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OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
DOCKETING & RECORDS
SECTION

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
Robert M. Bernero, Director

In the Matter of
U.S. DEPARTMENT OF ENERGY
AND
NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
Galileo Mission

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10 CFR Section 2.206

DIRECTOR'S DECISION UNDER 10 CFR SECTION 2.206

INTRODUCTION

By a petition dated September 3, 1989, (Petition), Thomas J. Saporito, Jr., on behalf of the Nuclear Energy Accountability Project, of Jupiter, Florida, filed a request pursuant to 10 CFR Section 2.206 that the Nuclear Regulatory Commission (the NRC or the Commission) intervene and stop the scheduled October 12, 1989, launch of the Galileo Spacecraft. The Petition alleges that the launch of the Galileo Spacecraft, which contains considerable quantities of plutonium-238, would be in violation of 42 U.S.C. Section 5841, which the Petition states prohibits the NRC from licensing any shipments by air transport of plutonium in any form,

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APP

whether exports, imports or domestic shipments, with the exception of certain medical devices, until the NRC certifies that a safe container has been developed and tested and shown to survive certain tests. The Petition alleges a number of health and safety concerns should the launch fail and should the plutonium be dispersed in the atmosphere.

By letter to Mr. Saporito dated September 15, 1989, I acknowledged receipt of the Petition of September 3, 1989, and informed Mr. Saporito that a formal decision with respect to this matter would be issued within a reasonable time. My decision in this matter follows.

BACKGROUND

The Galileo mission has the scientific objective of conducting comprehensive investigations of the Jupiter planetary system by making in situ and remote measurements of the planet, its environment, and its satellites. The Galileo Spacecraft is scheduled to be launched October 12, 1989, or shortly thereafter, aboard a space shuttle to attain a temporary orbit around Earth. After deployment from the space shuttle, Galileo's upper stage rocket will be used to propel the spacecraft from the Earth orbit into the escape trajectory toward Jupiter. The spacecraft will arrive in the vicinity of Jupiter after an interplanetary transit of 6 years and 4 months. Part of this period will be occupied with a maneuver involving a Venus and two Earth flybys to attain the energy required for the trajectory to Jupiter.

The Galileo Spacecraft will employ two radioisotope thermoelectric generators (RTGs) to provide its electrical power. Each RTG produces approximately 285 watts of electrical power from approximately 4400 watts

of heat provided by the radioactive decay of approximately 132,500 curies of plutonium-238. The spacecraft also employs about 129 lightweight radioisotope heater units (LWRHUs), each containing about 2.7 grams of plutonium oxide, or about 33.6 curies, and producing about one watt of heat. Altogether, the plutonium-238 on the Galileo Spacecraft will total about 49 pounds of plutonium oxide.

The RTGs and LWRHUs which provide electricity and heat to the Galileo Spacecraft are devices produced in research and development efforts of the U.S. Department of Energy (DOE). They are tailored to the energy needs of space missions like the Galileo mission, and are designed to be resistant to the hazards of such missions. From time to time NRC observes the safety review of these devices.

DISCUSSION

Pursuant to 10 CFR Section 2.206, any person may file a request to institute a proceeding pursuant to 10 CFR Section 2.202 to modify, suspend or revoke a license, or for such other action as may be proper. Mr. Saporito's Petition is, in the context of 10 CFR Section 2.206, a request that the NRC intervene in the planned launch of the Galileo Spacecraft.

Mr. Saporito's Petition presents two principal arguments in support of the request. One is that the launch of the Galileo Spacecraft carrying plutonium would be in violation of 42 U.S.C. Section 5841, more correctly Public Law 94-79, to the effect that the Commission shall not license any shipment by air transport of plutonium in any form with the exception

of certain medical devices. The other is that if the launch of the Galileo Spacecraft carrying plutonium is allowed to proceed, the launch would cause undue risk, placing the public health and safety in grave danger.

The Petition relies upon Public Law 94-79 as authority for the NRC to stop the launch. That law provides, in part: "The Nuclear Regulatory Commission shall not license any shipments by air transport of plutonium in any form, whether exports, imports, or domestic shipments" Certain medical devices are excluded and the restriction is to apply until the NRC certifies that a safe container has been developed and tested ". . . which will not rupture under crash and blast-testing equivalent to the crash of a high-flying aircraft."

As can be determined from the plain meaning of the statute, it is to apply only to air transport, i.e., transport from one point on the earth's surface to another such point by a vehicle that moves through, and is supported by the lift provided by, air. Indeed, the statute itself makes reference to the term "aircraft." The vehicle which is to launch the Galileo Spacecraft is a rocket, not an aircraft. Nor does the Galileo mission involve an export, import, or domestic shipment of plutonium. Consequently, the provisions of Public Law 94-79 are not applicable to the Galileo launch and do not provide authority to stop the launch as alleged by the Petitioner.

A review of the legislative history associated with this statutory provision supports this conclusion. There is nothing in the legislative history to suggest that the provision was to apply to a rocket-powered launch such as the National Aeronautic and Space Administration's (NASA's)

planned launch of the Galileo Spacecraft. Consequently, Public Law 94-79 does not provide any basis for the action requested by Petitioner.*

Mr. Saporito's other argument is that the launch of the Galileo Spacecraft carrying plutonium will cause undue risk, placing the public health and safety in grave danger. His Petition cites 20 items ("a" through "t") as grounds for his position.

Plutonium-238 is a hazardous radionuclide and the use of it as plutonium oxide in the power supplies for the Galileo mission entails some risk. It is because of the risk involved that a considerable investment in science and engineering has been made to bring the plutonium-heated devices to the stage of development in which they will be flown aboard the Galileo Spacecraft. The ceramic form of the plutonium dioxide, its iridium encapsulation, and the form of graphite in the surrounding package were all selected to make the RTGs resistant to the potential hazards of missions like the Galileo mission. Sample RTGs and LWRHUs (with dummy fuel) have been subjected to an array of tests to demonstrate their resistance to fire, explosion and impacts.

Furthermore, the RTGs and LWRHUs, separately and in the normal Galileo Spacecraft configuration, and in many configurations associated with accidental disassembly of the spacecraft, have been subject to analysis to evaluate their response. Potential accidents in the near-earth phases of the Galileo mission have been analyzed to determine the range of threats to the integrity of the plutonium-loaded devices. These threats include reentry ablation, heat,

*As noted above, the RTGs and LWRHUs are produced by DOE. The DOE retains ownership of these devices, which are used by NASA as a DOE contractor in this regard. Consequently, these devices would not be subject to NRC authority under Public Law 94-79.

explosion-generated shock and pressure, and impact with air, water, soil, rock, and explosion-driven fragments of the space shuttle and its external rockets.

A comprehensive Federal safety evaluation process has been carried out with regard to the Galileo mission and the employment of the plutonium-loaded devices for energy on the Galileo Spacecraft. In addition to the sponsoring agencies, DOE and NASA, an Interagency Nuclear Safety Review Panel (INSRP) was formed to provide an independent evaluation of all safety aspects involving the RTGs and LWRHUs. The Federal safety evaluation process contained three principal segments, which produced a Preliminary Safety Analysis Report (PSAR), an Updated Safety Analysis Report and a Final Safety Analysis Report; each SAR was reviewed by the INSRP, and the safety evaluation was subsequently strengthened by further analysis and tests. This process culminated in a Safety Evaluation Report (SER) produced by the INSRP. This SER and its supporting material formed the basis for the recommendation for launch approval; launch approval has been obtained from the Office of the President.

CONCLUSION

The Petition provides no basis for the NRC to intervene in NASA's planned launch of the Galileo Spacecraft. The cited statute does not apply to the planned launch and provides no basis for the requested action. Furthermore, a comprehensive Federal safety evaluation process has been carried out with regard to the employment of plutonium-loaded devices for energy on the Galileo mission. There has been appropriate and due consideration of the risks involved.

I find no basis in the Petition for the extraordinary relief requested of intervention in the Galileo launch. Accordingly, the Petition of Mr. Saporito is denied in its entirety.

Dated at Rockville, Maryland, this 25th day of September 1989.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards