

International Safeguards - The Quantification Issue

by J. Jennekens

INTRODUCTION

As preparations for the forthcoming NPT Review Conference accelerate, the oft-repeated calls for a "strengthening" of the Agency's safeguards system take on a new note of urgency, and therefore a close examination of what is meant by the term is warranted. One major area of concern is the suggested need for further "quantification" of the technical objective of safeguards. Presumably, the intent is to achieve a clearer, more widespread understanding of the technical objective of safeguards and thereby an enhancement of the effectiveness and efficiency of the Agency's safeguards programme. There are obviously other areas of concern and these will no doubt be addressed prior to the opening of the Review Conference. However, from the standpoint of safeguards implementation, the question of further quantifying the technical objective of safeguards and the associated debate over objective versus subjective evaluation criteria and procedures are of particular relevance.

This is but one of the many subjects which the Standing Advisory Group on Safeguards Implementation (SAGSI) has addressed since its formation in December, 1975. Not surprisingly, a large fraction of the Group's time and effort has been devoted to deliberating over issues raised in other fora, issues which continue to evade resolution because of the somewhat intangible nature of the factors that apply. The debate over the further quantification of the safeguards objective is no exception.

THE QUANTIFICATION OF THE TECHNICAL OBJECTIVE OF SAFEGUARDS

In order to examine realistically the need for and the factors pertinent to the quantification of the safeguards objective, it is essential that at least two points of reference be identified. These are:

- 1) the degree of quantification that is expected or considered to be desirable as compared to what has actually been achieved; and
- 2) the extent to which the technical objective of safeguards was initially quantified as compared to the present situation.

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In a memorandum to the Board of Governors, dated 5 September, 1968 (GOV/1294), the Director General described the aims of safeguards system analysis studies then underway as being:

- “(a) to identify points in a nuclear complex where the application of safeguards is important;
- (b) to assess quantitatively the relative importance of these points;
- (c) to assess quantitatively the efficacy of safeguards when existing techniques are applied at these points; and
- (d) to specify the needs for research and development to increase the efficacy of safeguards at a particular point”.

The system analysis studies referred to in the Director General's memorandum were being conducted in several Member States in an attempt to extend the rather rudimentary thinking which had influenced the preparation of the Agency's 1961, 1964, 1965, 1966 and 1968 "safeguards documents" INFCIRC/26, -/26/Add. 1, -/66, -/66/Rev. 1 and -/66/Rev. 2.

Although rudimentary in nature, the exemption and suspension provisions of these documents and the stipulations regarding inspection frequencies and intensities were the result of a concentrated effort by several Member States to establish numerical bench marks for the guidance of safeguards inspectors. The very specification of exemption and suspension limits provided a direct indication of the quantities of nuclear material believed to be of safeguards significance. Similarly, the inspection frequencies stipulated in the documents were an equally direct reflection of the importance of timeliness. The use of the terms "resident inspector", "inspection at all times", and "continuous inspection" constituted implicit recognition of the near-zero time element of the quantification equation in certain safeguards applications. The widespread objection by many Member States, some twelve years ago, to the actual use of a near-zero (or at least a very short) time interval regardless of the intent, and justified or not, provides singular but powerful evidence to suggest that the call for "further" quantification of the technical objective of safeguards is the result of a misunderstanding.

In their 1969 report* to the Director General, Drs. Frank Morgan and Carl Bennett described very well the importance of the time dimension and attempted to emphasize the non-physical but obviously relevant relationship between quantity, time and accessibility (the latter term referring to the chemical and physical state of the nuclear material and the directness of its possible use for weapons purposes).

The Consultants' Report and the active discussions which it prompted in safeguards circles resulted in further development of the "critical time" concept. These discussions broadened considerably with the establishment by the Agency's Board of Governors of the Safeguards Committee (1970).

In its now widely known Report to the Board of Governors, the Safeguards Committee (1970) defined the objective of safeguards quite explicitly (paragraph 28 of INFCIRC/153). Equally clear is the definition of the "technical conclusion of the Agency's safeguards verification activities" (paragraph 30 of INFCIRC/153). Neither of these paragraphs nor any other part of the Report gives guidance on the quantification of the technical objective of safeguards beyond that which already existed in other Agency documents. The realities

* Report by the Consultants on Criteria for Safeguards Procedures.

of the matter were self-evident and continue to be so today. Although the time intervals and quantities of nuclear material of safeguards significance could be identified with relative ease from a strictly technical standpoint, their application in designing safeguards procedures for a variety of instances was clearly unacceptable to a number of Member States. As a result, a finely balanced compromise was struck between the requirements dictated by the need for an effective system of safeguards and the requirements arising out of national and multi-national sovereignty considerations, the legitimate concerns of facility operators about such matters as radiation safety, unnecessary intrusion and interruption, protection of proprietary information, and the financial and personnel resource implications for the Agency and for the operator. Certainly, encouragement was given by the Safeguards Committee (1970) to those Member States attempting to advance the degree of safeguards quantification, but the brunt of the responsibility fell upon the Agency's Secretariat.

At its inaugural meeting in December, 1975, SAGSI was asked to consider two main subjects, the inter-relationship between which is unmistakably clear:

- 1) the proposed form, scope and content of an annual report on the performance and findings of the Agency's safeguards system; and
- 2) the quantification of the technical objective of safeguards and related matters.

Needless to say, SAGSI was unable to resolve all of the questions arising out of its consideration of the two subjects during its three-day meeting. In fact, it was not until two years later, after the Group had met three more times, and after considerable effort had been expended by the Agency and by some Member States that a carefully qualified set of recommendations regarding the quantities of nuclear materials which are considered to be of safeguards significance could be submitted to the Director General. At a subsequent meeting in January, 1978, SAGSI reached tentative agreement on interim numerical values for "conversion" times and "detection" times, and recommended these to the Director General on the same carefully qualified basis.

In view of the long history of this subject, and of the many attempts which have been made to resolve the difficult questions involved, it was not surprising that SAGSI's carefully qualified recommendations failed to moderate the debate. As in the case of previous efforts to quantify the objective of safeguards, the SAGSI exercise has shown that the numerical values for time intervals and quantities of different nuclear materials are relatively easily ascertained in terms of safeguards significance. Unfortunately, these values are not acceptable on other grounds, principally because of what they mean under existing procedures and practices in terms of inspection frequencies, inspection intensities and requirements for such important activities as the taking of physical inventories.

Thus, the repeated calls for greater quantification of the technical objective of safeguards reflect a lack of basic understanding of what has already been achieved and what must be accomplished to overcome the difficulties which arise in applying the criteria already developed to present and future safeguards situations.

A COMMITMENT FOR THE FUTURE

Unjustified optimism invariably results in extreme pessimism when the early resolution of a problem proves to be elusive. In the current context, there is reason for measured optimism because of the growing recognition of the fact that little purpose will be served by continuing to debate the technical validity of the recommendations made by SAGSI concerning

“significant quantities” and “detection times”. The technical basis for these recommendations is quite sound. What is required is a commitment to examine without prejudice the measures by which the technical objective of safeguards can best be achieved. Quite clearly, a direct, dogmatic application of the interim criteria developed by the Agency’s Secretariat on the basis of SAGSI’s recommendations will meet with continued opposition. Equally unacceptable will be any attempt to weaken the fabric of the Agency’s safeguards system by a “rationalization” of the criteria or by amendment of existing procedures in a short-sighted attempt to ease the burdens which would otherwise be imposed upon the Agency and facility operators.

SAGSI is very much aware of the difficulties to be overcome in resolving this issue. However, the Group is committed to an open examination of alternative safeguards measures including those for which the development of the underlying philosophy has not yet progressed to the point of practical demonstration. This commitment must be matched by a broader commitment by all Member States to reassess the constraints imposed upon the Agency in implementing its safeguards programme.