

**ANNEX
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER
AND
RAYTHEON COMPANY
UNDER SPACE ACT UMBRELLA AGREEMENT NO. 41493 / SAA2-403841
(ANNEX NUMBER ONE)**

ARTICLE 1. PURPOSE

Annex One shall be for the purpose of utilizing NASA's unique expertise in microstructural and compositional analysis for the proper selection of either standard or modified testing tailored to individual candidate thermal protection system materials under an existing Reimbursable Space Act Umbrella Agreement ("Umbrella Agreement") with Raytheon (SAA2-403841, PAM ID # 41493). Under this Annex, Raytheon seeks NASA's support to survey and screen high temperature insulation materials suitable for thermal protection of sensor packages on high velocity vehicles. The material survey will be used to formulate a down-selected recommendation list of candidates for testing. Tasks 2 through 4 (described below) will screen these candidate materials by increasingly sophisticated material property testing. Ultimately, NASA shall provide results with interpretation, based upon NASA's unique expertise, leveraging best practices and unique testing capabilities, in thermal protection materials to help Raytheon make informed decisions of their own which they can use to support their vehicle and sub-system development. Each capitalized term used in this Annex One, but not defined herein, shall have the meaning ascribed to it in the Umbrella Agreement. Raytheon ("Partner") and NASA ARC may be individually referred to as a "Party" and collectively referred to as the "Parties."

Candidate materials shall be selected from commercially available, high temperature insulation (preferable) or otherwise commonly used aerospace materials. Material property testing for screening shall be performed at NASA ARC. Testing shall focus on properties of the materials at relevant conditions, as described in the individual tasks below.

The legal authority for this Annex, consistent with the Umbrella Agreement, is in accordance with the Space Act, Other Transactions Authority (OTA), 51 U.S.C. § 20113(e).

ARTICLE 2. RESPONSIBILITIES

A. NASA ARC will use reasonable efforts to:

1 (Task 1). Perform and provide a survey of candidate thermal protection materials. NASA databases as well as published datasheets will be leveraged (Partner responsible for final design).

2 (Task 2). Select a set of three to ten materials from Task 1. Perform material testing of these candidates. Test campaign will be designed to screen the candidates based on properties indicative of performance at relevant environments. Testing results shall be reported in meeting presentations and final documentation.

3 (Task 3, if elected). Perform and/or coordinate more sophisticated testing (detailed or at relevant environments) of material candidates. Testing results shall be reported in meeting presentations and final documentation.

4 (Task 4, if elected). Perform and/or coordinate testing of representative configurations and/or with representative loading. Testing results shall be reported in meeting presentations and final documentation.

B. Partner will use reasonable efforts to:

1. Provide requirements or material property targets to aid in selection of candidate materials which may be general trends/goals and can be periodically updated.
2. Provide all candidate materials of commercially available, high temperature insulation, or otherwise commonly used aerospace materials, selected for testing and characterization by NASA ARC for evaluation as thermal protection materials.
3. Provide additional testing results as required, performed by Partner, as additional input into material screening.
4. Provide information on material compatibility or suitability for evolving designs.

ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities for this Annex defined in the "Responsibilities" Article below. Upon execution of this Agreement, the Parties agree that NASA will initiate work on Tasks 1 and 2. Thereafter, Partner shall provide NASA the Authorization to Proceed (ATP) and funding (see Article 4) for NASA to continue to perform work in furtherance of the remaining milestones. Should Partner provide ATP and funding out of sequential order, NASA reserves the right to revise the Estimated Completion Date.

Milestone		Estimated Completion Date
1	Provide requirements or material property targets to aid in selection of candidate materials (Partner)	1 month after Effective Date and through 6 months of Effective Date
2	Perform and provide a survey of candidate thermal protection materials (NASA Task 1)	1 months after Effective Date and through 12 months of Effective Date
3	Provide all candidate materials of commercially available, high temperature insulation, or otherwise commonly used aerospace materials, selected for testing and characterization by NASA (Partner)	5 months after Effective Date and through 12 months of Effective Date

4	Select a set of three to ten materials. Perform material testing of the candidates. Testing results shall be reported in meeting presentations and final documentation (NASA Task 2)	6 months after Effective Date and through 16 months of Effective Date
5	Provide additional testing results as required, performed by Partner, as additional input into material screening as well as provide information on material compatibility or suitability for evolving designs (Partner)	6 months after Effective Date and through 24 months of Effective Date
6	Perform more sophisticated testing of material candidates. (NASA Task 3, if elected)	ATP + 8 months and no earlier than 8 months after the completion of Task 2
7	Perform testing of representative configurations and/or with representative loading. (NASA Task 4, if elected)	ATP + 6 months and no earlier than 6 months after the completion of Task 3
8	Electable testing results, Tasks 3 and 4, shall be reported in meeting presentations and final documentation. (NASA)	After completion of 6 and 7 above, if elected, and through 36 months of Effective Date

ARTICLE 4. FINANCIAL OBLIGATIONS

A. Partner agrees to reimburse NASA to carry out its responsibilities on a per subtask basis under this Agreement. In no event will NASA transfer any U.S. Government funds to Partner under this Agreement. Payment must be made by Partner in advance of initiation of NASA's efforts for each selected subtask on behalf of the Partner.

Partner can selectively fund any or all of the elective subtasks listed in this Article, which correspond to the NASA Deliverables/Subtasks listed in the previous Article. In advance of subtask performance by NASA, Partner shall provide NASA with written notice identifying each subtask that it chooses to fund. Deliverables/ Tasks estimated costs are:

Deliverables/Tasks

<u>Description</u>	<u>Cost</u>
Perform and provide a survey of candidate thermal protection materials (NASA Task 1)	\$14,842
Select a set of three to ten materials from Task 1. Perform material testing of the candidates. Testing results shall be reported in meeting presentations and final documentation (NASA Task 2)	\$215,677
Perform more sophisticated testing of material	\$221,160

candidates. (NASA Task 3, if elected)	
Perform testing of representative configurations and/or with representative loading. (NASA Task 4, if elected)	\$49,224

Each payment shall be marked with Ames, Annex One, SAA2-403841-1.

B. NASA will not provide services or incur costs beyond the current funding. Although NASA has made a good faith effort to accurately estimate its costs, it is understood that NASA provides no assurance that the proposed effort under this Annex will be accomplished for the estimated amount. Should the effort cost more than the estimate, Partner will be advised by NASA as soon as possible. Partner shall pay all costs incurred and have the option of canceling the remaining effort, or providing additional funding in order to continue the proposed effort under the revised estimate. Should this Annex be terminated, or the effort completed at a cost less than the agreed-to estimated cost, NASA shall account for any unspent funds within one year after completion of all effort under this Annex, and promptly thereafter, at Partner's option return any unspent funds to Partner or apply any such unspent funds to other activities under the Umbrella Agreement. Return of unspent funds will be processed via Electronic Funds Transfer (EFT) in accordance with 31 C.F.R. Part 208 and, upon request by NASA, Partner agrees to complete the Automated Clearing House (ACH) Vendor/Miscellaneous Payment Enrollment Form (SF 3881).

ARTICLE 5. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. Data produced under this Annex which is subject to paragraph C. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement will be protected for the period of two years.

B. Under paragraph H. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement, Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data provided.

1. Background Data:

The Disclosing Party's Background Data, if any, will be identified in a separate technical document.

2. Third Party Proprietary Data:

The Disclosing Party's Third Party Proprietary Data, if any, will be identified in a separate technical document.

3. Controlled Government Data:

The Disclosing Party's Controlled Government Data, if any, will be identified in a separate technical document.

4. The following software and related Data will be provided to Partner under a separate Software Usage Agreement:

None.

ARTICLE 6. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect until the completion of all obligations of both Parties hereto, or three years from the Effective Date, whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. The term of this Annex shall not exceed the term of the Umbrella Agreement. The Annex automatically expires upon the expiration of the Umbrella Agreement.

ARTICLE 7. TERMINATION

Either Party may unilaterally terminate this Annex by providing thirty (30) calendar days written notice to the other Party.

ARTICLE 8. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Annex.

Management Points of Contact

NASA Ames Research Center

Matt Holtrust
Agreement Manager
Mail Stop: 223-3, Room 100
Moffett Field, CA 94035
Phone: 650-604-4069
matthew.j.holtrust@nasa.gov

Raytheon Company

Name: Slade Hill
Title: Associate Director-Acquisition
2501 W University Drive
McKinney, TX 75071-2813
Phone: 214-578-8095
Email: Slade.J.Hill@rtx.com

Technical Points of Contact

NASA Ames Research Center
Peter Marshall
Materials Scientist
Moffett Field, CA 94035
Phone: (650) 604-2836
peter.e.marshall@nasa.gov

Raytheon Company
Name: Waid Paine
Title: Engineering
13510 N. Central Expressway
Dallas, TX 75243
Phone: 972-344-4157
Email: waid.a.paine@rtx.com

ARTICLE 9. MODIFICATIONS

Any modification to this Annex shall be executed, in writing, and signed by an authorized representative of NASA and the Partner. Modification of an Annex does not modify the terms of the Umbrella Agreement.

ARTICLE 10. SIGNATORY AUTHORITY

The signatories to this Annex covenant and warrant that they have authority to execute this Annex. By signing below, the undersigned agrees to the above terms and conditions.

**NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
AMES RESEARCH CENTER**

RAYTHEON COMPANY

BY: _____
Dr. Rupak Biswas
Director of Exploration Technology

BY: _____
Name:
Title:

Slade J Hill

Digitally signed by
Slade J Hill
Date: 2024.11.14
08:50:56 -06'00'

DATE: _____

DATE: _____