

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.

7.1 Introduction

Keywords: history, development of safeguards

Rich: These events in history happened nearly coincident in time – DPRK, South Africa, Iraq – and they all played really important, formative roles in the development of strengthened safeguards. You were a principle in all of these inspections. We would like to hear how you came to be involved, how you were briefed according to the mandate, how you were prepared, how you organized inspection teams, the incredibly complicated logistics, especially in Iraq in the early days.

Demetrius: It is related in part to the history that I had with the Agency. I started in 1972, and I started working in South and SE Asia areas, India, Vietnam, up to there, and the Far East, Korea and Japan at the time. The first inspections were in Pakistan and India systematically, and they were not very pleasant states at the time, there were health problems for the inspectors going there. But you could learn a lot at the time, you could learn to face difficulties, from solving problems of how to develop your surveillance films - you had to use the toilet, sit on the seat to have complete dark to have the film developed in the dark. You had to fight with scorpions and snakes – when you are staying in the areas near the reactors – but you learned a lot – how to negotiate with the people, how to discuss with them, they were not easy, but you had to be very careful.

Around 1980 or 81, there was a problem in Pakistan regarding the surveillance – access of the surveillance cameras over the top – it is not adequate – the C/S system we had. So there was a team formulated – head of the team, myself, Von Beckman, a few others, and we went over there and were doing things – being bad guys and good guys – and I had to be the bad guy, and we managed at that time to extend the surveillance, not because Pakistan wanted to accept it but they didn't want to have more problems accumulate at the Agency, with respect to the inadequacy of the subsidiary arrangements. So that was the first thing out of the ordinary arrangements and inspections.

Then Blix came, and then I started working with Blix on a number of issues that had come up. At this time, the very fundamental issues were the joining of Japan into the Nuclear Non-Proliferation Treaty (NPT) type of safeguards (SGs) agreement out of the 66 type. And of course, Euratom, with the European Union countries at the time, and with Euratom as the safeguards authority, they were not very accepting of everything coming up to Agency safeguards, and international pressures – the problems there, as with Japan, were with Subsidiary Arrangements. Now we're getting into an area where we're facing different beasts – not just research reactors, and fuel fabrication plants – now there were enrichment plants, Pu bearing facilities, MOX, reprocessing plants – opening up the NPT type safeguards, all these facilities dropped in.

It was not just to go and discuss – first you had to understand what it was all about, how to set up the system for safeguards at these facilities. There was a period of long negotiations and internal studies, and Blix was involved in these things, to understand and try to pressure politically with these things.

You remember, Rich, there were issues with coordinators in the Department of Safeguards and Directors. Coordinators were supposed to do operations, and Directors were supposed to do the political things – and there were conflicts. Within these conflicts – there were three people – Les Thorne, Sven Thorstenson, me (I was the young one) – we formulated a little group – we tried to coordinate things – so that if things are happening in one area, they happen also in another. So there was this assessment and discussion, and to the extent permissible by the different negotiation techniques, etc., to have more uniform approaches across the board. This is what I find missing now, there is not much discussion and coordination what is happening today, and I think this is one thing they should concentrate on.

7.2 Issue Background; The Creation of Programme 93+2

Keywords: SAGSI, development of safeguards, Additional Protocol

Rich: After graduation, I was hired into the old Hanford laboratories, where at the time, it was the very formative days of the development of statistics for nuclear material accountancy safeguards. My mentors at that time were people like Carl Bennett and John Jaech. Fairly soon after that, I became involved in the development of statistical methods for environmental sampling (ES). This was in its formative period. This was both Iodine- 127 analysis by neutron activation in the very early days, and heavy element analysis of individual particles. My participation in this effort continued, my time was split between development of statistical methods for the analysis of ES data and safeguards. In 1982, I came to the agency as a cost fee expert, and my primary assignment was to address some of the reliability problems they were having with surveillance instruments at the time. I returned home in 1985 for 3 years, and returned in 1988 as section head of the statistical analysis section.

I was there when the [UNSC] Resolution 687 inspections began in Iraq – I participated for the first time in the 3rd inspection, and this was in early July of 1991, and fairly soon thereafter was seconded to the Iraq Action Team for the next almost 2.5 years. I participated in 15 on-site inspections in Iraq, and at the same time, during that same period of time, the completeness inspections in South Africa got underway and I participated in some of those, addressing the completeness problem in their enrichment facility.

These experiences of the early 90's - Iraq, South Africa, and DPRK which was about that same time - all played really important roles in the formative part of strengthened safeguards. In the fall of 1991, Blix expanded SAGSI from its traditional size of 14 members to 20, and asked them across the next year to work toward making recommendations to him on ways to reach more efficient and effective safeguards. SAGSI carried out its work across the year 1992, of course it's always heavily supported by the Secretariat, and in April of 1993, they reported their recommendations to the Director General. He then in turn took a summary of those recommendations and reported them to the Board, at the end of 1993. The Board's response was to request the Secretariat by December of that year, to come to the Board with a proposal for how to define the technical, financial, and legal implications of SAGSI's recommendations.

At that time, I was asked to prepare that proposal; the proposal went to the Board as requested in December of that year, 1993. The Board endorsed that proposal, and that was the beginning of what became known as Programme 93+2. And I became the manager of that program.

The name Programme 93+2 was intended to convey the lifetime of the program. The review and extension conference of the Nonproliferation Treaty was scheduled for April-May of 1995, and the intention of the secretariat was to make a final report to the Board before that. 1993+2, that's where the name came from. Unfortunately, the name continued after the Programme continued past that, but that's where the name came from.

7.3 Experiences in Iraq, South Africa and DPRK

Keywords: history, key nonproliferation challenges, Tuwaitha nuclear facility

Rich: The experiences in Iraq, SA and DPRK... In Iraq it became absolutely clear that no set of proposals for strengthened safeguards made any sense if they didn't include steps to make sure - to provide a high level of assurance - of the absence of undeclared activities at declared locations, at places that the Agency knew about. Now, the reason that Iraq pointed so much to the importance of that, is that all elements of the Iraqi nuclear weapons program had their beginnings at Tuwaitha, the nuclear research center south of Baghdad. Of course this was a location that the Agency knew about. Agency's access prior to the UNSCR 687 inspections was limited to four specific locations at Tuwaitha. There was the IRT-6000 reactor, a zero power so-called Osirak-2 reactor, an away-from-reactor fresh fuel store, and a very small pilot fuel fabrication facility. Those were the four specific locations inspectors had access to. And this was a huge place with hundreds of buildings.

In 1981, the Israelis destroyed with aerial bombardment a large 40 MW Osirak 1 reactor that the French were building there. They did so believing that it was the Iraqi intention to use that reactor to produce Pu for a weapons program. The Iraqi response to this was to build two amazing things – an earthen berm around the whole huge research complex, so when you approach Tuwaitha, the first thing you see is this huge 30-35 meter high berm that surrounds the place. There were military kinds of installations on top of it, like anti-aircraft guns and other sorts of things. Then, surrounding the whole of Tuwaitha¹ was a set of concentric towers with wires strung between them. All of this was intended for, if the Israeli attack came in very low, that it was intended to keep that from happening again. It really is quite a sight the first time you come there. Those Iraqi can move some dirt I tell you.

But the Iraqi inspection experience was formative in development of strengthened safeguards in a variety of ways. I've already mentioned the importance of assuring the absence of undeclared nuclear material at declared locations. There was a tremendous amount of equipment that supported their clandestine nuclear program. Much of this equipment was dual-use, but not all. And so it certainly taught the lesson of Iraq – if you're going to pay attention to the completeness of their nuclear material declaration, you need to pay attention to their procurement kinds of activities and the kinds of equipment they're trying to get their hands on. The importance of access to individuals – to be able to talk to people that were involved in the program, certainly that was another major lesson in Iraq.

¹ <http://isis-online.org/isis-reports/detail/development-of-the-al-tuwaitha-site-what-if-the-public-or-the-iaea-had-over/9#images>

7.4 Iraq

Keywords: Iraqi inspections

Demetrius: But going back to the history, the issue of Iraq came up in 1990, August, the invasion of Kuwait. When everything in the war was finished in Feb 1991, I was asked by Blix with Mohammad Elbaradei, director of legal at that time, to go to New York, because some Americans were trying to put together a resolution (famous resolution 687), and Blix wanted to make sure from a technical and legal point of view, the Agency retained its rights.

We met Robert Galucci² at that time, who was leading this, had some discussions - some smooth, some not - Galucci is very sharp and capable person. We came up with the guarantee that the Agency would do the nuclear part, and there would not be too many interferences from the other part of the organization, which was the United Nations. And they undertook at that time, that they would cover logistical support for the Agency under Res 687. The whole thing finished around April, which you remember, both of you, because you were involved. At that time we said to Blix that we had to go fast.

So Blix created the Action Team in the Agency, and he wanted to have 3 people to start with. This was me, Zifferero, who was the DDG for research and isotope separation, and then he asked me to come in to direct operations, and then he asked David Kay to do the administration part, contact with different agencies, etc. We came in together, and I remember at that time Zifferero insisted that I move my office to the 28th floor, and I insisted that I would not, because at that time I felt that the basic principles of the inspection effort in Iraq would have to come out of the Department of Safeguards. Because the IAEA Dept of Safeguards had trained inspectors, trained, ready, knew how to work on a team, how to assess results from an inspection, to put it in perspective, how to measure nuclear material quite well. We had already the spirit and structure of a team right inside the house.

I felt if I stayed where I was, on the 19th floor, if I were there I would not be considered a foreign body, I would be part of the group that I would ask to come on inspection. We got Blix to agree that whoever we asked they would be given to us for inspection as a priority. And then we said we are ready in 2 weeks to go. Because we felt it would be the requirements there, and we started talking about logistics support, but it did not exist at that time, because UNSCOM was 3-4 people at that time. They had not capability to do, but they managed to get us a plane, and 1-2 people together to join us, and so we in mid-May, one month after the resolution, we got into the country, and I had to be there.

7.5 First UNSCR 687 inspection in Iraq

Keywords: Iraqi nuclear complex, inadequate access to information

Demetrius: We had a very old plane, Romanian airlines – flew from Vienna to Bucharest, there were about 35 people on the first team, because you had to be joined by people who would take care of not stepping on bombs – the whole area was heavily bombed - so we flew with them, the whole group to Bucharest, filled the plane, stopped at Cyprus, filled the plane, and arrived in the middle of the night in a faraway airport in Iraq...

² In 1991, was the Deputy Executive Chairman of the UNSCOM for Iraq.

Rich: Habaniya.

Demetrius: Yes, Habaniya. It was selected on purpose so we'd be far away from the population of Baghdad, so they wouldn't see planes from UN flying over. They'd see buses that brought people to hotels. Next, problems started. Under the arrangement, there were already some UN people, they set up some telephones so we could communicate amongst ourselves. They gave us some Jeeps. These were really old Jeeps – I tell you – you could feel the whole dust of Baghdad in your nostrils every time you got into that Jeep. Then we went to a site for the first time – the site was known to the Agency because inspectors were going there, heavily escorted, to only 2 – 3 facilities on that site. This was Tuwaitha³ site. It had very peculiar characteristic – it had very high berms, 30-40 meters, around the site. The idea of the berms was to prevent anti-aircraft missiles by Israel or anybody else, which had been the situation back in 81 at the Osirak reactor. The problem with the berms is that the inspectors didn't know what was happening behind the berms.

When we were making preparations for the team to go, we were asked to get maximum information, and while we were getting information of where we were going, what was happening, what were suspicions of different sites. We decided the first instance, we needed to take control over all nuclear material in Iraq. As was in the declaration from Iraq. We said we would do that (Tuwaitha) and one more center – Tarmiya – it was chemical plants and physical heavy plants with lots of electrical power – so these 2 would be enough for the first 2 weeks.

So we went to that site and asked to see the HEU, and asked to see the Iraqi materiel. And then started our first experience with the wishy washy Iraqi side. Everybody was doing whatever they could, distractions, to try to have a smooth operation towards us but not to provide everything that was to be provided. And we remember the guy who always put his hand over the wrong side, on the right instead of left, and so we knew he was lying.

Rich: He had a Michigan State PhD.

Demetrius: But he was under instruction to do his job, not to reveal. So we had a lot of discussions, until we managed to find out where they had the spent fuel. The spent fuel, because they were being bombarded, they'd been ordered to move it to another location, outside Tuwaitha, so they found a location – a farm between Tuwaitha and Baghdad – and they put it in pools there, filled with water, and they transferred the SNF⁴ over there while bombing was going on. For whatever reason, the birds in the sky missed it completely. They had no idea what was going on there. And I think that if it was not the way that we started discussing with them about future cooperation, the problems that might exist, the importance of getting at least the Nuclear Material in the hands of the Agency, we pressured them to come clean on this part. In the last few days it was Tom Canada who went over there, and to find in the agricultural area, the homes with the spent fuel, to make measurements. In the meantime a group had gone to Tarmiya – they got lots of pictures, finding it was strange things happening in Tarmiya. When they came back they said it was a chemical plant nothing to do with nuclear, but then of course started taking samples, but we put it as part of the high priority. So when we came over here and took pictures, there was Gugul – the guy who came from the time of the Manhattan project, who...

³ <http://isis-online.org/isis-reports/detail/development-of-the-al-tuwaitha-site-what-if-the-public-or-the-iaea-had-over/9#images>

⁴ Spent Nuclear Fuel

Rich – there were two guys from Oak Ridge - Jerry Nickels, and this Gugul.

Demetrius: I can still see him – sitting on the 28th floor in the offices of the Action Team, looking at the photographs, and he started putting the photographs on the table, separating them into two piles. One set of the photos was the big facility, where they had huge high ceilings, and the other was a smaller facility with smaller area. And he said, “here, they were going to do enrichment up to 5%, and here they would go higher. This is the typical set up, what we did at Oak Ridge.” So he identified that Tarmiya was a very interesting area for us. We started getting more faith in what intelligence was coming out with - intelligence of the Americans, imagery. Before we left for the site with our team, we reached agreement that I could have one picture of Tuwaitha from the sky, that would permit me to brief the people before they went there. Because what we’d seen is that behind the berms was a huge area, that no one had touched before, and it was the new development area. It was sort of divided like the Russian area where their reactors were, and the new area with their own things, the fabrication area. So the surprise was also that what we saw at Tarmiya fit with some of the stuff we found at the development area at Tuwaitha. We saw huge magnets, they said they were physics experiments – nothing to do with separating uranium, but other isotopes... And this part was there in the physics building, and there was another building where we found a lot of samples of uranium. And it was chemical labs and a lot of uranium there, and that’s where finally it came out that they were doing UCl₄, which was part of preparation for the targeting, which they wanted for the separations. So the results were accelerated, we put more pressure on them.

7.6 2nd Inspection in Iraq

Keywords: calutrons

Demetrius: The 2nd inspection was with David Kay, it came up there was a shooting incident, Les Thorman was there, he was in a car with UNSCOM guys, and they were going after a truck that was half covered - that was a huge truck - it had left the area when they showed up to inspect it, and they took photos of that, and were being shot at by the Iraqi military that was there. There was the usual sort of discussions with the UNSC and condemnations and everything else, but that picture was important. Because it showed something that was huge and circular – it was a magnet for the calutrons.⁵ Then the 3rd inspection happened, with Rich Hooper, it was your first inspection, the 3rd one yes? – in the meantime with the action team, we started getting people with experience in different areas, Olli Heinonen, Rich, Gerard (?) - people with big experience but they were coming in either as members, or collaborators, but close collaborators.

7.7 3rd Inspection in Iraq

Keywords: Iraqi nuclear complex, enrichment, expanded declarations of information

Demetrius: So when we went down there, the 3rd inspection was spectacular, because they came up when we arrived and they gave us a new declaration. And in this one they told us all about Tarmiya. This is when Jafar Jafar came up.

Rich: “I will tell you everything.”

⁵ <http://en.wikipedia.org/wiki/Calutron>

Demetrius: We reached Tarmiya – they explained - and the American guy who had assessed it was absolutely right – they had Calutron A and B area – in one they would enrich to a certain percent, and then use the 2nd area to enrich it further. This reminded you of the present day situation where you may have was an enrichment plant, and another which they may use to go higher and higher. So we learned this, and had to go into the desert to be able to unearth all the equipment, to identify (it).. Rich was preparing eggs on the hot glass on the Jeeps because it was 60, 70 degrees Celsius, very hot, everybody really behaved extraordinarily.

And then the inspectors learned of Al Athiya – the area where the 6th inspection occurred – purely a documentary inspection. One document had been missed and it was found, with the whole program of their nuclear weapon orientation.

7.8 Contrasting IAEA Action Team Inspections in Iraq with Safeguards⁶

Keywords: development of additional safeguards, access to information, monitoring and verification, correctness vs. completeness

Rich: Maybe it would be helpful to preface this discussion with the description of the kinds of authorities that the agency had to conduct its work in Iraq, and to contrast those that more typically accompany the comprehensive safeguards.

Jacques: Yes, it's certainly a very important parameter. I've been used to, for years now, to call the conditions we had in Iraq as dream conditions for verification. The basis was a cease fire resolution, 687, passed by the Security Council in April of 1991. As far as the verification regime was concerned, we had tremendous access rights. We could go anywhere in the country, we could do it at any time, in other words, as far as implementation was concerned, being able to systematically conduct unannounced inspections. We had the right of access to any individual necessary to talk to. We had access to all documents that the country would have to provide us if we requested. And we could also use any technology that we felt was useful to cope with our mandate. Our mandate was first to identify what was Iraq's past program. Second phase was to destroy any remnant of that program that existed. Destroy, remove or render harmless. And third was to implement an ongoing monitoring and verification regime, to ensure that Iraq did not resume activities prohibited by the Security Council. This access right was definitely something that was specific to Iraq, and I believe that unless we return to a situation where a country is forced to agree to such rights, for instance in the context of a cease fire resolution, it can never be the type of right that would result from an agreement or a treaty. And this is the difference – we usually access as along traditional safeguards, declared facilities. The improvement with the Additional Protocol has given us far more access, both in terms of locations, in terms of information, in other words coming from declarations, but we will still remain far away from the 687 conditions. I sometimes worry when I read in the press for instance, the translation of the Additional Protocol as being access anytime, anywhere. I think it may mislead the layman in terms of understanding what are the limitations of the Agency in an agreed regime like Safeguards.

Rich: If a person stands back a little bit and looks over time, and you contrast the very broad rights that the Agency had under UNSCR resolution 687 with the inspection possibilities that the Agency had prior

⁶ <http://www.globalsecurity.org/wmd/world/iraq/nuke-program.htm>

to the Gulf War, because Iraq had signed the NPT, had a CSA with the Agency, under that agreement there were certain points of access that were made available to Agency inspectors. There were actually four locations at the Tuwaitha Research Center. And the declarations that the Iraqis were required to provide were limited to information regarding the design of facilities, that inspectors had access, as well as any material subject to safeguards, at those locations. That's a far different situation than you describe under 687.

Jacques: I think when we look back in the 80's and the way safeguards was defined and implemented, I was not here, I was too young in the business at the time, but the main flow was the assumption that a country that would have committed itself through signing the NPT would by definition respect its commitment. So all the verification regimes was based on verifying declared material, be sure the material would not be diverted, verifying the function of declared facilities, but there is no emphasis at all or no effort put into making sure that the country remained committed. In other words, did not develop a pilot program. I often react strongly when I hear, that was the agency's approach. I don't think so. I think that was the international community understanding of what needed to be done, not only the weakness of its technical R&D agency. So its clear that Iraq used that limitation of the approach to have a full blown pilot program, from mine to weapon, extracting uranium from phosphate mine, down to having a laboratory producing the nuclear weapon, and all the intermediary stages, in an organizational structure in locations that were not actually subject to inspections, and which we had at the time no reach. Even at declared sites like Tuwaitha, Iraq was capable to conduct activities because most buildings were not under inspection, and even in the buildings that were under inspection, the criteria approach that there would be 2 inspections a year, such that inspections were taking place in April and November, and in between, they could use these buildings to do something else. That's the main difference in my view that has been very seriously addressed with the Additional Protocol.

Laura: You know, we've heard over the years many people criticize the Agency's safeguard system as failing to detect Iraq. Can you say a few words about that?

Jacques: It's always easy to find a scapegoat, thank you for making me react again to that. I don't think it was a failure of the Agency as such. It was a global misunderstanding translated into these limitations of the technical implementation. Its clear that if we had looked beyond considering the additional rights that were needed to go to all the places, for instance, if the Agency had looked at open sources in the late 80's there were clear indications that Iraq was interested in centrifuge enrichment for instance, so that was something that could have been done, if only someone had the idea to push the Agency to do it. I would say they were also in the intel community a certain knowledge in certain countries that Iraq was doing something, and again, centrifuge enrichment interest was something that had left lots of footprints, so if member states had helped the Agency to push the Iraqis answering some questions, would have probably been capable not to wait for the Gulf War and the SC Resolution, and the resulting regime, to find what was happening there. Among the footprints, of course, there were ones were those left by the procurement attempts by Iraq to have an accelerated centrifuge program through buying everywhere whatever they could buy. That was a big difference in their approach from the EMIS (the electromagnetic isotope separation) where actually security and confidentiality was their priority and pretty much it seemed that nobody knew except the core group in Iraq that were working on it, what was going on. We could have even without additional rights put the finger on the fact that something was happening, but it would have only been partial. Only a change in the rights could have made the difference.

Rich: Yeah, EMIS⁷ program was almost totally indigenous. Where the higher technology requirements of centrifuge enrichment required them to go shopping.

Jacques: Absolutely.

7.9 Implementing Verification under UNSCR 687

Keywords: expansion of verification to include completeness, nondiversion, undeclared activities

Laura: An incredibly large task. Talk to us about how the team was set up, how you structured the team, how did it operate. To have to map out and destroy a nuclear weapons program. Not something one does overnight.

Jacques: That is true, it took far more time than the SC had anticipated. The timescales were, and Laura you know that very well, because you were contributing to the drafting, the SC was talking about 15 days, 45 days, to draw a plan, to implement it, in terms of obtaining final declaration, or implementing destruction plan. Actually the order of magnitude had been more like 15 years, rather than 15 days. The challenge of having the right team was a big one. I would say the Agency started very well. I have to say even the DG of the agency, Hans Blix, who is the entity referred to in the SC, not the Agency as an organization, made the first great decision when he appointed Maurizio Zifferero⁸ to be the director of the team.

Maurizio was a real expert in this area, and I think that he started that program of verification, with a very scientific approach, from which we benefited for the rest of the program, until 2003. He started drawing onto what I would call the top staff of the department at the time, Rich was one of them, and started to dig into understanding what the program could have done. Inspection teams were made of a significant proportion of Agency's inspectors, bringing into the verification the thoroughness, the rigor, of the traditional safeguards approach, but also made of outside experts, bringing abnormal competence to the team, and that in some ways how I started in the program, and as well there was a number of other contributors. You may remember at the time UNSCOM⁹ was supposed to provide assistance and cooperation to the Agency, and UNSCOM staff were usually a few among the team. That is how it started.

There were regular inspections, they were numbered at the time, from IAEA 1 to IAEA 23 I think, going to Iraq once a month or more depending a little bit on the rate and the issues to address, and these lasted to the summer of 1994. By that time, not only did we have to continue to understand the remaining questions that were to regard the past program, but we also had to implement the ongoing monitoring and verification regime. And in that context, it was decided that the only way to make it effective was to have a permanent presence in Iraq. We ended up at HQ to have a team of dedicated people to the Iraq project, working a 100% working on the project, and a permanent presence in Iraq, with teams made of people on rotation. And still a leading team from the AT, at the time some assistance from inspectors in the Dept of SGs and additional external experts brought by member states with the aim to fill the gaps in terms of

⁷ Electromagnetic isotope separation

⁸ Former deputy director of IAEA, head of IAEA's Iraq Action Team

⁹ United Nations Special Commission in Iraq <http://www.un.org/Depts/unscom/General/basicfacts.html>

competence. Again, the size of the team started small, we were when I joined the team full time in 94, something like 6 or 7 members, as our mandate developed through time, including in 2002 for instance, for the need for the Agency to contribute to the implementation of the old four foot program.

And review all contracts, and be sure there wouldn't be any diverted towards to a prohibited activity, the team ended up being over 20 at the time of the extensive inspection regime we implemented between November 2002 and 2003. But the key lesson learned for me has been the fact that having people work full time on it like that one is essential. You cannot, particularly when you want to go into deep analyses of very complicated issues like that one, presence or absence of the right cooperation from the country as it was as far of Iraq is concerned as late as summer of 1995. But also to make sure that follow up is done in the most timely manner. The Council, as well as the Iraqis were always extremely impatient to obtain results from the agency. So the permanent dedication of the team, and a team made of all the competence necessary to cover the whole program, mostly the members, but also the ability to draw on the unique competence dealing with the key areas has been a key factor of the success.

7.10 Importance of 3rd Party Information in Iraq

Keywords: national technical means, Iraqi weapons development document

Rich: As the whole thing developed, and information came to the Action Team, both from the Iraqi side, but also from outside, it was really the first time in the history of the Agency that extensive, of what we now euphemistically refer to as 3rd party information, information from states, intelligence kinds of information, was provided to the Agency to support inspection effort.

Laura: National technical means. Rich: National technical means.

Rich: Could you speak to that a little bit, how it came, how it was used.

Jacques: Yes, the provision of information voluntarily provided by a state has been key as far as the Agency's ability to discover what was the Iraq program. However, I've always called the attention, particularly at the time of the way to war of 2002, there was some communication lines saying that the Agency has not been able to find anything other than what it was able to find from defectors, it had been tremendously important, but probably in terms of the proportion a limited input. What is the tremendous important is example for instance, the famous IAEA 6, and the parking lot event where inspectors were locked in the parking because they didn't want to leave the premises without the documentation they had found. It was definitely an illustration on how effective proper and timely communication between a state having information through national means, and inspectors having the right of access to a site, under 687 of course, could make the difference. I would say one of the key results of these inspections was the famous smoking gun document demonstrating that Iraq had a weapons development program, which they had always denied. And I'm very glad for this document, because that's the reason that I joined the Agency, I mean today, being called as a weapon expert. Before that there was no real need for me.

Laura: Tell us a little bit about the parking lot incident. How did that place get targeted, tell us a little bit more for the people who might not have been there.

Jacques: I wasn't there either. This is one of my great regrets. If I had started 6 months earlier, I could have gone through the Iraq verification regime from the beginning. And maybe I would have been on this famous parking, but I was not.

The Iraqis at the time were in the process of concealing what was the true extent of their program. And given they had already understood the power of 687, and that an inspection team would be able to access any site, and would be able to access then any document that would prove the extent of the program. So they entered a concealment program that included the collection of damning documents and started to move them from one location to another, in order to avoid these documents being reached by the inspectors. It happened, when I say it's an illustration of very timely transmission of information, one of the temporary locations or two of them were actually leaked from some human source in Iraq, and transferred to the Agency in such a timely manner that when the team reached the sites, the documents were still there. So that's really the mechanism that led to that key event.

7.11 Verifying Iraq's Declaration

Jacques: Back to my initial caveat, the fact that no there is not only 3rd party information that provided the basis for the Agency's understanding which is the basis for any verification regime. It starts with a declaration. The Iraqi declaration was not the most reliable. Because I was not there, Rich may remember and Laura too, that the first Iraqi declaration was a one page statement stating that "we do not have a nuclear program", to which the Agency responded, "you can't declare that because you already have a declared nuclear program." The system actually in the Spring of 1992 we received a new FFCD¹⁰ of a few dozens of pages - the full final and complete declaration as requested by the SC - that was still something very sketchy and very skinny. So the declaration grew until we told the Council by late 1996 I think or even 97, for sure when we went to the Council in October that we had an acceptable declaration, in terms of being full, final and complete. And that was then several thousand of pages.

So it developed based on recurring questions. And the consistency of the declaration is one of the power tools that the Agency has assessing the consistency of a declaration, and so just with a declaration, we could have done, and we made lots of progress, making sure that the Iraqis were conscious of the fact that there were key questions, discrepancies, between different areas, and they didn't explain that. So that was absolutely key.

We certainly put lots of effort, and that's an area where in my view the nonproliferation community, and I try to explain it even to JNMM¹¹ in an article published last summer, needs to make progress - is the area of analysis. I think that the way we conduct the analysis by having a permanent team, having key experts, but also having an adequate circulation of information – and the scientific background of Zifferero was key for that. He helped us develop a thorough understanding of what was the disconnect between the declaration, the info we were getting from 3rd parties, and of course, what we were gathering from the field. This collection from the field, which is the absolute key for the Agency, the role the Agency has in terms of verification, the niche for us, is the legal access to the field. That makes the difference, and we

¹⁰ FFCD – Full, Final and Complete Disclosure

¹¹ Journal of Nuclear Materials Management - <http://www.inmm.org/publications/ratecard.cfm>

can make the difference in terms of being the reference for the international community, proving what is the truth.

Of course, it all starts with observations from the inspectors. And the more important is that the knowledge of the inspector in an area, the better observations can be. Hence the competence need, then there is the key issue of technologies. At the time when the Iraq program started, the Agency benefited from the introduction of a technology which was swipe sampling followed by particle analysis. And this allowed to corner the counterparts and have them acknowledge that a facility that was supposed to be for whatever innocuous fabrication – I think Tarmiya was told to be a convertor factory – prove there was trace of the use of NMs there that couldn't match a purely electrical production. So, it's the combination of the three components – the declaration, the information obtained from multiple sources, and how it fits with what is discovered in the field - that gives the power of the verification analysis.

7.12 Access to Individuals

Keywords: Iraqi weapons complex, expanded access to individuals for verification

Rich: It seemed to me that one of the primary lessons of Iraq and other difficult verification challenges that existed at the same time, was the importance of access to individuals. That you will run across problems with idiosyncrasies, instances of issues that occurred in the course of their work, that you have no possibility to understand, without access to people that were there at the time.

Jacques: That, I can't disagree at all with that. Individuals were key. But we have to find the right individuals, and I agree with you. One of the problems we had in Iraq, or I could say, one of the problems Iraq had in the beginning, because it was the problem of the inspected party, was to find people who had been briefed, to talk to us, but did not really know what they were talking about. Which means that it was an additional manner to inject inconsistencies, to inject problems, that if we had been able to talk directly and immediately to the right people, some problems that we wasted some time on both sides to resolve, would not have appeared. So that's, for instance, one of the area where progress was only made after August 1995, was centrifuge enrichment. Before that, we had essentially spokespersons.

I would leave aside the weaponization side, before that we had no information, or hard information. Al Atheer¹² – the weapon development lab that we had destroyed in 1992, that we had decided contributed to weapon development, was actually only acknowledged in 1995. And then we had access to all people. So back to how effective it was, it was tremendous. Being able to talk to anybody who had worked on a given report, and ask in detail what was the reality, what were the problems, allowed us to have a tremendous understanding of the past program. It even allowed us to correct some of the achievements that were recorded in the formal reports, because, as you know, in any business, you know, "everything is under control, we're making good progress," reports were writing that. But then we're talking to people who obviously didn't understand what they were doing all that well, so things weren't going all that good. So we needed to sort out what was actually lack of progress that were real, and what were lack of progress that were only part of concealment.

¹² http://www.globalsecurity.org/wmd/world/iraq/al_atheer.htm

So talking to people, being able to understand how a team was working, was absolutely key. I know an anecdote that was interesting – we dug for a long time to understand why there was no connection between two teams that should have worked together, and then we realized after meetings of repeating the same question, expressing the same lack of belief in what we were told, we ended up talking to the two teams on the same time at the table, and they obviously hated each other so much, that I thought, “I think it’s true, they didn’t actually work together.”

So I think it’s true, it’s something I think from a legal standpoint is always difficult to enforce. Again, 687 was great, but for all sorts of human rights issues, but even with the right we had with 687 I remember some times when the Iraqi counterpart, our official counterparts, were eager to provide us access to the person we had asked to talk to. I remember the event when I was someone, wanting to talk to the person on the Iraq side, that I got repeated apologies from the Iraq counterpart that that person simply did not want to talk to us. At the end, by whatever means, we ended up meeting each other, and the guy was just beyond himself, and shredded me during the whole meeting. It was genuine. It was just honesty. It wasn’t a part of concealment. But that access to individuals will always remain a sensitive issue for verification regimes.

Rich: I think in Iraq, particularly in the early years, the delay of getting access to the right people, really slowed down the whole endeavor. Had there been access from the beginning to the people that had been involved in the development of the Iraqi centrifuge, for example, what ended up being spread over about a 4 year period could’ve been taken care of in about 4 months.

Jacques: I couldn’t agree more.

Laura: They were surely motivated not to have us meet with the right people.

Rich: During the 3rd inspection, there was a design, at that point in time the only design we had, of the Iraqi centrifuge. And this was a design that had been stolen from a German fellow that was working with them. We had with us on the team some of the best centrifuge enrichment experts in the world, and there were details of this design they just simply couldn’t put together. It isn’t really this, and it’s not really that, it’s something in between.

And I remember the magic day when the Iraqis finally produced the guy, and in five minutes, you know, all the fog is gone. But it took them 2 years to produce this guy.

Laura: I wanted to touch on this 2002 time, when there was some pressure to take people out of Iraq.

Jacques: I completely agree with Rich, and I think it’s to the benefit of the inspected party, but whenever there’s an issue that needs to be resolved, bringing the right people, rather than sticking to an official counterpart, is the only way to resolve in a timely manner an issue for which someone has the answer.

Laura: Jacques we’ve been talking about the importance of access to the right people, if the state is interested in resolving a problem. I remember in 2002 when the SC was negotiating the “Return to Iraq Resolution,” we were under considerable pressure to work with the measure that was being proposed about taking people out of Iraq, and people thought it was a great idea, they will feel safer when they’re outside of Iraq. It’s the human aspect of access to people.

Jacques: Yes, that's an important point. Whatever we do as part of a verification activity, we sometimes could forget we do not deal between an organization and a state system, that's what the legal text seem to imply, but on a daily basis we deal with individuals. We are individuals dealing with people on the other side. And the issue of taking into account the pressure that individuals can face was always important. We always kept in mind the as far as the Agency action in Iraq was concerned - the fact that we had people on the other side.

I was never a great supporter of the "Resolution 1441"¹³ idea that we would get people talking freely as soon as we would interview them abroad. They would leave, if we had started to implement that action, they would leave their whole family behind. Which means that their freedom of speech, if there really was something to hide, and that they were tasked not to tell us about, was in existence. So that measure in my eyes never brought anything else.

More importantly for us was to make the most of any action in the field, and interviews, given the importance of getting the right people's input, were key. And we even tried to develop our own interview skills, tried to understand even if it is in an official context, even surrounded by officials here to make sure that the party line was not going to be abandoned by one interviewee, we tried to make sure that we could read out of the interviews what we were comfortable to affect and what were obviously things that people were asked to say, rather than reality. You know there is one line that we always took care, that we would never use, you know, and I personally, having conducted dozens of interviews, is "you're lying." Because the person in front of you isn't lying, they are on duty. And so the respect of the individual in my mind, is always a key parameter for a successful relation including in the context of a very tough, very demanding inspection regime.

Rich: The poor fellow that was assigned to deal with us in the early days on the centrifuge enrichment program, who was such a decent guy, that when he would start the party line, he would start to sweat. We used to tease him, "Alright, put the notes away."

7.13 Handling Massive Volumes of Information

Keywords: data analysis, need for integrated information system

Laura: Speaking of notes, we had massive documentation of the chicken farm, and other documentation that we had already acquired before, from the point of view of the verification organization, you're dealing with non-English documentation...

Jacques: That was a monstrous task. And we tried to address the various aspects of the challenge just in a practical manner. First of all non-English speaking documents, Arabic was not the main working language in the Agency. All the teams were able to communicate, even with a French man in English, but the documents in particular were the original documents of the Iraq program, they were in Arabic.

So there were several layers – some way to address that was to first of all, every team that was made in particular of a majority of Agency staff, had a certain number of Arabic speaking staff. UNSCOM was

¹³ <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N02/682/26/PDF/N0268226.pdf?OpenElement> – the final opportunity for Saddam Hussein to comply with its disarmament obligations. Stating that Iraq was in material breach of the ceasefire terms presented in Resolution 687.

also providing assistance because they had a pool of translators that would add, in the field in particular, additional capabilities in that area. The team at HQ in particular we developed this permanent team, always included one or two Arabic speakers. So usually they were IT specialists able to speak Arabic, so when there was not something urgent to translate they would develop the tools needed to put together and shape properly the tremendous amount of information we had.

And certainly and I would say that's one of the basis of my competence and responsibility today, to turn what we did in the 90's for Iraq into an integrated information system where anybody who has a duty to perform, be it in the field, or at headquarters, an analyst, the inspector, has right on the screen, the information that is needed. So we spend lots of time in digitizing information, scanning hard copies, turning it into structured key information in databases, and making sure that when a team was going to go sometime on short notice to a place where actually the team available in Baghdad was not very familiar with the site, we had in place an information system that would by a single push button, would provide the team on the way to the site with all the key information necessary. The site location, the layout, the key equipment items.

Laura: It was really fascinating – type in the name and you'd come up with a picture of something. You could click on one part of the picture, and it would give you dialog boxes where you would get data, pictures, documents...

Jacques: Absolutely. The only way for us to cope with the amount is to use what was the modern technology of the 90's and now we're trying to do the same with the modern technology of the 21st century for the Department of Safeguards.

7.14 Satellite Imagery¹⁴

Keywords: ddvantages of satellite imagery, verification of completeness

Jacques: A technology that I've not mentioned yet, that we used in Iraq, is overhead imagery. Through the 90's, we benefited from these high altitude plane, so called U2, that provided the overhead assistance to the inspection activities in Iraq. It was something of tremendous help, because even going to a site where we have been before, we could have visited the site, and we prepared the inspection ahead of time based on satellite imagery. On an overhead imagery.

Thanks to the progress of the technology, at the end of the 1990's - actually we got the first sample at the end of 1999 -commercial satellite imagery became available. High resolution imagery, and what I mean by that, is resolution that is 1 meter. Because if you start to get satellite imagery which is 1 meter or ½ a meter, you have the capability to understand the potential of a site and of an infrastructure to support some activities that could be nuclear relevant. So today imagery has become a key component of safeguards, of information driven safeguards. I would say that no inspector would in some future, I'm not saying it's already done, simply because we don't have the resources to accumulate from a financial standpoint all the images, and recent images that we would like to for all facilities worldwide, nor do we have the capability to do the analysis, but through time, we are building these basis. So that any facility could be virtually visited by an inspector before he or she went out on inspection.

¹⁴ <http://isis-online.org/isis-reports/detail/development-of-the-al-tuwaitha-site-what-if-the-public-or-the-iaea-had-over/9#images>

So the coherent picture can be challenged by all the other technical means. I mentioned Environmental Sampling for instance. And there could be input from so called 3rd party sources. Maybe I need to come back on that with what I said earlier. The Agency benefited from 3rd party information, but that was something that was very well structured. The Agency, for any matter, talks to missions in Vienna, and this transfer of knowledge from a state, knowledge acquired from national technical or human means, would then be provided to, for Iraq was to the DG, the head of the Action Team, and then when there was the need for specific technical knowledge, then the team members having the need for the knowledge would benefit from the briefings. That's something that worked very well. Sensitive information was always handled on a need to know basis. But the need to know also translated into the need to share. The need to translate something that could have been ... information with sensitivity about the source, into information that could be shared with the right people, so that the right actions could be taken. There is no point for a system receiving information if it is not translated into actions through the adequate processing of it.

Rich: But I think an important point is that much of the information as time went along that came to the Agency came as a request of the Agency, not the other way around.

Jacques: I completely agree with you Rich, I missed the 6 first months, so you can answer those far better than me, but later on, in front of the deficiency of Iraq's declaration in particular, in front of the inconsistencies we were finding in the field, we had to ask questions to those who could help us. And I would say that one key example for instance was, in order to reinforce the credibility of our OMV¹⁵ system, we wanted to demonstrate that, as part of the monitoring system, we would keep the same right to go anywhere in Iraq as we had implemented in the discovery phase. This is when we entered into this program of so called "capable sites."

We asked for the assistance of countries with heavy overhead means to provide us with site imagery which had the industrial capability to be of assistance. With time going by, we developed our own approach and generally our own capable sites, because we were getting overhead images, and we could determine ourselves that these sites looked capable. Our own analysts over time became an additional source of sites. It was at the time as a demonstration of our ability to continue to implement access anywhere as part of the ongoing monitoring.

7.15 Iraq and Illicit Procurement

Keywords: export controls, 3rd party participation

Rich: There was a decision taken fairly early on in the inspection reports to publish the names of companies whose equipment was found in Iraq. The equipment was there not under export controls. And that was very controversial at the time. But I think as time went along, I think it played a role in gaining assistance from states as information was collected and clarification was needed. I remember several representatives of those companies and countries coming to Vienna and being very upset. But I think it was the right decision.

¹⁵ Ongoing Monitoring and Verification

Jacques: I would say that was when the decision was taken in 91, but what I can emphasize on is definitely the importance of getting commercial information from the source, from the company, to understand a past program. But also, and that is one of the key challenges of safeguards today, to see early warnings of what could be a developing program. As far as Iraq was concerned, we, as part of this crazy amount of information we got, pretty much every single piece of equipment that was identified in the field, either as having been used, or having the capability to support nuclear activities, were recorded.

By recorded I mean in detail from the model to the serial number, and everything that could allow to identify precisely that unique item. Then we would go back to the company through the state system, writing individually to every single manufacturer or trader identified, in order to understand when the deal had happened. But above all, was there any other type of equipment or other equipment of the same type anywhere sent to Iraq at some point in time. So from the field observation we would be able to get the response from the supporting countries, obtain from their companies, that we had found one, but there may be five items that had been sold to Iraq at some point in time. The immediate feedback would be for us to go back to Iraq and say, you have this one, you know you have these four others, where are they? That was a permanent loop.

Having not been there the first few months, I didn't know there was the need for this arm twist of some counterparts. But after I joined the Agency, this was something that worked extremely well. I would even say at the time of going to the second Gulf War in 2002 we were getting information from companies because there was this whole assumption that Iraq was bursting sanctions and that there was a permanent flow of equipment that could support the resumption of a program. We had started at the time to approach key companies including and above all those which had, or the daughters of those that had, fed Iraq in the 80's, and tried to understand if something was going on. We were also trying to understand if there were networks that would support an indirect export to Iraq. This is where we developed the concept of what we call today the outreach to companies to try to obtain the early warning signs that would help us prevent, rather than address this crisis.

Rich: Uncovering that whole, very convoluted complicated ways that they were able to procure things, was a tremendous challenge because it takes a very circuitous route. I remember the winding machines that were used to produce the composite rotors that were part of the Iraqi's development program for centrifuge enrichment – that winding machine was sold to the Iraqi and was on its way to Iraq when it was stopped by the sanctions. Its resting place at the time when we discovered it was in a warehouse down the road here just a couple kilometers. So there was a very interesting... the winding machine was in Austria at the time of the sanctions. It was bought by an Austrian company at a very cheap price, because obviously it wasn't going to go any further. It was that cheap, I don't think they had any plan for it. The samples of the resin from that machine exactly matched the resin from the rotors we confiscated in Iraq.

Jacques: There was another winding machine that we destroyed actually during the time of the absence of inspection during 1998 to 2002, that had a very complex trip. It was destroyed in neighboring country of Iraq, it had started in Europe, it had gone through several routes, including via Asia. So that's something – understanding the phenomenon of trade related to clandestine proliferation is something where we have tried in the department to develop competence. The urgency to develop this competence [was seen] when some of us landed in Libya in 2003, and we discovered that in a country which had been demoted as a

proliferation threat because it was not capable to develop an indigenous program, had made progress in developing a program. Because if you had the right checkbook, people are ready to sell anything for some greed. So that's definitely something, if I may divert from the Iraq topic, but it's one of my key lines of concern, and communication these days, that there is still in the nuclear proliferation area too much compartmentalization between safeguards community and the export control community, and the security community.

These are three communities that should work far better together – that is a lesson from Iraq topped by my Libyan experience.

7.16 Drawing Conclusions

Keywords: development of the “Coherent Picture,” ongoing monitoring and verification

Rich: But the basic kinds of information that somehow or another had to come together, any inconsistencies identified and resolved, is the declaration from the state itself, this is what we did; the information that is generated from the agency activities in Iraq, and that information from open sources or third parties – that all of that information has to come together into some sort of a cohesive picture. And it's through that sort of analysis that the inconsistencies are identified that then become the driving force for activities to be carried out for the next inspection, and this whole iterative process goes on and on.

Jacques: Yes. It's clear. You use the word cohesive. I think we told the Security Council in 1997 “Coherent Picture.” That was at the time, a discrepancy with regard to the way we explain our achievement, versus the way the Council defined the challenge. The challenge was defined as Iraq having to provide a FFCDD. To be frank, from a technical standpoint, a declaration can never be full, final and complete. Simply because we can never know all the details, and in particular we don't need to know the details that are so minute that they are not relevant to the overall assessment.

So we came up with the concept that we were confident that we had developed a “coherent picture” of Iraq's program. The wording at the time, correct me Laura if I'm wrong, that the DG was considering that there was a diminishing return to continuing to dig to all the details, to get something full final and complete. It was recommended to turn our resources to the Ongoing Monitoring and Verification (OMV). The key, and I would say today, in the process of information-driven safeguards, the concept of having a coherent picture of a country's capability is absolutely essential.

We no longer are into verification of declarations as the old approach. When we have to draw conclusions for a state as a whole, we need to have the good enough understanding of the state nuclear program, of the state capabilities that could actually support a nuclear program, and everything that we do on a daily basis serve actually as probes that may collect information to challenge that coherent picture. [Information] that may come next time could challenge that coherent picture. So checking that it is coherent with the picture is key. A new information source that could indicate some experiments that are relevant that are taking place that are not part of the coherent picture...

7.17 DPRK

Keywords: advanced technical capability of IAEA, special inspections

Demetrius: While this was going on, other things were – at the same time, North Korea came up. Under the pressure, they were finally ready to go. They'd signed the NPT, and finally in 91 they were ready to ratify their safeguards agreement. So we start all over again. A new country, a little bit suspected of being not quite right. So with Blix a visit happened, together with staff from the Agency and Department of Safeguards, and we find huge buildings, which they called a chemical laboratory, bigger than standard reprocessing plants.

Inspectors are feeling a little uneasy, taking a lot of samples. One thing missed by the North Korean side, is that the Agency, because of Iraq, had suddenly increased tremendously its technical capability. Not only for the first time did we have satellite imagery, not yet commercial, but under the control of the intelligence agencies, and this really helped a lot because now we could assess what things were. But now, more important, we started getting access to the environmental sampling technology, and this definitely helped a lot because not only were we getting information from locations in Iraq, but we were using the smears and samples to that technology to make analysis taken from the chemical lab in DPRK.

Rich: But you know the interesting thing about that is that the Koreans accepted that voluntarily – it wasn't obligatory until 2 years later.

Laura: They didn't know how powerful it was.

Demetrius: It happened so fast, all at the same time, that there was no time to really report all the availability of the technology and the results you could obtain. They didn't know – yeah, you want a sample, sure, you want to take a smear there, sure. They didn't know what we could learn. They found out much later – they learned it with great anguish. For the first time, it led to great friction between the Agency and the member state. That took us to 1992. There's a lot of pressure on Korea to provide access to more facilities, some identified by intelligence, a number were clearly identified by satellite.

By the satellite we could compare what we saw in Korea, with what we saw at a waste facility in Iraq – they were both supplied by Russia, so we could tell what they were. There were a few other problems related to the accuracy of the declaration of Korea, about the facility and Pu, isotopes of Pu, that was the product - they said about a few grams - but what was in waste solutions didn't match. Blix said his famous phrase, "there are two gloves and they don't fit." Something is wrong that has to be explained. There were no explanations.

Long meetings at the political level were held, the Minister of Energy visited here in Vienna, Blix presided over the meetings. Unfortunately, there was no agreement, and so, the Agency was forced for the first time to ask for a special inspection. The special inspection - Laura knows quite well - it's a standard clause in the NPT type of agreement, but at that time no one was using it, because basically they felt that whoever was going to be under a special inspection was being suspected of something. So there was a reluctance to use this thing. But Blix was obliged to do that. All other political options were gone. The Koreans had withdrawn their anytime - anywhere offer.

So the decision was made to go to the BOG.¹⁶ This was a first. The Board up to now had just discussion, statements, but now the Board was obliged to sit quietly and get the presentation of what was the situation in a particular state. First time in the years since the Agency existed. It's more usual now because there's a precedent.

They were presented with a report of the findings, and the disagreements the Agency found with the declaration and verification findings. They made a presentation of the satellite imagery that existed at the time over the issues that they'd discovered. The BOG was taken through the images showing the waste area, then it was covered by grass, by earth, put some trees on it and changed completely the whole scheme, the picture of the surroundings. So that was enough for the BOG – to approve the request for a Special Inspection.

The things they did not comply with – they were getting really bad until 1994, when Carter went over there, negotiated an agreement, with Robert Galluci again, the terms for the agreed framework. In the meantime, Blix asked me to move over to take the Division of Operations with Japan, so I changed posts, resigned from the Action Team, went to Ops A and DPRK - now it's my basic problem.

7.18 Hexapartite Safeguards for Enrichment Plants

Keywords: negotiating access

Demetrius: But unfortunately that was not my only problem. We'd formed a negotiating team for resolving issues. I was involved in 1985, negotiating the Hexapartite project, with the UK, Netherlands, URENCO countries, the US, they were involved with Euratom and the Agency, in order to formulate an approach for an enrichment plant which would be palatable. This has a history. When you started under Euratom, they put the CSAs into force, one of the points that came up was Almelo [the enrichment plant in The Netherlands]– you have to see how we're going to do things. It was Ken Sanders from US Department of Energy, he was here working for me as an inspector – ok, we'll go to the enrichment plant. We will say, "We want to enter." They say you cannot enter. All hell breaks loose. How are we going to continue?

To go outside [of the facility] is fine, but you can't provide any assurances of non diversion or no higher enrichment. So the Hexapartite Safeguards Project (HSP) was formed, a number of years going around the world, Japan was also involved, Australia also, - it was Urenco 3, Japan, Australia, US, Agency & Euratom. So finally we had an agreement on the HSP, but because we had this agreement now we had to implement it. Von Beckman, then he left and I took it over.

7.19 DPRK

Keywords: special inspections

Rich: DPRK – all these things were coincident in time. It became very important not for the reasons people typically think. There was a special board meeting in March of 93. In that meeting the Secretariat chose to go to the Board and make a case to the Board to request a special inspection, and that's why

¹⁶ BOG Board of Governors

people remember that meeting. Because they wanted the political support of the Board for that decision. People remember it for that reason. But something much more important happened at that Board. And that was it was the first time that 3rd party information was presented to the Board; from that point forward, it was understood that the Secretariat would accept and receive 3rd party information as a routine aspect of safeguards. Before that, the Board had always taken the position that the Secretariat should not receive and make use of information that all states were not in a position to provide. That was really a much more important outcome than gaining political support for an action that the Secretariat already had the authority to do.

7.20 South Africa

Keywords: verifying South African disarmament, completeness vs. correctness, inventory accountancy, constructing a nuclear history, importance of transparency

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 19th 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 reactor¹⁷, 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 Norwegian, 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

¹⁷ <http://www.globalsecurity.org/wmd/world/rsa/pelindaba.htm>; <http://isis-online.org/isis-reports/detail/pelindaba-and-valindaba-facilities-south-africa/13#images>

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.

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 Circle¹⁸ (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.

7.21 Estimating HEU Production in South Africa

Rich: But trying to assess, or estimate, the amount of 90% enriched uranium that they could’ve reasonably produced is - you couldn’t do any U235 balance, and the reason is that almost all the material is in the tails, they simply attached no value to it at all. They hauled it away. You needed some other way to approach it.

It was extremely fortunate that the South Africans had retained very detailed records of the operating history over 15 years, and so with the access to those records, which we only had in SA, we were able to reconstruct the operating history of that plant over a 15 year period, come up with various estimates of

¹⁸ <http://isis-online.org/isis-reports/detail/south-africas-nuclear-weapons-storage-vault/13#images>

losses, and at the end, say, this is how much they could have reasonably produced. And this is how it was done. And I did not know what the declaration was, up until the time I said this is how much they could've reasonably produced. So it was an intellectually honest exercise.

The weapons part of the thing that Dmitri described earlier, I had nothing to do with. I was strictly there to address the enrichment part of the problem.

I was detailed on one Saturday, was transported by the South African air force to the Kalahari desert, to observe the rendering harmless of some test shafts. That was one of the most entertaining days I had had in my life up to that time. Because the people from Armscorp¹⁹, from the South African side, that had gone down to render the shaft harmless, could not get the local community contractor support that they had expected to get. So they kind of had to jerry rig this whole thing. What they attempted to do – they had a very large front loader, with a capacity of something like 12 cubic meters in one bite, is that they wanted to dump sand down these very large one meter wide shafts. They would dump sand, and then they had 50 gallon barrels filled with concrete, and they would layer them – sand, barrel, sand, barrel, and in that way, they'd render these shafts so that it'd be more expensive and difficult to recover the shaft than to just drill a new one. Unfortunately, as they dumped this large quantity of sand, as it's falling down the shaft, it can't displace the air fast enough. So what happened was, the air that was displaced comes roaring up this hole under a lot of pressure and carries sand with it. Well then, the sand that is down there is sitting on a layer of compressed air. So as they continued to dump sand down there, this compressed air is put under greater and greater pressure. So then, when they realized what's happening, they managed to find a very large air compressor, and they hook the compressor up to lengths of pipe, and with the air coming up through the pipe they hope to be able to push the sand out of the way, feed lengths of pipe down, and eventually hit this layer of compressed air and allow it to come up. It didn't work. But it was a fun day. At the end of it, when they gave up – well, eventually the air leaked up and they were able to do it as they advertised. But at that day, they were making a film, and on their film, they wanted a picture of an IAEA staff person going up to the hole and looking in the hole. There was loose sand all around it, and who wants to walk up around that hole? Eventually they tied me to the bumper of a pickup, and I have this picture of me walking up to the edge of this hole with a rope tied around my waist.

Without the kind of cooperation, particularly with understanding the enrichment process and the various attempts they made to solve this radiocatalytic problem with the chlorine, we would've had no chance. So not only did they make people available who had worked in that plant, and learned in an empirical way what was happening in the plant, but to the scientists who had worked hard to solve the problem, so it made a really huge difference.

7.22 Leading to Strengthened Safeguards, Part 1

Keywords: Programme 93+2, environmental sampling, rights to information

Laura: You know, it seems to me, as fallout from the Iraq situation, and South Africa and North Korea, you can see it here, how the seeds for the strengthened safeguards system were sown, we started with Environmental Sampling that was a technique used by a member state, and now we've developed our own indigenous capabilities; satellite imagery, we haven't yet purchased our own satellite, but we do have

¹⁹ South African government-supported arms company. <http://www.armscor.co.za/>

our own satellite imagery analysts, this whole issue of broader access, rights to information, the whole Programme 93+2²⁰ are whole children, or spawns of the experiences that we had.

7.23 Information Credibility

Keywords: information management, verification of information

Laura: One of the things I wanted to get back to, because we've suffered from it unfortunately, is the intelligence and the Agency's ability to evaluate, its responsibility for evaluating the goodness of information that is provided to the Agency by a member state.

Jacques: I think the sole key to that is the coherent picture. In other words, and that was our tremendous strength in 2002 we had such a deep knowledge of Iraq, we had spent so many years running around going anywhere, that we knew at least where Iraq was in 1998. We had through this information system, even in spite of the turnover that the team had faced, we had the possibility to see how a new piece of information provided by a defector, at the time many were talking to journalists, through serious intelligence network, we could very easily at the time gauge what was just a rehash of information that was valid fifteen years ago and what was really new.

When something is really new, and in total contradiction to the coherent picture, it's always worth digging into it, and this is where beyond the coherent picture it's our ability to perform additional investigations, through open source, through information collection, additional questioning in order to make sure an action that would be politically sensitive, we were sure that it is worth the risk. It was a great opportunity given the rights to check how far we could go, and I remember my first meeting with Rich, where the Agency teams had already, based on intel tips, gone to many places which actually had nothing to do with nuclear past nuclear program or capabilities, but in the context of Iraq it was not a problem. We had access anywhere anytime, we even used the possibility to access facilities and not find anything as a positive outcome in the context of the OMV.²¹ We were going to a capable site, we wouldn't find anything, we verified that everything is fine. The challenge for the Agency is going to sites that, based on a not well based tip, that would end up to be with no relevance to anything related to a nuclear program, is something that we will always face and in particular in the context of the implementation of Special Inspections for instance, and in the context it seems to be a crown jewel and unapproachable these days.

Laura: I was there with you when you were analyzing these Niger documents.²² I think people would like to hear your side of how things came about. I think the unfortunate thing is as a consequence of that, although in the early 90's we were finally able to get over the sensitivity member states had about our actually using and receiving intelligence information, were back fighting that battle again because of that. So the suspicions have risen again, but my own view is that we demonstrated that we have the

²⁰ An IAEA safeguards development program started in 1993 and ending in 1995 that resulted in the development of the Model Additional Protocol. http://www.iaea.org/OurWork/SV/Safeguards/safeg_system.pdf

²¹ Ongoing Monitoring and Verification

²² Documents that reported an attempt by Saddam Hussein to procure "yellowcake" uranium power from Niger, later believed to be forgeries.

wherewithal and the sense of capability and responsibility to evaluate this information and not accept it at face value. Tell us a little bit about that incident.

Jacques: Ok, maybe going into that case, I don't want to go into my traditional speech about proper information management and information analysis, but there is an understanding that anybody needs to have if there is a contribution into nonproliferation analysis and drawing safeguards conclusions for instance, or Security Council mandated conclusions, is the fact that whatever we collect is *data*. We collect data through even hard technical measures, because when a sample is taken in the field they could always be a false alarm or a false signal because there could be contamination in the field where it is collected. So it does not indicate that something that is an activity that has really taken place there. There could be a cross contamination in the handling of the sample in the field and affect the final result.

And Rich was in the front line at the Agency at the time, the Agency faced the type of contamination in the early days, and that's why the Agency with the financial assistance of a state was able to have a clean lab, to be able to handle this sensitive samples. So a declaration also may be misleading. Let's not talk about open source disinformation where we need to always try to validate. We try to collect data, only by thorough analysis by competent experts can turn data into information. So in this process, the Niger documents, it all started with statements that Iraq had imported Uranium from Africa. It took us a few months to obtain the source of that. And obviously the source, beyond probably some human source reporting and all the caveats we can put on the validity, somebody talking that may have as much interest in actually misrepresenting the truth than the country you are targeting.

We finally ended up with what was thought to be the main source, which was a dozen page document, letters, so on, that at some point in time, between a trip to NY, to London, to Moscow, with the DG we were traveling all the time. The day I could sit for a couple of hours, it was obvious that these documents were wrong. So my biggest disappointment or concern was the fact that I had to find that, when those documents had gone through many hands before, in national systems, and it was pretty blatant that there was something wrong with these documents. Why weren't they stopped before? My sole interpretation is one of my lines of communication these days, to make sure that analytical processes are correct, is the risk of stove pipe. It's when people who contribute to an analytical process actually shape their contribution to please the level above. I think that in this point in time there was an expectation there was a need to find proof that Iraq had resumed a nuclear program. And accepting these documents at face value was considered to be the right way to deal with them, until these documents ended up in the Agency. So one of the key challenges that we have today in implementing a proper way to draw conclusions is to make sure that at a lower scale we have the injection of competence and the approach to providing contradictory assessment of any piece of data that would lead to something that is real, the most probable evaluation.

We can always be wrong – we always have to draw conclusions out of a limited extent of information, but at least we put in place an evaluation of different scenarios. When we get information from anybody, one scenario is that is good information, we can go ahead with taking action on it, but the second scenario should always be, there might be a flaw in there, let's identify what that flaw may exist. And that applies to the declaration. It's overall assessing the correctness and completeness of a declaration. It's making sure that we are not misled by technical measures and results, talked about cross contamination. And make sure we aren't misled by a lack of competence. You can interpret something wrongly simply

because you do not have the technical background to interpret it properly. Or we are not misled by a 3rd party disinformation.

Laura: Or you are not looking for what you expect to see.

Jacques: Sure, that's the stovepipe. You take a piece of information and interpret it in a manner that is consistently leading to the already drawn conclusion. That is, in terms of credibility, absolutely lethal.

7.24 Leading to Strengthened Safeguards, Part 2

Keywords: developing safeguards conclusions, 3rd party information, Additional Protocol

Rich: one of the difficulties in the probably least understood or misunderstood aspect of the safeguards business, are the nature of the safeguards conclusions, of the assurances that are attached to them. Certainly the situation in Iraq under the SC 687 was famously referred to in this house as "this isn't safeguards, this is disarmament," it had a tremendous impact because the board had historically taken the position that they should never receive and make use of 3rd party information that all states are not in a position to provide. Yet they accepted the 3rd party information in the context of Iraq because, "that's not safeguards, that's something else." Well that changed with DPRK and we will come to some of those issues in later interviews.

But the level of assurance that associates itself with the conclusions, and as time went along, how that level of assurance became more comfortable, is probably worth speaking to.

Jacques: Yes, the challenge of safeguards today has been created a while ago, which is concluding at a state level that there is no undeclared activities and nuclear material. This is a tremendously forward compared to the traditional safeguards conclusion that was the non diversion of declared material. Even in the case of Iraq, in spite of these dream verification conditions there was always an uncertainty and although in March 2003, the team was fully convinced that every single word that the DG had expressed in the SC was right, these were conclusions that were based on extensive activities but not on a comprehensive knowledge of the whole country - every single square meter of the country, or every single import that could've gone through sanctions. It was the conviction that we were right, but it took me a few months after the Iraq survey team concluded that we were 100 percent right, that I might have misled the DG, and could have let him express technical conclusions that were not strong enough. It turns out that we were - I can brag a little bit - 100 percent right, including the reservations we had about what was left with question marks, such as missing documents and components of centrifuges, that were provided to the coalition by the head of the centrifuge program at the time.

So now back to safeguards conclusions in a normal safeguards mandate – the amount of information is less than what we ever had in Iraq, the access to the field is far more limited, although Complementary Access in the field is a powerful tool, it has to come through a very specific process before we reach somewhere. So there will always be a remaining challenge, a remaining uncertainty in a conclusion. In other words, and this is where the problem is for the Agency, a remaining risk with regard to its credibility. That is why we need to continue to put lots of effort into collecting more information, be it through development of tools that we already have in the legal basis. I put lots of hoping into

improvement of Annex 1 and 2 of the AP²³ for instance, collecting more information. Because states, when they have something relevant, will be eager to provide us on a voluntary basis. This is where a closer relation between the safeguards community and the export control community is needed. But again collection is not enough, it is making sure that we process that information, that we conduct the right analysis, through the injection of competence, through the appropriate dissemination. We put on our side the highest chances not to be contradicted. That's the mandate we've received now, to draw the broader conclusion. We have to draw something that covers a whole state, while we only know a very small fraction of information that could be relevant to drawing that conclusion. But that's our mandate.

Rich: But we know a lot more now than we used to.

Jacques: Absolutely, the progress that the dept has made since the Programme 93+2 in terms of understanding what needs to be done, what needs to be known, before we can start to conclude is certainly tremendous. But as in any risky area, and today nonproliferation is risky starting from the point that it is all the time in the headlines, we need to continue to make progress and build on the lessons learned of the case like Iraq. Although it is not a safeguards verification regime, I believe in all areas there are lessons learned that can be translated into a daily activity, not forgetting already the tremendous translation into real safeguards life that has been done through 93+2 and its result, the AP.

Laura: And one of the other aspects Iraq helped us deal with, is trying to carry out really good technical competent safeguards in the face of enormous political pressure, scrutiny, cameras, media, people who have all kinds of vested interest. And trying to stay the course, the technical course, including picking every single word that is put down in this report carefully because no matter what you write, it is always possible for somebody to misuse it or misinterpret it, accidentally or intentionally, so we've had to learn how to deal with that aspect of it as well.

Jacques: Actually on that line I can refer to a quote of Garry Dillon, who was the Director of the Action Team after Maurizio Zifferero and before me. When we went to the Council in 1997, Council members were all unhappy because our report was seen as a kind of concluding report on the past, turning the page, and the Council members did not want to set anything that would lead to possible lifting of sanctions. On the other side we had put all the questions and concerns in, so that the Council members who were pro sanction lifting were mad at us, "why didn't you close the file?" When we came out of the Council meeting where all Council members were mad at us, Garry Dillon said, "we must be right, because they are unhappy with us from totally opposite reasons."

And I think that is something which is specific with the challenge the Agency faces. We are here to report facts. We are here to make sure that what we report will not be contradicted. And the problem in life is that facts do not systematically serve any given political agenda. So it's our key responsibility - making sure that we tell the international community, what it is, what the reality is, and it's up to decision makers to draw the conclusions, but the worst that we could do would be to bend one direction or another, with a technical arm, and we have to stick to it.

²³ Annex I is the list of Activities referred to in the Model Additional Protocol's (INFCIRC/540) provision of information under Article II. Annex II is the list of specified equipment and non-nuclear material for the reporting of exports and imports according to Article II. <http://www.iaea.org/Publications/Documents/Infcircs/1997/infcirc540c.pdf>

Rich: It's no question that the events in Iraq convinced States of the need to strengthen the safeguards system, and the technical experience in Iraq was a primary guiding force in the design of strengthened safeguards, so it's really been great to hear about it from you Jacques.

7.25 Programme 93+2

Keywords: strengthening safeguards

Demetrius: Important development was the start up of the Programme 93+2, became +4, sorry, but the program which was headed by Rich. It really provided a culmination of all the lessons we had learned, and all the experiences we had created from these three basic adventures in the Agency in the nuclear field. To harmonize with the existence of the new technology and the experience we had with the new technology. This again showed that the political entities are saying, "Whatever is good for them? Good. But whatever is bad for me is not good." So I can accept you can do something on them, but not on me. It came as part of long negotiations. It was good to do in Korea, but don't generalize to do it to everyone else.

After long studies, discussions, the agreement on the protocol came up, and well, I guess we are still striving on this front. Lot of work to be done, and experience to be gained, lot of things in the protocol coming out of the routine, a lot of things have not yet become routine. Not sure yet how all this is connected, lot of work to be done - but we have the basis. We had the basis that the protocol is something you can negotiate with and can force it on some states to accept it or otherwise they will not have Integrated Safeguards or other advantages for reduced effort on their facilities.

Rich: Demetri that was fantastic.

7.26 Implementing Programme 93+2

Keywords: transparency, completeness, material accountancy, environmental sampling, special inspections, Additional Protocol

Rich: As these various experiences came together, they also came together with SAGSI²⁴s recommendations. SAGSI's recommendations were, as SAGSI is wont to do, very general. For example, States should be more transparent. What information would you need from States to bring about that condition of greater transparency? And it was during defining those specifics that these experiences in Iraq and South Africa became so important. The work of 93+2 got underway seriously in the first of 1994, that work was carried out that year, it was comprised of seven tasks; two of those involved extensive field trials. We needed, 12-13 member states, supported the Agency's effort. We needed to collect ES's²⁵ around a variety of kinds of nuclear plants, in and around, that would provide the basis for us to argue to the Board that ES was a new safeguards measure that was objective and technically feasible. And that was Task 3 of 93+2, and in my mind, probably the most important. I think it was the single most important technical measure ever introduced into safeguards.

²⁴ Standing Advisory Group on Safeguard Implementation

²⁵ ES – Environmental Samples

Carrie: So its success in Iraq wasn't sufficient to convince the Board to adopt it as a routine safeguards measure?

Rich: No. The importance of it in Iraq was, to say it wasn't important is incorrect, but it was limited in a way. It was through ES that the Secretariat, the Action Team, was able to say to the Iraqi that these were some locations where the Iraqi said, nothing nuclear had gone on here, but there was evidence of nuclear material. But, when the Iraqi side took the decision to try to hide this program away, in the summer of 91, it was even before that summer, that the Iraqi army went around to all these nuclear sites and removed all the equipment. So any of the tell-tale equipment had been hauled out to the desert, they dug big holes and dumped them in and blew them up in these big holes. It was through ES once all this became known and this equipment was dug up and samples were taken, that the equipment was tied back to the locations in the nuclear weapons program. But you have to remember that at that point in time, the UNSC 687 in Iraq was not safeguards. And the Board went out of their way to say this is not safeguards. This is a UNSC resolution mandated disarmament mission, and the fact that you have this technical measure that's found to be useful in this disarmament exercise – that's something different.

Now, when the DPRK brought into force their comprehensive safeguards agreement, this action (and concluded the ratification of the NPT), in the aftermath of that, Blix²⁶ visited DPRK. And DPRK made very broad statements to him about access anyplace, anywhere, and so on. Agency inspectors showed up there, it was the ad hoc inspections to look at their initial report, and it was at this point in time when the Board has taken no action with respect to environmental sampling, the inspectors asked permission to take samples, and the DPRK gave it. To their sorrow as it turns out. So during the early ad hoc inspections, at least the first several, they collected a variety of environmental samples, and the analysis of those samples turned out to be pretty damning. In the plutonium finishing area, it showed a species of Pu of isotopic composition, for which there was no Pu declared like it, so that suggested the presence of additional Pu somewhere. Secondly, while they had declared the small amount of plutonium they had was the result of one hot reprocessing campaign, the Pu particles that were found in the finishing area looked like separations took place three different times.

Jill: Rich, let me ask a little bit more about the ES. The sampling done in Iraq and DPRK - was it focused on just swipe sampling, or was it a broader range, and then how did you go forward with the field trials, I think ES was one of the major field trials that was done.

Rich: The samples collected in DPRK were all swipe samples. There were a variety of ES media used in Iraq. There was a very large campaign - Iraq has a very peculiar hydrology. The whole country is drained by the Euphrates-Tigris river system, it was a very clever water sampling scheme that was set up where a baseline set of water samples, these were both high volume and grab samples, were collected at points in the Tigris and Euphrates river drainage, and after that then, as time went by, they were periodically revisited. There was vegetation samples, and swipes. But swipes were the predominant type. And as time went along, it became clear that swipe samples were by far the preferred medium. Part of the reason is the difficulties in the number of labs that are involved. And you have a consistent media with swipe samples, where vegetation, soil and other types of things create problems.

²⁶ Hans Blix – Head of IAEA from 1981 – 2007, Lead UN Monitoring, Verification and Inspection Commission in Iraq.

Jill: During the field trials, they tried a variety of media. That's when the Agency with member states was trying to understand the best way to handle things.

Rich: As a result from the field trials became available they were very carefully documented, and shown to the state where the samples were collected, and then there was a summary that was constructed that went to the Board. The summary was contained in a very large technical annex to the final report of Programme 93+2. The Board had the best chance to learn about that in a briefing prior to that Board meeting. Any member that chose to, however, could come to my office and read the full results of the field trials. And then they could sit and look at the full details. And two did. Wanna know the two? The Iranian and the Israeli. And that was early 1995. Interesting.

So when the Secretariat went forward to the Board with the report for 93+2, it made no proposals, it simply laid out the measures that constituted Programme 93+2, and provided an assessment of the financial and legal implications.

So when the Chairman's summary was done for Gov 2784,²⁷ he simply made mention of the fact that the Board's taking note of the report did not mean that they were approving any of the measures. They invited the Secretariat to submit a proposal in June. So that's what they did. The program was divided into two parts. The first part could be done under existing authority, and the other was the measures where the Secretariat thought additional legal authority was needed.

Blix chose to simply inform the Board of his intention to proceed with the Part 1 measures immediately, in implementation. The Board took note of that, in effect approving it. And the collection of ES; everywhere the Agency inspectors had access, it was a part 1 measure. And it was argued that, as being under existing legal authority as both a surveillance measure (para 74d) and also as a new technical measure that's shown to be objective and feasible (para 74e).

Carrie: Do you know if Dr. Blix struggled with the decision about how to convey the message to the Board, whether he should notify them, or ask for approval?

Rich: He really struggled. The reason is that he was under so much pressure from some States that you already have the authority you need. All you really have to do is make use of special inspections. The trouble with that is, from a legal authority standpoint, the issue is never physical access, the issue is always information. There just simply was no way at all that anybody could dream up to incorporate all these transparency measures into the existing legal authority. Another dimension was – the conventional wisdom in this house, forever, but certainly through the Blix years, is that you avoided at all costs, being reprimanded by the Board for overreaching. And secondly, that you never accept the renegotiation of an already accepted measure. And so a number of the early proposals in 93+2 involved correcting some bad practices, mistakes that had been made in the past, and some of those were incorporated in the legal framework, in subsidiary arrangements. So in some of these proposals, Blix took the decision that if any of these proposals amend or in any way could result in 153 negotiation or having to go back individually to state by state, and could threaten other things that were proposed, they just all went away. Turns out that some of the proposals that he had pushed over the years of administrative nature, issuance of multi-

²⁷ Report to the March 1995 Board of Governors titled, "Strengthening the effectiveness and improving the efficiency of the safeguards system: Programme 93 + 2 - A report by the Director General"

entry visa, and inspector designations, both of which were measures in 153, they remained. And Committee 24 didn't have any trouble with those, but still it's gone now. So in the Board in June of 1995, they simply took note of the DG's decision to proceed with the part 1 measures, and at that point, the Secretariat embarked on a year-long informal negotiation involving these measures that needed additional authority.

This involved unending meetings, individual states, groups of states, the Board was involved all along, through what were called "discussion drafts", there were two of these very thick drafts that went to the Board, very heavily discussed. At the end of the year, Blix decided that this informal process had taken things as far as it can, and it's time for the Board, then a Committee of the Board, to invite States to negotiate a new legal instrument. The Board agreed, and so they immediately and urgently formed an open ended Committee of the Board, the 24th such Committee in the Board's history, and it began its work 3 weeks later.

Jill: This was in the summer of 1996?

Rich: Yes.

Carrie: And how was participation on this Committee determined?

Rich: There are two ways. If you are Member State of the agency, or if you have a Safeguards Agreement.

And there was a substantial participation – 75 or something, States chose to participate.

The first negotiating session scheduled for 2 weeks in the early part of July in 1996 fell apart. And the reason is because States didn't take into account that there had been this one year preparation, essentially, and so they came to Vienna expecting the first week to be agreeing on procedures, and the technical people would only need to come the 2nd week when the Secretariat would read through the proposal they had prepared. When they were ready to begin reading on the 2nd day, their people weren't. So it ended with States being invited to provide the Secretariat with comments. Many did. And then the real negotiating began in October. There was a 2 week session in October of 1996. From the Secretariat's standpoint it was disastrous. It was at that point that it really looked like there wouldn't be an agreement. It also was a time when Blix had announced he would not seek another term. There was a lot of bad feelings within the house regarding his successor - whether or not his successor was negotiating away the legacy by giving away too much on the AP.

Unbeknownst to us, however, the U.S. intervened. President Clinton called Chancellor Cole and together they decided they wanted an agreement. So the head of the German delegation, Reinhardt Loche, and the head of the U.S. delegation, Norm Wulf – again the Secretariat knew nothing of this - did their own shuttle diplomacy. The January negotiating session got underway. It was like a miracle. These guys were in lockstep. One guy would have a problem, the other would propose language for a solution. The Secretariat sat there with their mouth open. So at the end of January, there was essentially consensus language. Delegations needed to return to Capitals to get approvals. There was a very brief 3-4 day meeting in April, when they reported back, and the language went to the Board the 15th of May 1997. And the Board approved the Additional Protocol.

Jill: I know you were clearly involved in the front lines, and the back lines, of the negotiations. I know there were a lot of compromises that were made in what was included, and not included in the Additional Protocol. Can you say a few words about what didn't make it in, but were discussed clearly and were something that was felt to be considered.

Carrie: If you could, divide it into two areas – what hit the cutting room floor before Committee 24, and what was discussed and removed within Committee 24?

Rich: I can. We pretty much knew what would go and what wouldn't before Committee 24; If we knew things weren't going to fly we removed them from the protocol ourselves. As I mentioned a few minutes ago, the kinds of things we would've liked to see addressed with respect to 153-based kinds of implementation, the decision not to do that was taken by the Secretariat very early on. The decision not to address the timing of Inventory Change Reports (ICRs)²⁸, not to address the Small Quantities Protocol (SQP), not to address the basic undertaking in 153 that says "All nuclear material," – All means All. When the Secretariat constructed the language for subsidiary arrangements, they limited the contents of the initial report to paragraph 34c material – meaning not ALL, but only that material according to the Secretariat or the State's view, that was subject to the detailed material accountancy procedures specified in the agreement. So you asked what hit the cutting room floor? Those bounced early on. The original proposals included reporting on a selected but still extensive list of dual-use items. Through discussions it became clear that that simply was not sellable. The primary opposition came from the western Europeans actually, and the reason was that legislation within the EU guaranteed free movement of goods and services between states. And they saw that requirement, since safeguards is implemented state by state, and not in blocks of states, so they saw the requirement as impacting already agreed legislation within the community. And they even went further- they saw it as Pandora's box of ever increasing reporting requirements that they simply didn't want to sign up to.

So the reporting of dual use equipment and non-nuclear materials disappeared as a proposal – it was still discussed through the year following the discussion draft year, but it was never formally placed in a Board document or put forward. We also had a great deal of discussion dealing with access to individuals. Again, there seemed to be no way to construct such a measure without running into State by State constitutional barriers regarding unlawful search and seizure. And then we had the sort of conflicting experiences of Iraq and South Africa where it became clear that if a State was being cooperative, they produced the people, and if they weren't, they wouldn't. And it simply came down to cooperation irregardless of the legal obligation, because Iraq certainly had the legal obligation to do so, and eventually they did, but only in a slow and painful way.

Jill: Back to the things that weren't included in the Additional Protocol – was there anything in Annex 1 with regard to manufacturing activities that wasn't included?

Rich: Yeah, I forgot that. We decided late to take what we thought was a modest run at including some dual-use materials on the Annex 1 manufacturing list. And we thought they were sufficiently single-use that there wouldn't be too much objection. Let's see if I can remember what they were – tritium was one,

²⁸ A report that describes changes in inventory of [nuclear material](#) in a [material balance area](#). ICRs are usually provided on a monthly basis.

metallic beryllium, enriched lithium, and boron 10. And we got an incredibly strong negative reaction – they didn't threaten to throw us out of the room, but it was a very surprising negative reaction. The western Europeans were negative, as before, and particularly the Belgians saw it as a Pandora's box, that they were going to have reporting requirements and conditions upon which they had no say. But for me, the surprising resistance, and it was specific to tritium, came from the Canadians. It was the only time in Committee 24, they really came to an impasse, the Chairman set up a side group - go away and set up a compromise - and the compromise really was not much – the proposals themselves disappeared. But the Canadians did agree to leave heavy water if nuclear grade graphite was included.

Carrie: Program 93+2 was also responsible for addressing the financial implications of the AP, can you say a few words about that?

Rich: Well, the final report, measure by measure, contained a statement about the financial implications. And in some of them I think they were probably realistic – costs would increase, information evaluation would increase, - they were reasonable. The overall cost of the program, however, was advertised to the Board and member states as being cost neutral. And that was a political decision, that was not a decision that could be very well defended. The increased cost in the early days of implementing strengthened safeguards was going to be offset by trade offs - by reducing conventional nuclear material accountancy kind of safeguards, with the idea that over a period of time it would become cost neutral. I don't know that anybody ever believed that, but there certainly were Governors that would say, "I don't believe you." But Blix maintained that position during his tenure, and it was repeated by Mohammad.²⁹ It was a couple years after that, it became recognized that it wasn't sustainable.

Jill: I think there are still people who remember that position. It was advertised as cost neutral for the Secretariat. This is something that has come up that states say it was supposed to be cost neutral for them as well.

Rich: Yes. We made very clear that we did not believe that it would be cost neutral for states. And we believed that some operators would win, and others would lose. I believe we were quite honest on that front. We certainly never advertised to states that implementation of strengthened safeguards wasn't going to cost them something.

Carrie: If there's anything that you would do differently in hindsight, can you say what it would be?

Rich: If I could do it again, and had the authority, I would have included all of those various sort of gaps that developed between intent and practice over the years, in the implementation of material accountancy safeguards – I would have addressed those explicitly – whether it was the SQP, or the contents of initial reports, the timing of ICRs, there are others – I would have addressed those explicitly. As time has shown, it would've been the right thing to do. The SQP problem has been addressed by itself, as a stand alone kind of thing, where it could've been addressed as a larger set of values. And the contents of initial reports is getting addressed a little bit for those states that are needing to submit initial reports- states with modified SQPs for example. No one has suggested going back to states that have been under safeguards for 40 years and asking them to submit new initial reports. And the inclusion of dual use remains a big

²⁹ Mohammad El Baradei – Former Director General of IAEA

hole. Right now if you said, today, what is the most important thing that could augment the Agency's safeguards, that would be it.

Carrie: Jill – do you have any closing remarks?

Jill: Rich, this has been extremely interesting, especially trying to implement some of these, and hearing how they came about and how they were negotiated, and I think from the contributions you've made to the department in the years since you've left, in terms of consulting and teaching, you've certainly given that sense to the staff of the Department which has been fantastic. But also have recognized some of the difficulties in implementing some of the concepts which we continue to struggle with and hope for your continued support and advice as we go forward.

Carrie: I would also like to thank you very much for your continued devotion to sharing your knowledge with the next generation of safeguards experts, through teaching courses, participating in intern lectures, and just staying involved with the community. Thank you, it's extremely valuable and we appreciate it.