

A return to transparent safeguards reporting

OLLI HEINONEN

Senior Advisor on Science and Nonproliferation
Foundation for Defense of Democracies

Former Deputy Director-General for Safeguards
International Atomic Energy Agency (IAEA)

Indian Wells, CA
July 17, 2017

Abstract

This paper reviews changes introduced in recent years by the Secretariat to the Safeguards Implementation Report (SIR) in providing less information about inspection goal attainment while adding more financial information. Some of these changes can be attributed to the transition from criteria driven safeguards implementation to the integrated safeguards, and to the introduction of implementation guidelines. This, however, has led to a situation of a weakening of connection in the SIR between safeguards goal attainment and the safeguards statement. Implementation guidelines require a set of minimum quantitative and timeliness verification goals to be met at the level of a facility and a state, which are not anymore reflected in the SIR. It is equally difficult to assess the impact of the stated implementation problems with the overall conclusions. This paper highlights some of the deficiencies to be address to connect verification goal attainment with the overall conclusions while fulfilling the confidentiality requirements.

Introduction

While the International Atomic Energy Agency (IAEA) must protect safeguards confidential or privileged information, it should work closely with member states to provide a level of transparency that allows the international community to track how the IAEA meets its verification obligations and how its financial contributions are used to ensure that efforts and expenditures have a measurable impact. To that end the IAEA Secretariat has developed the safeguards implementation criteria and guidelines to set uniform and nondiscriminatory verification parameters.

The annual Safeguards Implementation Report (SIR) illustrates the performance of the Agency's verification regime and shares details on the use of inspection resources. The Annual Safeguards Statement provides the public with overall conclusions. This in turn is supplemented by the SIR that provides more detailed information about: actual safeguards verification goal attainment, problem areas in implementation, and data including inspection costs by state.

Trends in IAEA SIR reporting

In recent years the SIR has progressively reduced the amount of technical information about inspection goal attainment while adding on more financial information. In other words, the contents of the SIR have gradually developed from a performance-oriented dossier to an output document and with increased financial emphasis as the findings from the SIRs in 2000, 2010, and 2010 demonstrate in Annex 1.

In 2000, the Secretariat presented the annual safeguards evaluation reflecting the safeguards verification goal attainment from the point of view both the quantity goal as well as timeliness goal attainments measured against the parameters set by the Safeguard Implementation Criteria. The quantity component relates to the scope of inspection activities that should be carried out in order to draw a conclusion about the non-diversion

of a significant quantity of nuclear material over the material balance period (MBP) — a year in the majority of cases.¹ The timeliness component relates to the periodic inspection activities necessary for concluding that an abrupt diversion has not taken place during a calendar year.² In making its overall evaluation, the IAEA in practice places emphasis on attainment of the quantity component because of its greater significance in the derivation of safeguards conclusions on non-diversion of nuclear material. One has also to keep in mind that a failure to attain either or both of the components of the inspection goal does not in itself constitute evidence of diversion of nuclear material. In such a case, the Secretariat examines the evaluation to confirm the result, and then extensively reviews the reason(s) and seek the State's necessary corrective action. Where appropriate, the Secretariat further performs a qualitative assessment of the safeguards significance of the failure in drawing safeguards conclusions.

The Secretariat also identifies and analyses reasons for failures, which assessments in turn contributes to the Secretariat's efforts to strengthen the implementation of safeguards, for example, by developing more rugged verification instrumentation, developing new verification methods or pursuing additional cooperation from the state authorities and facility operators to overcome verification obstacles in the future.

In 2000, the IAEA Secretariat not only presented in the SIR the safeguards performance per facility type, as reflected in in Tables 1.1. and 1.2 of the Annex, but also paid attention to the performance on the verification of un-irradiated and irradiated direct-use nuclear material.³ In 2000, out of 276 facilities with direct use material, the quantity goal was

¹ Quantity component of the inspection goal is regarded as fully attained if all of the relevant safeguards criteria for all material categories present at the facility have been satisfied. The quantity component is regarded as partially attained if, for all material categories present at the facility, the subset of the safeguards criteria which covers the most likely diversion paths has been satisfied. If any verification activity associated with this subset of criteria has not been completed, the quantity component is regarded as not attained.

Full attainment of the quantity component of the inspection goal for the facility, together with completion of all other safeguards activities (such as matching accounting reports on transfers into and out of the facility with corresponding data from shipping and receiving facilities), provides a high level of confidence in the Agency's assurance that there has been no diversion of 1 SQ or more of nuclear material over the MBP.

² The timeliness component of the inspection goal is regarded as fully attained if the safeguards criteria for verification for timely detection purposes have been satisfied for all material categories present at the facility, and if the period between physical inventory verifications (PIVs) and the time for resolution of anomalies were within the limits specified in the criteria.

The timeliness component is regarded as partially attained if the required activities were performed in more than 70 per cent of the intervals in which material was present in quantities of 1 SQ or more; the prescribed periods for the resolution of anomalies were not exceeded by more than 30 per cent and the timeliness period between consecutive PIVs was not exceeded by more than 30 per cent. The timeliness component is regarded as not attained if the required activities were performed in less than 70% of the intervals or if either period exceeded the limits by more than 30%.

³ Direct-use material is nuclear material that can be used for the manufacture of nuclear explosive components without transmutation or further enrichment, and has two categories: un-irradiated direct-use (UDU) and irradiated direct-use (IDU) material.

met in 88 % of the cases, while in 7 % of cases the attainment was only partial. 58 of the evaluated facilities had un-irradiated direct use material. In 93 % of the cases, the quantity goal was fully met, and in 2 % of the cases only a partial attainment of goals was met. Timeliness goals of all direct use material were fully met at 85 % of the facilities and at 7 % of facilities the attainment was partial only.

SIR 2000 included detailed analysis for the reasons of non-attainment the verification goals analyzing each of the cases, but the report did not disclose the facility of the country of concern. Subsequent SIRs in 2010 and 2015 stepped back from detailing such analysis.

In SIR 2010, the Secretariat provided even less information – as reflected in Tables 2.1. - 2.4. of Annex I - about the actual inspection goal attainment.

Some of these changes can be attributed to the transition from criteria driven safeguards implementation to the integrated safeguards, and to the introduction of implementation guidelines. To be sure, evolution of the SIR can be viewed as an organic and positive review towards more meaningful reporting. Such changes however should not lead to a situation of a weakening of connection in the SIR between safeguards goal attainment and the safeguards statement, which was the resulting case.

As an example, the implementation guidelines for integrated safeguards still require a set of minimum quantitative and timeliness verification goals to be met at the level of a facility and a state, but those results are not anymore reflected in the SIR.

Also discontinued as of 2010 is information provided on the IAEA's performance in verification of direct use material. Current information moreover does not distinct between the attainment of quantity and timelines goals of inspection performance.

With regard the SIR 2015, no information on inspection goal attainment is provided at all (Tables 3.1. -3.4.).

With the SIRs over the said period of time, it has also become increasingly difficult to assess the impact of the stated implementation problems with the overall conclusions.

Why SIR reporting matters

The IAEA safeguards system forms a cornerstone of the NPT verification regime. While it has its strengths and weaknesses, safeguards have to provide credible assurances in a transparent and non-discriminatory manner that show states are complying with their safeguards obligations. The IAEA system also has to be able to raise the concerns of non-compliance in a timely manner. It can only do so if it has an evaluation process in place that is meaningful, transparent, and derived from sound analysis. With today's verification system relying increasingly on qualitative information, it is indispensable to maintain a solid verification system of nuclear materials and facilities, - a fundament of the IAEA safeguards system, tools to do the job, and a reporting system that js able to

reflect these objectives, which includes more meaningful SIR reporting from a verification and evaluation standpoint. To achieve this, it is incumbent to properly demonstrate not only that states comply with their undertakings but that the IAEA's physical verification activities meet the safeguards implementation criteria and guidelines with regard to the quantitative and timeliness verification goals.

Annex

Table 1. Extracts from Safeguards Implementation Report 2000

Table 1.1. Attainment of the quantity component of the inspection goal in 2000

| | Number under safeguards | Full attainment | Partial Attainment | Non-Attainment |
|--|-------------------------|-----------------|--------------------|----------------|
| Power Reactors | 182 | 158 (86%) | 15 (8%) | 11 (6%) |
| Reprocessing | 4 | 3 (75%) | - | 1 (25%) |
| Enrichment | 9 | 6 (67%) | - | 3 (33%) |
| Conversion and fuel fabrication | 38 | 34 (90%) | 2 (5%) | 2 (5%) |
| Other facilities | 119 | 109 (92%) | 6 (5%) | 4 (3%) |

Table 1.2. Attainment of the timeliness component of the inspection goal in 2000

| | Number under safeguards | Full attainment | Partial Attainment | Non-Attainment |
|--|-------------------------|-----------------|--------------------|----------------|
| Power Reactors | 182 | 155 (85%) | 13 (7%) | 4 (8%) |
| Reprocessing | 4 | 3 (75%) | | 1 (25%) |
| Enrichment | 9 | 8 (89%) | | 1 (11%) |
| Conversion and fuel fabrication | 38 | 38 (100%) | | |
| Other facilities | 119 | 105 (88%) | 7 (6%) | 7 (6%) |

Table 2. Extracts from Safeguards Implementation Report 2010**Table 2.1. States with both comprehensive safeguards agreements and additional protocols in force, with the broader conclusion and integrated safeguards implemented during 2010**

| | Number under safeguards | Number evaluated | Number of inspections | Number of DIV visits | Number of PDIs | Number with objectives met |
|--|--------------------------------|-------------------------|------------------------------|-----------------------------|-----------------------|-----------------------------------|
| Power Reactors | 186 | 163 | 634 | 137 | 1523 | 151 (93%) |
| Reprocessing | 9 | 8 | 50 | 11 | 487 | 7 (88%) |
| Enrichment | 6 | 6 | 67 | 7 | 333 | 5 (83%) |
| Conversion and fuel fabrication | 37 | 31 | 127 | 31 | 877 | 23 (74%) |
| Other facilities | 232 | 144 | 452 | 153 | 901 | 137 (95%) |

Table 2.2. States with both comprehensive safeguards agreements and additional protocols in force, with the broader conclusion and integrated safeguards not implemented fully during 2010

| | Number under safeguards | Number evaluated | Number of inspections | Number of DIV visits | Number of PDIs | Number with objectives met |
|--|--------------------------------|-------------------------|------------------------------|-----------------------------|-----------------------|-----------------------------------|
| Power Reactors | 17 | 17 | 112 | 18 | 295 | 15 (88%) |
| Reprocessing | 0 | 0 | 0 | 0 | 0 | - |
| Enrichment | 1 | 0 | 0 | 0 | 0 | - |
| Conversion and fuel fabrication | 4 | 4 | 26 | 4 | 97 | 3 (75%) |
| Other facilities | 27 | 25 | 92 | 25 | 271 | 23 (92%) |

Table 2.3. States with both comprehensive safeguards agreements and additional protocols in force, but without the broader conclusion during 2010

| | Number under safeguards | Number evaluated | Number of inspections | Number of DIV visits | Number of PDIs | Number with objectives met |
|--|--------------------------------|-------------------------|------------------------------|-----------------------------|-----------------------|-----------------------------------|
| Power Reactors | 7 | 6 | 43 | 6 | 514 | 4 (67%) |
| Reprocessing | 0 | 0 | 0 | 0 | 0 | - |
| Enrichment | 0 | 0 | 0 | 2 | 0 | - |
| Conversion and fuel fabrication | 2 | 2 | 7 | 2 | 101 | 2 (100%) |
| Other facilities | 23 | 20 | 87 | 20 | 384 | 18 (90%) |

Table 2.4. States with comprehensive safeguards agreements in force, but without additional protocols in force during 2010

| | Number under safeguards | Number evaluated | Number of inspections | Number of DIV visits | Number of PDIs | Number with objectives met |
|--|--------------------------------|-------------------------|------------------------------|-----------------------------|-----------------------|-----------------------------------|
| Power Reactors | 15 | 8 | 32 | 10 | 257 | 8 (100%) |
| Reprocessing | 2 | 0 | 5 | 5 | 0 | - |
| Enrichment | 9 | 8 | 73 | 52 | 433 | 6 (75%) |
| Conversion and fuel fabrication | 16 | 15 | 34 | 24 | 102 | 13 (86%) |
| Other facilities | 53 | 46 | 81 | 59 | 180 | 40 (87%) |

Table 3. Extracts from Safeguards Implementation Report 2015**Table 3.1. States with both comprehensive safeguards agreements and additional protocols in force, with the broader conclusion and integrated safeguards implemented during 2015**

| | Number under safeguards | Number evaluated | Number of inspections | Number of DIV visits | Number of PDIs |
|--|--------------------------------|-------------------------|------------------------------|-----------------------------|-----------------------|
| Power Reactors | 217 | 169 | 580 | 130 | 1136 |
| Reprocessing | 9 | 8 | 41 | 8 | 458 |
| Enrichment | 5 | 5 | 81 | 5 | 567 |
| Conversion and fuel fabrication | 39 | 29 | 139 | 28 | 924 |
| Other facilities | 265 | 159 | 487 | 164 | 1175 |

Table 3.2. States with both comprehensive safeguards agreements and additional protocols in force, with the broader conclusion and integrated safeguards not implemented during 2015

| | Number under safeguards | Number inspected | Number of inspections | Number of DIV visits | Number of PDIs |
|--|--------------------------------|-------------------------|------------------------------|-----------------------------|-----------------------|
| Power Reactors | 11 | 6 | 22 | 6 | 74 |
| Reprocessing | 0 | 0 | 0 | 0 | 0 |
| Enrichment | 0 | 0 | 0 | 0 | 0 |
| Conversion and fuel fabrication | 2 | 2 | 6 | 3 | 100 |
| Other facilities | 22 | 19 | 55 | 20 | 184 |

Table 3.3. States with both comprehensive safeguards agreements and additional protocols in force, but without the broader conclusion during 2015

| | Number under safeguards | Number inspected | Number of inspections | Number of DIV visits | Number of PDIs |
|--|--------------------------------|-------------------------|------------------------------|-----------------------------|-----------------------|
| Power Reactors | 2 | 2 | 5 | 2 | 18 |
| Reprocessing | 0 | 0 | 0 | 0 | 0 |
| Enrichment | 0 | 0 | 0 | 0 | 0 |
| Conversion and fuel fabrication | 1 | 1 | 1 | 1 | 2 |
| Other facilities | 10 | 7 | 9 | 7 | 23 |

Table 3.4. States with both comprehensive safeguards agreements, but without additional protocols in force during 2015

| | Number under safeguards | Number inspected | Number of inspections | Number of DIV visits | Number of PDIs |
|--|--------------------------------|-------------------------|------------------------------|-----------------------------|-----------------------|
| Power Reactors | 11 | 6 | 28 | 9 | 168 |
| Reprocessing | 0 | 0 | 0 | 0 | 0 |
| Enrichment | 11 | 11 | 249 | 47 | 1707 |
| Conversion and fuel fabrication | 17 | 16 | 118 | 55 | 526 |
| Other facilities | 57 | 40 | 75 | 89 | 149 |