

A trial set of Safety Recommendations to  
implement the *Guidance for Governments*  
section of the Safety Framework

Sam Harbison, Consultant to UK Space Agency

# Objective

- ◆ To establish recommendations in relation to the responsibilities of a Government that authorises, approves or conducts space NPS missions.
- ◆ Governmental responsibilities include:
  - Establishing safety policies, requirements and processes;
  - Ensuring compliance with such policies, requirements and processes;
  - Ensuring that the use of each space NPS is justified;
  - Establishing a formal mission launch authorization process;
  - Preparing for, and responding to, emergencies.

# Scope

- ◆ All essential aspects of the governmental and legal framework needed to ensure effective control of safety during relevant launch, operation and end-of-service phases of space NPS applications.
- ◆ Need to ensure efficient and effective compliance with:
  - Existing standards that cover other aspects of space NPS applications;
  - Non-nuclear safety aspects of space NPS applications;
  - Those support services necessary for providing emergency preparedness and response, nuclear security and nuclear material accountancy.

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

- ◆ Any government that authorises or approves space NPS missions should establish a 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

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

- ◆ The government that authorises or approves space NPS missions should establish and maintain an appropriate legal and assurance framework for safety, within which responsibilities are clearly allocated

## **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. An IIO should ensure that its safety assurance regime is harmonized with those of the governments that constitute the organization

## 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

## **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” to operate any facility or activity involved in enabling such use



## **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”

## **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

## 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

## **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

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

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

## 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

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

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

## 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



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

- ◆ Any government that authorizes the launch of space NPS missions should establish a policy and strategy for authorization

## **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

## **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 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

## **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

# Conclusions

- ◆ A trial set of *Safety Recommendations* has been developed to implement the *Guidance for Governments* section of the Safety Framework for Nuclear Power Source Applications in Outer Space
- ◆ These *Recommendations* take note of information and advice provided by the USA and Russian Federation, and the IAEA document GSR Part 1
- ◆ These *Recommendations* are intended to apply specifically to the UK, as a member of ESA, and are at a very preliminary stage of development
- ◆ These *Recommendations* should assist in the development of the coherent and transparent systems necessary to ensure that NPS activities in the UK are carried out safely and in accordance with the *Safety Framework*