50th Anniversary of Los Alamos Nuclear Laboratory's Support to Safeguards

Keynote Speech by Tero Varjoranta

Deputy Director General, Head of the Department of Safeguards, IAEA

13 July 2017

It is a great honour for me to be here with you today to celebrate the 50th anniversary of Los Alamos Nuclear Laboratory's (LANL's) support to IAEA safeguards. Of all the institutions that have assisted us over the past 50 years, LANL has made some of the most significant contributions to the technological and conceptual developments that have enabled the IAEA to perform its verification role so successfully. The next 50 years will be no less important and we will look to Los Alamos to continue its legacy of innovation in safeguards. The world continues to change at an accelerating speed and we need to change with it.

Looking ahead to the next 50 years, we all agree that deterring the spread of nuclear weapons is one of the top security priorities of the international community, and that IAEA safeguards must and will continue to make an indispensable contribution to this effort. The safeguards mission will remain the same: to detect and deter the diversion of nuclear energy. Nuclear material accountancy and verification in the field remain at the core of this effort.

Here are some key statistics that demonstrate the level of effort involved in implementing the safeguards mission in 2016. We implemented safeguards in 181 states, 129 of which have Additional Protocols. There are over 204,000 significant quantities of nuclear material under safeguards. 1290 nuclear facilities and locations outside of facilities are under safeguards. We conducted 3007 inspections, including 13,275 verification days in the field. We collected 1077 samples, deployed 1057 NDA systems, and have 1436 cameras installed.

However, our operating environment is changing in a number of important respects - placing increasing pressure on our work. We monitor these larger currents through our internal strategic planning process. We have identified several challenges. For example:

- The amount of nuclear material under safeguards continues to grow as does the number of nuclear facilities and locations outside of facilities under safeguards.
- We have also seen a significant growth in the number of Additional Protocols in force.
- We are seeing a lot more spent fuel transfers to medium and long-term storage and decommissioning of facilities – activities that are verification-intensive.

The accelerating pace of technological change and globalization profoundly shape our operating environment. The volume, velocity and diversity of data available is growing exponentially, increasing the demands on analysts to stay abreast of developments in their areas of focus. In parallel, technologies have been developed to efficiently process, store, and effectively extract information suitable for further analysis. We have to be able to take advantage of these developments - to identify what is safeguards relevant information in this data rich environment. In

addition, globalization has led to more scientific cooperation across borders, which also poses challenges.

While these demands on the safeguards system have grown, our resources to meet them have flat-lined. And, of course, it is our *legal obligation* to implement safeguards—it is not a matter of choice. Our legal obligations determine our workload, and our workload continues to increase.

Extraordinary events - whether positive or negative – also complicate the effective management of safeguards implementation. I will divide these extraordinary events into three types:

- First: security events – for instance, a State's loss of control over part of its territory in which we apply safeguards. This is already happening - the Agency is being required to safeguard nuclear material located within areas in conflict, which disrupts our normal ways of operating.
- Second: climatic events - for example, an earthquake, flood or volcanic ash cloud – which result in damage to nuclear facilities and/or compromising our field activities. Coping with the Fukushima accident required a variety of innovative instruments and methods, including surveillance systems and radiation detectors installed at the edge of the highly radioactive zone.
- Third: diplomatic events - the JPA and JCPOA were extraordinary diplomatic events. Another would be a diplomatic breakthrough on the DPRK's nuclear programme. This would obviously require novel and modified monitoring and verification approaches to be developed and probably implemented at short notice in a very challenging environment.

I will now say a little more about the particular challenges posed by the JCPOA – the so-called "Iran Nuclear Deal".

As you all know - since January of last year, the Agency has been verifying and monitoring Iran's implementation of its nuclear-related commitments under the JCPOA. There were a number of features of this experience that required a significant, swift and innovative Agency response, i.e. to succeed, we had to be agile – while still acting within our legal mandate.

Many of the things we were requested to do under the JPA - and then JCPOA - required us to develop new, robust approaches and ways of working – even to develop new equipment - and with little time available. In such cases there were no "baseline" documents to consult, and no precedent to help us.

Let me list a few of these new challenges that we met successfully:

- Verifying the enrichment levels of UF_6 in real time inside Iran required the deployment of a new instrument – the on-line enrichment monitor.
- Measuring the production and inventory of heavy water had rarely been done by the Agency previously.
- Monitoring and verifying centrifuge R&D and manufacturing activities required new, innovative and robust solutions.
- The funding issue: putting together a realistic budget was a challenge. At least initially – the JPA and JCPOA had to be funded through extrabudgetary contributions.

- The recruitment process - had to be substantially speeded up, normally recruitment takes one year and training another year. As agile measures, some recent retirees were reinstated and retirements postponed. As experienced staff moved back into frontline JCPOA-related positions, we had to backfill their vacant posts with temporary staff as we waited for new recruits to arrive and be trained.

How do we deal with these trends that place the safeguards system under increasing strain? I want to highlight some of the key elements of our strategy, which include major improvements in productivity, substantial modernization of our infrastructure and business practices, and enhancements to our organizational agility.

Through a number of new initiatives, we are striving to become a state-of-the-art, highly productive and lean verification organization that continues to deliver effective safeguards. We have a strategy to tackle the technical safeguards challenges – some elements of which are outlined below:

The modernization of safeguards IT through the MOSAIC project will ensure that the Department's IT system supports all safeguards implementation processes well into the future. Through MOSAIC, we are developing software and applications that help staff across the entire Department do their work more effectively and efficiently. The introduction of new and improved IT applications and its integration with existing software will allow for better planning, conducting, reporting, and quality assessment of safeguards activities. We have undertaken this upgrade using in-house expertise, but we have relied heavily on extra-budgetary support from Member States. I am happy to report that we are on track to complete the entire upgrade by May 2018 and within the budget.

We are continually improving our technical capabilities. We will continue to deploy user-friendly equipment for measurement, monitoring, and containment techniques and automate data processing and review. The equipment developed for, and deployed in, the field has to be usable for staff with a wide range of technical capabilities, rugged enough to be shipped around the world and flexible enough to be used in a number of different environments.

We are constantly monitoring the commercial technology environment to identify and exploit innovations that could enhance our capabilities. Recently, as part of our technology foresight initiative, we looked at how different gamma imaging cameras might be applied for safeguards use. We have also started looking at new possibilities in robotics and in the automation of data processing. We will select promising technologies for further testing and, if such tests are positive, move expeditiously to deploy them in the field.

Environmental sampling and nuclear material analysis are very important for safeguards. We will continually improve our capabilities in this area to ensure there is a high level of sensitivity, reliability, and timeliness in our measurements and analysis. As capabilities in this area progress in the rest of the world, the IAEA's analytical laboratories in Seibersdorf and the Agency's Network of Analytical Laboratories (NWAL) will remain tightly coordinated. We are examining ways of improving the timeliness of our analysis, including reducing sample sizes, applying more *in situ* analysis, or working with States to reduce packaging and shipping time. The IAEA will also improve its quality assurance and quality control programme for the NWAL, in particular in the area of particle analysis.

We are continuing to develop State-level safeguards approaches, which strengthen our culture of analysis. The structured analytical approach ensures that our staff understand why they do what they do, how it supports our mission, and encourages the questioning and validation of their assumptions. We are accelerating our efforts to update our internal guidance documents and reference materials to implement safeguards at the State level.

We are continuing to strengthen information collection and analysis. One of our most recent efforts in this area has been the Collaborative Analytical Platform (CAP), a project that integrates the use of big data collection and analysis software tools into safeguards work. CAP collects and sorts open source information according to the steps of the nuclear fuel cycle, and makes this information available in a network analysis platform available for our staff to analyse. We will also explore the use of automated systems to review and analyse new types of open source information, including from multimedia sources.

The IAEA may be called upon to perform other verification tasks, as requested by States and approved by the Board. For instance, we continue to monitor and evaluate the status of DPRK's nuclear activities, and we are enhancing our readiness to carry out verification activities there if and when so requested.

The challenges to the safeguards system are more profound and varied today than they have ever been. To succeed, the IAEA will need to be agile in response to the unexpected, without diluting the credibility of the safeguards conclusions it draws. I am confident that working together we can meet those challenges, preserve our credibility and continue to make the world a safer place for future generations.