safeguards." Dr. DeVilliers concluded by stating that any sales of such material or equipment must have guarantees that it will only be used for peaceful purposes. (c)

be protracted.[1] The enrichment process utilized by the South Africans has unique features that Pretoria will wish to protect as a commercial secret. (c)

20. The South Africans are acutely aware of the time it will take to resolve the safeguards issue and may well have calculated that their gesture was a relatively costless way to buy time and more protection against further attacks on their IAEA membership status. If the black African states and others continue their effort to expel Pretoria from the IAEA, the South Africans will have a legitimate rationale for breaking off negotiations at any time. We doubt that there is some other vested interest that would persuade Pretoria to remain at the negotiating table under such circumstances.

[redacted] (c)

South Africa's Nuclear Explosives Capability

21. Evidence that South Africa has developed a significant nuclear explosives capability is substantial and compelling.

[redacted]

22. We are reasonably confident of the existence of an active nuclear explosives program dating back to the early 1970s. The program envisioned testing, and efforts proceeded in that direction until the Kalahari test site was discovered by the Soviet Union in 1977.

[redacted]

23.

[redacted]

[1] A serious proliferation concern is whether IAEA safeguards coverage can be extended in some manner to the pilot enrichment facility at Valindaba.

[redacted]

[redacted] (S NF NC OC)

Genesis and Development

24. According to open literature, South Africa could have begun research on nuclear explosives devices as early as 1968-69, when the Valindaba plant was being designed and at least one South African scientist was in the United States studying the application of peaceful nuclear explosive

[redacted] (S NF NC OC)

25

[redacted] (S NF NC OC)

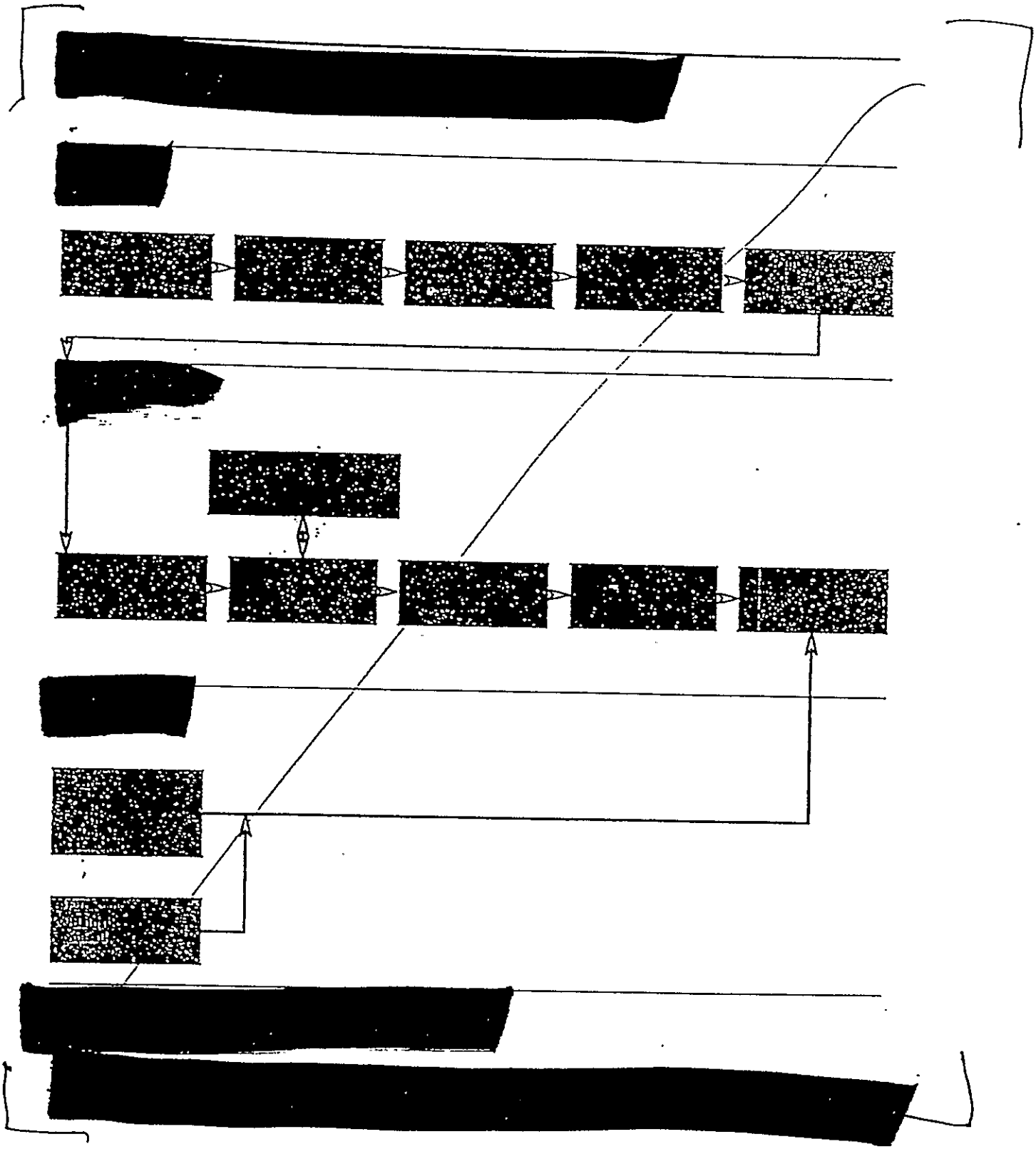
26.

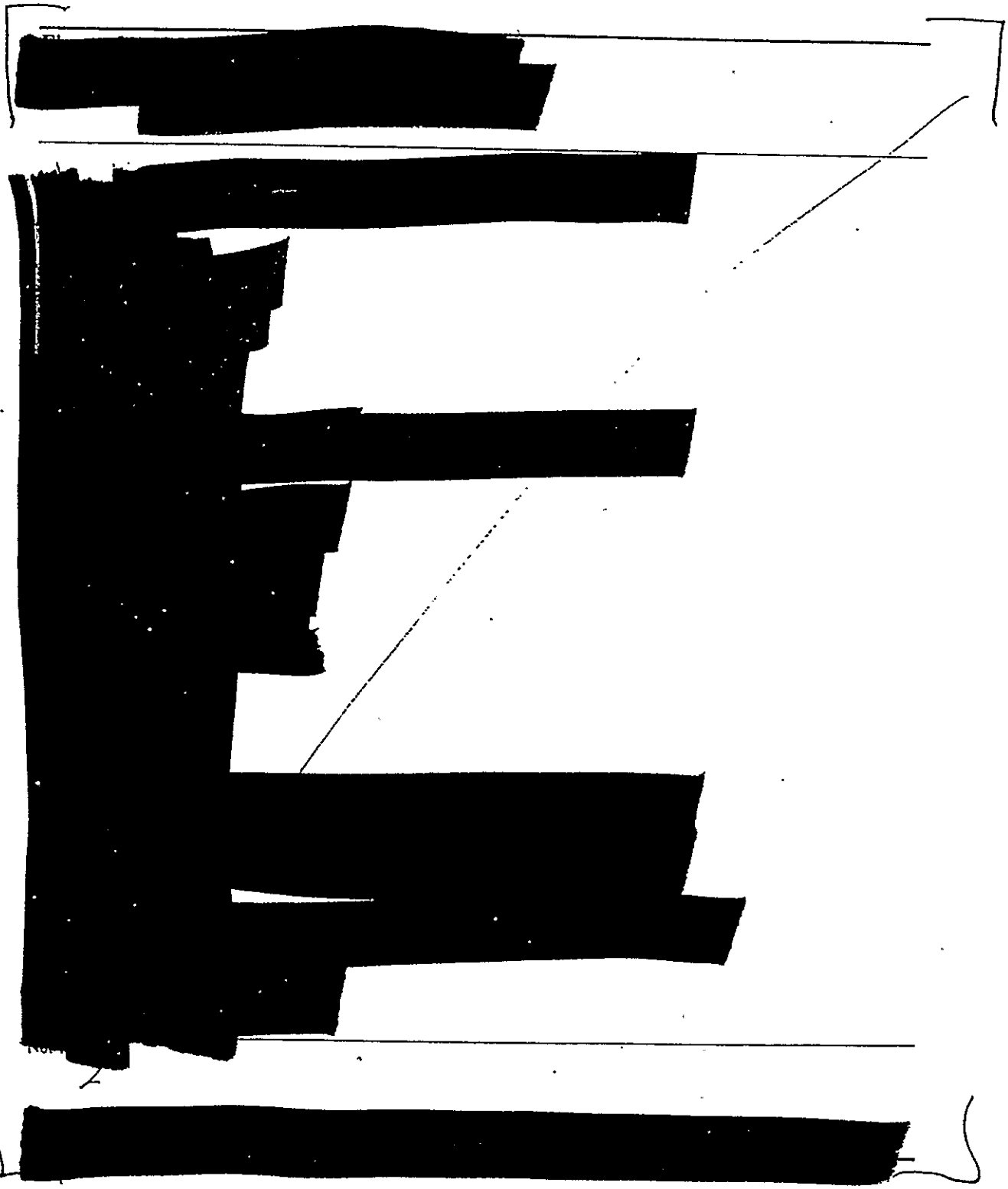
[redacted] (S NF NC OC)

27

[redacted]

[redacted]





28. [redacted] (S NF NC OC)

29. [redacted] (See annex B.) (S NF NC OC)

Availability of Fissile Material

30. The Valindaba pilot scale uranium enrichment plant was crucial to South Africa's development of a nuclear explosive device. The plant uses a unique aerodynamic enrichment process developed from research that began in 1961. Pretoria asserts that it is a proprietary process and has refused to subject it to international nuclear safeguards inspection for fear that the design and operating data for it will be stolen. (S NF NO OC)

31. [redacted] (S NF NO OC WN)

[redacted] (S NF NO OC WN)

33. [redacted] (S NF NC OC)

34. South Africa currently is building a semi-commercial-scale enrichment plant for producing low enriched uranium for the two Koeberg power reactors. [redacted] The capacity of the semi-commercial-scale plant will be about 30 percent higher than the needs of the Koeberg reactors. This excess could be used for export or making up for unscheduled plant shutdowns. (S NF WN)

35. [redacted] (S NF WN)

36. [redacted] (S NF NC OC)

Heavy Water Technology and Plutonium Production

[redacted]

[redacted] (S-NF-NC-OC)

South Africa once had plans to develop natural uranium power reactors. Those plans were abandoned in the 1960s in favor of light water reactors, purportedly because of economic [redacted]

[redacted] (S-NF-NC-OC)

In comparison to the enrichment issue, we believe that South Africa would have a less credible argument for rejecting nuclear safeguards either on the heavy water plant or on an indigenous plutonium production reactor. These technologies do not have as much proprietary sensitivity and uniqueness as does the South African enrichment process. (S-NF-NC-OC)

Interest in heavy-water may portend yet another technology—spent fuel reprocessing. The South Africans have shown interest in this technology for several years, and every country of proliferation concern that has added heavy-water-based natural uranium reactor technology to its program also has shown strong interest in reprocessing. (S-NF-NC-OC)

37. [redacted]

[redacted]

[redacted]

[redacted] (S-NF-NC-OC)

38. [redacted]

[redacted] (S-NF-NC-OC)

Foreign Suppliers

39. Foreign suppliers, predominantly West European, have been important to South Africa's nuclear program from its inception. The development of South Africa's nuclear explosives program would not have been possible without foreign technical assistance during the 1970[redacted] (S-NF)

40. [redacted]

[redacted] (S-NF-NC-OC)

41. [redacted]

42. [redacted]

[redacted] (S-NF-NC-OC)

43. [redacted]

44. [redacted]

45. The South Africans have had little difficulty acquiring materials and technology essential to their nuclear weapons development program. There are a number of reasons for this. First, the program was very secret for most of its history, and nonproliferation concerns were lower during the 1960s and early 1970s when many important acquisitions took place. [redacted]

46. [redacted]

47. [redacted]

(S-NF-NC-OC)

48. [redacted]

[redacted] (S-NF-NC-OC)

Prospects for South Africa's Nuclear Weapons Development

Size and Nature Over the Next Five Years

49. [redacted] Pretoria's apparent standdown regarding testing in recent years suggests that nuclear development has met the country's military requirements, at least to the extent warranted by current perceptions of the strategic threat and of the risks involved in overt actions such as testing. It also suggests that the diplomatic and political benefits of being seen as having once prepared for a nuclear test are considered to be as great as if a test had been carried out.[a] (S-NF)

50. [redacted]

[redacted] (S-NF-NC-OC)

51. South Africa will not be constrained by economic considerations [redacted]

(S-NF-WN)

Considerations Regarding Nuclear Testing

Nuclear Test Plans

52. [redacted]

[a] Prime Minister Botha stated in 1981 that he could not set the minds of his enemies at rest by signing the Nuclear Non-Proliferation Treaty. (S)

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DENIED IN FULL

Exemptions: (b)(1) & (b)(3)

[redacted] (S-NF-NO-OC)

53. [redacted] (S-NF-NO-OC)

54. [redacted] (S-NF-NO-OC)

55. [redacted] (S-NF-NC-OC-WN)

Political Considerations

56. Since 1977 South Africa has followed a policy of calculated ambiguity with respect to the nuclear option by intimating that it has the capability to produce nuclear weapons while disavowing any interest in doing so. (U)

57. Such a policy holds a number of benefits, particularly for a pariah state such as South Africa. It forces Pretoria's adversaries to assume that South Africa has a weapons capability and to factor that assumption into their policy formulation. For example, even though Moscow need have no fear of South Africa's ability to launch a nuclear strike against the Soviet Union, it must take into consideration the damage South Africa could inflict on the Soviet Union's African clients, as well as on Soviet and Cuban garrisons in Africa. (S-NF-NO-OC)

58. Calculated ambiguity also allows South Africa to avoid the intensified pressures for nuclear safeguards and sanctions that would inevitably follow any open display of a weapons capability. Under present policy it can proceed with research and development fairly confident that the court of world opinion lacks the evidence to bring a case against it. (S-NF)

59. The assumption on the part of its adversaries that South Africa has a nuclear weapons capability also gives Pretoria a deterrent credibility while allowing it to avoid the stigma of being the first to introduce nuclear weapons on the African continent. That introduction also might prompt neighboring black African states to seek protection under the Soviet nuclear umbrella or—though less likely—to allow deployment on their territory of tactical nuclear weapons superior, no doubt, to any South Africa might have. (S-NF)

60. [redacted] (S-NF)

61. The South African defense force's clear-cut superiority in southern Africa and the success of its operations against its adversaries make a nuclear strike capability irrelevant at the present time. In addition, the cost and effort involved in maintaining and upgrading the conventional capabilities of the military and of acquiring, if possible, new and advanced weaponry, particularly aircraft and tanks, strongly suggest that a nuclear weapon is far down on the military's shopping list. (S-NF)

62. We believe that South Africa is not likely to test a nuclear explosive device during the time frame of this Estimate. At the present time, the sense of urgency associated with nuclear development in the 1970s appears to have diminished. Moreover, the increase in tensions on the continent and with the West that would accrue from a test would be greater than the political/military gains to be derived, particularly in view of South Africa's military superiority in the region and the conventional deterrent capability it now enjoys. (S-NF-NO-OC)

63. There are circumstances which could induce the South Africans to change their policy and test a nuclear device. International considerations could lead to a nuclear test far sooner than regional ones, at least within the period of this Estimate. Growing tension between the United States and the Soviet Union, if accompanied by perceptions that the United States

was losing ground to Moscow in Africa, or was losing interest in Africa, might give added weight to advocates of nuclear deterrence and trigger a test. (S NF)

64. Stronger Soviet efforts to defend its African allies either with conventional weapons or intimations of stronger retaliation could force South Africa to counter with a test and with proclamations that it will not be bullied. A private Soviet message last November condemning South Africa's military policy toward Angola, while not accompanied by threats of retaliation, nonetheless was regarded by Pretoria as an attempt at intimidation. (S NF)

Technical Considerations

65. Although we believe that the political considerations governing whether South Africa conducts a nuclear test are preeminent, there are, nevertheless, significant technical considerations as well. These relate principally to reliability and performance of nuclear explosives devices. (S NF)

66. [redacted] (S NF NC OC)

67. [redacted]

[redacted] (S NF NC OC)

Alternative Scenarios

68. [redacted] it is possible that South Africa has leapfrogged the testing phase and is concentrating on the weaponizing and delivery of its nuclear explosives device. Afrikaners are a contingency-minded people and as such probably would prefer to have a deliverable nuclear weapon rather than be forced to develop one hastily in the face of a worsening security situation. (S NF NC OC)

69. The head of South Africa's National Intelligence Service, Dr. Bernard, voiced that point of view in 1979 when he publicly stated that "by the time a nuclear crisis really faces us, it will probably be too late to make ourselves really prepared and to be able to defend ourselves at that level." (C)

70. Another alternative scenario is that South Africa is working on advanced design concepts such as boosting or the thermonuclear device that was originally tasked in 1973 [redacted] (S NF NC OC WN)

71. [redacted] (S NF NC OC WN)

Delivery System: Present Status and Future Prospects

It is unquestionable that the Republic of South Africa has the technological capacity to manufacture nuclear arms as well as sophisticated systems of delivery with the desired accuracy and penetration.

—(Commodore H. F. Nel, speech to the South African Institute of Strategic Studies, 1980.) (C)

72. Virtually all of South Africa's combat aircraft can carry a nuclear payload. These include the Mirage F1AZ, the Mirage III EZ, the Buccaneer S Mk 50, the Impala, and the Canberra B(I)Mk 12. We do not believe the Impala is a sound tactical choice, however, because of its small size and inferior performance. This issue is discussed in detail in annex C. (S NF)

73. In 1976, the South African Air Force (SAAF) publicly announced that Buccaneer bombers had been used for practicing nuclear delivery techniques. Using conventional bombs, five Buccaneer bombers destroyed a decommissioned 797-ton World War II salvage ship off Cape Town. The bombers released their bombs 3 to 5 miles away from the ship, then pulled up sharply and veered away. The SAAF further characterized the exercise as employing a "computerized technique to deliver nuclear bombs and escape the effect of the resulting explosions." (U)

74. [redacted] (see annex C). (S NF)

75. [redacted] (S NF NC OC WN)

Implications of South African Nuclear Weapons Development

76. For the past few years at least, South Africa's nuclear program has not been a major source of contention in Africa nor has it had adverse implications for the United States except in relation to the international nonproliferation regime. With the exception of the discovery of the Kalahari test site in 1977 and the mysterious flash in the South Atlantic in 1979, South Africa's nuclear program has provoked little condemnation. This is partly because of its low visibility and partly because Africans—who would be the first to condemn—have been preoccupied with other matters. The low level of open contention regarding Pretoria's nuclear development has provided the United States with room to maneuver [redacted] to attempt to bring South African facilities under international nuclear safeguards. (S NF NC OC)

77. Revelation that South Africa possessed nuclear weaponry would immediately exacerbate the tensions in southern Africa. Black African states, supported by the Soviet Union, would renew their calls for UN and other sanctions against Pretoria. Those calls would be more intense than previous ones in view of South Africa's recent military operations in the region and fears of South African nuclear blackmail to achieve regional domination. Moscow's clients in southern Africa might seek some form of protective guarantee from their patron. While the Soviet Union almost certainly would not offer any explicit nuclear commitment, it might provide more sophisticated air defense systems and step up arms and advisory assistance. In addition, Moscow could be counted on to issue generalized but ominous threats against South Africa and those who were suspected of contributing to its nuclear development. (S NF)

78. Black African states would hold the United States at least partly responsible for Pretoria's nuclear status, particularly if the United States did not join in the denunciations. In African eyes, the United States has done little to restrain South Africa's military operations in the region and the United States as a nuclear superpower would be criticized for not restraining its nuclear progress as well. (S NF)

79. [redacted] (S NF)

80. On the other hand, strong US denunciations would be additional evidence to Pretoria that the West is undependable or, at the very least, that the United States expected South Africa to meet the threats against it with one hand tied behind its back. Many South African officials long have believed that accepting the safeguards demanded by the West puts smaller nuclear countries at a distinct disadvantage. We doubt that a harsh US reaction would provoke Pretoria to cut

off important minerals exports to the United States, as some observers have contended, since economic reality probably would prevail over South African pique. A cutoff could become more possible, however, should the United States actively seek to interrupt the flow of nuclear-related equipment and technology to South Africa. (S NF)

81. South African testing of a nuclear device would weaken the international nonproliferation regime and encourage the acquisition of nuclear weapons by other countries by demonstrating that indigenous development of a nuclear weapons capability can be successfully accomplished. Several states (such as Pakistan, Argentina, Brazil, and Israel) might feel fewer inhibitions about developing nuclear weapons or openly publicizing their nuclear weapons capabilities if South Africa suffered no serious international repercussions or technological setbacks. (S NF)

[redacted]

ANNEX A

THE CIVIL NUCLEAR PROGRAM

1. Although South Africa has vast coal reserves and exports significant amounts of coal, it saw a need for nuclear power as early as the 1960s. This need arises because South Africa has built its electrical power plants where its coal is located. A number of the developed regions in South Africa, most notably the western Cape, are not near coal deposits, however, and transporting coal by rail or transmitting power over electrical lines, at distances sometimes up to 1,500 kilometers, is inefficient and prohibitively expensive. (C)

2. Pretoria chose therefore to construct nuclear power plants on the coast to ensure adequate cooling water from the ocean. In fact, the recent drought in South Africa has heightened South African interest in additional nuclear plants since some conventional power plants located inland have been forced to shut down because of inadequate cooling water supply. (C)

3. South Africa's entry into the realm of civil nuclear power began in 1976 when it signed an agreement with a French-led consortium to supply two 922-megawatt (electrical) light water reactor power plants for the Koeberg nuclear station near Cape Town. The first of these reactors started up for initial testing on 19 March 1984. When both reactors are operating, they will contribute about 8 to 10 percent of the country's electrical power needs. (C)

4. The problems encountered in obtaining foreign enriched uranium fuel have pushed Pretoria into a program for self-sufficiency in nuclear fuel supply. It is developing and/or constructing commercial-scale facilities for uranium processing, enrichment, and reactor fuel fabrication. These facilities, shown in figure 4, should be available by the time current foreign supply contracts are completed. (S NF NC OC)

5. [redacted] (S NF NC OC)

Heavy Water Technology and Its Implications

6. [redacted]

[redacted] (S NF NC OC)

7. In the 1960s a South African effort to develop a heavy-water-based power reactor was abandoned. A competing effort on a process for uranium enrichment, which would support a light-water-based nuclear fuel cycle succeeded, however, and development of the process began. (S NF)

8. [redacted] (S NF NC OC)

9. [redacted] (S NF NC OC)

10. At the present time, however, there is a large worldwide oversupply of enriched uranium, and an export market does not exist. [redacted] (S NF NC OC)

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Exemptions: (b)(1) & (b)(3)

Spent Fuel Reprocessing

11. [redacted]

(S-NF-NC-OC)

12. [redacted]

(S-NF-NC-OC-WN)

13. [redacted] Under the terms of the French-South African agreement concerning the Koeberg power reactors, all Koeberg fuel reprocessing must be done outside of South Africa. The French reaffirmed that provision in 1983. In addition, the South Africans have announced the construction of a hot cell complex, not for reprocessing but for the examination of nuclear fuel associated with fabrication development [redacted]

(S-NF-WN)

14. [redacted]

(S-NF-NC-OC)

15. [redacted]

(S-NF-NC-OC)

[redacted]

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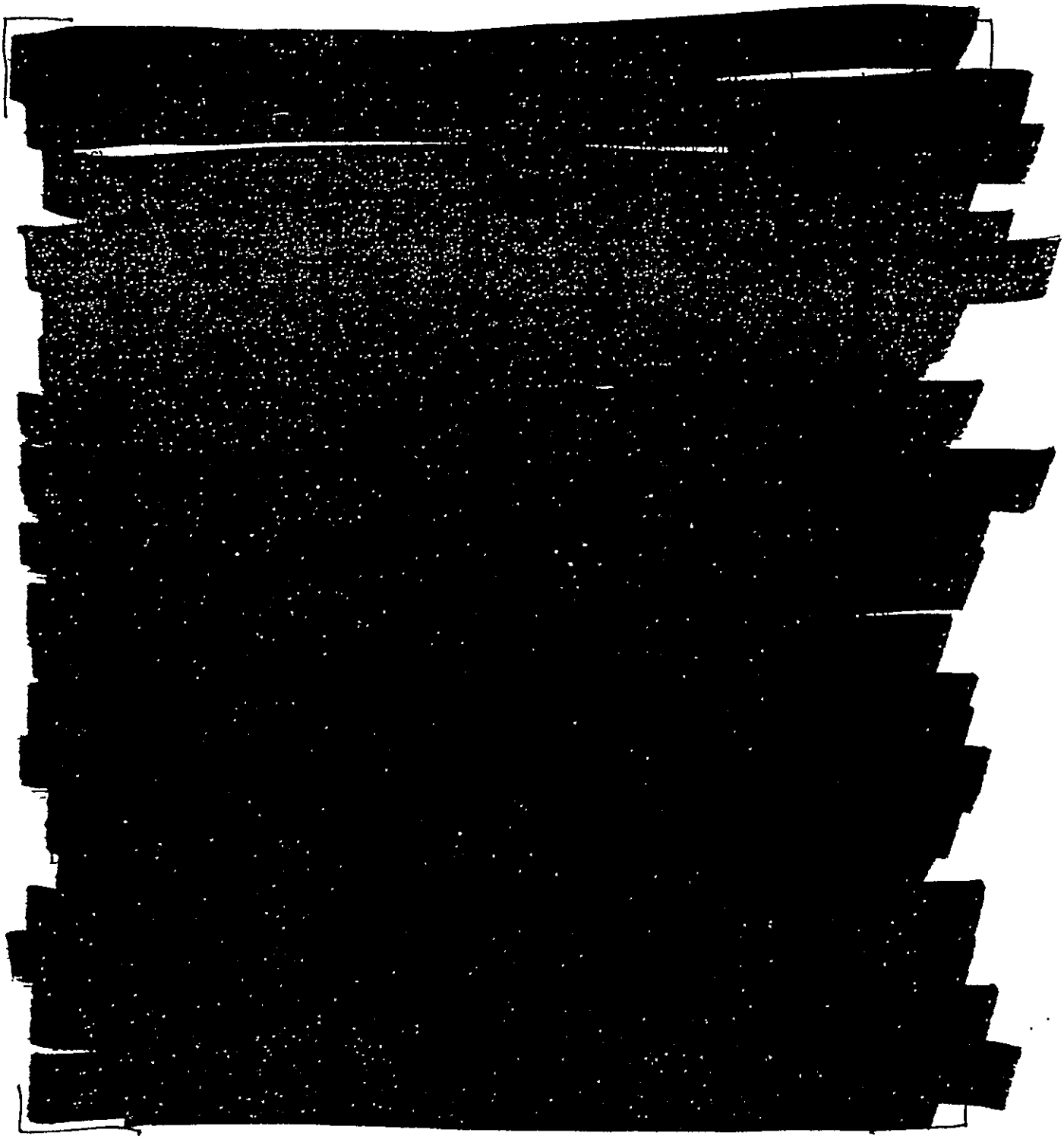
ANNEX B

NUCLEAR TEST CAPABILITIES



[redacted]

[redacted] (S-NF)

The Kalahari Nuclear Test Site

Background

9. The Kalahari nuclear test site is located about 80 kilometers north of Upington in the Kalahari Desert. The site's existence was discovered and publicly made known by the Soviets in August 1977. [redacted] At the time of its discovery, early preparations appeared to be under way for an underground nuclear test. Subsequent to the international uproar created by the Soviets' announcement, the site was mothballed, although not decommissioned. A low level of activity has been observed by satellite imagery since that time. (S-NF-NO-OC-WN).

Site Description

10. The general area around the Kalahari facility is well-suited to underground nuclear testing. The isolation from important centers of activity, the relatively low intrinsic value of the land, and the hard-rock geology are all typical features sought in selecting a nuclear test site. (S-NF-WN).

11. The site itself is large, comprising a perimeter of 20 by 23 kilometers (or an area of about 450 square kilometers). The facility consists of an operational area and a support base. The support base generally is upwind of the operational (test) areas as one would expect at a test site. (S-NF-WN).

12. [redacted]

[redacted]

[redacted]

We estimate that by 1979 Pretoria could have produced enough of that fissile material for a first nuclear device. (c NF NC OC wn)

The Event

17. [redacted]

The Search for Other Technical Evidence

18. A massive Intelligence Community effort was launched to corroborate the occurrence of a nuclear detonation through means other than satellite observations. [redacted]

19. [redacted]

20. [redacted]

The 22 September 1979 Event

The Context

16. While faced with the possibility that South Africa conducted a nuclear test in 1979, we should consider the following context.[9] In 1963, South Africa acceded to the Limited Test Ban Treaty, which prohibits atmospheric nuclear testing. [redacted]

[9] South Africa would be the principal though not the only candidate for such a test. (c)

[redacted]

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Exemptions: (b)(1) & (b)(3)

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DENIED IN FULL

Exemptions: (b)(6) & (b)(3)

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Exemptions: (b)(1) & (b)(3)

ANNEX C

SOUTH AFRICAN DELIVERY SYSTEM ALTERNATIVES [10]

Aircraft

1. The aircraft in the current South African Air Force (SAAF) inventory most likely to be selected for the nuclear weapons delivery role are fighter-bombers and light bombers. The fighter-bomber and light bomber aircraft in the SAAF are the Mirage F1AZ, the Mirage III EZ, the Buccaneer S Mk 50, the Impala, and the Canberra B(I)Mk 12. We do not believe the Impala is a realistic alternative because of its small size and inferior performance. Thus, our analysis of the SAAF's nuclear-capable aircraft focused on the Mirage F1, Mirage III, Buccaneer, and Canberra. ~~(S-NF)~~

2. Based on all performance aspects, we believe that the best nuclear strike aircraft in the SAAF is the Buccaneer. The Canberra has a greater combat radius but was designed for clear-weather operations. The Buccaneer is capable of unrestricted operations at night and in adverse weather. Furthermore, the low-altitude penetration speed of the Buccaneer is higher, and the Buccaneer's superior avionics should enable it to penetrate at a lower altitude.[11] Although no information was available on the electronic countermeasures (ECM) of either aircraft, the Buccaneer ECM is almost certainly superior to that of the Canberra. All of these factors—the higher speed, lower penetration altitude, and superior ECM—tend to make the Buccaneer more survivable than the Canberra. The Canberra probably would not be selected in preference to the Buccaneer unless:

- The weight and/or size of the nuclear weapon exceeds the Buccaneer bomb bay weight or dimension limits.
- The selection criteria are such that the Canberra's 200-nautical-mile combat radius advantage over the Buccaneer is a critical factor. ~~(S-NF)~~

3. The survivability of the Mirage F1 and Mirage III probably is comparable to that of the Buccaneer. However, the inferior combat radius of the two Mirage aircraft limits their employment to targets at relatively short range. Even against short-range targets, the superior range of the Buccaneer would allow it to follow a more circuitous route to the target. Such flexibility permits an aircraft to bypass concentrations of air defense weapons, to use terrain-masking to make tracking and interception more difficult, or to approach the target from the most advantageous direction. Thus, we would not expect either Mirage aircraft to be selected over the Buccaneer unless the selection criteria are such that:

- The markedly superior combat radius of the Buccaneer is not a critical factor.
- The SAAF believes that the superior over-target speed of the Mirage aircraft will significantly improve the mission's chances of success. ~~(S-NF)~~

Weapons Delivery

4. All four aircraft are capable of performing the standard nuclear weapons delivery techniques. High-altitude bombing, for example, with a free-fall or parachute-retarded nuclear weapon should present no problems, since all four aircraft have service ceilings in excess of 10,000 meters. However, this delivery profile may not be used in a high-threat environment since low-level delivery makes the attacking aircraft less vulnerable to air defenses. The four aircraft should be capable of low-level bombing techniques—loft bombing (free-fall or parachute-retarded weapon) and level laydown (parachute-retarded weapon)—with no unusual restrictions. (U)

Cruise Missile or Glide Bomb

[redacted]

[10] [redacted]

[11] The Buccaneer is equipped with a Doppler radar, a search-and-fire-control radar, and a head-up display radar. Canberra has none of these. (C)

[redacted]

[redacted]

(S-NF-NC-OC)

6. The South Africa Navy has Gabriel cruise missiles on its Reshef patrol boats from Israel. The Gabriel missile conventional warhead weighs 180 kilograms and is about 0.3 meter in diameter. While the environmental considerations for a cruise missile (temperature, acceleration, altitude) are similar to those for aircraft delivery, [redacted]

(S-NF)

7. If the South Africans were to develop indigenously a cruise missile of sufficient size to carry the postulated design, then the weaponization requirements would not be significantly more difficult to master than for an air-delivered free-fall bomb. The same conclusions apply whether the missile is surface launched or air launched, or whether it is a glide bomb. We believe the South Africans would have little trouble in adapting their aircraft delivered design to a cruise missile if no major weight and size reductions are necessary. (S-NF)

Ballistic Missiles

8. [redacted]

(S-NF-NC-OC-PR-WN)

Artillery

9. Nuclear artillery projectile design is very different from that of aircraft or missile delivered nuclear weapons. Artillery delivery requires that very high acceleration be imparted directly to the projectile case and presents formidable challenges to weapon designers. Both interior and exterior ballistics considerations must be included in the design. Center of gravity, moment of inertia, size, weight, volume, and safety are critical to provide the reliability and accuracy required for battlefield operations. (C-NF)

10. The South Africans manufacture their own 155-mm field artillery guns and sophisticated extended-range ammunition for them. This has led to speculation that they may also be working on nuclear rounds for these guns. Given the present known scope of their program, however, we believe they would stand no chance of succeeding in such an effort. (S-NF)

11. [redacted]

(S-NF)

12. [redacted]

(S-NF)

13. [redacted]

[redacted] (S-NF)

[redacted] (S-NF)

Torpedoes

14. [redacted]

15. [redacted] (S-NF)

[redacted]