

## **The Path towards Strengthened Safeguards: Experiences in Iraq, South Africa, and North Korea**

This video series is a collection of dialogues centered on the immense role played by the IAEA, and in particular how the Agency supports nuclear nonproliferation through the practice of safeguards. This current update is a chronicle of events during the 1990s, Iraq, South Africa, and North Korea, that led to the development of the Additional Protocol.

### **7.20 South Africa**

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Group: Then came the issue that South Africa came into a request for having a CSA after joining the NPT. The surprise was that they came into the NPT and decided to do a CSA. This was in fall of 1991 – at the General Conference - the group of states got a resolution through the conference – and we wanted to have assurance the South Africans had dismantled their weapons program. And that their declaration was complete.

Demetrius: After the experiences in Iraq and Korea, inside our own system we started discussing – it's time we started discussing completeness. Correctness is not good enough, completeness is where we need to go. We need to expand. This is where investigations need to go. So we had one country – North Korea where we had investigated completeness. So now South Africa – the focus of everyone was the enrichment capability of South Africa. Blix decided to involve the enrichment team, and to supplement them as needed with other experts. One of the big problems in SA at the time was that they had already dismantled their bombs, taken all the nuclear material and melted it into ingots, and put it in the safe. Of course, they presented it to the Agency as the initial inventory. Some hundreds of KGs of enriched uranium residing over there. And it seems that OK – this is the declaration they made. The question is then, how can the Agency verify or certify to the world that it's complete, that nothing is missing. So how much material had the enrichment plants produced?

Rich would concentrate on the issue of the enrichment assessment - he had to go over and request all the operating and accounting records that existed, and luckily for the Agency and SA they hadn't followed the rules – they had 15 years of records of operations retained. Only because of that, there was an ability to assess the completeness of the production and the declaration. This was also the first time that we went and verified the authenticity of the records. We brought the FBI and other agencies around the world to give them pieces of paper and they came back with the right dates. We had a meeting on the 19<sup>th</sup> floor when they came to brief us, different agencies from different countries brief us, and they all had the same result.

Rich: The South Africans wouldn't let us remove the records from South Africa, understandably, but they did allow us to take some samples, so we took some, and with the ink and things they were able to age date them.

Laura: I have visions of Rich with a light and a visor going through those records...

Rich: It's not far off – we had to recreate the operations, 15 years with hand calculators. And because of the detail, and the records were so detailed we were able to do that. I never doubted that the records were

authentic, because after you look at it for awhile you start to recognize that these individuals had idiosyncrasies, and I just don't think you could fake that.

Demetrius: But you see, the kind of responsibility we felt, to be able to tell the General Conference where there were lots of African states with a loud voice – you ask a question, we have the answer – we've taken samples, we've measured, we've analyzed records – we are able to surmise the results which were reported to the Board and GC. But it wasn't enough. In March 93, among all the other problems existed – this was the time when North Korea said we're leaving the NPT, then South Africa comes up and in order for them to clean the slate – they said, “you know we had a nuclear weapon program”.

And thank god, because otherwise we would have to say it. Why? Because you cannot just make the amount of HEU that we found, just for a feed of their reactor, Safari reactor<sup>1</sup>, so it was a good thing they came clean, but a bad thing because of among all the other problems, Iraq was going on – the same people are running around, jumping from one place to another, one plane to another, on top of this was South Africa.

We had to verify that the nuclear weapons were all dismantled and the program was dead. Again, it's a new thing for us. We hadn't seen a nuclear weapon, we didn't know what it consisted of, how it would go, how we'd handle it. So we had long session discussing between us, what was appropriate to do. And we went down there – we said, you say they're dismantled – what are the individual pieces? It was a good thing the South Africans had maintained important parts from each bomb. Because they'd retained electronics and things. They'd maintained records of what was going into each bomb – what went into each bomb, with a number recorded appropriately, and you could go from the records to the numbers and see that these were coming from a particular bomb. This implied that we had to do a Physical Inventory of the items that were there, located with each bomb. And we needed access to the records.

Another complication. The South Africans didn't want nuclear weapon experts to see the design per se or characteristics, or photos, because they had their own design of different nature, so they said I could do it, as a head of the team, and I could choose one person from a Nuclear Weapon State. A problem was the records were all in Afrikaans – so I couldn't guarantee – because I can't read it. I can't do it by myself, I'm not a weapons expert. Blix said, you are permitted to have access to the information by my blessing. So now I need someone with this language. So Sven Thorstenson was a Norweigan, but he spent a long time in Mol, where the Dutch is similar to Afrikaans, so now I had a NNWS person to go with me to check all this. We spent 4 days or so in a vault surrounded with papers doing a cross checking of every information existing to see that it was all there.

We kept a lot of notes, they were provided to Blix, he gave the instruction to his assistant for technical issues, Pierre Vilivos, to put it in the safe, and it seems that it went from DG to DG, I have no idea what has happened, I have no access to it, the copy with my personal notes are there, kept there. To have these records, you are ready to do it all over again. So we had to get rid of the records in SA. You can't guarantee there are no records, but what you don't want, is that the records they gave you to identify the cross check, that these same records are not being kept.

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<sup>1</sup> <http://www.globalsecurity.org/wmd/world/rsa/pelindaba.htm>; <http://isis-online.org/isis-reports/detail/pelindaba-and-valindaba-facilities-south-africa/13#images>

So we put our own records under our control. If there had been copies, there might be – we don't know. They say, "this is it". And for their own security and safety, they've not permitted any copies, for their own security. So we followed with big trucks and filled them with all the records from the SA program, all the papers, and we took them out to the desert and burned them. All the information about which part goes where, and what components... I'm sure there are people who know but at least all these papers were destroyed. That was a different matter.

Demetrius: "But, what I forgot to say..." is that the South Africans are very transparent, which Rich also commented on that, the more transparency we have, the more we can accept certain things that exist. They started, complied with our demands to have access anytime, anyplace. For me, from my experience up to now, access is the most important thing. In integrated safeguards, level 2 or 3 of the state system, inspectors at the agency must have access to the material and installations. The thing is that the South Africans were so transparent, provided the documents and people. We wanted this to be a statement that you will provide access anytime, anyplace to anyone – there is a letter from South Africa, access anytime, anyplace to anyone. We really went wherever there was any hint – by the fastest means available – to the Kalahari desert – like the cobras on the hills with the fuel storage, and the place with the drilled hole where the test site was, the Air Force couldn't find the place! They had the wrong coordinates, they were moving around and around, trying to find it. We did finally destroy the Kalahari test site, filled it with sand and cement and whatever we could find to drop in there.

They really helped, and there was very high transparency. In both GC papers we underlined the transparency that allowed us without delay to have access, move around, access to any place we needed.

Laura: Can you say a little bit more about the story with the snakes and the desert?

Demetrius: The waste had been accumulated on a hill – big waste drums, lots of waste, from filters they were using, uranium deposits. And some of it we wanted to measure to make a rough estimate of how much was in the waste. So we could close a material balance. We had to figure out how to measure a drum. It was on a hill with thousands of drums of depleted Uranium with various enrichments, and of course pieces of material and filters and things. To try to do a completely random proper scientific selection – to get the last drum in the last row – it's difficult. So we had trouble with that logistically.

But another problem – there were snakes everywhere –cobras, pythons – but people really did the best job they could. It was South Africa, don't forget that!

In Iraq and South Africa and North Korea, we had still to go and do a lot of other jobs – had to verify the freeze of the installations. This was without any help of the North Koreans. We didn't dare to touch the rail of the staircase, it's 30 below, if you touch it you'll burn yourself. No heat at all. Fur hats and bundled up in meetings. People are getting hardened up, doing their job, in Iraq, NK, SA. It brought in a new spirit to the Agency. It was a change definitely – not only in the attitude, broadening of the interest and mission, becoming more and more acceptable that the agency has to report on the completeness of the declaration, not just the correctness.

This was installed in stages – as things came up in Iraq, NK and SA - contributing in technology and also in ideology. They were making progress in the way they were handling things, getting used to negotiating, having new ways of communications. You know, the first satellite phone I had when we went

there in May 91, had to be carried on a truck, to be set up with a tripod, 5 people had to carry down all the things from the truck, it had a huge antennae.

The inspections I did in 2002 I had a small sat phone, to talk to Blix, just from the balcony of the hotel, so I could see the stars. GPS became available. It was originally complicated instruments but they became easy to use – to find out where you are within 10 meters.

This was tremendous progress. Also in surveillance systems, that would do a marvelous job for you, also in containment, seals, not only Vacoss, but electronic seals you could open and see when they opened it. Technology progressed a lot, as a result of the needs for more complicated inspections which had the political interest, which inspired and gave the money – labs like Sandia worked for the inspections, made a lot of contributions for this.

Laura: The concepts – do you remember when we were in Blix’s offices and developed the expression “correctness and completeness?” We debated whether correctness implied completeness. But we decided that correctness meant if they said they had it, then they did. Completeness was when we verified the non-diversion of declared material, and no undeclared material or activities. We had an extensive discussion.

Demetrius: But the most important result was the experience and resources we were getting. South Africa finished in 1993. For a long time afterwards, we had made arrangements that some of the equipment used in the program, we did not destroy them as we did in Iraq. There they made an agreement they would disperse them around to different facilities. Inspectors had to go around and verify that the equipment taken from the Circle<sup>2</sup> (the SA weapons development complex) continued to be used for exclusively peaceful purposes. So, we had finished with SA but Iraq was continuing. Although in a little bit more “forced to continue” approach, because there was some monitoring from UNSCOM for other purposes. But fundamental activities in Iraq were taking place. And then of course in Korea it had changed a little bit – under the Agreed Framework there was a freeze on the facilities, and IAEA verified the freeze, which was a new activity for the Agency. So the decade of the 90’s, there was all new things happening in the Agency.

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<sup>2</sup> <http://isis-online.org/isis-reports/detail/south-africas-nuclear-weapons-storage-vault/13#images>