

National Aeronautics and Space Administration



**Ames Research Center**  
Moffett Field, California 94035

March 17, 2023

Ms. Julianne Polanco  
State Historic Preservation Officer  
Office of Historic Preservation  
Department of Parks & Recreation  
1725 23rd Street, Suite 100  
Sacramento, CA 95816

Attn: Mr. Mark Beason

**Subject:** Section 106 Consultation for the Arc Jet Modernization Project at Ames Research Center, Moffett Field, Santa Clara County, California

Dear Ms. Polanco:

The National Aeronautics and Space Administration (NASA) Ames Research Center (ARC) requests Section 106 consultation on the Arc Jet Modernization Project (project or undertaking). NASA ARC proposes to upgrade the Arc Jet Complex, which includes Building N234, N238, and the Steam Vacuum System (SVS) on the Ames Campus at ARC (see Figures 1 and 2 in Appendix A in attachment). The Arc Jet Complex is composed of Buildings N234 and N238 and the Steam Vacuum System (SVS) and is listed in the National Register of Historic Places (NRHP). The Arc Jet Complex is powered by the 60-megawatt (MW) Power Supply Substation, which is adjacent to the complex to the northwest (directly west of Building N238). NASA ARC has determined that this project constitutes an undertaking under Section 106 of the National Historic Preservation Act of 1966 (54 United States Code § 306108), as amended.

In support of its responsibilities under Section 106, NASA ARC retained AECOM to conduct a technical study for this project. The study was conducted by cultural resources professional who meet the Secretary of the Interior's professional qualifications standards (48 Federal Register 44738). The technical memo prepared by AECOM, dated March 3, 2023, which includes a description of the undertaking, the Area of Potential Effects (APE), identification efforts, and an assessment of potential effects resulting from the undertaking, is enclosed for your review. For further details on the following summary, see the attached report.

### *Description of the Undertaking*

The purpose of the project is to install necessary improvements to update the Arc Jet Complex and the 60-MW Power Supply Substation to modern standards, specifically addressing health and safety and technological advancements. The goal of the project is to extend and sustain the lifetime of test capability for an additional 20 years beyond the current lifetime of the facility. The majority of the project work involves upgrading interior technical equipment; exterior work is limited to improvements to the 60-MW Power Supply Substation. There are seven distinct project actions, which are described below.

- 1) **Data Acquisition System Upgrade.** The project would replace (in kind) or update hardware of the Data Acquisition System, as necessary. The existing system was installed in the 1990s and has been modified several times to meet advancements in technology and other changing needs, but now requires more substantial modernization.
- 2) **Air and Argon Flow Controls.** The project would replace obsolete programmable logic controllers, controller interfaces, flowmeters, regulators, sensors, and valve actuators [REDACTED]  
[REDACTED]  
[REDACTED] Components would be replaced in kind or with suitable upgrades.
- 3) **Aerodynamic Heating Facility (AHF) Model Insertion.** The project would replace the existing model system with a swing arm-style model system [REDACTED]  
[REDACTED] The project would create a more reliable, safer, and better performing system.
- 4) **Interaction Heating Facility (IHF) Modifications.** The project would reconfigure the existing IHF hose system and construct a new IHF enclosure. The IHF currently poses workplace safety risks and maintenance challenges that would be addressed by the project.
- 5) **Transformer Arc Jet Risk Reduction Project (TARRP).** The project would modify existing transformers [REDACTED] to prevent high risk degradation or failure.
- 6) **Safety and Interlock Control System.** The project would replace the existing safety and interlock control system with a modern standard system.
- 7) **Power Supply Improvements.** The project would repair and upgrade the 60-MW Power Supply Substation with replacement transformers and other parts as necessary to restore full functionality.

See Appendix B in the attachment for exhibits related to the project.

### *Area of Potential Effects*

The APE is defined to address both direct and indirect impacts on historic properties. The APE encompasses areas that may be affected by both temporary and permanent construction activities. The undertaking does not include any ground-disturbing activities; therefore, the vertical APE does not extend below grade. Due to the scale and nature of the project, visual and

atmospheric impacts resulting from system upgrades are unlikely to affect historic properties at a reasonable distance from the project area; therefore, the APE is limited to the Arc Jet Complex and the 60-MW Power Supply Substation (Appendix A, Figure 3).

### *Identification Efforts*

The APE encompasses one historic property, the Arc Jet Complex, previously listed in the NRHP in 2017. No ground-disturbing activities are proposed; therefore, archaeological resources were not considered as part of this study. For more details on the study's methodology, please see the attached memorandum provided for your review.

### *Affected Historic Properties*

The Arc Jet Complex was listed in the NRHP in 2017 and is significant at the national level for its contributions in the areas of science and engineering. The property is listed under Criterion A for its association with advancements in arc jet technology and research and development of Thermal Protection Systems (TPS) for NASA's spaceflight programs, including the exceptional role of the 60-MW Interaction Heating Facility arc jet in developing and refining TPS for the Space Shuttle Program (SSP). The property is also listed under Criterion C for its design and engineering, which allowed for significant innovations in arc jet technology. The period of significance is 1962, the year Building N234 and the SVS were constructed, to the end of the SSP in 2011. The property is also listed under Criteria Consideration G as a property that has achieved significance within the past 50 years in relation to its exceptional significance within the context of the SSP.

The NRHP listing is available at:

[https://historicproperties.arc.nasa.gov/downloads/summary/nrhp\\_arcjet\\_20161101.pdf](https://historicproperties.arc.nasa.gov/downloads/summary/nrhp_arcjet_20161101.pdf).

### *Effects Assessment*

There are no known archaeological sites in the APE, and the undertaking does not include work that would result in ground disturbance. Therefore, no archaeological historic properties would be affected by the undertaking.

The project would modify interior equipment in the NRHP-listed Arc Jet Complex, including the data acquisition system; programmable logic controllers, controller interfaces, flowmeters, regulators, sensors, and valve actuators [REDACTED], and associated control software; the AHF model insertion system; the IHF; transformers; and the safety and interlock control system.

The Arc Jet Complex is significant for "its association with advancements in arc jet technology and research and development of TPS for NASA's spaceflight programs, including the exceptional role of the 60-megawatt IHF arc jet in developing and refining TPS for the SSP" (AECOM 2017). During its period of significance from 1962 to 2011 and since, advancements in technology have required incremental alterations to N234, N238, and the SVS, and to the arc jet testing equipment within the complex. To facilitate continued technological advancements, the project would replace in kind or upgrade technical equipment to sustain and improve functionality and safety.

Exterior alterations are limited to transformer system upgrades to the 60-MW Power Supply Substation. The proposed work would have no effect. These changes would not indirectly affect the Arc Jet Complex.

The criteria of adverse effect were applied to the project and its proposed alteration of the Arc Jet Complex. In summary, the project would meet the Secretary of the Interior's Standards for Rehabilitation (see attachment for full assessment of effects), and the Arc Jet Complex would retain integrity of location, design, setting, materials, workmanship, feeling, and association after implementation of the project. The continued function of the Arc Jet Complex as a laboratory aligns with its historical associations, and its improvement will reflect the changing nature of a highly technical facility as addressed in the Advisory Council for Historic Preservation's 1991 Program Comment *Balancing Historic Preservation Needs with the Operation of Highly Technical or Scientific Facilities* (ACHP 1991). The proposed undertaking would not alter, directly or indirectly, any of the characteristics of a historic property that qualify it for inclusion in the NRHP.

#### *Finding of Effect*

Based on the assessment conducted by a qualified architectural historian, NASA ARC has made a finding of No Adverse Effect for this undertaking, per 36 CFR 800.5(b).

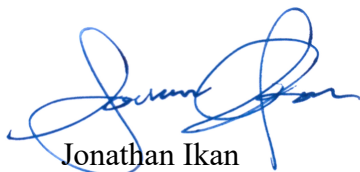
#### *Consultation Efforts*

Due to the limited scope of the project and its limited potential to cause effects on the Arc Jet Complex, NASA ARC has not identified additional consulting parties for this Section 106 review. However, NASA ARC is making these findings available to the public via the NASA ARC Historic Preservation Office website (<https://historicproperties.arc.nasa.gov/section106.html>).

NASA ARC requests the State Historic Preservation Officer's concurrence on NASA's determinations of eligibility pursuant to 36 CFR 800.4(c)(2) and finding of No Adverse Effect for this undertaking pursuant to 36 CFR 800.5(b). Please provide a response within 30 days of receipt of this letter, as specified in 36 CFR 800.5(c).

Please contact me at [jonathan.d.ikan@nasa.gov](mailto:jonathan.d.ikan@nasa.gov) or at (650) 604-6859 with your comments or questions.

Sincerely,



Jonathan Ikan  
Center Cultural Resources Manager



Ames Research Center, MS 213-8  
Moffett Field, California 94035

**cc:**

HQ/EMD/Dr. Rebecca Klein, Ph.D., RPA

**Enclosures**

Technical Memorandum for the Arc Jet Modernization Project, prepared by AECOM, dated March 3, 2023