

June 19, 2002

MEMORANDUM TO: Chairman Meserve
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan
Commissioner Merrifield

FROM: Janice Dunn Lee, Director */RA/*
Office of international Programs

SUBJECT: IAEA SAFEGUARDS - VISIT OF JOHN CARLSON, AUSTRALIA,
CHAIRMAN OF THE IAEA STANDING ADVISORY GROUP ON
SAFEGUARDS IMPLEMENTATION (SAGSI), JULY 1, 2002

BACKGROUND

John Carlson, Chairman of the International Atomic Energy Agency (IAEA) Standing Advisory Group on Safeguards Implementation (SAGSI) will meet with the Commission on July 1 from 2:00-3:30 in the 18th Floor Conference Room. Carlson, from Australia, is also the Director General of the Australian Safeguards and Non-Proliferation Office (ASNO). He played a major role in the negotiation of the Additional Protocol for the strengthening of IAEA safeguards, and has worked closely with the IAEA in the development of and promotion of strengthened safeguards. A short biographical sketch of Mr. Carlson is at Attachment 1. He will be accompanied by James Tape, the U.S. Government's representative to SAGSI. Dr. Tape will not make a formal presentation during the meeting, but will be prepared to respond to Commissioner questions in his capacity as the U.S. representative to SAGSI.

SAGSI has recently completed its first series of meetings for 2002 and Carlson will focus his presentation on SAGSI's recent activities in support of the IAEA's strengthened safeguards program, in particular the Agency's recently implemented "Integrated Safeguards" system. A notional agenda for Mr. Carlson's presentation is at Attachment 2 and his briefing charts are at Attachment 3. He has entitled his presentation: "IAEA Safeguards: Developments and Challenges."

The continued effectiveness of the IAEA's safeguards program is of direct interest to the NRC since statutorily required IAEA safeguards adequacy determinations must be made by the Commission with respect to NRC-licensed exports of source material, special nuclear material and nuclear facilities. Background information on the IAEA's Integrated Safeguards system was provided to the Commission in a May 2 memorandum from the Executive Director for Operations (EDO) (Attachment 4). The EDO's memorandum provides a status report on the Integrated Safeguards initiative and a discussion of its underlying "Conceptual Framework," as described in the accompanying Secretariat document, GOV/2002/8. The Conceptual Framework document was presented to the IAEA Board of Governors at its March meeting where it received broad support from IAEA member States, including the U.S.

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DISCUSSION

As Mr. Carlson will note in his presentation, a key challenge facing the IAEA is the development of a credible methodology for evaluating the effectiveness of Integrated Safeguards, taking into account each inspected State's unique characteristics. Under Integrated Safeguards the IAEA must make judgments concerning both (1) the non-diversion of nuclear material from declared activities and (2) the absence of undeclared nuclear material and activities in each State as a whole. A conclusion on non-diversion of declared nuclear material is based on verification, largely by quantitative means, of information on nuclear material and facility design provided by the State. In contrast, a conclusion on the absence of undeclared nuclear material and activities is based on evaluation, largely by qualitative assessment, of a broad range of information on nuclear and nuclear-related activities within the State, Agency activities and other available sources (e.g., intelligence information provided by member States).

With respect to the evaluation methodology issue, Mr. Carlson has recently developed the tentative concept of "Information Driven" safeguards and intends to touch upon this topic towards the end of his presentation. This concept is closely linked and partially based on the NRC's experience with "risk-informed" regulation in the reactor safety area. Since the risk-informed regulatory concept contemplates a holistic effectiveness evaluation approach which embraces a complex combination of quantitative and qualitative factors, it is possible that a similar concept may be of utility to the IAEA in developing an improved evaluation methodology for Integrated Safeguards. In view of the possibility that SAGSI and the IAEA may request support from NRC in this area, OIP has prepared a draft discussion paper on the topic (Attachment 5). OIP has made NSIR, NMSS and NRR staff aware of this possible use of risk-informed concepts in the IAEA safeguards area, but the staff has not yet examined the merits of this idea.

Attachments: 1. Biographical Sketch of SAGSI Chairman John Carlson
2. Notional Agenda
3. Briefing Slides
4. May 2, 2002, EDO Memorandum to Commission on Integrated Safeguards
5. Discussion Paper on Information Driven safeguards

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BIOGRAPHICAL SKETCH

John Carlson, Director General, Australian Safeguards and Non-Proliferation Office

Mr. Carlson is a senior Australian Government official, appointed by the Cabinet and reporting directly to the Foreign Minister. He is responsible for Australia's national safeguards system, operation of Australia's bilateral safeguards agreements, interaction with the international safeguards system, and advising on non-proliferation/safeguards matters. His responsibilities also include implementation of the CWC (Chemical Weapons Convention) and CTBT (Comprehensive Test Ban Treaty); and he is involved in the development of verification arrangements for the BWC (Biological Weapons Convention).

Mr. Carlson is the Chairman of SAGSI, the IAEA's Standing Advisory Group on Safeguards Implementation.

Mr. Carlson has postgraduate qualifications in international law and jurisprudence from Sydney University. He has held his current appointment since 1989. Prior to that he had extensive involvement in nuclear, petroleum, and energy policy issues.

NOTIONAL AGENDA

IAEA SAFEGUARDS: DEVELOPMENTS AND CHALLENGES

PRESENTATION BY SAGSI CHAIRMAN JOHN CARLSON TO COMMISSION

JULY 1, 2002

1. Importance of seeing safeguards in context - what safeguards can and can't do.
2. Current safeguards developments at the IAEA, particularly "Integrated Safeguards"
3. Current management challenges - culture, methodologies, resources.
4. Current political challenges - DPRK, Iran
5. The future - what SAGSI and IAEA member States can do to help (e.g., development of the "Information-Driven" safeguards concept).

“INFORMATION-DRIVEN SAFEGUARDS”**DRAFT DISCUSSION PAPER ON RISK-INFORMED CONCEPTS
AND IAEA SAFEGUARDS****BACKGROUND**

This paper provides preliminary thoughts on the potential use of “Risk-Informed” concepts as an aid to evaluating the effectiveness of the IAEA’s strengthened “Integrated Safeguards” system. Stated broadly, the goal of Integrated Safeguards is to provide high confidence assurances that non-nuclear weapons States are in compliance with obligations under the Nuclear Nonproliferation Treaty (NPT) not to engage in nuclear weapons related activities. In contrast to “pre-Iraq” safeguards, which covered only declared nuclear activities, Integrated Safeguards also permit the IAEA to conduct country-wide verification activities with the goal of providing reasonable assurances of the absence of undeclared nuclear-related activities. Quantifying the effectiveness of the IAEA’s verification measures in this area is difficult. However, it is essential to do so if the IAEA is to allocate its inspection and related analytical workload in an intelligent fashion. While the IAEA is proceeding to implement Integrated Safeguards in selected countries (beginning with Australia), efforts to provide a technically sound basis for evaluating the combined effectiveness of the various verification measures available to the IAEA have not yet been fully successful. It has been suggested that NRC’s extensive experience with risk-informed concepts as applied to nuclear reactor safety regulation may be of use in this area.

COMPLEX SYSTEMS ANALYSIS - THE ESSENCE OF THE PROBLEM

The essence of the problem facing the IAEA lies in the complexities involved in evaluating the effectiveness “in the aggregate” of the wide range of verification tools that are now available to the IAEA for use in addressing the country-wide nuclear verification task. These new measures include:

1. Use of high-precision environmental monitoring and sampling techniques.
2. Use of satellite imagery.
3. Evaluation of information provided by member States on their nuclear programs, as well as information provided by other countries, including intelligence information concerning suspect clandestine nuclear activities.
4. Evaluation of “open source” information related to a country’s nuclear activities.
5. Use of advanced remote monitoring techniques.

6. Systematic review and evaluation of all information that is available to the Agency.

Integrating and evaluating the effectiveness of these new verification measures, when considered with the simultaneous implementation of the IAEA's classical safeguards inspections measures on declared activities, presents the IAEA with an unfamiliar and very complex "systems analysis" problem.

PARALLELS WITH NRC'S EXPERIENCE IN RISK-INFORMED TECHNIQUES

The IAEA's systems analysis problem has parallels with NRC's experience in designing the optimum regulatory regime for ensuring the safe operation of nuclear power reactors. These parallels include:

1. The dependency on a wide range of variable and disparate measures in providing the necessary overall assurances of (1) "safe" reactor operation, in the case of the NRC; or (2) the absence of an illicit nuclear weapons program, in the case of the IAEA.
2. The presence of both quantitative and qualitative factors in evaluating overall effectiveness.
3. The presence of unique "site-specific" factors (NRC) or "country-specific" factors (IAEA) that directly affect the level of "threat" to be addressed.
4. The influence of societal or cultural factors on overall effectiveness.
5. The common use of "defense in depth" philosophy.
6. The likely synergistic effects of the combined use of the various measures available for use by the NRC and the IAEA in their respective areas (i.e., the whole is much better than any of the parts).
7. The presence of a complex "event sequence" (NRC) or a "acquisition path" (IAEA) related to any significant reactor accident or proliferation attempt. Note: In contrast to a chemical or biological weapons proliferation threat, it is unrealistic to posit that a nation or sub-national group can obtain a nuclear weapons capability (other than by theft from an existing weapons state) without a complex clandestine program involving a large number of interconnected organizations, sub-programs and personnel.
8. The difficulty in justifying the use of solely prescriptive measures to provide assurances of either safe reactor operation (NRC) or the absence of an undeclared nuclear weapons program (IAEA).

In SECY-01-0218, the staff provided an update on the status of the Commission's Risk-Informed Regulation Implementation Plan (RIPA). The Commission paper discusses several risk-informed concepts of possible relevance to the IAEA's verification mission. For example, Attachment 3 to the paper notes that "A risk-informed approach enhances the traditional approach by: (a) explicitly considering a broader range of safety challenges; (b) prioritizing these challenges on the basis of risk significance, operating experience, and/or engineering judgment; (c) considering a broader range of counter measures against these

challenges; (d) explicitly identifying and quantifying uncertainties in analyses; and (e) testing the sensitivity of the results to key assumptions.” If one substitutes the word “safeguards” for “safety” in this statement one can envision possible areas where risk-informed concepts could help address the IAEA’s needs in the area of evaluating the effectiveness of Integrated Safeguards. Doing so would also help address the related effort by the IAEA to reduce the burden of classical safeguards measures on declared activities as a result of reasonable assurances of the absence of significant clandestine activities, such as a clandestine reprocessing capability. With U.S. support, this approach has been adopted for Integrated Safeguards. This contrasts with current IAEA practice, which is to assume the existence of clandestine facilities. However, the Integrated Safeguards approach needs further development to optimize its implementation. Risk-informed concepts may help in this effort. In this regard, and to paraphrase Chairman Meserve in a speech given in 2001, “The aim.... is to use risk as the tool for dissecting and reforming our [safeguards] system so that the [IAEA] focuses on risk-significant activities, thereby both enhancing [safeguards assurances] and reducing needless [verification] burden.”

WHY SHOULD NRC HELP THE IAEA?

NRC has traditionally focused its support to the IAEA in the areas of nuclear facility and nuclear materials safety. These are areas in which NRC’s considerable experience and expertise in domestic health and safety regulation are of direct benefit to the IAEA in fulfilling its international nuclear safety mandate. With respect to the IAEA’s international safeguards responsibilities, NRC has traditionally provided less extensive support. However, effective IAEA safeguards are an essential element in allowing NRC to fulfill its statutory role in managing the U.S. Government’s export control program over nuclear materials and major nuclear facilities. Making available NRC’s expertise in risk-informed regulation to the IAEA’s safeguards mission, if deemed helpful, would thus directly benefit a program under NRC’s existing authority and responsibility. In a broader sense, by enabling a closer working relationship between the nuclear safeguards and nuclear safety communities within the U.S. Government and within the IAEA, it would also provide recognition of the synergistic relationship between safety and safeguards both domestically and abroad. In other words, an effective, open and transparent nuclear safety program directly benefits an effective, open and transparent safeguards regime. The two areas are complementary in ways not formally recognized within their respective bureaucracies and internal procedures. Risk-informed regulatory concepts may provide an opportunity to bridge this gap.

NEXT STEPS

The IAEA’s Standing Advisory Group on Safeguards Implementation (SAGSI) is considering an inquiry into “risk-informed” safeguards. SAGSI’s Chairman, John Carlson, prefers to use the term “Information Driven” safeguards for this concept, because the term “risk,” though a well understood technical term among specialists, might be seen by non-specialists as implying a non-objective political judgment. Depending on the outcome of SAGS’s current review, and its advice to the IAEA Secretariat, it is possible that the U.S. could be requested to provide support in the area of risk-informed techniques.