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Draft report of the Working Group on the Use of Nuclear Power Sources in Outer Space

1. At its 758th meeting, on 6 February 2012, the Scientific and Technical Subcommittee reconvened its Working Group on the Use of Nuclear Power Sources in Outer Space, under the chairmanship of Sam Harbison (United Kingdom of Great Britain and Northern Ireland).

2. The Working Group recalled the objectives of its multi-year workplan for the period 2011-2015, adopted by the Subcommittee at its forty-seventh session (A/AC.105/958, annex II, para. 7):

(a) To promote and facilitate the implementation of the Safety Framework for Nuclear Power Source Applications in Outer Space by providing information pertinent to challenges faced by member States and international intergovernmental organizations, in particular those considering or initiating involvement in applications of nuclear power sources (NPS) in outer space;

(b) To identify any technical topics for, and establish the objectives, scope and attributes of, any potential additional work by the Working Group to further enhance safety in the development and use of space NPS applications. Any such additional work would require the approval of the Subcommittee and would be developed with due consideration for relevant principles and treaties.

3. The Working Group held a workshop during its first meeting, on 8 February 2012, in accordance with its multi-year workplan. Five presentations were delivered at the workshop. (For summaries of the presentations, see the appendix to the present report.)

4. The presentations were followed by an open discussion on various topics, including the launch authorization process; the range of entities involved in the emergency response process; the relationship between emergency response for non-NPS launches and that for launches involving NPS applications; and the current



status of, and any potential hazards associated with, past, present and future NPS applications. The implementation status of the Safety Framework and its relationship to relevant international treaties and conventions were also discussed, as well as the responsibilities and liabilities of organizations involved in space NPS missions.

5. The Working Group noted that the presentations had contributed significantly to fulfilling the objectives of its multi-year workplan contained in paragraph 2 (a) above. It also noted that there would be a further opportunity for member States and international intergovernmental organizations to make presentations at the next workshop.

6. Some delegations expressed the view that additional research could be needed in relation to the potential impact of certain possible future NPS applications on the environments surrounding the Earth, other planets and other celestial bodies.

7. The Working Group noted the comments that had been made in the presentations and general discussions about possible areas for further enhancing safety in the development and use of space NPS applications. Those were potentially relevant to the objectives of the workplan contained in paragraph 2 (b) above and would be considered at the workshop in 2013 and carried forward into the discussion about potential additional work that would take place at the end of the series of workshops.

8. The Working Group noted with appreciation the following presentations:

(a) “The safety framework for nuclear power sources in outer space: current and planned applications, and challenges”, by the representative of France, which addressed the topic of international responsibility and liability in the specific case of the ITER¹ International Fusion Energy Organization;²

(b) “European Space Nuclear Power Programme: United Kingdom activities”, by the representative of the United Kingdom, which outlined the ongoing work in the United Kingdom, within the European Space Nuclear Power Programme, on the development of potential radioisotope power sources for space missions.

9. The Working Group recognized that the information contained in those presentations was relevant to its ongoing discussions.

10. The Working Group recalled that, in accordance with its multi-year workplan, it would hold in 2013 a workshop with member States and international intergovernmental organizations and that the workshop would be organized with the same arrangements as set out in the report on its meeting held during the forty-seventh session of the Subcommittee, in 2010 (A/AC.105/958, annex II, para. 9).

11. The Working Group stressed that, at the workshop to be held in 2013, it would be beneficial to have the broadest possible contribution from member States and international intergovernmental organizations with experience in space NPS applications. Also, the Working Group encouraged all those member States and

¹ International Thermonuclear Experimental Reactor.

² Also contained in A/AC.105/C.1/L.318.

international intergovernmental organizations considering or initiating involvement in space NPS applications to contribute actively to that workshop.

12. The Working Group requested the Secretariat to invite, in March 2012, member States and international intergovernmental organizations with experience in space NPS applications, as well as those considering or initiating involvement in space NPS applications, to notify the Secretariat of any plans they might have to provide workshop presentations in 2013, in accordance with the workplan of the Working Group.

13. The Working Group agreed to hold a teleconference in June or July 2012 in order to review the replies received to the invitation referred to in paragraph 12 above and to plan its activities for the rest of 2012.

14. The Working Group agreed that, should no presentations be offered from member States and international intergovernmental organizations for the workshop in 2013, it would conduct its work during the fiftieth session of the Subcommittee, in 2013, under the arrangements established in its workplan for 2014, as adopted by the Subcommittee at its forty-seventh session (A/AC.105/958, annex II, para. 9).

15. At its third meeting, on [...] February 2012, the Working Group adopted the present report.

Appendix

Summaries of the presentations made at the workshop held during the meeting of the Working Group on the Use of Nuclear Power Sources in Outer Space

“Discussion on the safety of space nuclear power sources”, by Zhu Anwen (China) (A/AC.105/C.1/2012/CRP.5)

As regards the safety of nuclear power sources (NPS) in outer space, China takes a similar view to that contained in the Safety Framework for Nuclear Power Source Applications in Outer Space.

When it comes to space NPS, special attention should be paid to technology relating to safety and radiation protection. The safety of space NPS should be taken into account in their design. Safeguards should be put in place and tested in the development process. Relatively accurate risk assessments of space NPS can be made on the basis of the technology used for conducting risk assessments of civilian nuclear facilities in China. All possible measures should be adopted in accordance with accident plans in order to minimize the consequences of a potential accident.

Space NPS are an essential technological development that facilitate the exploration of space and the universe. Nevertheless, they also pose a threat to the environment of the Earth's biosphere. As space nuclear power sources are developed, China is committed to supporting the efforts of the Office for Outer Space Affairs of the Secretariat and the International Atomic Energy Agency relating to the safety of space NPS, and is convinced that the safety of such sources is a key issue in the development of space nuclear power technologies.

China appeals to countries around the world to strengthen research and cooperation in developing technologies that ensure the safety of space NPS in order to increase the safety and use of such technologies, remove any uncertainty about their safety and ensure adequate protection for people and the environment, while also ensuring that the benefits of those new advanced technologies are widely enjoyed.

“Joint statement made by representatives of the Russian Federal Space Agency and the State Atomic Energy Corporation ‘Rosatom’”, by Alexander Solodukhin (Russian Federation) (A/AC.105/C.1/2012/CRP.6)

The Russian Federation has established a system for the safe use of space vehicles with NPS that meets international requirements.

In accordance with United Nations recommendations, a body of State and space-sector regulations to ensure the safe use of transport power modules with megawatt-class nuclear power propulsion systems is being drawn up.

The project to create a transport power module with such a system is being implemented in accordance with all technical safety measures recommended by the United Nations and prescribed by the relevant regulations of the Russian Federation.

While the transport power module is being developed, possible new issues relating to the safe use of NPS in space are being examined and identified for further investigation.

“United States preparedness and response activities for space exploration missions involving nuclear power sources”, by Reed Wilcox (United States of America) (A/AC.105/C.1/L.314 and A/AC.105/C.2/2011/CRP.4)

The United States of America conducts extensive preparedness and response activities for all missions involving the application of NPS. Consistent with the Safety Framework for Nuclear Power Source Applications in Outer Space, jointly published by the Scientific and Technical Subcommittee and the International Atomic Energy Agency in 2009, these plans encompass planning, training, rehearsals, procedures development (including communication protocols), and the drafting of potential accident notifications. Because accidents could occur at the launch site, downrange or out of orbit, the plans involve multiple government agencies at the federal, state and local levels and a broad range of resources that are either pre-deployed or readily accessible in the event of an accident. The plans support a rapid response to an accident potentially involving the release of radioactive material. They also facilitate the establishment of systems required for quickly identifying those accidents which do not involve a release of radioactive material — an important capability for avoiding the extended imposition of protective action measures.

“The United States approach to nuclear launch accident mitigation”, by Ryan Bechtel (United States of America) (A/AC.105/C.1/L.315 and A/AC.105/C.1/2012/CRP.3)

The United States of America subjects its planned launches of nuclear power source applications to an extensive radiological contingency planning process to characterize and mitigate any possible effects of a nuclear launch accident. This process is consistent with the relevant guidance recommended in the Safety Framework. For every launch involving nuclear material, the United States creates contingency plans to mitigate accident sequences that could lead to a radiological hazard. A network of remote sensors and monitoring teams are established around the launch area to determine whether a release from an accident has occurred and, if necessary, to characterize the nature of any release. Information from the sensors is collected and interpreted in the Radiological Control Center, which is staffed by national experts in radiological emergencies. These experts may recommend actions to limit the exposure of population groups in potentially affected areas. A joint information centre is established to promptly distribute consistent, accurate and current information to the appropriate Governments, international organizations and non-governmental entities, as well as the general public. Numerous exercises are conducted before every launch to practise this response and ensure that the United States is ready to react appropriately and promptly in the unlikely event of a launch accident involving nuclear material.

“Implementing the International Safety Framework for Space Nuclear Power Sources at the European Space Agency: options and open questions”, by Leopold Summerer (European Space Agency) (A/AC.105/C.1/2012/CRP.24)

The European Space Agency (ESA) subjects all its space missions to a rigorous, well-established safety programme that has an excellent track record. The energy provided by nuclear power sources has enabled past interplanetary science missions of ESA and might be needed to enable future science and exploration missions.

ESA has started the process of implementing the guidance provided by the Safety Framework. While preliminary analysis indicates that the implementation of much of the guidance appears to be straightforward, the implementation of some of the guidance requires a deeper analysis of the options available within the organizational setup of ESA. These include questions related to:

(a) The implementation of the prime responsibility of the organization conducting the space NPS mission, not to be confounded with the responsibilities of States, and its formal arrangements with all relevant participants of the mission;

(b) The division of responsibilities between ESA and its member States related to the guidance for Governments and relevant international intergovernmental organizations authorizing, approving or conducting space NPS missions;

(c) The organization of launch safety and emergency preparedness and response for different launch phases and accident scenarios.