



PRESIDENTIAL MEMORANDA

Presidential Memorandum on Launch of Spacecraft Containing Space Nuclear Systems

INFRASTRUCTURE & TECHNOLOGY

Issued on: August 20, 2019



MEMORANDUM FOR THE SECRETARY OF STATE
THE SECRETARY OF DEFENSE
THE SECRETARY OF TRANSPORTATION
THE SECRETARY OF ENERGY
THE ADMINISTRATOR OF THE ENVIRONMENTAL
PROTECTION AGENCY
THE ADMINISTRATOR OF THE NATIONAL
AERONAUTICS AND SPACE ADMINISTRATION
THE CHAIRMAN OF THE NUCLEAR REGULATORY
COMMISSION
THE ASSISTANT TO THE PRESIDENT FOR NATIONAL
SECURITY AFFAIRS
THE ASSISTANT TO THE PRESIDENT FOR SCIENCE AND
TECHNOLOGY AND DIRECTOR OF THE OFFICE OF
SCIENCE AND TECHNOLOGY POLICY

SUBJECT: Launch of Spacecraft Containing Space Nuclear
Systems

By the authority vested in me as President by the Constitution and the laws of the United States of America, I hereby direct the following:

Section 1. Purpose. This memorandum updates the process for launches of spacecraft containing space nuclear systems. Space nuclear systems include radioisotope power systems (RPSs), such as radioisotope thermoelectric generators (RTGs) and radioisotope heater units (RHUs), and fission reactors used for power and propulsion.

The ability to use space nuclear systems safely and sustainably is vital to maintaining and advancing United States dominance and strategic leadership in space. For United States launches of space nuclear systems, the Federal Government must ensure a rigorous, risk informed safety analysis and launch authorization process. This memorandum establishes processes for Federal Government launches and launches for which the Department of Transportation (DOT) has statutory authority to license as commercial space launch activities (commercial launches). These processes include transparent safety guidelines and are forward-looking and amenable to effective use of space nuclear systems for heating, power, and propulsion.

Sec. 2. Policy. The United States shall develop and use space nuclear systems when such systems safely enable or enhance space exploration or operational capabilities. The Secretary of Energy shall maintain, on a full cost recovery basis, the capability and infrastructure to develop, furnish, and conduct safety analyses for space nuclear systems for use in United States Government space systems. Executive departments and agencies (agencies) shall seek to ensure that safe application of space nuclear systems is a viable option for Federal Government and commercial space activities.

Sec. 3. Safety Guidelines. (a) All United States Government entities involved in the launch of spacecraft containing space nuclear systems (including in the licensing of non-Government launches) shall seek to ensure safe operation. For any mission that includes a space nuclear system, mission planners and launch authorization authorities should, as appropriate, seek to ensure that:

(i) normal operation of the space nuclear system is consistent with applicable Federal, State, and local requirements;

(ii) an accident resulting in exposure in excess of 25 millirem but less than 5 rem total effective dose (TED), as that term is defined in section 835.2 of title 10, Code of Federal Regulations, to any member of the public is unlikely, such that the probability of such an event does not exceed 1 in 100;

(iii) an accident resulting in exposure in the range of 5 rem to 25 rem TED to any member of the public is extremely unlikely, such that the probability of such an event does not exceed 1 in 10,000; and

(iv) the probability of an accident resulting in exposure in excess of 25 rem TED to any member of the public does not exceed 1 in 100,000.

(b) Additional safety guidelines may be appropriate for the non-terrestrial operation of nuclear fission systems. Within 1 year of the date of this memorandum, the Administrator of the National Aeronautics and Space Administration (NASA), in coordination with the Secretary of Defense and the Secretary of Energy, shall submit to the Director of the Office of Science and Technology Policy (OSTP) and the Assistant to the President for National Security Affairs (APNSA) a report identifying guidelines for safe non-terrestrial operation of nuclear fission reactors, including orbital and planetary surface activities.

Sec. 4. Launch Authorization Processes. Authorization for launches of spacecraft containing space nuclear systems shall follow a three-tiered process based upon the characteristics of the system, the level of potential hazard, and national security considerations. "Federal Government missions," as the term is used in this section and section 5 of this memorandum, are non-commercial missions either conducted or sponsored by an agency. Consistent with chapter 509 of title 51, United States Code, the Secretary of Transportation, or the Secretary's designee, is the licensing authority for commercial launches of spacecraft containing space nuclear systems in all three tiers.

Issuance of a launch authorization or license as described in this memorandum shall not relieve the mission sponsor or licensee of its obligations with respect to other applicable laws, regulations, policies, or agreements that may apply to its activities.

(a) Tier I shall apply to launches of spacecraft containing radioactive sources of total quantities up to and including 100,000 times the A2 value listed in Table 2 of the International Atomic Energy Agency's Specific Safety Requirements No. SSR-6 (Rev. 1), Regulations for the Safe Transport of Radioactive Material, 2018 Edition. For Federal Government missions in Tier I, the head of the sponsoring agency shall be the launch authorization authority.

(b) Tier II shall apply to:

(i) launches of spacecraft containing radioactive sources in excess of 100,000 times the A2 value referenced above;

(ii) any Tier I launches where the associated safety analyses determine that the probability of an accident during launch or subsequent operation resulting in an exposure in the range of 5 rem to 25 rem TED to any member of the public is equal to or greater than 1 in 1,000,000; and

(iii) any launches of spacecraft containing nuclear fission systems and other devices with a potential for criticality (defined as the condition in which a nuclear fission chain reaction becomes self-sustaining), when such systems utilize low-enriched uranium (less than 20 percent uranium-235 enrichment). For Federal Government missions in Tier II, the head of the sponsoring agency shall be the launch authorization authority. Tier II missions require additional safety review, as detailed in section 5 of this memorandum, and the launch authorization authority shall consider the resulting analysis and review results when making a launch authorization determination.

(c) Tier III shall apply to launches of any spacecraft containing a space nuclear system for which the associated safety analyses determine that the probability of an accident

during launch or subsequent operation resulting in an exposure in excess of 25 rem TED to any member of the public is equal to or greater than 1 in 1,000,000.

Due to potential national security considerations associated with nuclear nonproliferation, Tier III shall also apply to launches of spacecraft containing nuclear fission systems and other devices with a potential for criticality when such systems utilize any nuclear fuel other than low-enriched uranium.

The President's authorization shall be required for Federal Government launches in Tier III. When the sponsoring agency is the Department of Defense or an element of the Intelligence Community, the head of the sponsoring agency shall request the President's authorization for the launch through the APNSA. In all other proposed Tier III Federal Government launches, the head of the sponsoring agency shall request the President's authorization for the launch through the Director of OSTP. The Director of OSTP may authorize such launches, unless the Director of OSTP considers it advisable to forward the matter to the President for a decision.

Sec. 5. Safety Analysis and Review. Nuclear safety analysis and review is a critical step before any launch of a space nuclear system. Safety analysis should include an assessment of potential consequences to a maximally exposed individual member of the public in accident scenarios. Safety analysis should address launch and any subsequent stages when accidents may result in radiological effects on the public or the environment, for instance, in an unplanned reentry from Earth orbit or during an Earth flyby. To the extent possible, safety analyses and reviews should incorporate previous mission and review experience.

(a) For Federal Government missions in all tiers, the head of the sponsoring agency shall be responsible for ensuring compliance with requirements under the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 et seq. As the licensing authority for commercial space launches, the Secretary of Transportation is responsible for ensuring compliance with NEPA for commercial launches.

(b) For Federal Government missions in all tiers, the head of the sponsoring agency shall ensure that a mission Safety Analysis Report (SAR) be prepared. For commercial launches of spacecraft containing space nuclear systems in all tiers, the Secretary of Transportation shall, if necessary, issue a notice of proposed rulemaking to require that a mission SAR is prepared to inform a launch determination, and to require review of the mission SAR in consultation with other agencies as appropriate. The mission SAR shall demonstrate that safety analysis incorporates technical peer review, and shall include a concise, high-level summary of key risk information. This summary should include: the likelihood of an accident resulting in an exposure in excess of 5 rem TED to any member of the public; the number of individuals who might receive such exposure in an accident scenario; and comparisons of potential exposure levels to other meaningful measures such as nuclear space launch safety guidelines, background radiation, average public exposure from natural and manmade sources, and other relevant public safety standards. When appropriate, a mission SAR may incorporate a system-specific SAR that establishes a safety basis for the space nuclear system. The safety basis provides a set of conditions (a safety basis envelope) under which safety analysis and hazard controls provide assurance of safe operation for the given system. In such cases, the mission SAR must either:

(i) demonstrate that the mission is within the safety basis envelope established in the system-specific SAR, in which case it is not necessary to repeat the analysis supporting the system-specific SAR; or

(ii) include supplemental safety analysis for any deviations that are outside of the established safety basis envelope and for which safety has therefore not yet been demonstrated.

Agencies responsible for system-specific SARs should review them annually and update them as necessary.

(c) Within 180 days of the date of this memorandum, the NASA Administrator shall establish an Interagency Nuclear Safety Review Board (INSRB). The INSRB shall consist

of representatives from the Departments of State, Defense, Energy, and Transportation, the Environmental Protection Agency, NASA, and, as appropriate, the Nuclear Regulatory Commission. Each of these agencies shall designate technically qualified personnel to the INSRB. For Federal Government launches in Tier II and Tier III, the head of the sponsoring agency shall request of the NASA Administrator that the INSRB review the nuclear safety analysis, ultimately including the mission SAR, and report its findings, in the form of a Safety Evaluation Report, to the head of the sponsoring agency in order to inform the decision to proceed with launch and, for Tier III missions, inform any decision to request Presidential launch authorization. When necessary to protect national security, the head of the sponsoring agency, in consultation with the APNSA, may restrict INSRB member participation in any mission review. The INSRB shall evaluate the quality of the safety analysis and identify any significant gaps in analysis. The INSRB may recommend areas for additional analysis where it identifies gaps, but it is not tasked with repeating or conducting its own analysis. The INSRB shall engage early in the safety analysis process, after the conceptual design of the mission is generated, in order to identify gaps in time for mission planners to address them without creating unnecessary delays in the launch timeline. Before completion of the mission SAR, the INSRB shall advise the head of the sponsoring agency of any omissions or gaps that the INSRB has identified in analysis that is planned or underway, and may provide recommendations for corrective action. In licensing non-Federal Government launches in Tier II and Tier III, the Secretary of Transportation shall consult with the heads of any other agencies that the Secretary of Transportation deems appropriate to review the SAR in a similar manner, evaluate the quality of the safety analysis, and identify any significant gaps. At the request of the Secretary of Transportation, the INSRB shall review any nuclear safety analysis associated with a potential commercial launch of a space nuclear system under review by the Secretary of Transportation. The terms of any INSRB review, including the costs of such review, shall be agreed upon between the NASA Administrator and the head of the agency requesting INSRB review.

(d) Within 1 year of the date of this memorandum, the Secretary of Transportation shall issue public guidance for applicants seeking a license for a launch or reentry involving a space nuclear system. This guidance shall describe the process used to evaluate any

such license application, including relevant safety standards, as appropriate and consistent with applicable law.

Sec. 6. Reporting Requirements. (a) On an annual basis, the recipients of this memorandum shall provide a report to the Director of OSTP listing all launches that the agency has sponsored or licensed in the past calendar year of spacecraft using radioactive sources containing total quantities in the range of 1,000 times to 100,000 times the A2 value listed in Table 2 of the International Atomic Energy Agency's Specific Safety Requirements No. SSR-6 (Rev. 1), Regulations for the Safe Transport of Radioactive Material, 2018 Edition, and listing all such launches planned for the coming calendar year.

(b) Any agency planning Tier II or Tier III launches shall provide an annual briefing to OSTP and the National Science and Technology Council on the status of safety analysis for any such planned missions. The Secretary of Transportation shall provide a similar briefing within 120 days of accepting an application for a license pertaining to a commercial mission that will involve the launch or reentry involving a space nuclear system.

Sec. 7. Effect on Prior Memoranda. This memorandum supersedes the section of the June 28, 2010, National Space Policy titled "Space Nuclear Power" and its corresponding section in Presidential Policy Directive-4. The following paragraph replaces the ninth numbered paragraph of National Security Council Presidential Directive-25 (NSC/PD-25) of December 14, 1977 (as modified May 17, 1995, and May 8, 1996):

"9. Launching nuclear systems requires a separate procedure established in National Security Presidential Memorandum-20 of August 20, 2019 (Launch of Spacecraft Containing Space Nuclear Systems)."

Sec. 8. General Provisions. (a) Nothing in this memorandum shall be construed to impair or otherwise affect:

(i) the authority granted by law to an executive department or agency, or the head thereof; or

(ii) the functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(b) This memorandum shall be implemented consistent with applicable law and subject to the availability of appropriations.

(c) This memorandum is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

DONALD J. TRUMP