Memorandum of Understanding
between
the National Aeronautics and Space Administration
and the Department of Energy
Concerning Radioisotope Power Systems

I. Authority and Parties

The National Aeronautics and Space Administration, (hereinafter referred to as "NASA") enters into this Memorandum of Understanding (hereinafter referred to as "MOU") in accordance with the National Aeronautics and Space Act, 51 U.S.C. § 20101, *et seq*. The Department of Energy (hereinafter referred to as "DOE") enters into this MOU in accordance with the Atomic Energy Act of 1954 as amended, 42 U.S.C. 2011, *et seq*., and the Department of Energy Organization Act, 42 U.S.C. § 7101, *et seq*. NASA and DOE may be individually referred to as a "Party" and are collectively referred to as the "Parties."

This MOU contains the general provisions for collaboration between NASA and DOE for the development and flight of Radioisotope Power Systems (RPS) to be used by NASA and for such other power units as may be mutually agreed to in writing in the future for inclusion under the provisions of this MOU. Implementing Interagency Agreements (IAAs), supplemental to this MOU, will address the deliverables, project-level responsibilities, levels of support, funding, and other project-specific items in accordance with this MOU and will be executed between DOE at the Assistant Secretary level and NASA at the appropriate level.

II. Purpose

NASA and DOE have successfully worked together for over 50 years in space science applications, exploration, and technology development. NASA relies on DOE to ensure the availability of nuclear power sources when needed for NASA's planetary missions. NASA and DOE are committed to advancing their relationship by leveraging the strengths of both agencies in the area of RPS.

The purpose of this MOU is to delineate the authorities and responsibilities, and document the understandings, of NASA and DOE related to the research, development, design, production, delivery, space vehicle integration, and launch of RPS, including radioisotope heater units (RHUs), and to establish a basis for future agreements pursuant to which NASA and DOE may perform certain functions and provide funds for certain portions of the undertakings covered hereby. As used in this document, "space vehicle" shall mean the launch vehicle and the spacecraft. As used in this MOU, the term "nuclear incident" shall have the meaning ascribed to it in the Atomic Energy Act of 1954, as amended (42 U.S.C. §2014.q).

III. General

DOE and NASA recognize that RPS offer performance advantages over other space-power concepts when applied to certain space missions. They recognize that the use of RPS will require their collaborative efforts to ensure effective system development and space vehicle integration as well as to ensure that the statutory responsibilities of each agency are properly fulfilled. The Parties agree that NASA and DOE will coordinate responsibilities for successful implementation of RPS power for planetary exploration missions, with DOE responsible, in accordance with its authorities, responsibilities, and processes, for nuclear materials and nuclear activities, including protection of human health and safety, security, safe handling, and safe utilization of nuclear materials. DOE will retain title to the RPS at all times. DOE will control all work done by DOE and its contractors. NASA will furnish to DOE its requirements as to specifications, scheduling, interface, and management controls (e.g., earned value, project reporting) to support NASA's space mission needs; and DOE will be responsible for the RPS design, development, and production to meet NASA requirements, for activities undertaken for specific IAAs. DOE will have the necessary means to enable it to fulfill its responsibility with respect to the radiological health and safety and to safeguards and security aspects of the RPS program.

Integrated government teams may be established to implement activities of specific IAAs in a manner that takes advantage of the strengths of the Parties and their contractors, allows each Party to manage its responsibilities in accordance with its own authorities and processes, and is consistent with applicable laws and requirements, including DOE's authority and responsibilities concerning nuclear material and nuclear activities. Such teams will be structured to ensure accountability to NASA for projects and activities executed under this MOU.

The Parties will jointly evaluate the readiness of technologies for inclusion in an RPS development effort so that project risk is mutually understood and accepted prior to execution. Acquisition approaches, in compliance with applicable statutes, should be coordinated as appropriate to promote successful development, reduce life cycle costs, and to ensure procurement integrity. DOE and NASA will continually explore opportunities to achieve cost savings in the execution of activities covered by this MOU in a manner that preserves mission effectiveness and responsibilities for radiological health and safety.

Those facilities and services normally furnished by the Department of Defense (DoD) as range operators or by agreement with NASA will be considered to be furnished by NASA insofar as this MOU is concerned.

IV. Agency Responsibilities

A. NASA will be responsible for:

1. Developing the overall strategy, and providing funding for the activities undertaken in the execution of this MOU to support NASA's space mission needs;

2. Establishing with DOE integrated government teams to implement the activities in this MOU that meets the requirements for both NASA and DOE, in a manner that allows each Party to manage its responsibilities in accordance with its own authorities and processes, and is consistent with applicable laws and requirements, including DOE's authority and responsibilities concerning nuclear material and nuclear activities;

3. In collaboration with DOE, coordinating project responsibilities between NASA and DOE in accord with each Party's authorities, capabilities, responsibilities and processes, and identifying areas of coordinated project responsibility between NASA and DOE. These responsibilities will be documented in the IAA for each project;

4. Providing DOE with necessary details, including technical specifications, and continuing technical support to satisfy the mission and the interface requirements, trajectory information, mission operational and termination procedures, the configuration of the integrated RPS as governed by the requirements of the mission, the electrical and thermal operating characteristics, the reliability required by the mission, and such other technical requirements as may pertain to the successful execution of the mission;

5. Providing DOE with the necessary technical data and continuing technical support to conduct the required safety tests and analyses associated with satisfying the requirements of the environmental and safety analyses and the nuclear launch safety approval process;

6. Accepting custody of the fueled RPS when turned over to NASA by DOE or a DOE contractor and retaining custody, for the purpose of carrying out the requirements of this MOU, at all times except when transferring custody to DOE or a DOE-designated recipient;

7. Complying with the radiological occupational and public health and safety procedures and criteria specified or otherwise approved by DOE for the fueled RPS;

8. Providing adequate facilities, in conjunction with prelaunch and launch operations, which meet criteria mutually acceptable to DOE and NASA for storage, assembly, checkout, servicing, and/or repair of the RPS while in NASA custody, including safeguards and security protection;

9. Providing tracking, command, and data acquisition and reduction facilities and services including those required to monitor the RPS;

10. Advising the Department of State, in cooperation with DOE, of the proposed launch of the space vehicle with the RPS aboard;

11. Coordinating, in cooperation with DOE, with the Office of Science and Technology Policy on the proposed use of a particular RPS;

12. Taking such cooperative action with DOE concerning the RPS with respect to international, national, State, or other government bodies as may be necessary or advisable;

13. Preparing with DOE joint public information plans for applications involving RPS;

14. Installing and testing of the RPS in the space vehicle or other mission applications and conducting prelaunch testing in accordance with specifications or instructions agreed to by DOE and NASA;

15. Making overall operational command decisions relating to a launch involving RPS aboard and launching the space vehicle consistent with radiological health and safety procedures and criteria specified or otherwise agreed to by DOE and NASA provided, however, that in any event, the DOE instructions or directions respecting radiological health and safety, safeguards, security, and handling of the RPS will be complied with;

16. Providing DOE with available data or information concerning operation, performance, and location of the RPS in space;

17. Conducting recovery, monitoring, and security operations in the event of ground or mission accident or mission abort and providing personnel and equipment in support of the DOE for recovery of the RPS and associated decontamination and disposal operations, as necessary; and

18. Jointly investigating and reporting (with DOE) nuclear incidents.

B. DOE will be responsible for:

1. Designing, developing, fabricating, evaluating, testing, and delivering the RPS, as agreed to by NASA and DOE, to meet the overall system requirements, specifications, schedules, and interface requirements. DOE will also provide thermal and mechanical models (including software and hardware) for space vehicle integration and test purposes, ground support and test equipment, prelaunch operations support, and documentation as agreed to by NASA and DOE;

2. Retaining custody of the fueled RPS at all times, except when the devices are in NASA's custody pursuant to A.6 above;

3. Providing (with the assistance of NASA and any other appropriate agencies) a documented analysis of potential accidents and their associated risks (e.g. Safety Analysis Report);

4. Specifying, in consultation with NASA, the minimum radiological, occupational/public health, safety procedures/criteria, and providing guidance with respect to safeguards and security requirements related to NASA facilities and services associated with the fueled RPS;

5. Providing such information concerning the RPS as may be required for use in: (1) NASA operational plans and other documents required as part of the mission definition, environmental analysis, and launch approval process; (2) advising the Department of State and the Office of Science and Technology Policy, National Space Council, and United Nations (as appropriate); and (3) operational planning and safety analysis concerning DoD controlled range facilities, including radiological safety in the event of a launch accident;

6. Cooperating with NASA concerning the RPS with respect to international, national, State, or other governmental bodies as may be necessary or advisable;

7. Preparing, with NASA, joint public information plans for applications involving RPS;

8. Providing technical observation, advice, and assistance to NASA during various operations involving the RPS including, but not limited to: (1) prelaunch storage, monitoring, handling, transportation, and preparations for launch; (2) installation on the space vehicle; (3) prelaunch acceptance testing aboard the space vehicle; and (4) launch and mission operations;

9. Affirming to NASA the operational use and flight readiness of the RPS with respect to nuclear safety, and participating in the nuclear launch safety approval process;

10. Advising NASA (in the event of a ground or mission accident or flight termination) of DOE's determination of whether a nuclear incident has occurred and determining the extent of any off-site radiological releases. In the event of a nuclear incident, providing technical guidance to NASA and, if applicable, DoD range forces and others, as may be required, for the recovery of the RPS and necessary decontamination and disposal operations;

11. Assuming, as between DOE and NASA and to the extent consistent with applicable law, legal responsibility for damages to life and property resulting from a nuclear incident in accordance with Article V, "Nuclear Hazards Indemnity" of this MOU; and

12. Jointly investigating and reporting (with NASA) nuclear incidents.

V. Nuclear Hazards Indemnity

DOE hereby indemnifies NASA for liability for nuclear incidents under Section 170d. of the Atomic Energy Act of 1954, 42 U.S.C. §2210(d), as amended, including the amendments made thereto by the Price-Anderson Amendments Act of 2005, Public Law 109-58 (the Act). The provisions of the clause set forth in 48 C. F. R. 952.250-70, Nuclear Hazards Indemnity, shall apply to this MOU provided, however, that in the event of inconsistency between the provisions of the clause and those of the Act, the latter shall prevail. For purposes of this Article and the clause set forth in 48 C.F.R. 952.250-70, the term "contract location" means the property and facilities owned and/or operated by NASA and the Jet Propulsion Laboratory whereon radioisotope power systems are present. NASA agrees to modify this Article to include herein any Nuclear Hazards Indemnity clause promulgated by DOE to implement the Act.

VI. Additional Provisions

A. Funding for the research, development, design, fabrication, qualification, test, evaluation, storage, delivery, contingency planning support, and other activities related to the RPS included under subparagraphs IV.A and IV.B as mutually agreed to by NASA and DOE will be provided for under separate IAAs to this MOU.

B. Each of the Parties will utilize its contract policies and procedures when contracting with others in furtherance of its undertakings under this MOU.

C. Freedom of Information Act (5 U.S.C. 552), decisions on disclosure of information to the public regarding projects and programs implemented under this MOU and supplemental IAAs will be made following consultation between DOE and NASA representatives.

VII. Term of MOU

A. This MOU becomes effective upon the date of the last signature below ("Effective Date") and will remain in effect for ten (10) years from the Effective Date, unless revised or extended by the Parties in writing. The Parties agree to meet at a reasonable time before expiration of this MOU to consider revising or extending the MOU.

B. This MOU supersedes the Memorandum of Understanding between the Department of Energy and the National Aeronautics and Space Administration concerning Radioisotope Power Systems for Space Missions, effective July 26, 1991, for programs or projects commenced after the effective date of this MOU.

VIII. Right To Terminate

Either Party may unilaterally terminate this MOU by providing thirty (30) calendar days advance written notice to the other Party.

IX. Modifications

Any modification to this MOU will be executed, in writing, and signed by an authorized representative of NASA and DOE.

X. Applicable Law

U.S. Federal law governs this MOU for all purposes, including, but not limited to, determining the validity of the MOU, the meaning of its provisions, and the rights, obligations and remedies of the Parties.

XI. Signatory Authority

Approved and authorized on behalf of each Party by:

NASA

Charles F. Bolden, Jr.
Administrator

October 31, 2016
Date

DOE

Ernest Moniz
Secretary of Energy

October 31, 2016
Date