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Use of nuclear power sources in outer space

Possible organizational plans for potential co-sponsorship of an effort to develop an international space nuclear power source technical safety standard and potential advice of the International Atomic Energy Agency to the Scientific and Technical Subcommittee in the preparation of such a standard

Note by the Secretariat

1. At its forty-sixth session, the Committee on the Peaceful Uses of Outer Space noted that the Scientific and Technical Subcommittee at its fortieth session, in 2003, further to the deliberations of its Working Group on the Use of Nuclear Power Sources in Outer Space, had adopted a new multi-year work plan on the use of nuclear power sources in outer space, covering the period 2003-2006. The work plan was designed to develop an international technically based framework of goals and recommendations for the safety of nuclear power source applications in outer space, as contained in the report of the Subcommittee (A/AC.105/804, annex III).

2. In accordance with item (f) of the multi-year work plan, the Scientific and Technical Subcommittee, at its fortieth session, requested the Office for Outer Space Affairs and the International Atomic Energy Agency (IAEA) jointly to prepare, by September 2003, possible organizational plans providing for (a) potential co-sponsorship of an effort to develop an international space nuclear power sources technical safety standard; and (b) potential IAEA advice to the Scientific and Technical Subcommittee in the preparation of such a standard.

3. Pursuant to that request, the paper contained in the annex to the present note was prepared by the Secretariat and IAEA. The paper takes into account the progress made during the intersessional informal discussions of the Working Group on the Use of Nuclear Power Sources in Outer Space, held in Vienna on 10 June 2003.

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Annex

Possible organizational plans for potential co-sponsorship of an effort to develop an international space nuclear power source technical safety standard and potential advice of the International Atomic Energy Agency to the Scientific and Technical Subcommittee in the preparation of such a standard

Paper prepared by the Secretariat in cooperation with the International Atomic Energy Agency

I. Introduction

1. The possible organizational plans presented below incorporate the main points set out in the discussion papers prepared by the International Atomic Energy Agency (IAEA) and the Office for Outer Space Affairs for informal discussions held on 10 June 2003 and the relevant comments made during those discussions. Based on the plans, the Working Group on the Use of Nuclear Power Sources in Outer Space intends to prepare an additional working paper containing draft recommendations that will serve as a guide to the Scientific and Technical Subcommittee at its session in 2004 towards making, if appropriate, a preliminary decision on whether to recommend co-sponsorship with IAEA in an effort to develop a technical standard starting in 2006.[1]

2. During the course of the informal discussions, two potential courses of action, as referred to in the work plan, were considered: (a) potential co-sponsorship of an effort to develop an international space nuclear power source technical safety standard; and (b) potential IAEA advice to the Scientific and Technical Subcommittee in the preparation of such a standard. In addition, a third potential course of action was identified, which is presented below as option 2. The Working Group on the Use of Nuclear Power Sources in Outer Space also considered but discarded a fourth option, namely to take no further action.

3. The three options are not mutually exclusive. For example, option 2 or 3 could be adopted as initial actions aimed at building consensus, while retaining the possibility of pursuing option 1 in the future. Option 2 in particular seems unlikely to be a stand-alone option, but rather a step towards one of the other options.

[1] Such a preliminary decision would allow for the inclusion of any necessary provisions in the IAEA programme and budget for the biennium 2006-2007.

II. Possible organizational plans under the framework of cooperation between the International Atomic Energy Agency and the Office for Outer Space Affairs

Option 1: initiate a joint programme of work with IAEA to develop a safety standard for nuclear power sources in outer space, using IAEA's safety standard development process with appropriate involvement of experts from the Committee on the Peaceful Uses of Outer Space and its Scientific and Technical Subcommittee, taking into consideration the reporting mechanisms and procedures of IAEA and the Committee.

4. IAEA, in cooperation with the Office for Outer Space Affairs, has prepared a paper, attached to the present note as appendix I, that provides a summary of the main features of the IAEA process and indicates suggested procedures for the involvement of experts from the Committee on the Peaceful Uses of Outer Space in the various stages of the process. If the Scientific and Technical Subcommittee decides to pursue this option, a request (possibly from the Subcommittee) to IAEA to initiate joint work on a safety standard could be accommodated in IAEA's 2006-2007 programme.

Option 2: organize, jointly with IAEA, a workshop/technical meeting, possibly in the second half of 2004, to discuss the scope and general attributes of a potential safety standard for nuclear power sources in outer space.

5. The basis for discussions would be two or more papers prepared in advance: one or more drafted by interested members of the Working Group on the Use of Nuclear Power Sources in Outer Space from a "space community" perspective; one drafted by IAEA experts, from a "standard setters" perspective. The aim would be to improve each set of experts' understanding of the other set's perspectives and to move towards a shared vision of the scope and general attributes of a potential safety standard. The discussions should take into account the preliminary attributes of an international technically based framework of goals and recommendations for the safety of planned and foreseeable nuclear power source applications in outer space identified by the Working Group on the Use of Nuclear Power Sources in Outer Space (see A/AC.105/804, annex IV, para. 8). If such a workshop/technical meeting were agreed to, it would need to be added to the appropriate year of the work plan of the Scientific and Technical Subcommittee and the work plan would have to be adjusted accordingly. The results of the workshop/technical meeting would be reported to the next session of the Subcommittee.

6. The workshop/technical meeting could be held in Vienna, at the Vienna International Centre. IAEA would be able to organize and provide facilities for the meeting and the Office for Outer Space Affairs could consider the possibility of providing interpretation, subject to resources being available. Proposed terms of reference for such a workshop/technical meeting are set out in appendix II to the present paper.

Option 3: promote work by interested members of the Working Group on the Use of Nuclear Power Sources in Outer Space to develop common standards on a multilateral basis, for consideration by the Scientific and Technical Subcommittee, with a view to the Subcommittee requesting IAEA to undertake a peer review of the draft standards.

7. The organizational plan for this option would be relatively straightforward: interested member States would make the necessary arrangements to prepare draft common standards for consideration by the Subcommittee, possibly at its forty-second session, in 2005. Any request from the Subcommittee to IAEA for peer review could be treated by IAEA as an ad hoc request to provide for the application of its safety standards. Such requests are normally accommodated within its regular programme (as existing financial resources permit) or, if specific additional resources were made available by interested States, could be carried out as an extrabudgetary task.

Appendix I

Potential co-sponsorship of an effort to develop an international space nuclear power source technical safety standard: a brief description of International Atomic Energy Agency procedures and preliminary suggestions for cooperation with the Committee on the Peaceful Uses of Outer Space[a]

Paper prepared by the International Atomic Energy Agency in cooperation with the Office for Outer Space Affairs[b]

I. The International Atomic Energy Agency safety standards

1. The International Atomic Energy Agency (IAEA) Statute authorizes the Agency "to establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property".

2. IAEA's safety standards are binding on the Agency for its own activities and for Agency-assisted activities in member States, but are not binding on its member States for their own activities, although member States may choose to incorporate or adapt them in their own legislation.

3. Safety standards fall into three categories: "safety fundamentals" set out the basic objectives, concepts and principles for safety; "safety requirements" specify requirements that are essential to satisfy the basic safety principles (known as "shall" statements); and "safety guides" recommend more detailed measures to comply with the safety requirements (known as "should" statements).

II. Preparation and review process for International Atomic Energy Agency safety standards

4. The preparation and review process for safety standards involves four committees of experts nominated by IAEA member States and appointed by the Director General, the Nuclear Safety Standards Advisory Committee (NUSSC) for nuclear installation safety, the Radiation Safety Standards Committee (RASSC)[c] for

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[a] This appendix focuses on the IAEA standards development process. However, other options for cooperation between the Committee on the Peaceful Uses of Outer Space and its Scientific and Technical Subcommittee and IAEA may also be considered.

[b] For the purposes of the present paper, the term IAEA is intended to include members of the IAEA committees and commission and any consultants engaged by IAEA, as well as the secretariat and policy-making organs. The term Committee on the Peaceful Uses of Outer Space is intended to include the Scientific and Technical Subcommittee and its Working Group as well as the Office for Outer Space Affairs.

[c] RASSC is, inter alia, the lead committee for safety standards on preparedness and response for nuclear or radiological emergencies, the scope of which includes unplanned re-entry of satellites carrying radioactive material. RASSC would therefore be in a position to review the interface

radiation source safety, the Waste Safety Standards Committee (WASSC) for radioactive waste safety and the Transport Safety Standards Committee (TRANSSC) for safety of transport of radioactive material. The committees are overseen by a commission of senior officials from member States with large nuclear programmes.

5. In response to a request or identified need, the Agency secretariat drafts an outline and work plan (called a "document preparation profile") describing the proposed standard. The document must be approved by the relevant committee(s) and commission for work to proceed.

6. Drafting of the standard is usually done by small groups of consultants,[d] assisted by the Agency Secretariat. When the draft is sufficiently advanced, it is reviewed by the relevant committee(s).

7. When agreed by the committee(s), the draft is distributed to all IAEA member States for comment. Comments are incorporated by the secretariat, with the assistance of consultants when necessary, and the draft is returned to the committee(s).

8. When the committee(s) have endorsed the draft, it is reviewed by the commission. When approved by the commission (and an internal review committee), safety guides can be published. Safety requirements and safety fundamentals must first be approved by the Board of Governors.

9. The whole process to publication typically takes about three years.

III. Initiating the safety standards process

10. Although IAEA has the authority to initiate work on safety standards, the best basis for the Agency to proceed would be a formal request from the Committee on the Peaceful Uses of Outer Space or its Scientific and Technical Subcommittee, whichever is appropriate. A request delivered during 2004 could be taken formally into account in preparing IAEA's programme for 2006-2007. Depending on other priorities, some earlier work might be accommodated within the general safety standards programme. Since the level of participation by co-sponsoring organizations in the preparation and review process varies, it would be advisable to indicate in the request the degree and type of involvement by the Committee on the Peaceful Uses of Outer Space that is foreseen. In the event that the request were to encompass the development of a safety standard, the request should indicate:

(a) The scope of the standards envisaged;

(b) The "level" of standards, i.e. whether they would be considered basic principles, requirements/obligations ("shall" statements) or guidance/recommendations ("should" statements);

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between these existing standards and any new safety standards for nuclear power sources in outer space.

[d] In this context, the term "consultants" refers only to the individuals' relationship with the Agency. It does not imply anything about their normal employment status: they may be employees of Governments or governmental agencies, regulatory or research bodies or private industry, or may be retired. Agency "consultants" are individual experts invited, and paid travel and per diem, by IAEA.

(c) The intended relationship to the existing Principles Relevant to the Use of Nuclear Power Sources in Outer Space. The task of developing new standards would be simplified considerably if there was flexibility to deviate from the existing Principles if necessary and IAEA would strongly recommend that this flexibility be allowed. If the new standards are intended to complement, rather than replace or be incorporated into, the Principles, it would also be useful to have some indication of the extent to which comments on the Principles from IAEA would be welcomed and the mechanisms for providing such comment.

11. Since a decision to request IAEA to develop safety standards would be a policy decision, the request should come from an intergovernmental body (rather than the Office for Outer Space Affairs). In that connection, the Scientific and Technical Subcommittee's work plan for developing an international technically based framework of goals and recommendations for the safety of nuclear power source applications in outer space (A/AC.105/804, annex III) calls for the Subcommittee in 2004, if appropriate, to "make a preliminary decision on whether to recommend co-sponsorship with IAEA of a technical standard development effort starting in 2006". It also notes that such a preliminary decision would allow for the inclusion of any necessary provisions in the IAEA programme and budget for the biennium 2006-2007.

12. The preliminary decision would then be considered for endorsement at the forty-seventh session of the Committee on the Peaceful Uses of Outer Space, in June 2004, and then by the United Nations General Assembly later in the year, probably in December. Following endorsement by the General Assembly, the decision could be confirmed to IAEA in late 2004.

IV. Member States

13. IAEA has 136 member States; the Committee on the Peaceful Uses of Outer Space has 65. The only member State of the Committee that is not also an IAEA member State is Chad. If the Committee were to initiate a technical standard development with IAEA in 2006, then when IAEA invited its member States to provide comments on draft safety standards, the request could also be forwarded by the Office for Outer Space Affairs to States members of the Committee via a note verbale. Although for the most part the invitations from IAEA and the Office for Outer Space Affairs would be going to the same Permanent Missions, it is possible that the Missions might channel the two invitations to different experts.

V. Languages

14. In recent years, IAEA has typically had about 30-40 safety standards at various stages of development at any one time, and typically held about 30-40 drafting meetings per year to work on those standards. For reasons of efficiency, therefore, IAEA standards are developed in English and translated only after approval by the Commission. Meetings to draft and review safety standards are conducted in English and draft standards exist only in English during development.[e] If this is

[e] Draft safety requirements and safety fundamentals are translated into Arabic, Chinese, French,

unacceptable to participants in the process from the Committee on the Peaceful Uses of Outer Space, special arrangements (and resources) would be needed for interpretation and/or translation; however, neither IAEA nor the Office for Outer Space Affairs has a budget to provide interpretation during IAEA meetings. One possibility would be for countries needing interpretation during an IAEA meeting to bring an interpreter to the meeting themselves. Another possibility could be that some member States might volunteer to cover the interpretation costs.

VI. Preparation and approval

15. IAEA's procedures for review and approval of safety standards are described above. One question regarding any proposed standard on nuclear power sources in outer space would be which of the safety standards committees to consult. Consideration needs to be given to the points in IAEA's process at which the Committee on the Peaceful Uses of Outer Space would wish to conduct its own review and approval procedures and the appropriate bodies to involve. Some or all of the following mechanisms could be used to allow interaction between the Committee and IAEA:

(a) IAEA might wish to invite some experts involved with or recommended by the Working Group on the Use of Nuclear Power Sources in Outer Space to participate in the IAEA group of consultants;

(b) IAEA could make a presentation and/or submit a short written report (to be distributed in the six official languages) to the annual session of the Scientific and Technical Subcommittee on the progress in the development of the standards;

(c) The Working Group on the Use of Nuclear Power Sources in Outer Space could carry out a regular review of the latest draft of the standards, both during regular meetings in connection with Scientific and Technical Subcommittee sessions, and possibly during intersessional meetings;

(d) Although both IAEA and the Committee on the Peaceful Uses of Outer Space would review the standards from the perspective of its own area of expertise, it would be desirable to have some exchange between them; for example, representatives of the Office for Outer Space Affairs or the Working Group on the Use of Nuclear Power Sources in Outer Space might participate in discussions in the relevant IAEA committee(s) to assist the safety specialists in understanding the outer space context. To this end, the Working Group could be represented, possibly by its Chairman and/or other member(s), during the discussion of draft standards by the IAEA committees. This would provide a reciprocal arrangement to the IAEA's representation at meetings of the Working Group and the Scientific and Technical Subcommittee.

16. In order for IAEA and the Committee on the Peaceful Uses of Outer Space to develop joint standards, it would be necessary to consider how to ensure that the two bodies approve the same set of standards. If the second body to approve the standards were to introduce changes at the final adoption stage, the revised standards would presumably have to be re-examined by the other body for

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Russian and Spanish when they are submitted to the Board of Governors for approval.

re-approval. In this regard, IAEA's mechanism of issuing interim standards, after approval by IAEA but pending approval by co-sponsors, could be employed.

VII. Summary of issues

17. Clearly, the first issue is whether the Committee on the Peaceful Uses of Outer Space wishes to work with IAEA on the development of safety standards for nuclear power sources in outer space. If the Committee decides to do so, then the main issues that need to be clarified are:

(a) Working language(s) and interpretation during IAEA meetings;

(b) Review and approval mechanisms of the Committee;

(c) The intended relationship between new standards and the existing Principles Relevant to the Use of Nuclear Power Sources in Outer Space.

Appendix II

Proposed terms of reference for a joint Committee on the Peaceful Uses of Outer Space/International Atomic Energy Agency workshop/technical meeting to discuss the scope and general attributes of a potential safety standard for nuclear power sources in outer space

Objective

1. To have an exchange of perspectives between experts from the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space and the International Atomic Energy Agency (IAEA) on the scope and general attributes of a potential safety standard for nuclear power sources in outer space.

Terms of reference

2. The workshop/technical meeting would:

(a) Briefly review relevant background information, such as:

(i) Report of the Working Group on the Use of Nuclear Power Sources in Outer Space: a review of international documents and national processes potentially relevant to the peaceful uses of nuclear power sources in outer space (A/AC.105/781);

(ii) A working paper from IAEA on its processes and procedures for developing general nuclear safety standards and obtaining the endorsement of its member States;

(b) Consider working papers, one or more to be prepared by member States of the Committee on the Peaceful Uses of Outer Space on the unique features associated with the use of nuclear power sources in outer space applications that bear on potential safety standards; and one, to be prepared by IAEA experts, on the scope and general attributes of a potential safety standard from the perspective of safety standard setters;

(c) Discuss the possible scope of a potential safety standard for nuclear power sources in outer space;

(d) Discuss a set of potential attributes of a potential safety standard for nuclear power sources in outer space, taking account of the preliminary attributes of an international technically based framework of goals and recommendations for the safety of planned and foreseeable nuclear power source applications in outer space (A/AC.105/804, annex IV, para. 8);

(e) If appropriate, consider preliminary components of such a potential safety standard for nuclear power sources in outer space;

(f) Prepare an agreed joint report of the workshop/technical meeting for submission to IAEA and the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space.

Duration

3. Provisionally, it is assumed that the workshop/technical meeting would last for two days. During the first day, after the formal introductions, the background papers, IAEA working paper and member State working papers would be presented. The papers would provide an input for discussing the potential scope, general attributes and components of a potential safety standard for nuclear power sources in outer space.

4. On the second day, delegates would continue their discussions in the morning. During the afternoon, workshop participants would draft a report back to IAEA and the Scientific and Technical Subcommittee, presenting the consensus on the topics covered during the workshop.

Venue and timing

5. The workshop/technical meeting could be organized by the Office for Outer Space Affairs and the IAEA secretariat in Vienna in the autumn of 2004, if possible immediately adjacent to the RASSC meeting in order to facilitate attendance by IAEA experts.