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**Use of nuclear power sources in outer space**

# A trial set of safety recommendations to implement the guidance for governments section of the Safety Framework**

**Paper submitted by the United Kingdom of Great Britain and Northern Ireland**

## I. Introduction

1. The Safety Framework for Nuclear Power Source Applications in Outer Space (A/AC.105/934) ("the Safety Framework") was jointly published by the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space and the International Atomic Energy Agency (IAEA) in 2009. It provides high-level guidance in the form of a model safety framework, which can be used as "a foundation for the development of national and international intergovernmental safety frameworks while allowing for flexibility in adapting such frameworks to specific space nuclear power sources (NPS) applications and organizational structures". The Safety Framework is written at the level of general principles and is intentionally generic in order to be applicable to all types of nuclear power source developments and applications. It focuses on the policies, structures, capabilities and competencies necessary to ensure that any space NPS application is launched and used in a safe manner, rather than setting down any prescriptive recommendations or requirements. It is then up to each Member State and international intergovernmental organization to develop the more detailed safety frameworks, including both technical and programmatic elements, necessary for the interpretation of the Safety Framework at a level which is useful to policymakers,

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mission designers, managers, scientists and engineers. Without this more detailed elaboration of the Safety Framework, it is likely to be difficult for any Member State or international intergovernmental organization considering or initiating involvement in applications of NPS in outer space to demonstrate unequivocally that it complies fully with the voluntary guidance contained therein.

2. The two Member States with lengthy experience in the application of NPS in outer space, the United States of America and the Russian Federation, have been able to compare the Safety Framework with their well-established safety systems and reassure themselves that they are entirely consistent. In the conference room paper entitled "Safety in the Design and Development of United States Space NPS Applications" (A/AC.105/C.1/2011/CRP.6), it was concluded that "consistent with the entire scope of guidance in the United Nations/IAEA Safety Framework, the United States has effectively integrated safety into the design, development and operation of space radioisotope power system (RPS) applications by mandating nuclear safety review and approval processes that encompass all the phases, components and participants of a proposed/planned RPS application, and by supporting these processes with rigorous risk assessments and the 'lessons learned' from previous RPS applications". In conference room paper A/AC.105/C.1/2012/CRP.6,[1] the Russian Federation noted that work on the construction of the proposed transport energy module is being carried out in full compliance with the fundamental safety objective set out in the Safety Framework.

3. Those other Member States and international intergovernmental organizations considering or initiating involvement in applications of NPS in outer space face a major challenge to demonstrate unequivocally their compliance with the Safety Framework. In the absence of any generic recommendations to elaborate the high-level guidance in the Safety Framework it falls to each individual Member State to establish its own safety framework, suitably adapted from the Safety Framework to reflect its specific space NPS applications and organizational structures. This is particularly the case when the Member State is also a member of an international intergovernmental organization, for example, the United Kingdom of Great Britain and Northern Ireland within the European Space Agency (ESA). Within an international intergovernmental organization, it is essential that the roles, rights and responsibilities of each partner are clearly defined for each proposed NPS application in order to promote harmonization and transparent accountability. The Safety Framework recognized, as it states that "Implementation of such (national and international intergovernmental organization) frameworks not only would provide assurance to the global public that space NPS applications would be launched and used in a safe manner, but could also facilitate bilateral and multilateral cooperation on space missions using NPS". For this purpose, a trial set of safety recommendations concerning guidance for governments has been drafted for discussion within the United Kingdom and is attached as an annex to this paper.

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[1] Joint statement made by representatives of the Russian Federal Space Agency and the State Atomic Energy Corporation "Rosatom" at the seminar of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space on the Safety Framework for Nuclear Power Source Applications in Outer Space: current and planned applications, and challenges.

# II. Development of a trial set of general safety recommendations

4. In the Safety Framework, the fundamental safety objective is to protect people and the environment in Earth's biosphere from potential hazards associated with relevant launch, operation and end-of-service phases of space NPS applications.

5. Any detailed safety recommendations should be governed by this safety objective and the three "guidance" sections of the Safety Framework. In the annex to this paper, draft safety recommendations are proposed for the first "guidance" section of the Safety Framework, namely: guidance for governments (section 3). This section is seen as fundamental to the establishment of a proper regime for the design, construction and operation of space NPS in order to regulate nuclear activities in space (as recommended by China in document A/AC.105/C.1/L.319). It is also the section which, when finally agreed, is least likely to require regular updating in order to accommodate the relative infrequency of space NPS projects or changes in technology.

6. In developing this set of trial safety recommendations, close attention has been paid to information provided by the two Member States (the United States and the Russian Federation) with decades of experience in using space NPS applications. In conference room paper A/AC.105/C.1/2011/CRP.6, it was pointed out that the United States safety framework closely parallels the Safety Framework and United States federal law aligns with the three major categories of guidance contained in the Safety Framework. The guidance for governments section of the Safety Framework corresponds to:

(a) The National Environmental Policy Act;

(b) The White House launch nuclear safety approval process;

(c) The Code of Federal Regulations;

(d) The National Aeronautics and Space Administration (NASA) Procedural Requirements;

(e) The National Response Framework.

7. In conference room paper A/AC.105/C.1/2012/CRP.6, the Russian Federation explained that its experts are conducting their activities in accordance with national federal laws, including the Space Activities Act, the Act on the Use of Atomic Energy, the Act on Protection of the Public from Radiation, the Environmental Protection Act, the Environmental Assessment Act and regulations such as the Radiation Safety Standards and the Basic Public Health Regulations for Radiation Safety. All laws and regulations of the Russian Federation relating to the use of atomic energy are stated to be in full conformity with international instruments, including the Safety Framework.

8. In attempting to transfer this experience to the different governmental, cultural and legal/regulatory situation that exists in the United Kingdom and to generalize it into a set of safety recommendations, extensive reference has been made to the

IAEA General Safety Requirements Part 1 (GSR Part 1).[2] It must be emphasized, of course, that this is only the first step in a lengthy process which, if pursued, will involve detailed, extensive and undoubtedly lengthy discussions, both nationally and with other partners within ESA, before a final version of these safety recommendations can be achieved. However, it is considered useful to present these trial safety recommendations to the Subcommittee at this early stage both for information and to seek comments on the approach being adopted.

# III. Conclusion

9. A trial set of safety recommendations has been developed to implement the guidance for governments section of the Safety Framework. It takes particular note of the information and advice of the two Member States with decades of experience in the use of NPS applications in space as well as the general standard making experience of IAEA in its General Safety Requirements Part 1. This trial set of safety recommendations is intended specifically for the United Kingdom situation (as a member of the international intergovernmental organization, ESA) and is at a very preliminary stage of development. It is intended to assist in the development of the coherent and transparent systems necessary to ensure that NPS activities in the United Kingdom are carried out safely and in accordance with the Safety Framework.

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[2] International Atomic Energy Agency, *Governmental, Legal and Regulatory Framework for Safety*, IAEA safety standards series No. GSR Part 1 (STI/PUB/1465).

# Annex

## Possible general safety recommendations for nuclear power source applications in outer space

## Safety recommendations: guidance for governments

### A. Introduction

#### 1. Background

The presence of radioactive materials or nuclear fuels in space NPS and their consequent potential for harm to people and the environment in Earth's biosphere due to an accident require that safety must always be an inherent part of the design and application of space NPS.

Therefore, safety needs to be addressed in the context of the entire space NPS application, which includes the design, development, construction and testing of the space NPS and its incorporation into the spacecraft, launch system, mission design and flight rules. This means that mission planners should use the existing processes for ensuring the protection of hardware, personnel and the public against non-nuclear hazardous materials such as propellants as the starting point for addressing the additional requirements arising from the use of NPS.

This document establishes recommendations that support and amplify the safety objective and guidance provided in the Safety Framework for Nuclear Power Source Applications in Outer Space.

#### 2. Objective

The objective of this document is to establish recommendations in relation to the responsibilities of a government that authorizes, approves or conducts space NPS missions or is part of an international intergovernmental organization that does so. Governmental responsibilities include establishing safety policies, requirements and processes; ensuring compliance with those policies, requirements and processes; ensuring that there is acceptable justification for using a space NPS when weighed against other alternatives; establishing a formal mission launch authorization process; and preparing for, and responding to, emergencies. For multinational or multi-organizational missions, governing instruments should define clearly the allocation of responsibilities between the different parties.

#### 3. Scope

This document covers the essential aspects of the governmental and legal framework needed to ensure the effective control of safety during relevant launch, operation and end-of-service phases of space NPS applications. Other responsibilities and functions are also considered, such as ensuring efficient and effective compliance with:

(a) Existing standards that cover other aspects of space NPS applications, e.g., activities that occur during the terrestrial phase of space NPS applications, such as development, testing, manufacturing, handling and transportation;

(b) Non-nuclear safety aspects of space NPS applications that are addressed in relevant safety standards of governments and international intergovernmental organizations;

(c) Those support services necessary for providing emergency preparedness and response, nuclear security and the State system for accounting for, and control of, nuclear material.

## B. Recommendations

**Recommendation 1: Establishment of a policy and strategy for safety in the use of nuclear power source applications in outer space.**

*Any government that authorizes or approves space NPS missions should establish a national policy and strategy for safety to achieve the fundamental safety objective and to apply the fundamental safety principles established in the Safety Framework for Nuclear Power Source Applications in Outer Space.*

The policy and strategy for safety should express a long-term commitment to safety. The policy should be promulgated as a statement of the government's intent. The strategy should set out the mechanisms for implementing the policy. In the policy and strategy, account should be taken of the following:

(a) The fundamental safety objective and the fundamental safety principles established in the Safety Framework for Nuclear Power Source Applications in Outer Space;

(b) Relevant international legal instruments, such as conventions and other international instruments;

(c) The specification of the scope of the government's legal and assurance framework for safety;

(d) The need and provision for human and financial resources;

(e) The provision and framework for research and development;

(f) Adequate mechanisms for taking account of societal and economic developments;

(g) The promotion of leadership and management for safety, including safety culture.

**Recommendation 2: Establishment of a framework for safety in the use of nuclear power source applications in outer space.**

*Any government that authorizes or approves space NPS missions should establish and maintain an appropriate legal and assurance framework for safety, within which responsibilities are clearly allocated.*

The government should promulgate such legal instruments as are necessary to provide for an effective legal and assurance framework for safety in the use of NPS applications in outer space. This framework should set out the following:

(a) The safety principles for protecting people (individually and collectively) and the environment in the Earth's biosphere from the risks associated with the use of NPS in outer space;

(b) The types of facilities and activities that are included within the scope of the framework for safety;

(c) The type of authorization that is required for the operation of facilities and for the conduct of all activities associated with the preparation and launch of space missions with NPS applications, in accordance with a graded approach;

(d) The rationale for the authorization of new facilities and activities, as well as the applicable decision-making process;

(e) Provision for the involvement of interested parties and for their input to decision-making;

(f) Provision for assigning legal responsibility for safety to the persons or organizations responsible for the facilities and activities and for ensuring the continuity of responsibility where activities are carried out by several persons or organizations successively;

(g) The establishment of appropriate assurance mechanisms to provide an independent oversight of the safety achievement of the persons or organizations responsible for safety;

(h) Provision for the review, assessment and inspection, through the established assurance mechanisms, of facilities and activities, in accordance with a graded approach;

(i) Provision for preparedness for, and response to, a nuclear or radiological emergency involving a space NPS application and for the timely notification of other States that may be affected;

(j) Provision for an appropriate interface with nuclear security entities;

(k) Provision for an interface with the system of accounting for, and control of, nuclear material;

(l) Provision for acquiring and maintaining the necessary competency nationally for ensuring safety;

(m) Responsibilities and obligations with respect to the end-of-life phase of any space mission involving a NPS application;

(n) Provision for controls on the import and export of nuclear material and radioactive material, and for tracking authorized export of radioactive sources.

Where several authorities are involved, the government should specify clearly the responsibilities and functions of each authority within the governmental, legal and assurance framework for safety.

**Recommendation 3: Establishment of an appropriate safety assurance regime.**

*The government, through its legal system, should establish and maintain an appropriate safety assurance regime with the competence and resources necessary to fulfil its statutory obligations in relation to overseeing the safety of facilities and activities associated with the use of NPS in outer space.*

**Recommendation 4: Ensure independence of the safety assurance regime.**

*The government should ensure that its safety assurance regime is effectively independent in its safety-related decision-making and that it has functional separation from entities having responsibilities or interests that could unduly influence its decision-making.*

In this context, the term "safety assurance regime" means all the systems, procedures and resources applied by a government to provide an assessment and verification, independent of the designers and operators, of the safety of any NPS application.

The safety assurance regime cannot be entirely separate from other government bodies and entities with legitimate and recognized interests in the preparation and launch of space missions utilizing NPS applications. However, the government should ensure that the safety assurance regime has sufficient authority and resources to allow it to discharge its assigned responsibilities in a competent and timely manner without undue pressure or constraint.

The government should confer on the safety assurance regime the legal authority to require the persons or organizations responsible for the safety of NPS applications to make arrangements to provide all necessary safety-related information, including information from suppliers, and access for inspection to the premises of any designer, supplier, manufacturer, constructor, contractor or operating organization associated with the NPS application.

**Recommendation 5: Prime responsibility for safety in the use of nuclear power source applications in outer space.**

*The government should expressly assign the prime responsibility for safety in the use of nuclear power source applications in outer space to the person or organization "authorized" by it to operate any facility or activity involved in enabling such use.*

The legal framework for the safe use of space NPS applications should be established in such a way that the "authorized party" retains the prime responsibility for safety throughout the lifetime of a facility or the duration of an activity, and the "authorized party" should not be able to delegate this prime responsibility. Responsibility for safety may be transferred to a different "authorized party" in the chain of responsibility for the overall space NPS application provided that the transfer has been declared in advance and approved under formal arrangements mandated by the government.

**Recommendation 6: Coordination of different authorities with responsibilities within the safety assurance regime for the use of nuclear power source applications in outer space.**

*Where several authorities have responsibilities within the safety assurance regime for the use of nuclear power source applications in outer space, the government should make provisions for the effective coordination of their safety assurance functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on "authorized parties".*

Where several authorities have responsibilities for safety within the safety assurance regime, the responsibilities and functions of each authority should be clearly specified in the relevant legislation. The government should ensure that there is appropriate coordination of and liaison between the various authorities in areas such as:

(a) Safety of workers and the public;

(b) Protection of the environment;

(c) Emergency preparedness and response;

(d) Management of radioactive waste;

(e) Liability for nuclear damage (including relevant conventions);

(f) Nuclear security;

(g) Accounting for, and control of, nuclear material;

(h) Safety in the transport of nuclear and radioactive material;

(i) Controls on the import and export of nuclear and radioactive material.

**Recommendation 7: Provision for the safe management of the end-of-service phases of space missions with NPS applications.**

*Any government that authorizes or approves space missions with NPS applications should ensure that adequate provision is made for the safe management of the end-of-service phases of such missions.*

The safe management of the end-of-service phases of space missions with NPS applications should constitute an essential element of the governmental policy and strategy. The policy should reflect all relevant international conventions and agreements and include appropriate interim targets and end states. The government should enforce continuity of responsibility between successive authorized parties. The government should make provision for appropriate research and development programmes in relation to the end-of-service phases of space NPS missions.

**Recommendation 8: Competency for safety.**

*The government should make provision for building and maintaining the competency of all parties having responsibilities in relation to the safe use of NPS applications.*

As an essential element of the national policy and strategy for safety in the use of NPS applications in outer space, arrangements should be made to achieve and

maintain the competency of a sufficient number of suitably qualified and experienced staff.

The building of competency should be required for all parties with responsibilities for the safety of NPS facilities and activities, including authorized parties, the safety assurance regime and organizations providing services or expert advice on matters relating to safety.

The government should:

(a) Stipulate a necessary level of competency for persons with responsibilities in relation to the safety of NPS facilities and activities;

(b) Make adequate arrangements for the safety assurance regime to build and maintain its expertise in the disciplines necessary for the discharge of its responsibilities;

(c) Make adequate arrangements for increasing, maintaining and regularly verifying the technical competency of persons working for authorized parties.

**Recommendation 9: Interfaces of NPS safety with nuclear security and with the system of accounting for, and control of, nuclear material.**

*The government should ensure that adequate infrastructure arrangements are established for interfaces of NPS safety with arrangements for nuclear security and with the system of accounting for, and control of, nuclear material.*

Specific responsibilities within the statutory and legal frameworks of a government should include:

(a) Assessment of the configuration of space NPS facilities and activities for the optimization of safety, with factors relating to nuclear security and to the system of accounting for, and control of, nuclear material being taken into account;

(b) Oversight and enforcement to maintain arrangements for NPS safety, nuclear security and the system of accounting for, and control of, nuclear material;

(c) Integration of emergency response arrangements for safety-related and nuclear security-related incidents for relevant space NPS facilities and activities.

Safety measures and nuclear security measures should be designed and implemented in an integrated manner to avoid either one compromising the other.

**Recommendation 10: International obligations and arrangements for international cooperation.**

*The government should fulfil its respective international obligations, participate in the relevant international arrangements and promote international cooperation to enhance safety in the use of space NPS globally.*

Governments that authorize or approve space NPS missions should actively seek to promote a global safety regime for such activities through such things as:

(a) International treaties and conventions that establish common obligations and mechanisms for ensuring the safety of NPS missions;

(b) The Safety Framework for Nuclear Power Source Applications in Outer Space and any recommendations and other guidance developed to support and expand it;

(c) Multilateral and bilateral cooperation that enhances safety by means of harmonized approaches as well as increasing the quality and effectiveness of safety reviews.

**Recommendation 11: Sharing of operational experience.**

*The government should make arrangements for analysis to be carried out to identify lessons to be learned from operational experience with space NPS applications, including experience in other States, and for the dissemination of the lessons learned and for their use by authorized parties, the safety assurance regime and other relevant authorities.*

The government should establish and maintain a means for receiving information from other States and from authorized parties in relation to their experiences with space NPS applications, as well as a means for making available to others the lessons it has learned from its own operating experiences. Through its safety assurance regime, the government should require appropriate corrective actions to be carried out to prevent the recurrence of safety significant events.

**Recommendation 12: Establish a policy and strategy for justifying the use of space NPS applications.**

*Any government that authorizes or approves space NPS missions should establish a national policy and strategy for justifying the use of space NPS applications on such missions.*

The policy and strategy for justifying the use of space NPS applications should express a commitment to explore all the viable alternative options that may be available. The policy should be promulgated as a statement of the government's intent. The strategy should set out the mechanisms for implementing the policy. In the policy and strategy, account should be taken of the following:

(a) The fundamental safety objective and the fundamental safety principles established in the Safety Framework for Nuclear Power Source Applications in Outer Space;

(b) Relevant international legal instruments, such as conventions and other international instruments;

(c) The specification of the scope of the governmental and legal framework for justification;

(d) The specification of the process and procedures to be used to consider the justification for using space NPS applications in specific missions and who has the responsibility for making justification decisions;

(e) The time frame for reaching decisions on the justification for using space NPS applications in specific missions;

(f) The scope of the information required in order for a justification decision to be made and who is responsible for providing it;

(g) The provision and framework for obtaining additional information or carrying out additional research to underpin a justification decision;

(h) Adequate mechanisms for taking account of social and economic developments.

**Recommendation 13: Establishment of a framework for justification.**

*Any government that authorizes or approves space NPS missions should establish and maintain an appropriate governmental, legal and assurance framework for justification within which responsibilities are clearly allocated.*

The government should promulgate laws and statutes to make provision for an effective governmental, legal and assurance framework for justification. This framework for justification should set out the following:

(a) The basic principles that are to be applied when considering and deciding on the justification for using space NPS applications compared with possible alternatives;

(b) The type of justification that is required for using space NPS applications in different types of space missions;

(c) The rationale for justifying the use of space NPS applications in different situations;

(d) Provision for the involvement of interested parties and for their input to decision-making;

(e) Provision for assigning legal responsibility to the appropriate organizations or persons responsible for any space NPS mission to provide sufficient information to allow the justification decision to be made;

(f) Provision for review of any justification decision if substantial new evidence is acquired about the efficacy or consequences (to people or the environment in the Earth's biosphere) of using any particular NPS application on any specific mission.

Where several authorities are involved, the government should specify clearly the responsibilities and functions of each authority within the governmental, legal and assurance framework for justification.

**Recommendation 14: Establishment of a policy and strategy for authorization.**

*Any government that authorizes the launch of space NPS missions should establish a national policy and strategy for authorization.*

The policy and strategy for authorization should express a long-term commitment to safety. The policy should be promulgated as a statement of the government's intent. The strategy should set out the mechanisms for implementing the policy. In the policy and strategy, account should be taken of the following:

(a) The fundamental safety objective and the fundamental safety principles established in the Safety Framework for Nuclear Power Source Applications in Outer Space;

(b) Relevant international legal instruments, such as conventions and other international instruments;

(c) The specification of the scope of the governmental and legal framework for authorization;

(d) The specification of the process and procedures to be used to determine whether to authorize the launch of missions using space NPS applications and who makes the final decision on authorization;

(e) The time frame for reaching decisions on the authorization of missions using space NPS applications;

(f) The scope of the information required in order for an authorization decision to be made and who is responsible for providing it;

(g) The provision and framework for obtaining additional information or carrying out additional research to underpin an authorization decision;

(h) Adequate mechanisms for taking account of the authorization processes covering non-nuclear and terrestrial aspects of launch safety;

(i) Adequate mechanisms for taking account of social and economic developments.

**Recommendation 15: Establishment of a framework for authorization.**

*Any government that authorizes the launch operations for space NPS missions should establish and maintain an appropriate governmental, legal and assurance framework for mission launch authorization within which responsibilities are clearly allocated.*

The government should promulgate laws and statutes to make provision for an effective governmental, legal and assurance framework for mission launch authorization of space nuclear power source applications. This framework should set out the following:

(a) The safety principles for protecting people (individually and collectively) and the environment in the Earth's biosphere from the risks associated with the launch of an NPS application on a space mission;

(b) The type of authorization that is required for the launch of space missions with NPS applications, in accordance with a graded approach;

(c) The rationale for the authorization of space missions incorporating NPS applications, as well as the applicable decision-making process;

(d) Provision for appropriate interfaces with the authorization processes covering non-nuclear and terrestrial aspects of launch safety;

(e) Provision for the involvement of interested parties and for their input to decision-making;

(f) Provision for assigning legal responsibility to the appropriate organizations or persons responsible for any space NPS mission to provide sufficient information to allow the authorization decision to be made;

(g) The establishment of an appropriate safety assurance mechanism to provide an independent evaluation of the adequacy and validity of the safety case presented by the management organization conducting the mission as the basis for its authorization request.

Where several authorities are involved, the government should specify clearly the responsibilities and functions of each authority within the governmental, legal and assurance framework for authorization.

**Recommendation 16: Establishment of a policy and strategy for emergency preparedness and response.**

*Any government that authorizes or approves space NPS missions should establish a national policy and strategy for emergency preparedness and response to achieve the fundamental safety objective and to apply the fundamental safety principles established in the Safety Framework for Nuclear Power Source Applications in Outer Space.*

The policy and strategy for emergency preparedness and response should express a long-term commitment to ensuring the safety of people and protecting the environment. The policy should be promulgated as a statement of the government's intent. The strategy should set out the mechanisms for implementing the policy. In the policy and strategy, account should be taken of the following:

(a) The fundamental safety objective and the fundamental safety principles established in the Safety Framework for Nuclear Power Source Applications in Outer Space;

(b) Relevant international legal instruments, such as conventions and other international instruments;

(c) The specification of the scope of the governmental, legal and assurance framework for emergency preparedness and response;

(d) The assignment of responsibilities, within the overall framework, for preparing emergency response plans and for making arrangements for emergency preparedness and response;

(e) The need and provision for human and financial resources;

(f) The provision and framework for research and development;

(g) Adequate mechanisms for taking account of social and economic developments.

**Recommendation 17: Establishment of a framework for emergency preparedness and response**.

*The government should establish and maintain an appropriate governmental, legal and assurance framework for emergency preparedness and response within which responsibilities are clearly allocated.*

The government should promulgate such legal instruments as are necessary to make provision for an effective governmental, legal and assurance framework for emergency preparedness and response. This framework should set out the following:

(a) The safety principles for protecting people (individually and collectively) and the environment in the Earth's biosphere from the risks associated with potential accidents resulting from space missions incorporating NPS applications;

(b) The system, including emergency response arrangements, for protecting people (individually and collectively) and the environment in the Earth's biosphere

from a nuclear or radiological emergency declared as a consequence of an accident involving a space NPS application within or outside the territories and jurisdiction of the State;

(c) The types of facilities and activities that are to be included within the scope of the framework for emergency preparedness and response;

(d) Provision for assigning legal responsibility to the persons or organizations responsible for the space NPS mission for preparing an emergency response plan and for making arrangements for emergency preparedness and response;

(e) Provision for assigning legal responsibility to the persons or organizations responsible for the space NPS mission for the immediate notification of an emergency to the competent authorities;

(f) Designation of competent authorities that will have the responsibility and resources necessary to make preparations and arrangements for dealing with the consequences of an emergency involving a space NPS application, both during the emergency and in its aftermath;

(g) Provision for specifying and assigning clear responsibilities for decision-making in an emergency and for ensuring effective liaison between all authorized parties and the competent authorities;

(h) Provision for an effective means of communication with affected parties, particularly the general public, during the course of an emergency involving a space NPS application;

(i) Provision for the review, assessment and inspection, through the established assurance mechanisms, of the emergency response plans of organizations responsible for space NPS missions and of their state of preparedness for such emergencies;

(j) Provision for acquiring and maintaining the necessary competence nationally for ensuring an appropriate, continuing level of emergency preparedness and response.