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Committee on the Peaceful Uses of Outer Space
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Agenda item 8
Use of nuclear power sources in outer space

Outline of objectives, scope and attributes for an international technically based framework of goals and recommendations for the safety of planned and currently foreseeable nuclear power source applications in outer space

Note by the Secretariat

1. At its fortieth session in 2003, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space adopted a work plan for the period 2003-2006 for developing 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). One element of the work plan, item (d) for the year 2004, identified the need to prepare a draft outline of the objectives, scope and attributes for an international technically based framework of goals and recommendations for the safety of planned and currently foreseeable space nuclear power source applications.

2. At the forty-first session of the Scientific and Technical Subcommittee, held in Vienna from 16 to 27 February 2004, the Working Group on the Use of Nuclear Power Sources in Outer Space considered a proposed outline of objectives, scope and attributes for an international technically based framework of goals and recommendations for the safety of planned and currently foreseeable nuclear power source applications in outer space, as contained in document A/AC.105/L.253. At that same session, the Subcommittee endorsed the recommendation of the Working Group that it continue intersessional work on the topics described in the multi-year work plan and meet for informal consultations during the forty-seventh session of the Committee on the Peaceful Uses of Outer Space.

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3. At its forty-seventh session, held in Vienna from 2 to 11 June 2004, the Committee on the Peaceful Uses of Outer Space noted with satisfaction that, as a result of those informal consultations, the document entitled "Proposed outline of objectives, scope and attributes for an international technically based framework of goals and recommendations for the safety of planned and currently foreseeable nuclear power source applications in outer space" (A/AC.105/L.253) would be updated and resubmitted to the Scientific and Technical Subcommittee at its forty-second session, in 2005. The document was subsequently submitted as A/AC.105/L.253/Rev.1.

4. The outline presented in the annex to the present document reflects the agreement reached by the Working Group during the forty-second session of the Scientific and Technical Subcommittee.

Annex

Outline of objectives, scope and attributes for an international technically based framework of goals and recommendations for the safety of planned and currently foreseeable nuclear power source applications in outer space

I. Background

1. Historically, nuclear power sources for use in outer space have been developed and used in spacecraft applications where unique mission requirements and constraints on electrical power and component heating precluded the use of non-nuclear power sources. Such missions have included interplanetary missions to the outer limits of the solar system, for which solar panels were not suitable as a source of electrical power owing to the long duration of the missions at great distances from the Sun. The designs of nuclear power sources for use in outer space have included radioisotope (for example, radioisotope thermoelectric generators) and fission reactor systems. In addition, small radioisotope heater units have been used to provide local heating of spacecraft components. Due to the presence of radioactive materials in nuclear power sources used in space, safety is an inherent part of their design and application.

II. Objectives

2. The objective of an international technically based framework of goals and recommendations for the safe use of nuclear power source applications in outer space is to present a set of general guidelines relating to the safety aspects of the launch and operating life cycle of such sources. The document outlining such goals and recommendations would provide high-level guidance and be in the form of an international safety framework, reflecting international consensus on the appropriate level of safety that should be achieved for all activities relating to the various phases of the life cycle of a nuclear power source in outer space. Such a framework would make recommendations for the safety of activities relating to those phases of the life cycle of a nuclear power source in outer space. It would provide a technical foundation for the development of national standards and allow national programmes flexibility in adapting such standards to specific nuclear power source applications and national organizational structures. A sound and technically based international safety framework could provide reassurance to the global public that nuclear power sources in outer space would be used in a safe manner and could facilitate bilateral and multilateral cooperation on missions utilizing nuclear power sources.

III. Scope

3. The framework would address practices that could be implemented during the design, launch, operation and other relevant phases of the life cycle of a nuclear power source in outer space to promote its safe use. Guidelines would be

established for the designs of nuclear power sources for use in outer space in general, but their detailed application would depend on the particular design and application and the risks posed by them. Most activities during the development, manufacturing and transportation of nuclear power sources for use in outer space would be adequately addressed in national and international standards relating to ground-based nuclear installations and activities. Unique considerations relating to those operations could be addressed in the safety framework for nuclear power source applications in outer space.

IV. Attributes

4. The safety framework should be general and qualitative in nature, technically valid and relatively independent of evolving technology. The guidelines set forth in the framework should reflect broad international consensus. The framework would be intended for those who make decisions relating to the use of nuclear power sources in outer space but who may not be specialists in nuclear science and technology.

5. Consideration could be given to modelling the framework on the format and structure of the International Atomic Energy Agency Safety Fundamentals publication entitled "The safety of nuclear installations".[a]

Note

[a] "The safety of nuclear installations: a safety fundamental", International Atomic Energy Agency Safety Series No. 110 (STI/PUB/938) (1993).