DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration
Office of Commercial Space Transportation

Adoption of the Environmental Assessment and Finding of No Significant Impact for Programmatic Environmental Assessment for Launches Involving Radioisotope Heater Units

Summary

The National Aeronautics and Space Administration (NASA) acted as the lead agency, and the Federal Aviation Administration (FAA) was a cooperating agency, in the preparation of the February 2020 *Programmatic Environmental Assessment for Launches Involving Radioisotope Heater Units* (PEA), which analyzed the potential environmental impacts of radioisotope heater units (RHUs) in spacecraft launched from Kennedy Space Center (KSC) and Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida. The programmatic document would apply each time an RHU is used in a space mission if certain parameters are met. The Department of Energy (DOE) and the U.S. Air Force (USAF) also participated as cooperating agencies in the preparation of the PEA. The PEA was prepared in accordance with the National Environmental Policy Act of 1969, as amended (NEPA; 42 United States Code [U.S.C.] § 4321 et seq.); Council on Environmental Quality NEPA implementing regulations (40 Code of Federal Regulations [CFR] parts 1500 to 1508); and FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*.

The Proposed Action would require federal actions (as defined in 40 CFR § 1508.18) involving NASA and the FAA; therefore, the PEA was prepared to satisfy the NEPA obligations of both agencies. The FAA's Office of Commercial Space Transportation regulates the U.S. commercial space transportation industry and is required to analyze the potential environmental impacts of proposed licensed and permitted actions, including the licensing of launch and reentry activities, the operation of the launch and reentry sites, and the issuing of permits for suborbital reusable rockets. At this time, FAA-licensed commercial missions using RHUs are not anticipated; however, if that changes in the future, the FAA could tier from this PEA.

After reviewing and analyzing available data and information on existing conditions and potential impacts, the FAA has determined the Proposed Action would not significantly affect the quality of the human environment within the meaning of NEPA. Therefore, the preparation of an Environmental Impact Statement is not required, and the FAA is independently issuing this FONSI in accordance with FAA Order 1050.1F, paragraph 8-2.d., p. 8-3. The FAA has made this determination in accordance with applicable environmental laws and FAA regulations. The Final PEA is incorporated by reference into this FONSI.

For any questions or to request a copy of the PEA, contact the following FAA Environmental Specialist. A copy of the PEA may also be obtained from NASA's website: https://www.nasa.gov/sites/default/files/atoms/files/508_pea_rhu_final.pdf.

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Purpose and Need

To meet its mission and the mandates of the National Aeronautics and Space Act, NASA must be able to launch spacecraft into the Earth's orbit, near Earth, and deep space. One of the most important technical challenges in space exploration is efficiently keeping spacecraft warm in environments where solar energy is not available or is insufficient to meet all power needs. For these reasons, an alternate heat source is needed for spacecraft operating in these conditions. The heat from the natural decay of radionuclides is a well-tested and efficient technology for keeping spacecraft structures, systems, and instruments, at the necessary operating temperatures in deep space, independent of solar availability. Consequently, NASA needs to be able to use RHUs in its exploration mission.

Proposed Action

The FAA may have a future proposed action of issuing launch licenses involving RHUs to commercial space vehicle operators. At this time, there are no pending license applications for commercial missions using RHUs currently being reviewed by FAA for license applications; however, if this changes in the future, the FAA could tier from this PEA. FAA Order 1050.1F, paragraph 6-1.b., p. 6-1, states, in relevant

part: “FAA [Lines of Businesses/Staff Offices] are encouraged to build upon prior EAs… to the extent that data and analysis in those documents remain valid, and to incorporate FAA experience in the EA process. Whenever a broad EA… has been prepared… the responsible FAA official may use the tiering process to prepare subsequent EAs for actions… covered by the programmatic EA… The purpose of tiering is to eliminate repetition and facilitate analysis of issues at the appropriate level of detail.”

Under its Proposed Action, NASA would continue to use RHUs in its space missions when the use of solar or other technologies would be infeasible or when the use of an RHU would enhance the ability of a mission to meet its science goals. RHUs are small devices that use the natural decay of Pu-238 oxide (Pu-328) to provide thermal energy, which is then used to heat electronics. The current generation of RHUs are referred to as light-weight radioisotope heating units (LWRHUs). A LWRHU contains a fuel pellet which consists of 2.7 grams of Pu-238. LWRHUs were designed to withstand the potential accidents of a wide range of space missions without the release of Pu-238 by including multiple layers of protection.

The FAA’s Proposed Action is to adopt the PEA for NASA’s use of RHUs in space missions. This PEA only covers RHUs launched using U.S. domestic launch vehicles that have been examined through the NEPA and NASA launch approval process. The FAA could tier from the PEA in the future if commercial missions using RHUs launched are proposed.

Alternatives

Alternatives analyzed in the PEA include (1) the Proposed Action and (2) the No Action Alternative. Under the No Action Alternative, NASA would continue to use RHUs in major missions through the completion of mission-specific NEPA documents. The FAA may serve as a cooperating agency for such actions due to the agency’s special expertise with respect to environmental issues for space launch vehicle operations and because of the potential for commercial space vehicle operators to apply for a license for launches involving RHUs. However, the use of RHUs in smaller scale missions would be substantially disincentivized due to the considerable requirements associated with performing mission-specific NEPA documentation for nuclear-enabled missions. The No Action Alternative would not meet the stated purpose and need.

Environmental Impacts

The following presents a brief summary of the potential environmental impacts considered in the PEA for the Proposed Action. This FONSI incorporates the PEA by reference and is based on the potential

impacts discussed therein. The FAA has determined the analysis of impacts presented in the PEA represents the best available information regarding the potential impacts associated with the FAA's regulatory responsibilities as described in this FONSI. This FONSI analyzes all of the FAA's environmental impact categories except for visual resources, noise and noise-compatible land use, utilities and infrastructure (including natural resources and energy supply), environmental justice, ambient air quality and climate, socioeconomics, and coastal resources. The following resource areas were considered and dismissed from detailed analysis in the PEA, and are therefore not discussed in this FONSI: visual resources, noise and noise-compatible land use, utilities and infrastructure (including natural resources and energy supply), environmental justice, ambient air quality and climate, socioeconomics, and coastal resources.

Biological Resources (including Fish, Wildlife, and Plants)

Under normal operating conditions of the Proposed Action, there would be no impacts to biological resources from the use of RHUs. Impacts to wildlife from the extremely unlikely event of a release of Pu-238 would be temporary and minor. Pu-238 deposited in terrestrial or aquatic ecosystems would have a negligible impact. NASA informally consulted with the U.S. Fish and Wildlife Service regarding the proposed action. Based on the analysis presented in the PEA and the response safeguards in place for the extreme unlikely release scenario, the Service concurred with KSC's determination of "may affect, but is not likely to adversely affect" all federally listed species for the programmatically covered use of RHUs at the CCAFS and KSC launch facilities [PEA Appendix D]. No significant impacts to biological resources are anticipated as a result of the Proposed Action [PEA Section 3.4.2].

Department of Transportation Act, Section 4(f)

There are Section 4(f) resources that could be affected by the Proposed Action. However, there would be no permanent or constructive use of these Section 4(f) resources because the safeguards developed in compliance with the requirements in the Final PEA at Section 3.1.1.4., *Established Nuclear Safety Procedures,* would lessen the potential for impacts to Section 4(f) resources in case of an incident. Thus, the Proposed Action would not involve an actual physical taking of a Section 4(f) resource and the Proposed Action would not involve a constructive use of a Section 4(f) resource because the value of such resources would not be substantially diminished. No impacts to Section 4(f) resources are anticipated [PEA Section 3.2.2].

Hazardous Materials, Solid Waste, and Pollution Prevention

KSC and CCAFS have extensive infrastructure, safety controls, and policies in place for the handling and safeguard of nuclear material. These infrastructure and measures help to prevent the release of nuclear material, including Pu-238. Under normal operating conditions, there would be no hazardous materials impacts from the use of RHUs in spacecraft [PEA Section 3.6.2].

Historical, Architectural, Archeological, and Cultural Resources

There is a potential for Pu-238 to be released into the environment under an extremely unlikely release scenario. Such a release could theoretically result in deposition of radiological material on cultural resources. In the extremely unlikely event cleanup activities require the excavation of soil on a National Register of Historic Places (NRHP)-listed or eligible archeological resource, the Florida State Historic Preservation Officer (SHPO) will be notified prior to any response activities at the site, and appropriate mitigation measures will be developed per the National Historic Preservation Act (NHPA). Numerous NRHP-listed and eligible historic sites, as well as National Historic Landmarks, are located on KSC and CCAFS. These significant historic resources include the Launch Complexes, where missions containing RHUs could be launched. Impacts to archeological or historical sites are considered negligible, given the remote probability of these sites being affected and NASA's and the USAF's commitment to work with the SHPO in the event an archeological or historic site requires cleanup [PEA Section 3.5.2].

Land Use

There is an extremely unlikely potential for Pu-238 to be released into the environment under the Proposed Action. If this type of accident were to occur, the area of potential radiological deposition would remain within the boundaries of KSC and CCAFS. Therefore, there is little potential for lands designated for uses besides vehicle launch operations to be impacted. It is extremely unlikely that radiological materials would be deposited outside of KSC or CCAFS. The impact of the Proposed Action on land use would not be significant [PEA Section 3.2.2].

Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks

It is extremely unlikely that an accident would occur in which Pu-238 is released. In the extremely unlikely event that this type of accident does occur, the radiological dose consequences are below the typical annual exposure rates per year from background and man-made sources of radiation. The potential health and safety effects associated with the use of RHUs are considered minor and temporary

because the estimated maximum dose is below established radiation exposure thresholds, including limits for children and other sensitive populations. The Proposed Action will not have a significant impact on health and safety [PEA Section 3.1.2].

As stated above, the Proposed Action would not affect socioeconomics or environmental justice [PEA 2.3.2].

Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)

Under normal operating conditions of the Proposed Action, there would be no impacts to water resources from the use of RHUs. In the extremely unlikely event that Pu-238 is released during a launch accident, impacts to water resources could occur. However, Pu-238 is insoluble and so the potential impacts of its deposition into surface water, groundwater, potable water, and wetlands is negligible. NASA and the DOE would perform radiological response in accordance with the National Response Framework in the event of radiological deposition, thus preventing Pu-238 deposition onto topsoil from contacting groundwater. NASA would coordinate with the U.S. Army Corps of Engineers for any necessary mitigation if an accidental release of Pu-238 impacts wetlands. In summary, significant impacts to water resources are not anticipated [PEA Section 3.3.2].

Cumulative Impacts

This FONSI incorporates by reference the PEA, which addresses the potential impacts of past, present, and reasonably foreseeable future activities at and within the vicinity of KSC and CCAFS that would affect the resources impacted by the Proposed Action. The environmental impacts associated with the Proposed Action are all negligible to minor; thus, the potential for the Proposed Action to cause collectively significant cumulative environmental impacts is unlikely. The Proposed Action would not result in significant cumulative impacts in any environmental impact category [PEA Section 3.7].

Agency Finding and Statement

The FAA has determined that no significant impacts would occur as a result of the Proposed Action and, therefore, that preparation of an Environmental Impact Statement is not warranted and a FONSI in accordance with 40 CFR Section 1501.4(e) is appropriate.

After careful and thorough consideration of the facts contained herein, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives as set forth in Section 101 of NEPA and other applicable environmental requirements and will not significantly affect the quality of the human environment or otherwise include any condition requiring consultation pursuant to Section 102(2)(C) of NEPA.

APPROVED:  DATE: July 28, 2020

Daniel Murray
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