Safeguards: The evolving picture

The strengthened IAEA system of international safeguards stands to be not only more effective, but also more efficient in many ways

by Bruno Pellaud

The effectiveness of the IAEA safeguards system depends on what the Agency knows about nuclear-related activities. With a broad knowledge of such activities and a good understanding of their relationships, the IAEA can with a fair degree of confidence assess the non-proliferation credentials of a country. Up to now, the system has been rather narrowly focused, leading to perhaps overly thorough safeguards activities on large and visible facilities such as nuclear power plants, while other smaller facilities with a potentially larger proliferation risk would receive less attention. During the last years, the IAEA — the Secretariat, Board of Governors, and Member States — has taken a fresh look at the safeguards system. A shift in focus is under way, a drive to look beyond the current horizon to gain a broader *horizontal* view, rather than piling up controls vertically on existing nuclear facilities. This article examines key aspects of efforts to strengthen IAEA safeguards, and addresses some concerns that have been raised from the viewpoint of the nuclear industry.

Towards more efficient safeguards

Since 1991, the IAEA has begun to revamp the safeguards system through various initiatives and programmes. In 1993, a programme of strengthening and efficiency improvement was initiated on a broad scale in close association with Member States. Nicknamed "Programme 93+2", it led to a series of specific proposals that were approved by the IAEA Board of Governors and broadly endorsed by the Review and Extension Conference of Parties to the Treaty on the Non-Proliferation of Nuclear Weapons in May 1995. Prime movers were the negative experiences that the IAEA encountered in Iraq and in the Democratic People's Republic of Korea, as well as the positive experiences gained in the verification of the dismantlement of the South African nuclear weapon programme. By that time, it had become clear that the old approach of improving the effectiveness of standard safeguards only on ***declared*** facilities was approaching its limit. The IAEA had to broaden the focus of its safeguards system to ***undeclared***, clandestine activities. This new approach requires by necessity access to more information and more access to several kinds of facilities, whether such facilities contain nuclear materials or not. This double objective of additional access — to information and to facilities — lies at the core of the strengthening proposals contained in Programme 93+2.

In early 1996, the IAEA began to implement under its existing legal authority new measures contained in Programme 93+2. The collection of environmental samples and unannounced inspections stand in the forefront. From Kazakstan to South America and Australia, in tens of countries, the inspectors have introduced these new measures. This was done after consultations with the national authorities to ensure that the modalities of applications would satisfy the Agency's requirements and the operators' needs for safe and unhampered use of their facilities. *(See the following article for fuller details on the implementation of Part 1 measures of Programme 93+2.)*

Negotiations now are taking place in an open-ended Committee of the IAEA Board regarding other proposals for strengthened safeguards that require additional authority, Part 2 of Programme 93+2. In these negotiations, some delegations, reflecting the views of facili-

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ty operators with nuclear materials, have expressed concerns about providing extended access to buildings on their sites beyond strategic points, to such places as workshops, storage areas, and administrative buildings. Furthermore, some governments doubt their own ability to provide the Agency with information about and access to facilities without nuclear materials, that is, to locations where their own authority may be quite limited.

The Board's open-ended Committee met in July 1996 for a first reading of the proposals that had been put forward by the IAEA Secretariat for the measures requiring additional authority. The discussions were pursued in October 1996 in the course of a two-week session that included a thorough second reading with a review of the amendments that had been previously submitted by delegations. Much work remains to be done to reach an agreement on the substantial issues reflected in the current bracketed text (rolling text). Intensive multilateral consultations are under way and it can be hoped that substantial progress can be achieved in the negotiations during the next Committee session in late January 1997.

Proposed strengthened safeguards measures in a nutshell

The new measures include the provision to the IAEA of ***additional information***. For existing nuclear sites, the State would provide additional information containing a description and an explanation of the use of all buildings on the site, and, in some cases, additional operational data of safeguards relevance. The State is also called upon to provide information on pre- and post-safeguards nuclear materials (mines, export-import, nuclear wastes, etc.), on fuel cycle research and development facilities that do not involve nuclear materials, as well as on supporting facilities directly related to the operation of nuclear facilities.

As far as ***additional physical access*** is concerned, the Agency would be given an assured access to nuclear sites (where required "managed" to prevent exposure of commercially sensitive information) and a conditional access to non-nuclear sites.

The additional authority sought by the Agency rests on a few essential principles that show clearly the difference from the conventional verification measures applied to nuclear materials:

In co-operation with State authorities and facility operators, the IAEA applies safeguards at more than 800 nuclear facilities worldwide.
(Credits: KEPCO)

- The focus will extend beyond nuclear materials to the factors that might indicate the presence or production of undeclared nuclear materials. The treatment of the additional information and access will be *qualitative* rather than quantitative;
- The IAEA will not routinely verify *on site* the additional information received; it will most of the time assess such information in its own offices and when necessary ask questions to check its consistency; and
- For the locations under complementary access, the IAEA will not install traditional safeguards equipment as for nuclear materials. Its inspectors will mostly walk around for visual observation and, when appropriate, they will take an environmental sample.

This short description should bring to light an important fact that has been somewhat overlooked, namely that ***the main burden of implementing the additional authority sought by the IAEA will fall on the shoulders of the State authorities and not on the nuclear industry***. The authorities cannot always easily provide information about all "nuclear related facilities" in a State, and even less so ensure automatic access upon request. By contrast, the operator of a nuclear site maintains at all times an overview of his own facility, with a solid organization and a staff well trained in the related areas of security, safety, and safeguards. The additional information can be provided and updated by the operator with a minimal effort, and the complementary access granted with only a marginal perturbation and burden.

Concerns of the fuel cycle industry

The nuclear fuel cycle industry has a record of clear support for non-proliferation and for the safeguards system put in place by the IAEA.

Confronted with new proposals for the strengthening of the existing system, the industry wonders what is in stock for it, what could be the consequences in terms of costs or competitiveness. Those are of course legitimate concerns that governments participating in the negotiations of the new legal instrument for the IAEA need to take into account. Yet, in reality, the impact of the new measures should not affect much, if at all, their commercial interests.

An information paper issued by the nuclear industry of one State illustrates many of the concerns expressed by operators. Some of the objections put forward (here in italics) call for a comment:

- "*...the safeguards approaches implemented have so far proved successful in States with democratic societies*". Yes, but as an international organization, the IAEA does not distinguish between political systems. In carrying out its verification mandate, the Agency can only take into account the readiness of its partners to demonstrate transparency in the relevant nuclear activities.
- About the additional information that the IAEA wishes to receive, it was stated that the collection *"will require considerable effort on the operator's part if it is to correspond to the demands expected"* and *"will mean direct interference with facility operation"*. At the least, such a statement reflects a fundamental misreading of the proposals, since the additional information requested from nuclear facility operators will remain of a common nature with generally infrequent updates. As already noted, the situation could be quite different for State authorities in regard to facilities without nuclear materials. Incidentally, the proposals acknowledge concerns regarding commercially sensitive information and that constraints may need to be imposed by operators to maintain confidentiality.
- A fear expressed about increased physical access to nuclear facilities is that the "*number of personnel involved will increase quite considerably as opposed to earlier practice.*" An occasional visual visit to the workshop, the storage rooms or the laboratories by the very same inspectors coming for materials verification may well add a few hours to the duration of the inspection. But it will hardly require the hiring of additional personnel.
- Environmental sampling is labelled as a *"method unacceptable for routine use"*. The objections cover the rights of the operator (yes, the IAEA does leave duplicate samples in the facility), the lack of representativity of individual samples (yes, but conclusions will be drawn only from multiple samples), the fear of cross-contamination (yes, but detailed sample collection and handling procedures have been implemented that limit this possibility). The method is indeed quite sensitive — but not sensitive to the point of detecting "*transborder nuclear transports and illicit transfer of nuclear materials*", tens or hundreds of kilometres away. The field trials carried out by IAEA staff in collaboration with many Member States between 1993 and 1996 have demonstrated that the method provides a powerful tool and that it is acceptable for routine use. Therefore, as instructed by the IAEA Board of Governors, the IAEA inspectorate will implement it in all States having comprehensive safeguards agreements.
- Another serious concern is that the discovery of inconsistencies coming to light through additional information and access could discredit operators and nuclear energy as a whole. Over the years the IAEA has handled a large number of inconsistencies of varying importance without much publicity. Common sense in managing inconsistencies calls for checking and rechecking, for a dialogue with operators and national authorities, a dialogue that normally resolves the matter. Only when this dialogue fails does the IAEA ring the bell.

The proposed measures have been discussed with industrial representatives of many countries having large nuclear industries. While concerns were also expressed about the still unknown burden that these strengthening measures would entail, the measures themselves and the ability of the IAEA to implement them were not much questioned. The bottom line, the bottom question was rather: "What are the benefits — for us?"

Reducing the safeguards burden

Strengthening — that is, better effectiveness — is not the last word in Programme 93+2. As a matter of fact, efficiency — that is, the better use of resources — is part of the Programme's full official title. The Programme's original scope in matters of efficiency included two distinct elements: the first covered the accelerated development of all the technical and administrative measures which could be readily identified; the second dealt with additional efficiencies that would result from the strengthening of the system itself. Indeed, one important early

dimension of Programme 93+2 has since then been under-emphasized, namely that a strengthening of safeguards can be a step towards a simplication of safeguards for existing facilities of the nuclear fuel cycle.

The search for greater efficiency has always been an essential element of good safeguards management. The reduction from US $3000 in 1980 to $1000 in 1995 of the annual cost of safeguarding one "significant quantity" of nuclear material reflects this ongoing commitment.* This effort includes such things as the optimization of safeguards planning (e.g., through the use of regional offices) or the use of technological innovations that permit unattended modes of monitoring and verification.

In this respect, one technology stands out: the remote monitoring at IAEA headquarters, through line or satellite communications, of safeguards information in a facility located anywhere in the world. Several field trials are under way or planned: one in Switzerland started in February 1996 and another in the United States is scheduled to start in late 1996. The purpose of these field trials is to test the concept of remote monitoring via satellite and telephone links in real safeguards situations. Additional field trials are planned in South Africa, Canada, and Japan. The experience from these trials, as well as from the use of remote monitoring in Iraq by the UN/IAEA Action Team, will help identify and resolve issues associated with remote monitoring, as well as provide data on costs. This experimental work provides a solid basis to simultaneously establish the safeguards approaches and criteria for various types of facilities where remote monitoring is to be implemented, with priority given to material stores and nuclear power plants. A special Remote Monitoring Project has recently been established in the IAEA Department of Safeguards to prepare, through testing and planning, for the implementation of remote monitoring in January 1998.

But there is more to greater efficiency than technological improvements.

Confronted with severe budgetary constraints, the IAEA has no choice but to pay attention to the optimum use of resources — to ascertain that the money available is best used to achieve its broad non-proliferation objectives — by properly distributing its resources on the verification of declared facilities on the one hand, and providing assurances regarding the absence of undeclared activities on the other hand. In fact, for many years, the promoters of Programme 93+2 — in and outside the IAEA — have recognized that the strengthened measures, by giving more teeth to the safeguards system, could also permit a simplification of conventional verifications on declared facilities, thereby resulting in a better efficiency of the system as a whole. Simply stated, if the controls carried out in the most sensitive facilities of a country from the point of view of proliferation — research centres and some processing facilities — are conclusive, why should the IAEA inspect so frequently and thoroughly nuclear power plants? The greater degree of transparency that a State would demonstrate through the availability of more information and by offering generous access to its facilities would create a solid basis for a reduction in the inspection load in facilities of less concern. The IAEA Secretariat has not yet spelled out in any detail what these benefits would be — what it could "give" — preferring to await the end of the negotiations on Programme 93+2 in the Board Committee. However, the Secretariat's commitment to implement the revised safeguards system, within costs acceptable to Member States and with a burden acceptable to operators, has been repeatedly formulated, in particular by IAEA Director General Hans Blix.

A new look at spent fuel

The strengthening of the safeguards system envisaged by the full implementation of Programme 93+2 would open up new vistas and indeed allow a fresh look at some fundamental tenets of classical safeguards. The spent fuel from nuclear reactor operations might be one such possibility.

Over the last decades, the IAEA has developed specific procedures and criteria to apply safeguards to various forms of nuclear materials. In the case of uranium, safeguards application takes into account the nature of the materials — natural, depleted, low-enriched, or highly enriched uranium. The degree of proliferation concern varies and this fact is duly reflected. Up to now, a differentiated approach has not been considered for plutonium, except to take account of whether it is separated or still mixed in spent fuel. Seen in the broad con-

*A significant quantity corresponds to the approximate amounts of plutonium or uranium-233 (8 kg) or highly enriched uranium (25 kg) which is required for the manufacture of a first nuclear explosive device.

text of all nuclear materials; verification might be insufficient for separated plutonium and excessive for high burnup spent fuel. The time may well have come to revisit the issue.

A relevant initiative in this direction has been taken in the report published in August 1996 by the Canberra Commission, a group of eminent personalities brought together by the Government of Australia: Nobel Peace Prize recipient Joseph Rotblat, Sri Lankan Ambassador Jayantha Dhanapala (Chair of the 1995 NPT Conference), former French Prime Minister Michel Rocard, former US Secretary of Defense Robert McNamara, Dr. Ronald McCoy (International Physicians for the Prevention of Nuclear War), and General Lee Butler (former Commander in Chief of the US Strategic Air Command), among others. The Commission dealt with the broad issue of nuclear disarmament and the required verification mechanisms.

The report contains interesting ideas about the use of civilian and demilitarized fissile materials. Noting that a proper balance must be struck between the legitimate civilian use of such materials and the objectives of nuclear non-proliferation and disarmament, the Commission states that striking such a balance might be feasible:

"One possibility may be to draw a distinction between plutonium of different isotopic grades and to use this distinction both for safeguards purposes and for a proscription on the separation of plutonium of an isotopic composition which makes it attractive for weapons use...It is an unfortunate consequence of the current practice of not differentiating between plutonium grades for safeguards purposes that special attention is not directed to plutonium having the isotopic characteristics of greatest proliferation concern. Therefore, there would be merit in investigating various categories of plutonium in terms of applicable safeguards measures and resulting verification costs".

All those interested in strengthening safeguards, as well as those keen to reduce costs, should have an interest in such an investigation. For example, in analogy with the various categories of uranium, one could possibly define two or even three categories of plutonium: 1) *degraded* plutonium, such as high burnup spent fuel, 2) *low-grade* plutonium, such as separated high-burnup plutonium from light-water reactors; and 3) *high-grade* plutonium, e.g. from weapons, in breeder blankets, or in low-burnup spent fuel.

A sense of perspective

The proposals formulated by the Agency to strengthen its safeguards system have opened a broad debate on how the fight against proliferation should be led. Most of the discussion has been of a political nature — the lessons of Iraq, the need to reinforce the NPT regime, the drive towards nuclear disarmament. Many operators of nuclear facilities — in particular in those countries with a large fuel cycle — feel that the burden to achieve these grandiose objectives will fall on their shoulders. The following points must certainly be carefully thought about:

- The debate is indeed first of all political. Non-proliferation is part of the efforts of the international community to build a more secure world. While protecting its legitimate interests, while questioning what would be done in their facilities and the costs incurred, industrial associations should also maintain a broad vision of the political dimension and recognize that credible safeguards are vital to preserve public confidence in nuclear power.
- To truly assess the potential burden of Programme 93+2, the open-minded observer in industry should look at the fine print. He or she will see that the proposed new measures will not really affect the competitiveness of the business, that they will not in fact stand out through the burden they cause, but rather through their different nature: unannounced inspections, and request for access to unusual places, such as the workshop. Observers should also know that the safeguards budget of the IAEA will most likely stay at about the same level in the forthcoming years — it has been frozen for more than 10 years. Hence, there will be no resources for a profusion of burdensome inspections. Like any organization operating under the conflicting demands of "high-quality service" and "low cost", the IAEA Department of Safeguards will have to focus routine verification measures on the essential — namely, on the nuclear materials and facilities of real proliferation concern — and will have to plan its activities pragmatically, possibly by tuning down some of the old verification measures in order to make room for new ones.

As a community, the nuclear fuel cycle industry has few reasons to object to Programme 93+2. As a matter of fact, nuclear operators should wholeheartedly support the additional authority sought by the IAEA, since the better transparency and better non-proliferation assurances offered by the new measures will open the door to simpler, less frequent controls on nuclear materials. ❐