

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
DEPARTMENT OF ENERGY
AND THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONCERNING
RADIOISOTOPE POWER SYSTEMS
FOR SPACE MISSIONS

I. Purpose

The purpose of this agreement is to delineate the authorities and responsibilities of the Department of Energy (DOE) and the National Aeronautics and Space Administration (NASA) (the parties) in the research, technology development, design, production, delivery, space vehicle integration, and launch phases with respect to certain radioisotope power systems, including Radioisotope Thermoelectric Generators (RTGs) and Radioisotope Heater Units (RHUs), and to establish an agreement pursuant to which DOE and NASA will perform certain functions and provide funds for certain portions of the undertakings covered hereby. DOE is acting pursuant to the Atomic Energy Act of 1954 as amended and the Department of Energy Organization Act, 42 U.S.C. 7101, et seq. NASA is acting pursuant to the National Aeronautics and Space Act of 1958 as amended, 42 U.S.C. 2473 (c) (6). As used in this document, "space vehicle" shall mean the launch vehicle and the spacecraft.

II. General

DOE and NASA recognize that Radioisotope Power Systems (RPS) offer performance advantages over other space-power concepts when applied to certain space missions. They recognize that the use of radioisotope power systems will require their cooperative 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. Both agencies agree that NASA will furnish to DOE its requirements as to specifications, scheduling, interface, and management controls; and DOE will be responsible for managing the RPS development and production program to meet NASA requirements.

This agreement covers the general provisions for radioisotope power systems to be used by NASA and such other power units as may be mutually agreed to in writing in the future for inclusion under these provisions. Implementing Interagency Agreements, supplemental to this Memorandum of Understanding (MOU), will address the deliverables, levels of support, funding, and other program-specific items in accordance with this agreement and will be executed between DOE and NASA at the Assistant Secretary and Associate Administrator level.

DOE will be responsible for development, production, and delivery of the radioisotope power systems, and NASA shall provide the launch vehicle and spacecraft. DOE will retain title to the radioisotope power systems at all times. DOE shall 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 radioisotope power systems program.

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 agreement is concerned.

III. Agency Responsibilities

A. DOE will be responsible for:

1. Designing, developing, fabricating, evaluating, testing, and delivering the radioisotope power systems to meet the overall system requirements, specifications, schedules, and interface requirements as agreed to by NASA and DOE. 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 radioisotope power systems at all times, except when the devices are in NASA's custody pursuant to B.2 below.
3. Providing (with the assistance of NASA and any other appropriate agencies) an evaluation of hazards involved for credible nuclear incidents (e.g., Safety Analyses Report). As used in this agreement, the term "nuclear incident" shall have the meaning ascribed to it in the Atomic Energy Act of 1954 as amended and, in addition, shall mean in regard to subparagraph "10" and "12" of this paragraph and subparagraph "14" of paragraph "B," damage or possible damage to the radioisotope power systems.
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 radioisotope power systems.
5. Providing such information concerning the radioisotope power systems 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 analyses concerning DOD controlled range facilities, including radiological safety in the event of a launch accident.
6. Cooperating with NASA concerning the radioisotope power systems 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 radioisotope power systems.
8. Providing technical observation, advice, and assistance to NASA during various operations involving the radioisotope power systems 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 radioisotope power systems 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 radioisotope power systems 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 Appendix "A" attached hereto.
12. Jointly investigating and reporting (with NASA) nuclear incidents.
13. Funding for the research, development, design, fabrication, qualification, test, evaluation, storage, delivery, contingency planning support, and other related activities of the radioisotope power systems included under subparagraph III.A, as well as radioisotope fuel charges as mutually agreed to by DOE and NASA, will be provided for under separate Interagency Agreements to this agreement.

B. NASA will be responsible for:

1. Providing DOE with necessary details and continuing technical support to satisfy the mission and the technical interface requirements between the space vehicle or other mission applications and the radioisotope power systems, space vehicle trajectory information, mission operational and termination procedures, the configuration of the radioisotope power systems as governed by the application of the space vehicle and 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. 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.

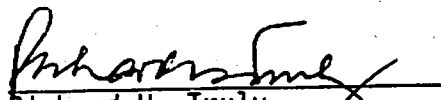
2. Accepting custody of the radioisotope power systems when turned over to NASA by DOE or a DOE contractor and retaining custody, for the purpose of carrying out the requirements of this agreement, at all times except when transferring custody to DOE or a DOE designated recipient.
3. Complying with the minimum radiological occupational and public health and safety procedures and criteria specified or otherwise approved by DOE for the particular radioisotope power systems.
4. 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 radioisotope power systems while in NASA custody, including safeguards and security protection.
5. Providing tracking, command, and data acquisition and reduction facilities and services including those required to monitor the radioisotope power systems.
6. Advising the Department of State, in cooperation with DOE, of the proposed launch of the space vehicle with the radioisotope power systems aboard.
7. Coordinating, in cooperation with DOE, with the Office of Science and Technology Policy on the proposed use of a particular radioisotope power system.
8. Taking such cooperative action with DOE concerning the radioisotope power systems with respect to international, national, State, or other government bodies as may be necessary or advisable.
9. Preparing with DOE joint public information plans for applications involving radioisotope power systems.
10. Installing and testing of the radioisotope power systems in the space vehicle or other mission applications and conducting prelaunch testing in accordance with specifications or instructions agreed to by DOE and NASA.
11. Making overall operational command decisions relating to a launch involving radioisotope power systems 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 radioisotope power systems shall be complied with.
12. Providing DOE with available data or information concerning operation, performance, and location of the radioisotope power systems in space.


13. 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 radioisotope power systems and associated decontamination and disposal operations, as necessary.
14. Jointly investigating and reporting (with DOE) nuclear incidents.
15. Funding for research, development, design, fabrication, qualification, test, evaluation, storage, delivery, contingency planning support, and other related activities of radioisotope power systems as well as radioisotope fuel charges, as mutually agreed to by NASA and DOE will be provided for under separate Interagency Agreements to this agreement.

IV. Additional Provisions

- A. This agreement is effective upon signature by both parties. The agreement shall continue in effect until terminated by either party by at least thirty (30) days advance written notice to the other. This agreement succeeds prior Interagency Agreements, and in the event of any potential conflicts, this agreement supersedes prior agreements.
- B. Each of the parties shall utilize its contract policies and procedures when contracting with others in furtherance of its undertakings under this agreement.

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


Richard H. Truly
Vice Admiral, U.S. Navy
Administrator
National Aeronautics and
Space Administration


James D. Watkins
Admiral, U.S. Navy (Retired)
Secretary
Department of Energy

Date: July 26, 1991

Date: 7/26/91

Appendix A

Nuclear Hazards Indemnity

DOE hereby indemnifies NASA for liability for nuclear incidents under Section 170d. of the Atomic Energy Act of 1954 as amended including the amendments made thereto by the Price-Anderson Amendments Act of 1988, Public Law 100-408 (the Act). The provisions of the clause set forth in 48 C.F.R. 952.250-70, Nuclear Hazards Indemnity, shall apply to this agreement 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 Appendix 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 Appendix to include herein any Nuclear Hazards Indemnity clause promulgated by DOE to implement the Act.