# DEPARTMENT OF TRANSPORTATION

# Federal Aviation Administration
# Office of Commercial Space Transportation

# Finding of No Significant Impact and Record of Decision
# for
# Proposed Issuance of a Vehicle Operator License to Varda for Reentry, Landing, and Recovery Operations of a Varda Space Industries Capsule within Utah Test and Training Range South or Northern Dugway Proving Ground, Utah

## Summary

This document serves as the Federal Aviation Administration's (FAA) Finding of No Significant Impact and Record of Decision (FONSI/ROD) and provides final agency determinations and approvals for the federal actions necessary to implement Varda Space Industries, Inc.'s (Varda) proposal to conduct reentry, landing, and recovery (RLR) operations of a small (approximately 3-foot [ft] diameter) aluminum capsule within the U.S. Department of the Air Force's (DAF) Utah Test and Training Range (UTTR) South and the U.S. Department of the Army's Dugway Proving Ground (DPG) located in Tooele County, Utah (the Proposed Action). Under the Proposed Action, the FAA would issue a Vehicle Operator License to Varda for conduct one RLR operation in 2024 within UTTR South or Northern DPG and would approve airspace closures associated with RLR operations. This FONSI/ROD is based on the information and analysis contained in the attached Final Environmental Assessment (EA). The EA 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*.

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. Therefore, the preparation of an Environmental Impact Statement (EIS) is not required, and the FAA is issuing this FONSI/ROD. The FAA has made this determination in accordance

with applicable environmental laws and FAA regulations. The Final EA is incorporated by reference into this FONSI/ROD.

For any questions or to request a copy of the EA, contact the following FAA Environmental Protection Specialist. A copy of the EA may also be obtained from the FAA's website: https://www.faa.gov/space/environmental/nepa_docs.

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## Purpose and Need

The purpose of Varda's proposed project is to implement a series of capsule return test missions to assess processes for manufacturing products in space that require zero-gravity to fabricate and return those products to Earth using a small aluminum return capsule. In addition, Varda's capsule reentry operations would support the Department of Defense's (DoD) reentry and hypersonic weapons research by providing data on reentry trajectories and associated hypersonic flows and subjecting components (e.g., sensors, navigation systems, and other subsystems) and materials to hypersonic environments. The Varda test capsule and reentry operations supports the DoD's need to conduct hypersonic operations within representative flight environments at low cost, with high launch and return rates, and within a DoD-controlled test range with sufficient airspace and land area to safely and securely accommodate the proposed RLR operations of the Varda capsule, and that has previously supported similar recovery operations.

## Proposed Action

Varda proposes to conduct a reentry, landing, and recovery (RLR) operation of a small (approximately 3-foot [ft] diameter) aluminum capsule within the U.S. Department of the Air Force's (DAF) Utah Test and Training Range (UTTR) South and the U.S. Department of the Army's Dugway Proving Ground (DPG) located in Tooele County, Utah. Under the Proposed Action, no construction activities would occur and there would be no change to existing infrastructure at UTTR South or DPG. On June 12, 2023, the Varda

capsule and Rocket Lab Photon satellite bus were launched into low Earth orbit on a SpaceX Falcon 9 rocket from Vandenburg Space Force Base, California. The Photon bus provides electrical power to the Varda capsule, as well as guidance, navigation, and control to maintain the desired orbit. Before deorbit of the Varda capsule, the Photon bus would separate from the capsule and the majority of it would disintegrate upon entering of the atmosphere. During reentry, the Varda capsule would enter UTTR airspace and descend along the proposed trajectory in a gradual fashion until it reached the area over UTTR South where it would then descend almost straight down to the proposed landing area within UTTR South. Proposed RLR operations would occur during daylight hours only.

## Federal Action

The FAA's Federal Action is to issue a Vehicle Operator License to Varda. The FAA's Federal Action also includes issuance of temporary airspace closures. All launch operations would comply with the necessary notification requirements, including issuance of Notice to Air Missions, as defined in agreements required for a Vehicle Operator License issued by the FAA.

## Alternatives

Alternatives analyzed in the EA include (1) the Proposed Action and (2) the No Action Alternative. The No Action Alternative provides the basis for comparing the environmental consequences of the Proposed Action. Under the No Action Alternative, the FAA would not issue a license to Varda for RLR operations at UTTR South or northern DPG and would not issue temporary airspace closures to accommodate reentry activities. The Varda capsule and Photon satellite bus would remain in their initial orbit. It is expected that their orbit would decay within 11.9 years, after which they would begin an uncontrolled reentry into the atmosphere. The No Action Alternative would not meet the stated purpose and need.

## Environmental Impacts

The potential environmental impacts of the Proposed Action and No Action Alternative were evaluated in the attached final EA for each environmental impact category identified in FAA Order 1050.1F.

Chapter 3 of the final EA describes the affected environment and regulatory setting and identifies the environmental impact categories that are not analyzed in detail, explaining why the Proposed Action would have no potential effect on those impact categories:

- Water Resources
- Hazardous Materials, Solid Waste, and Pollution Prevention
- Coastal Resources
- Farmlands
- Land Use
- Natural Resources and Energy Supply/Utilities
- Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks
- Visual Effects
- Geology and Soils
- Public Health and Safety

Chapter 3 of the final EA also provides evaluations of the potential environmental consequences of each alternative for each of the environmental impact categories analyzed in detail and documents the finding that no significant environmental impacts would result from the Proposed Action. As part of the assessment, Chapter 3 addresses the requirements of special purpose laws, regulations, and executive orders.

After publication of the public Draft EA, additional modeling was done regarding the Varda capsule reentry operations, and it was determined that approximately 25 inert metal fragments could potentially survive reentry (i.e., not burn up in the atmosphere) and land along the capsule trajectory. However, based upon their size and composition, the debris landing areas would not significantly change the ROI, and there would be no change in the finding that no significant environmental impacts would result from the Proposed Action

A summary of the documented findings for each impact category, including requisite findings with respect to relevant special purpose laws, regulations, and executive orders, follows.

- **Air Quality**, Final EA Section 3.2.5. Under the Proposed Action, Varda would conduct one RLR operation within UTTR South/DPG North. The emissions from activities associated with the

Proposed Action are not expected to result in significant air quality impacts. The modeled reentry debris from the Varda capsule reentry operation would not result in any impacts to air quality. The estimated emissions increase due to implementation of the Proposed Action is below the applicable General Conformity *de minimis* levels. A Record of Non-Applicability (RONA) was prepared and provided in the Final EA, Appendix B.

Airspace closures associated with commercial space operations may potentially result in additional aircraft emissions from aircraft being re-routed and expending more fuel. Airspace closures could occur as a result of the Proposed Action could occur. However, the closures that may or may not result in rerouting or delays of aircraft and associated emissions would be considered insignificant as any delays in aircraft departures from affected airports would be short-term and any increases in air emissions from grounded aircraft are expected to be minimal. Further, it is likely that a grounded aircraft would not have its engines idling during such a delay, further minimizing increases in air emissions. Therefore, minimal, if any, additional emissions would be generated from aircraft departure delays and these increases in emissions would not be expected to result in an exceedance of the NAAQS for any criteria pollutant or result in significant air quality impacts (EA Section 3.2.5, page 3-9).

- **Biological Resources (including Fish, Wildlife, and Plants)**, Final EA Section 3.7.4. Under the Proposed Action, the Varda capsule is expected to land within the proposed landing area on unvegetated playa or dry lake bed and there would be no impacts to vegetation. If the capsule does not land within the playa, the next most common vegetation type within the proposed landing area is dominated by shadscale and the non-native invasive cheatgrass. As this is a very common vegetation community on UTTR South and northern DPG and the capsule would only impact approximately 7 $ft^2$ upon impact, there would be no significant impacts to vegetation. Although the main parachute would also potentially cover vegetation, this would be short term, resulting in minimal to no impacts to vegetation. In addition, the landing area has been evaluated and used for similar operations, and the recovery team would follow proven procedures and limit ground disturbances during recovery efforts. Additionally, based upon the number of fragments, their size, and the distribution across such large areas, the Varda capsule debris would not impact any vegetation within the debris landing areas. Therefore, there would be no significant impacts to vegetation with implementation of the Proposed Action.

The Varda capsule is expected to land on unvegetated playa or dry lake bed, an area that is typically devoid of wildlife species except for bird species that may be potentially transiting through the area to other more vegetated surrounding habitats. Given the capsule would be descending at a relatively slow rate of speed under a very visible parachute, any wildlife species potentially under the capsule descent trajectory are expected to move away and not be struck by either the capsule or parachute. Impacts are also not expected to wildlife from the sonic boom associated with the Varda capsule reentry given the maximum sonic boom would be only 0.04 pounds per square foot (psf). Previous studies on the effects of sonic booms on wildlife have shown that wildlife are not significantly impacted at much higher sonic boom levels. Additionally, based upon the number of fragments, their size, and the distribution across such large areas, the Varda capsule debris would not impact any wildlife within the debris landing areas. Therefore, there would be no significant impacts to wildlife with implementation of the Proposed Action.

Impacts to special-status species would be the same as those previously described for wildlife. Therefore, there would be no significant impacts to special-status species with implementation of the Proposed Action. No Endangered Species Act (ESA)-listed species occur within the proposed capsule landing area and therefore would not be subject to ground disturbing operations. The only ESA-listed species that may be impacted by the sonic boom during reentry is the yellow-billed cuckoo. Its only known occurrence within the area is immediately south of the DPG within the Fish Springs National Wildlife Refuge (NWR). Fish Springs NWR would receive a sonic boom at 0.01 psf, which would be unlikely to be detected as the sound level would be significantly less than that of a distant thunderstorm and would probably not be discernable from other ambient noise sources. A sonic boom of 0.1 psf would have no effect on the ESA-listed yellow-billed cuckoo and consultation under ESA section 7 would not be necessary. Additionally, based upon the number of fragments, their size, and the distribution across such large areas, the Varda capsule debris would not impact any ESA-listed species within the debris landing areas. Therefore, proposed Varda reentry operations and associated sonic booms would not result in significant impacts to ESA-listed species (EA Section 3.7.4, page 3-30).

- **Climate**, Final EA Section 3.3.4. Activities conducted as part of the Proposed Action would involve mobile sources using fossil fuel combustion as a source of power (e.g., diesel-fueled equipment and vehicles), which results in generation of greenhouse gas (GHG) emissions from

the combustion of fossil fuels. Based on the most current GHG data for Tooele County, Utah, GHG emissions for 2020 totaled 431,523 megatons (MT) of Carbon Dioxide Equivalent ($CO_2e$). The FAA has not established a significance threshold for climate, nor have they identified specific factors to consider in making a significance determination for GHG emissions. However, the proposed RLR operation would produce 10.68 MT of $CO_2e$, a relatively insignificant amount of GHG emissions not likely to contribute to global warming to any discernible extent. Additionally, possible increases in GHG emissions caused by short-term airspace closures during commercial space operations are not expected to result in significant climate-related impacts (EA Section 3.3.4, page 3-12).

- **Department of Transportation Act, Section 4(f)**, Final EA Section 3.6.4. Within the proposed Varda capsule landing area there are 209 National Register of Historic Places (NRHP)-eligible sites that are considered Section 4(f) properties. The closest Section 4(f) properties to the proposed Varda capsule reentry trajectory are Fish Springs NWR, approximately 37 miles to the south, and the Unita-Wasatch-Cache National Forest/Deseret Peak Wilderness, approximately 45 miles to the east. Given their distance from the capsule reentry trajectory, the Fish Springs NWR and Unita-Wasatch-Cache National Forest/Deseret Peak Wilderness would experience a sonic boom from the proposed capsule reentry of only 0.01-0.02 psf. A sonic boom at 0.01 and 0.02 psf that would be received at the NWR and National Forest, respectively, would be unlikely to be noticed from background ambient activities. The Proposed Action would not substantially diminish the protected activities, features, or attributes of the identified Section 4(f) properties, including NRHP-eligible properties, and thus would not result in substantial impairment of the properties. The Proposed Action would not be considered a physical or constructive use of these properties and would not invoke Section 4(f) of the DOT Act. Based upon the number of fragments, their size, and the distribution across such large areas, the Varda capsule debris would not impact any Section 4(f) properties within the debris landing areas. Therefore, the Proposed Action would not result in significant impacts on Section 4(f) properties (EA Section 3.6.4, page 3-26).

- **Historical, Architectural, Archeological, and Cultural Resources**, Final EA Section 3.5.4. The cultural resources Area of Potential Effect (APE) includes 1) the proposed Varda capsule landing area within UTTR and DPG that would be subject to capsule recovery operations by personnel via helicopter, and 2) the area of the sonic boom associated with the capsule reentry and

associated noise that may potentially result in indirect effects to historic properties. Debris from the Varda capsule reentry operation could potentially land along the capsule trajectory. However, based upon the number of items and their size, the debris landing areas would not significantly change the cultural resources APE for the purposes of analysis presented in this Final EA.

Hill Air Force Base (AFB)[1], the Utah State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP) finalized a National Historic Preservation Action Section 106 Programmatic Agreement (PA), which includes stipulations to assess impacts and mitigate any potential adverse effects to historic properties on UTTR South from the landing and retrieval of objects. In accordance with the PA, all appropriate stipulations would be implemented to address potential effects of the proposed Varda capsule recovery operations on historic properties. A separate Section 106 consultation was conducted by DPG in the event that the proposed Varda capsule landing and recovery operations occur on DPG lands. SHPO concurred with the finding of No Adverse Effect for Varda RLR operations occurring on DPG lands. To avoid and minimize potential effects to cultural resources within the proposed capsule landing area on UTTR South and northern DPG, an archaeological monitor would be present on site for capsule recovery actions. The use of the Wendover Airport as a staging area for the transfer of the Varda capsule from the recovery helicopter to a truck or van would not result in any impacts to the Wendover Army Air Field Historic District and no facilities or infrastructure would be used or impacted by the Proposed Action. With implementation of the measures identified in the PA between Hill AFB, the Utah SHPO, and the ACHP, there would be no significant impacts to cultural resources on UTTR South and DPG lands.

The highest sonic boom level below the proposed capsule reentry trajectory would be 0.04 psf and would occur almost completely within the boundaries of UTTR South. Lesser sonic boom psf levels would occur in the surrounding areas including levels of 0.01 psf. Therefore, there would be a very low-level sonic boom along the capsule reentry trajectory over UTTR South, northern DPG, and the surrounding area. A maximum sonic boom of 0.04 psf would be unlikely to be detected as the sound level would be significantly less than that of a distant thunderstorm and would probably not be discernable from other ambient noise sources. A sonic boom at 0.01 and 0.02 psf would also be unlikely to be noticed from background ambient activities. Therefore,

[1] UTTR is administered and maintained by Headquarters UTTR stationed at Hill AFB.

proposed Varda reentry operations and associated sonic booms would not result in significant impacts to National Register of Historic Places-listed and eligible properties within UTTR South and DPG lands (EA Section 3.5.4, page 3-25).

- **Noise and Noise-Compatible Land Use**, Final EA Section 3.4.5. To determine the potential for a sonic boom, the modeling program PCBoom (version 4.99) was used. During reentry, the Varda capsule would generate a sonic boom as it travels along its flight path or trajectory. The highest sonic boom level below the proposed capsule reentry trajectory would be 0.04 pounds psf, occurring almost completely within the boundaries of UTTR South. A maximum sonic boom of 0.04 psf would be unlikely to be detected on the ground as the sound level would be significantly less than that of a distant thunderstorm and would probably not be discernable from other ambient noise sources. Lesser sonic boom psf levels of 0.01 and 0.02 psf that would be received at noise sensitive land uses such as the NWR, National Forest, The Confederated Tribes of Goshute Indian Reservation, and Skull Valley Indian Reservation, would also be unlikely to be noticed from background ambient activities. Therefore, proposed Varda reentry operations and associated sonic booms would not result in significant impacts to the regional noise environment.

  Short-term noise from the helicopter operations used during capsule recovery activities would not differ significantly from baseline conditions and is therefore not expected to result in any significant changes in the regional noise environment. Airspace closures associated with commercial space operations could result in temporarily grounded aircraft at affected airports and re-routing of en-route flights on established alternate flight paths. However, since RLR operations would occur only one time, which typically is far less frequent than all other sources of delays, the effect would be negligible. Any incremental increases in noise levels at an individual airport would only last the duration of the airspace closure on a periodic basis and are not expected to meaningfully change existing day-night average sound levels at the affected airports and surrounding areas. Therefore, airspace closures due to proposed Varda reentry operations within UTTR South and northern DPG are not expected to result in significant noise impacts (EA Section 3.4.5, page 3-17).

Please refer to Chapter 3 of the Final EA for a full discussion of the determination for each environmental impact category.

## Public Involvement

On March 29, 2023, the FAA published the Draft EA on the FAA's website at https://www.faa.gov/space/environmental/nepa_docs, beginning the public comment period. The FAA provided a public notice of the availability of the Draft EA for public review and comment through the Federal Register and a local newspaper advertisement. The public comment period ended on April 27, 2023. The FAA received 1 comment and considered all public comments when preparing the final EA. Response to the public comment is located in Appendix A, Section A.1 of the Final EA.

## Cumulative Impacts

Chapter 4 of the final EA provides an analysis of the potential cumulative impacts of the Proposed Action when added to other past, present, and reasonably foreseeable actions. The FAA has determined that the Proposed Action would not result in significant cumulative impacts in any environmental impact category.

## Conditions and Mitigation

As prescribed by 40 CFR § 1505.3, the FAA shall take steps as appropriate to the action, through mechanisms such as the enforcement of licensing conditions, and shall monitor these as necessary to ensure that Varda implements avoidance, minimization, and/or mitigation measures as set forth in Chapter 3 of the Final EA under the various impact categories. These avoidance, minimization, and mitigation measures include:

- To avoid and minimize potential effects to cultural resources within the proposed capsule landing area on UTTR South and northern DPG, an archaeological monitor will be present on site for all capsule recovery actions.
- Once the capsule is located, the archaeological monitor will determine the best landing area to avoid known cultural resources in the vicinity of the capsule. After disembarking the helicopter, the Explosive Ordinance Disposal (EOD) technician will inspect the immediate vicinity for the presence of potential unexploded ordinances (UXO) or other hazards. The archaeological monitor will then review known records of cultural resources in the vicinity to determine the best route for personnel to access the capsule on foot. The EOD technician and archaeological

monitor will lead the recovery team along the route to the capsule assessing the immediate area for potential UXO and observable cultural resources. If previously unrecorded cultural resources are observed, a buffer will be established, the location noted via GPS, and the resources avoided to the maximum extent practicable. The EOD technician will then inspect and safe the capsule prior to letting additional Recovery Team personnel approach the capsule. Once the capsule is confirmed to be safe, it will be switched into a state whereby it ceases to make any radio transmissions.

- The archaeological monitor will record the location of the retrieval activities and assess effects to historic properties. If the Hill AFB or DPG Cultural Resource Manager (CRM) determines that the retrieval action on their lands (i.e., UTTR South or DPG, respectively) did not adversely affect historic properties, no further consultation is required, and an inventory report will be submitted. If either the Hill AFB CRM or DPG CRM determines that there has been an adverse effect the appropriate installation CRM will coordinate with SHPO, consulting parties, and the proponent to implement mitigation through the Standard Mitigation Treatment Measures found in Appendix C. In addition, the installation CRM, in consultation with SHPO and other consulting parties (as applicable), will determine if the landing site meets National Register eligibility criteria. If so, the site will be fully recorded as such during retrieval and clean-up activities in coordination with Varda to ensure that all security and safety measures are met. Depending on whether the Varda capsule lands on UTTR South or DPG lands, the appropriate CRM will provide a monitoring and recordation report (as applicable) to SHPO and other consulting parties. Post review discoveries will be handled in accordance with the Hill AFB and DPG Unanticipated Discovery of Archaeological Deposits protocol.

## 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 EIS is not warranted and no mitigation measures beyond the ones identified by AST discussed in the EA are required as a condition of approval, and a FONSI/ROD in accordance with 40 CFR §1501.6 is appropriate. After careful and thorough consideration of the attached final EA and the facts contained herein, the undersigned finds that the FAA's Federal Action is consistent with existing national environmental policies and objectives as set forth in Section 101(a) 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. Therefore, the FAA will not prepare an EIS for this action.

The undersigned has carefully considered the FAA's statutory mandate under 49 U.S.C. § 40103 to ensure the safe and efficient use of the National Airspace System as well as the other aeronautical goals and objectives discussed in this EA. The undersigned finds that the FAA's Federal Action provides the best approach for meeting the purpose and need of that action.

Accordingly, under the authority delegated to the undersigned by the Administrator of the FAA, the undersigned approves and authorizes all necessary agency action to implement the FAA's Federal Action.

This decision signifies that applicable federal environmental requirements relating to the FAA's Federal Action have been met. The decision enables the FAA to implement that action.

STACEY MOLINICH ZEE

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Date: 2024.02.14 12:02:20 -05'00'

APPROVED: _____ DATE: _____

Stacey M. Zee
Manager, Operations Support Branch

## Right of Appeal

This FONSI/ROD constitutes a final order of the FAA Administrator and is subject to exclusive judicial review under 49 U.S.C. § 46110 by the U.S. Circuit Court of Appeals for the District of Columbia or the U.S. Circuit Court of Appeals for the circuit in which the person contesting the decision resides or has its principal place of business. Any party having substantial interest in this order may apply for review of the decision by filing a petition for review in the appropriate U.S. Court of Appeals no later than 60 days after the order is issued in accordance with the provisions of 49 U.S.C. § 46110.