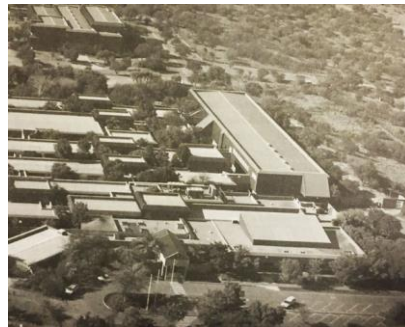


## Chapter 9 Dismantling the Nuclear Weapons

The end of the nuclear weapons program was an emotional experience for those who had labored tirelessly in secret to build the deliverable nuclear weapons. The previous few years had been particularly stressful, when most of the production quality nuclear weapons were built and tensions escalated in Angola.

Those in the program had to be told what President de Klerk had decided. After all, they would be the ones actually carrying out the dismantlement of the nuclear weapons. Armscor gathered those in the program into the new cafeteria at Advena Central Laboratories to tell them of their fate soon after President de Klerk had publicly announced the end of apartheid in February 1990.

After that dramatic speech, heralding a far different South Africa, most of the employees were not surprised by the decision to dismantle the nuclear weapons, according to one of the leaders of the Armscor nuclear weapons program.<sup>1</sup> They understood the lack of need for these dangerous weapons. Nevertheless, the announcement was an emotional blow to many of the workers, who had become like family. There was some relief that the government had decided to convert Advena to commercial purposes, ensuring that their jobs were secure, at least for a while.



**Figure 1** Cafeteria in Advena's main building near the front entrance, as it appeared in 2002. Here in early 1990, members of the nuclear weapons program heard that nuclear weapons were to be dismantled. In the aerial image on right, the cafeteria appears to be on the bottom right of the building, with the sloped roof. The long building behind the cafeteria is where the clean rooms were located. Photo Credit: Albright (left) and Al Venter, *How South Africa Built Six Atom Bombs* (right).

### Organizing and Implementing Nuclear Disarmament

<sup>1</sup> Interview with senior Armscor official, October 10, 1995.

Soon after taking office in the fall of 1989, President de Klerk ordered the creation of an Experts' Committee to investigate various ways to dismantle the nuclear arsenal and to draw up a schedule for dismantlement and accession to the Nuclear Non-Proliferation Treaty as a non-nuclear weapon state.<sup>2</sup> This committee, which included senior officials of the AEC, Armscor, and the South African Air Force, examined the entire dismantlement process over the next several weeks.<sup>3</sup>

Committee members were in consensus in their recommendations to de Klerk, but that did not mean that there had not been disagreements along the way. Should the arsenal be dismantled before announcing the existence of the program? Who outside the program should witness the dismantlement process? Some advocated that the weapons should be dismantled in exchange for something tangible from the international community.<sup>4</sup> However, this committee ruled out the IAEA as a body to verify the actual dismantlement process. The dismantlement would occur in secret and a nuclear weapons program would be denied, which would make it impossible to trade dismantlement for concrete benefits.

This committee gave its report to de Klerk in November 1989 with a formal recommendation to dismantle the arsenal and an outline of the dismantlement procedures.<sup>5</sup> According to Waldo Stumpf, then head of the Atomic Energy Corporation and a leader of the dismantlement effort, de Klerk approved the plan in principle.<sup>6</sup> He issued an instruction to stop the production of further nuclear devices, to shut down the Y Plant, and to dismantle South Africa's nuclear capability before accession to the NPT.

A few more months would pass before the formal dismantlement process was established. Many details needed to be worked out first.

Several recently declassified and translated documents shed light on the dismantlement decisions.<sup>7</sup> Codenamed the Mantel Project, the plan was intended for final review and approval by de Klerk. Outlined in a document dated February 8, 1990, it called for dismantling all the nuclear weapons and half-completed devices, components, and material in a tightly controlled

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<sup>2</sup> Waldo Stumpf, "South Africa's Nuclear Weapons Program," undated, p. 14. An edited version of this paper is in Kathleen C. Bailey, *Weapons of Mass Destruction: Costs versus Benefits* (New Delhi: Manohar Publishers and Distributors, 1994), pp. 63-81.

<sup>3</sup> Mitchell Reiss, *Bridled Ambition: Why Countries Constrain Their Nuclear Capabilities* (Washington, D.C.: The Wilson Center, 1995), p. 17.

<sup>4</sup> Following the 1994 agreement between the United States and North Korea, called the Agreed Framework, whereby North Korea would shut down its plutonium production facilities in exchange for two light water reactors worth many billions of dollars, an Armscor official expressed dismay to one of the authors that South Africa had not negotiated for something more concrete in exchange for abandoning its nuclear weapons program. A deal on the scale of the Agreed Framework would have paid a major share of the ANC government's reconstruction program. For regret about not doing so, see Hannes Steyn, Richardt van der Walt, and Jan van Loggerenberg, *Armament and Disarmament: South Africa's Nuclear Weapons Experience* (Pretoria: Network Publishers: 2003), p. 102.

<sup>5</sup> Reiss, *Bridled Ambition*, op. cit., p. 17.

<sup>6</sup> Transcript of Talk by Waldo Stumpf, South African Embassy, Washington, D.C., July 23, 1993.

<sup>7</sup> Nic von Wielligh and Lydia von Wielligh-Steyn, *The Bomb* (Pretoria: Litera Publications, 2015). See pp. 500-513.

manner along with melting down the HEU components.<sup>8</sup> In keeping with the decision to keep the nuclear weapons program secret, the plan stated: "Perform the necessary cleaning operations to attach credibility to the statement that the RSA [South Africa] did manufacture highly enriched uranium but did not undertake the final step of manufacturing nuclear weapons."<sup>9</sup> Thus, the existence of the weapons would be denied but not the production of HEU. Because of the ability of the IAEA to detect traces of HEU at the Y Plant and in the surrounding area, which had also been contaminated with HEU, hiding the AEC's production of HEU was assessed as impossible.<sup>10</sup> However, as will be discussed later, an effort was made to hide the presence of HEU at the Circle complex.

On February 26, 1990, de Klerk issued a written authorization to (1) release from the storage vault at Circle all existing nuclear devices and components, both complete and incomplete, (2) dismantle all existing nuclear devices, and (3) to transfer the HEU in a safe and secure manner to the AEC for storage. He ordered that the dismantling and cleaning up process take place under the supervision of a steering committee composed of senior members of the South African Defense Force, AEC, and Armscor. (Stumpf eventually became the head of steering committee).<sup>11</sup> De Klerk also appointed an independent expert to audit the entire process and to report independently to him.<sup>12</sup>

The President in the February 26<sup>th</sup> document also charged the steering committee to evaluate and approve the plan for dismantling the weapons and decontaminating the related facilities, to approve the dismantling process step-by-step, and to report regularly to the State President.

The steering committee's full set of specific responsibilities are not mentioned in the documents released by von Wielligh. However, key participants on the Steering Committee and its subsidiary working group charged with carrying out the dismantlement, have discussed these responsibilities. The following list was compiled mainly from a report by Stumpf.<sup>13</sup> Other responsibilities are added below this list and their sources cited.

- Dismantle the six completed gun-type devices and the pre-production "cold devices" at Advena under controlled and safe conditions;
- Melt and recast the HEU from these six devices, as well as from the partially completed seventh device, and to return it to the AEC for safe-keeping. Careful accountability measures must be followed;
- Decontaminate the Armscor facilities fully and return severely contaminated equipment

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<sup>8</sup> *The 'Mantel' Project*, signed by W.E. Stumpf, CEO for the AEC and J.L. Steyn, Senior General Manager: R&D, Armscor, February 8, 1990, in *The Bomb*, op. cit., p. 507.

<sup>9</sup> *The 'Mantel' Project*, op. cit.

<sup>10</sup> Interviews with Armscor and AEC officials. See also, *The Bomb*, op. cit., p. 217 and document in appendix, pp. 500-501.

<sup>11</sup> Stumpf, Transcript of talk at South African Embassy, op. cit.

<sup>12</sup> *Dismantling of Nuclear Weapons*, from State President to Minister of Defense, February 26, 1990, *The Bomb*, op. cit., p. 512. Since the order controlled the release of the nuclear warheads from the Circle vaults, under warhead control procedures, there should have been an identical order to the Minister of Minerals and Energy Affairs.

<sup>13</sup> Stumpf, "South Africa's Nuclear Weapons Program," op. cit., pp. 14-15.

- to the AEC, such as the melting furnace;
- Convert the Advena/Circle facilities to conventional weapon and non-weapon commercial activities;
- Destroy/dispose non-nuclear components of the devices as well as technical design and manufacturing information. (Many components were recycled or left at Circle);
- Advise the de Klerk government of a suitable time-table for accession to the NPT, signature of a comprehensive safeguards agreement with the IAEA, and submission of a full and complete national initial inventory of nuclear material and facilities, as required by the safeguards agreement; and
- Close down the Y Plant at the earliest moment.<sup>14</sup>

Additional responsibilities of the steering committee included:<sup>15</sup>

- Maintain security and safety during the dismantlement process;
- Carefully and sympathetically handle personnel through alternative employment, early retirement, and retraining. Before leaving employment, every member was to be debriefed and re-motivated for the changed circumstances. "Security (and motivation) follow-ups were arranged in those cases where it was known that the decision caused financial hardship or moral backlash;"<sup>16</sup> and
- Conduct an internal audit of the nuclear weapons program by a combined South African Defense Force, Atomic Energy Corporation, and Armscor internal audit team.

According to Stumpf, before actual dismantling of the nuclear devices could occur, the steering committee in conjunction with the working group had to create extensive operational procedures to fulfill the safety and security requirements associated with the dismantling process. The committee had to develop procedures on destroying equipment and documents and on handling the nuclear material. The dismantlement process also involved many security risks because disgruntled employees could decide to reveal the program's existence or steal materials or documents. As a result, procedures to inform program personnel about the dismantlement procedure needed to be established.

The steering committee also developed two options for dismantling the arsenal.<sup>17</sup> One option called for first dismantling one-half of each device, for example, the front end of each device, before destroying the remaining halves. This option would be the quickest way to eliminate the arsenal. The other option involved dismantling one device at a time, allowing South Africa to preserve a nuclear capability until the last weapon was dismantled. De Klerk chose the slower option and approved the rest of the Steering Committee's procedures in July 1990. Dismantling then started. Table 1 shows the dismantlement schedule of the seven devices with HEU, in

<sup>14</sup> The Y Plant was actually shut down on February 1, 1990, before the written instructions were received from de Klerk. Decommissioning and decontamination commenced immediately afterwards.

<sup>15</sup> *Armament and Disarmament*, op. cit., pp. 99-100.

<sup>16</sup> *Armament and Disarmament*, op. cit. p. 98.

<sup>17</sup> Reiss, *Bridled Ambition*, op. cit., p. 18. This information was told to Reiss by Wynand Mouton, the expert who de Klerk hand-picked to audit the dismantlement process.

particular when HEU was removed from the front sections of the devices and when the rest of the device was dismantled.

**Table 1: Dismantlement schedule of South African nuclear explosive devices, after President de Klerk's decision to dismantle the nuclear arsenal (arranged chronologically with respect to removal of HEU)**

<b>Name of Device</b>	<b>Rear or Front Part</b>	<b>Start of Dismantling (HEU removed)</b>	<b>Completion of Dismantling (Rest of Device)</b>
Set 7(1)		July 16, 1990	July 26, 1990
504	Rear Front	July 1990 August 1990	October 1991 October 1991
503	Rear Front	October 1990 November 1990	October 1991 October 1991
Video/Melba	Rear Front	January 1991 February 1991	February 1991 February 1991
502	Rear Front	March 1991 April 1991	September 1991 September 1991
501	Rear Front	May 1991 July 1991	September 1991 September 1991
306	Rear Front	August 1991 August 1991	September 1991 September 1991

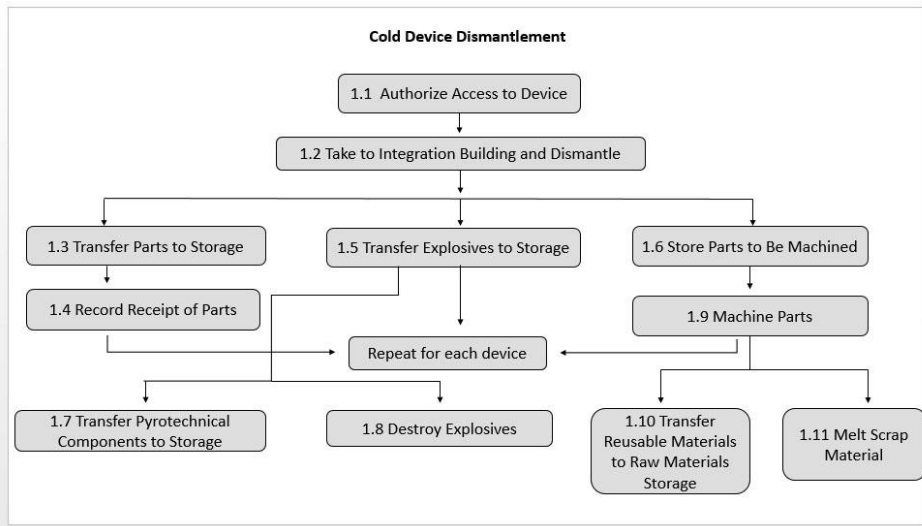
**Notes and Comments**

- (1) The HEU core was recast.
- (2) The source for this table is South Africa's 1993 declaration about its nuclear program.

The center of dismantlement activities was the Circle and Advena facilities, by then collectively referred to as Advena. During the dismantlement process, the devices were removed from the vault at the Circle building and HEU removed. The HEU was melted and recast into ingots of a few kilograms each and then returned to the vault. Special shelves were installed in one internal vault to safely store the recast HEU ingots without causing a criticality accident. The nonnuclear components were taken from a device and grouped according to their design sensitivity and fate. A quality control group kept a careful record of the origin (by device) of each component and its subsequent destination. Sensitive components were either dismantled into raw materials and non-sensitive parts or destroyed by cutting and melting. Sensitive pyrotechnical components were destroyed. Explosives from the device (and samples stored separately for life-expectancy testing) were destroyed by detonation. As much as possible, components from different devices were grouped together and then cut up or destroyed in only a few campaigns. Non-sensitive components were transferred to Circle’s stores or disposed as scrap. The dismantlement process is outlined in the sidebar for what Armscor called a “cold device,” which was a nuclear explosive device that did not contain HEU.

**Sidebar: Dismantling a Cold Device**

The following diagram is from a document preserved by South Africa and translated into English, titled “Rendering Harmless of Cold Device.” Following the diagram is a description of each step in the diagram.



**1.1 Authorize Access to Device**

The front and rear part of the device will be released simultaneously for dismantling. Concerned persons are:

ADVENA: Integration Group Mr .....

AIR FORCE: Mr .....

The formal release for dismantling will be entered into the logbooks.

#### 1.2 Take to Integration Building and Dismantle

The device will be dismantled, and the individual parts will be grouped as indicated on the Parts List. Dismantling will be done by ..... and ..... During dismantling the Quality Control Group will keep a record of the origin and destination of the various parts, and the record will be continuously updated. A device (front and rear parts) will be dismantled in the course of a week, but attempts will be made to speed up the process for subsequent devices.

#### 1.3 Transfer Parts to Storage

Following the dismantling of the device, all parts deemed necessary for storage (ref. Parts List) will be transferred to raw materials storage. Storage staff will transfer components to the appropriate storage as soon as adequate numbers are available. The Quality Control Group will record the physical location of the transferred parts.

#### 1.4 Record Receipt of Parts

The responsible storage staff will receive the parts at zero value. The parts will be stored separately. The storage staff may decide on the storage locations; however, it is important that the components can be traced.

#### 1.5 Transfer Explosives to Storage

Following removal of the explosives from the device, they will immediately be placed in appropriate containers and transferred temporarily to explosives storage.

#### 1.6 Store Parts to Be Machined

Parts which need to be machined (ref. Parts List) will temporarily be transferred to storage so that they can later be machined in one campaign. It is recommend that the integration area be cleaned and used for this purpose.

#### 1.7 Transfer Pyrotechnical Components to Storage

The pyrotechnical components which are not to be destroyed, such as detonators and cords, will be transferred to explosives storage and made available for later projects.

#### 1.8 Destroy Explosives

The explosives from the device, as well as the separately stored samples used for life expectancy testing, will be destroyed in one major destruction campaign. The destruction will be carried out by ..... and ..... and be controlled by the Quality Control Group.

#### 1.9 Machine Parts

Sensitive parts that must be rendered harmless through machining must be stored in a location where they can be easily accessed. The machining must take place in the ADVENA workshop. The Quality Control Group must maintain records of the parts machined.

#### 1.10 Transfer Reusable Parts to Raw Materials Storage

Parts which are not classified as sensitive shall be transferred to raw materials storage and may be used for other projects.

#### 1.11 Melt Scrap Material

Parts which can no longer be used as raw material must be deformed in such a manner that they can be transferred to outside companies as scrap to be melted.

Commented [A1]: END OF SIDEBAR

Before the last device was dismantled, de Klerk was asked if he was certain of his decision.<sup>18</sup> The President told Armscor and the AEC to finish the job.

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<sup>18</sup> This episode was told to Reiss by Mouton, see *Bridled Ambition*, op. cit., p. 40, see footnote 66.

To ensure secrecy, the HEU was sent from the Circle building back to Pelindaba at night in the trunks of Toyota sedans. For security reasons, Armscor initially had scheduled many military guards to patrol the road without informing them of the true purpose of their mission. Nevertheless, the increased activity attracted the attention of people living in the area. One curious neighbor of the site demanded to know what was happening. Subsequent shipments were done without arousing such curiosity, and involved far fewer guards. In total, about 20 shipments of HEU occurred over the four nights, March 12/13, March 14/15, September 3/4, and September 5/6, 1991.<sup>19</sup>

Soon after sending the last HEU to the AEC, the Circle building was completely decontaminated, and contaminated equipment that had been used for the re-melting and casting of HEU sent to the AEC. Most other machine tools and equipment were decontaminated, if necessary, but remained at Advena for commercial nonnuclear applications. Computerized testing equipment was rendered useless for the weapons program by destroying the specific software that controlled the equipment's operation. In addition, the main uranium processing section of Circle was carefully decontaminated. Walls were removed, and the concrete floor jacked out. Contamination was reduced to background levels. Special doors were built over the high security vault that would have served as part of an effort to hide the vaults from inspectors (see figure 3). As per ordered, the intent was to leave the room clean enough so that South Africa could plausibly deny the existence of the nuclear weapons program. Armscor officials stated that they personally did not believe that the program would ever be revealed.<sup>20</sup>

This portion of the dismantlement work was completed by September 6, 1991, approximately two months after South Africa acceded to the NPT on July 10, 1991, but prior to entry into force of the safeguards agreement on September 16, 1991.

By September 1991, not all of the major nonnuclear components of the weapons had been destroyed. In addition, detailed design drawings, computer software used in weapons design, documents, and photos of components remained. The retrieval of the classified records took time. The dismantlement team retrieved and indexed over 12,000 technical documents that described the design of the Y Plant and other nuclear weapon production facilities along with the methods for building nuclear weapons.<sup>21</sup> The documents were stored in a steel cage near the Circle building until they were burned in 1993.

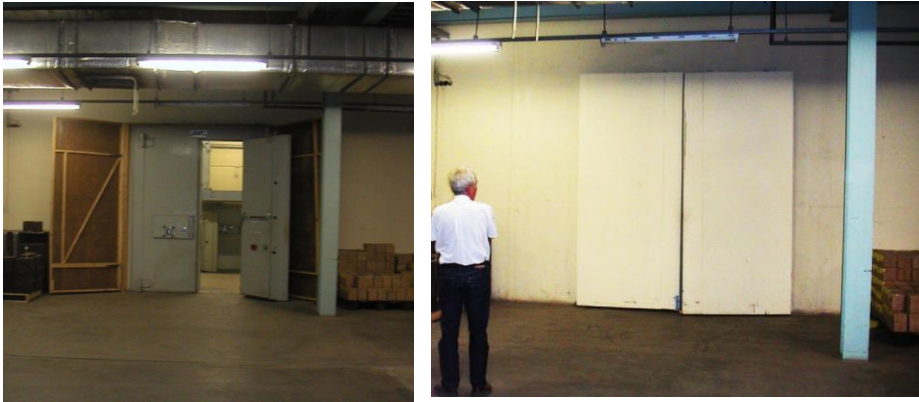
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<sup>19</sup> Reiss, *Bridled Ambition*, op. cit., p. 18; and IAEA, *The Denuclearization of Africa*, Annex 1, Attachment 1.

<sup>20</sup> D. Albright, "South Africa's Secret Nuclear Weapons" (Washington, D.C.: Institute for Science and International Security, May 1994, p. 16).

<sup>21</sup> Reiss, *Bridled Ambition*, op. cit., pp. 18-19.





**Figure 3** High security storage vault in Circle that held nuclear weapons, as it appeared in 2002, with outer doors to hide vault open and shut. Below is the uranium processing area after the removal of the original concrete floor and partition walls with the vault in the background. If the IAEA had asked to visit, the outer doors could have been blended into a blank wall.

Only on March 17, 1993 did President de Klerk order the destruction of the sensitive documents. The destruction orders were not limited only to technical documents; even the nuclear strategy and nuclear weapons policy documents were ordered destroyed before de Klerk announced the

program.<sup>22</sup> By March 24, 1993, when President de Klerk announced the program's existence, the sensitive records had been shredded or burned and the sensitive weapon components destroyed or damaged beyond re-use.

De Klerk ordered certain documents to be preserved, mainly those needed to verify key decisions, the amount of HEU produced, the number of nuclear devices produced, and dismantlement operations. Because the production and material accountancy records of the Y Plant had been identified early in the process as critical to the verification that could be required under the NPT, the AEC had retained those records. South Africa also retained original documents relating to the initiation and termination of the project. By law, South Africa was required to keep medical and radiological records of all project personnel for 30 years.

Dismantlement records varied in their detail and thoroughness. Dismantling records involving HEU weapon components were detailed; however, records for natural and depleted uranium used in the pre-production devices were sparse and non-quantitative. The dismantling records for the non-nuclear components were brief and largely involved listings of component systems dismantled from the deliverable nuclear devices. Records were absent for the dismantling of the pre-production experimental devices or the Melba device. There were no destruction records for the components.

In the February 26, 1990 order to dismantle the program, President de Klerk nominated Professor Wynand L. Mouton, a well-known retired nuclear physicist and academic, to audit the dismantlement process. He was tasked with ensuring that it was done in a safe, secure, and responsible manner, along with regularly informing de Klerk personally about the progress of the dismantlement.<sup>23</sup> Mouton, in short, was de Klerk's representative during the dismantlement and clean-up process.<sup>24</sup> He attended all steering committee meetings both during the planning and execution stages, contributing ideas and suggestions and responding to requests for his advice.

Mouton's primary responsibility was to help ensure that nuclear materials and secrets were not diverted. Because he was an auditor and thus present at Advena only a fraction of the time, he first sought to determine if he could trust the people responsible for the dismantlement process. Many of them had been his students or colleagues during his long professional career, but he needed to ascertain if they "kept information away from him."<sup>25</sup> In general, Mouton later reported the personnel involved in the dismantlement process were both competent and trustworthy.

Although some people reportedly expressed unhappiness with the decision to give up the nuclear weapons program, their concerns had more to do with hesitancy to give up on something they had worked years to create.<sup>26</sup> Such concerns, however, influenced Mouton's recommendation to

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<sup>22</sup> Reiss, *Bridled Ambition*, op. cit., p. 23; and various interviews by author with Armscor officials in 1994 and 1995.

<sup>23</sup> Interview with Mouton by telephone by one of the authors, October 13, 1995.

<sup>24</sup> Interview with Mouton, op. cit..

<sup>25</sup> Interview with Mouton, op. cit.

<sup>26</sup> Interview with Mouton, op. cit.; and Reiss, *Bridled Ambition*, op. cit., p. 18. There have been media reports that two workers were removed from the dismantlement program and kept under continuous surveillance when they

de Klerk to select the dismantlement option that would leave the country with a nuclear deterrent until the last weapon was dismantled. Mouton believed that this option was the "wiser one at that stage of the whole process"<sup>27</sup> and would help "acclimate the dismantlement team to the reality of the president's decision."<sup>28</sup>

Typically, Mouton would go to the Circle or Advena facilities two to three times a month, staying a day or more. He witnessed the dismantlement of the first device and returned later to see another weapon taken apart. In particular, he wanted to see the HEU components in the weapons. When the HEU ingots were sent back to the AEC, Mouton also accompanied the shipments in a separate car on two of the four nights. He also sampled the documents in the steel cage at Advena to ensure that the record keeping system was accurate, and he was present when the records were burned.<sup>29</sup>

Mouton reported personally to de Klerk, in most cases, briefing the president orally from his notes. On March 23, 1993, Mouton presented de Klerk with a final report that contained his judgments about the dismantlement process. He declared that the dismantlement objectives had been accomplished satisfactorily, namely that the nuclear devices were dismantled, all hardware for the nuclear devices in possession of Armscor was destroyed, no evidence was found that any documents ordered destroyed were deliberately withheld, and all of the highly-enriched uranium at Advena was sent back to the AEC.<sup>30</sup>

According to de Klerk, Mouton was charged "to satisfy himself that every gram of nuclear material had been accounted for and all the hardware and design information was destroyed."<sup>31</sup> However, despite Mouton's declaration, he could not accomplish such precise verification of the dismantlement process. For example, Mouton determined that the amount of HEU that was taken from the nuclear devices was "a few hundred grams" more than the amount subsequently returned to the AEC.<sup>32</sup> This amount, Mouton observed, was only a fraction of the amount needed for a nuclear weapon. He was not surprised by this small discrepancy, however, because the process of recovering the HEU involved steps such as removing the nickel coating that led to such losses of HEU.<sup>33</sup> More importantly, Mouton was unable to provide credible assurance to those outside the government, particularly the IAEA, that no weapons or HEU had been hidden away.

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threatened to steal nuclear materials. Mouton said that he did not think this story was true. Armscor officials have also denied this particular story, although not the underlying concern.

<sup>27</sup> Interview with Mouton, op. cit.

<sup>28</sup> Quoted in Reiss, *Bridled Ambition*, op. cit., p. 18.

<sup>29</sup> Reiss, *Bridled Ambition*, op. cit., pp. 18 and 40, footnote 69.

<sup>30</sup> An irony of Mouton's involvement was that he lived within a kilometer of P. W. Botha in Wilderness, a retirement resort. Although they periodically saw each other, Mouton never talked to Botha about his role in dismantling the arsenal Botha played such a major role in creating.

<sup>31</sup> "Speech by the State President, Mr. F. W. de Klerk, to a Joint Session of Parliament, 24 March 1993," Transcript of speech given in Cape Town. See also "De Klerk Discloses Nuclear Capability to Parliament," FBIS-APR-93-056, March 25, 1993, pp. 5-9.

<sup>32</sup> The total amount of HEU unaccounted for, some of which was known to have been lost during processing, at Circle was higher, about 3.9 kilograms of uranium in total, containing 3.2 kilograms of uranium 235. Of this total, about 1.6 kilograms (and 1.3 kilograms of uranium 235) resulted from process losses during melting and casting operations at the Circle facility.

<sup>33</sup> Interview with Mouton, op. cit.

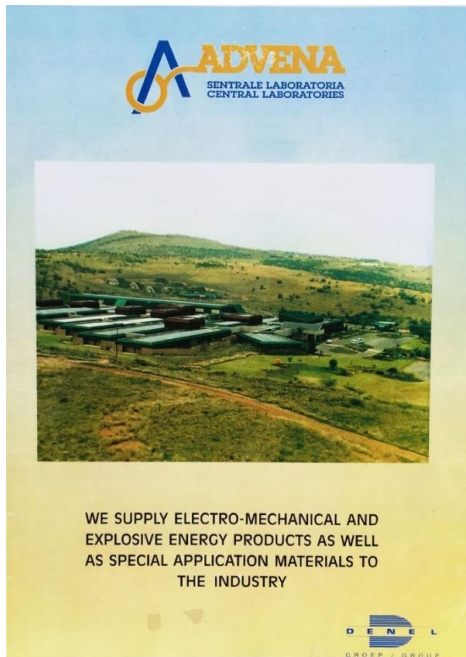
Because some employees in the nuclear weapons program were suspected of having far right-wing sympathies, Armscor had to ensure that the program was phased out in an orderly manner without leakage of fissile material or sensitive information. To minimize these risks, the government decided to commercialize Advena Central Laboratories and to gradually reduce the size of its operations. Its intent, according to Armscor officials, was "to reduce the risk of a security leak, or the even more serious risk of proliferation when persons with sensitive information [were] laid off." When the Advena employees were told in February 1990 of the end of the program, to soften the impact of the decision, management informed them that the site would be converted to the production of civilian products and that they were important to achieving this new goal. The commercialization decision allowed the program to shrink more slowly and thus provided time for members of the program to find other work. According to a former member of the program, this "cooling off period" enabled a more natural attrition in the workforce to occur. The workforce was reduced from about 300 to 100 during the first year.<sup>34</sup> Nonetheless, this rate of workforce reductions would be quite severe for any company.

Utilizing the remaining general and nonnuclear equipment, Advena sought to become a manufacturer of peaceful and commercial products during the first half of the 1990s.<sup>35</sup> Figure 4 shows the cover of Advena's commercial brochure that advertised its new products, which collectively looked like they were produced at a former nuclear weapons production site.

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<sup>34</sup> Information supplied to one of the authors by Armscor officials, April and May 1993.

<sup>35</sup> See for example, Andre Buys, "The Conversion of South Africa's Nuclear Weapons Facilities," *Bulletin of Arms Control*, Council for Arms Control and Center of Defense Studies at London University, No. 12, November 1993; and Albright, "A Curious Conversion," *Bulletin of the Atomic Scientists*, June 1993.



**Figure 4** Cover of advertisement of Advena Central Laboratories, which advertised a rather unique set of products that suggested that Advena was a former nuclear weapons production site. The main building is visible with its entrance on right. The bunkers of the high explosive manufacturing complex are visible in the background.

However, this commercialization effort failed, and the site was formally closed. All the workers were gradually laid off or they took other positions within Armscor or Denel, a commercial entity created in 1992 to absorb all of Armscor's production divisions, including Advena.

After several years of remaining unused, Advena re-opened in about 2001 or 2002 as a site to re-train military personnel who were being discharged as part of downsizing South Africa's military. When it was re-opened, many of the items, signs, and infrastructure remained from the day it was originally closed.<sup>36</sup> One Armscor official who visited the site in 2002 felt like he was traveling back in time.

### **Public Disclosure**

All of the dismantlement activities were occurring in utmost secrecy. One of the first public signs to emerge that South Africa had given up its nuclear weapons was in September 1990, when then Foreign Minister Pik Botha announced in Pretoria that his government was "prepared to accede to the treaty in the context of an equal commitment by the other states in the southern

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<sup>36</sup> One of the authors took a tour of the site in August 2002 with a former Armscor official involved in the program. Many pictures in this book are from that visit.

African region."<sup>37</sup> Botha also announced Pretoria's support for a nuclear weapons free zone in southern Africa, in part as a way to remove suspicions and strengthen economic and geographical cohesion of the region. A regional nuclear weapon free zone also would be seen domestically as a clear positive achievement for de Klerk.

At the time, the announcement disappointed but did not surprise the IAEA members meeting at the annual General Conference in Vienna. Leading members of the IAEA initially had been optimistic that South Africa would announce an unconditioned pledge to join the treaty. However, the South African government wanted its neighbors to make nuclear non-proliferation commitments as well. Following Zambia's and Tanzania's decision to sign the NPT, South Africa announced on June 27, 1991 its intent to accede to the treaty.

In his 1990 announcement in Pretoria, Pik Botha had refused to confirm whether South Africa had built nuclear weapons, saying the question was "irrelevant" now that the country had agreed to sign the NPT.<sup>38</sup> Several governments, experts, and the ANC disagreed and pressed the South African government to come clean.

Shortly before the announcement that South Africa would join the NPT in the summer of 1991, the de Klerk government revisited the decision to keep secret the existence of the nuclear weapons program. President de Klerk, however, remained unwilling to reveal the program.

Stumpf has given several reasons for de Klerk's decision in the summer of 1991.<sup>39</sup> First, when South Africa acceded to the NPT, it was under no obligation to reveal the existence of its past nuclear weapons program. Under his interpretation, which was common at the time, the NPT essentially looks forward and requires extensive accounting of nuclear material and facilities that exist when the treaty takes effect. More importantly, de Klerk decided that the internal political situation, including forming a new constitution, was not conducive to revealing a nuclear weapons program. Lastly, if the government revealed a secret nuclear weapons program right when international attention was focused on highly intrusive and confrontational nuclear inspections in Iraq, South Africa could be easily branded in the eyes of the public and the press as a second Iraq. This was despite the fact that South Africa, unlike Iraq, had not violated the NPT since it never signed it. Officials worried that South Africa would end up subject to the same type of confrontational inspections as those being conducted in Iraq.

Although in mid-1992 officials again advised de Klerk to announce the program, he continued to reject this course of action until February 1993. By this time, however, the government's lack of candor about the nuclear weapons program had erupted into both a domestic and international political controversy. In his speech revealing the program, de Klerk said that some countries and the media had alleged that South Africa still had covert nuclear weapon aspirations and had not fully revealed its stockpile of highly enriched uranium. This suspicion, de Klerk observed, was hurting South Africa's efforts to commercialize its nuclear infrastructure, particularly its efforts

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<sup>37</sup> Quoted in Ann MacLachlan and Mark Hibbs, "South Africa Ready to Sign NPT if Other States in Region Do So," *Nucleonics Week*, September 27, 1990.

<sup>38</sup> David Ottaway, "South Africa Agrees to Treaty Curbing Nuclear Weapons," *The Washington Post*, June 28, 1991, p. A25.

<sup>39</sup> Stumpf, "South Africa's Nuclear Weapons Program," op. cit., p. 16.

to export high-technology products. Other South African officials have said that lack of candor was also interfering with South Africa's negotiations for an African nuclear weapons free zone and with its cooperation with other African countries. In retrospect, Stumpf has said that South Africa would have been "possibly more correct to have announced the past program at accession to the NPT."<sup>40</sup>

Within South Africa, the ANC intended to make the secret nuclear weapons program an election issue, and this obviously worried de Klerk's party. At a late December 1992 press conference in Johannesburg, the ANC demanded full disclosure of all present and past nuclear weapons activities, calling on the government to "admit the full extent of its nuclear weapons program and weapons-grade uranium stockpile now."<sup>41</sup> The ANC warned in its press release: "To continue to act clandestinely and give ambiguous answers on nuclear matters undermines the important process of building the confidence of all South Africans in the process of democratizing our country."<sup>42</sup>

US officials privately urged South African officials to fully reveal the country's nuclear weapons program in order to reestablish South Africa's international credibility.<sup>43</sup> Yet they were met with stubborn denials. One US official who met with Wynand de Villiers, then Chairman of the Atomic Energy Corporation, shortly before de Klerk's announcement, reported that de Villiers slammed his fist on his desk while vehemently denying South Africa had had a nuclear weapons program.<sup>44</sup> De Villiers said that South Africa had assessed a peaceful nuclear explosive but did not develop it.

To encourage greater South African candor, US officials "leaked" to the media information or, in most cases, worst-case suspicions, about the program. For example, on March 18, 1993, six days before de Klerk's announcement and coinciding with a visit of South Africa's Foreign Minister to Washington, a *Washington Post* article quoted US officials as saying that they "strongly suspect South Africa has not accounted fully for all the bomb-grade uranium it produced or the other nuclear weapons components it amassed and [it] may still be hiding some nuclear bomb-related items."<sup>45</sup>

Lacking an admission of past nuclear activities, the US government started seriously questioning South Africa's commitment to the NPT. On January 19, 1993, in the annual report by the President to Congress detailing the adherence of other nations to arms control, nonproliferation, and disarmament agreements, commonly called the "Pell Report," the Bush administration stated: "The United States has serious questions about South Africa's compliance with its Article II and III obligations" under the NPT.<sup>46</sup> Article II forbids the manufacture of nuclear weapons or

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<sup>40</sup> Stumpf, Transcript of talk at South African Embassy, op. cit.

<sup>41</sup> Albright and Mark Hibbs, "The ANC and the Atom Bomb," *Bulletin of the Atomic Scientists*, April 1993.

<sup>42</sup> "The ANC and the Atom Bomb," op. cit.

<sup>43</sup> Interviews with US officials, 1994-96.

<sup>44</sup> Interview of US official by one of the authors (Albright), 1997.

<sup>45</sup> Steve Coll and Paul Taylor, "Tracking S. Africa's Elusive A-Program," *The Washington Post*, March 18, 1993. <https://www.washingtonpost.com/archive/politics/1993/03/18/tracking-s-africas-elusive-a-program/41d5a61d-d12a-4ed7-9504-8973eb92898c/>

<sup>46</sup> For a report on the Pell Report, see R. Jeffrey Smith, "Pretoria's Candor on Nuclear Program Questioned," *The Washington Post*, March 18, 1993.

explosives or their transfer to other countries, and Article III requires IAEA safeguards on all nuclear materials. The implication was that the United States had suspicions that South Africa had not declared all its HEU.

The Russian Foreign Intelligence Service expressed similar concerns. In early 1993, it reported that certain experts doubted that South Africa had declared all of its nuclear materials from nuclear explosive devices or weapons.<sup>47</sup>

Although President de Klerk had apparently already made his decision to reveal the program before the March 18<sup>th</sup> *Washington Post* story, he admitted that enough had leaked out that the government was getting press inquiries from "quite a number of sources."<sup>48</sup> Both countries and important commentators, he added, were expressing doubts that all the HEU had been disclosed, eroding trust in the government. However, suspicions remained even after de Klerk's March 1993 announcement.

The ANC, for instance, accused the government of hiding important information. "Despite his appeal, we cannot believe that 'South Africa's hands are clean' until we obtain full disclosure of all details of the weapons program and its alleged dismantling, the stockpile of weapons-grade uranium, and the full extent of international cooperation with Armscor and the Atomic Energy Corporation."<sup>49</sup> However, the worst of the suspicions would be laid to rest by a rigorous inspection effort by the IAEA. Although the inspections never became as confrontational as the ones then happening in Iraq, the inspections in South Africa were both intrusive and unprecedented in scope.

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<sup>47</sup> Senator John Glenn released the Russian intelligence report detailing global proliferation of weapons of mass destruction on February 24, 1993.

<sup>48</sup> "De Klerk Holds News Conference on Speech," SABC TV 1 Network in English, 24 March 1993, Transcript published in FBIS-AFR-93-056, March 25, 1993.

<sup>49</sup> "ANC Welcomes De Klerk Nuclear 'Admissions,'" Johannesburg SAPA, March 24, 1993. Also in FBIS-AFR-93-056, March 25, 1995, p. 15.