

REIMBURSABLE SPACE ACT AGREEMENT
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
AND WASHINGTON UNIVERSITY
FOR SHOCK-RECOVERY EXPERIMENTS.

ARTICLE 1. AUTHORITY AND PARTIES

In accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113(e)), this Agreement is entered into by the National Aeronautics and Space Administration Lyndon B. Johnson Space Center, located at 2101 NASA Parkway, Houston, Texas 77058 (hereinafter referred to as "NASA," "NASA JSC," or "JSC") and The Washington University, located at 1 Brookings Drive, St. Louis, MO 63130 (hereinafter referred to as "Partner" or "WUSTL"). NASA and Partner may be individually referred to as a "Party" and collectively referred to as the "Parties."

ARTICLE 2. PURPOSE

This Reimbursable Space Act Agreement documents a collaboration between the National Aeronautics and Space Administration Lyndon B. Johnson Space Center and Washington University in St. Louis, on behalf of its Department of Physics, to conduct shock-recovery experiments on meteorite and simulant samples provided to JSC by WUSTL. One of the top universities for planetary-science research in the United States, Washington University in St. Louis is the home institution of the McDonnell Center for the Space Sciences. Its personnel conduct world-class work on topics as varied as rover-based Martian investigations, noble-gas measurements of planetary materials, and studies of meteorites and cosmic dust. Scientists at WUSTL have received a grant to study the effects of shock on a particular class of meteorites (carbonaceous chondrites), but in order to conduct those studies, they require a means of shocking their samples to a range of specific stress levels. Their facility of choice is the Flat-Plate Accelerator in JSC's Experimental Impact Laboratory. The Experimental Impact Laboratory (EIL), which is part of the Astromaterials Research and Exploration Science (ARES) Office at JSC, is one of few facilities in the country with the ability to conduct shock-recovery experiments, in which samples are impacted under precisely controlled conditions by high-speed projectiles and subsequently recovered for analysis. The Flat-Plate Accelerator (FPA) has been regarded and used by scientists around the world for almost 50 years as a reliable and accurate means of shocking and recovering samples for planetary studies. Given their extensive experience in such impact experimentation, EIL personnel will provide advice to WUSTL on experiment design, sequencing, and execution.

They will then conduct the actual experiments according to a mutually derived plan and deliver the shocked samples to the WUSTL investigators. Planetary research is a highly synergistic process both in terms of the groups performing that research and the interdisciplinary nature of the various techniques and methods brought to bear on a wide range of problems and topics. As such, the investigation by WUSTL of samples shocked by the EIL's FPA will benefit NASA-funded research related to the study of carbonaceous meteorites upon dissemination of the results. The EIL at JSC, specifically, will learn how to handle and otherwise work with

carbonaceous-chondritic meteorite samples. It is anticipated that such samples will become much more common in shock and impact experimentation, due to the attention directed at those materials following the Hayabusa-2 and OSIRIS-REx missions to carbonaceous-chondritic asteroids. Thus, this work will provide valuable baseline experience for EIL personnel in preparation for future work. The research plan calls for thirteen (13) separate experiments to be performed in sets ("subseries") that will be specified in conjunction with WUSTL. Breaking the project into smaller subseries will permit each set of experiments to undergo preliminary analyses before the next set is begun. In that way, any potential problems, shortcomings, or surprises can be addressed before resuming experimentation. This is standard practice in the EIL.

ARTICLE 3. RESPONSIBILITIES

A. NASA JSC will use reasonable efforts to:

1. Advise WUSTL investigators regarding the details of shock-recovery experimentation. Determine, in consultation with WUSTL scientists, details of pre-experiment sample preparation and post-shock treatment of the shocked samples in their containers, along with the range of acceptable shock stress for each of the samples.
2. Establish, in cooperation with the WUSTL scientists, the best means of preparing the environment in the impact chamber to avoid sample contamination and to optimize the conditions around the sample immediately before impact.
3. Define, in cooperation with the WUSTL scientists, the acceptable variance in shock stress for each experiment.
4. Following those established protocols, portion each sample, load it into its holder, assemble the sample container, and machine the container to its final dimensions and configuration.
5. Subject each assembled container and sample to previously determined temperature and vacuum conditions for the specified time before placing it into the impact chamber, closing the door, and removing the ambient atmosphere from the chamber immediately prior to the experiment.
6. Shock each sample to a stress within the previously specified stress range.
7. After each experiment, remove the shocked container from the impact chamber and remove metal from around the sample until the sample can be accessed by prying away the remaining, thin flap of metal. Store the samples in their machined containers until the subseries of experiments is completed and send them to WUSTL via commercial carrier. Email the relevant data detailing the conditions of those experiments to WUSTL.
8. Participate in tag-up meetings to review and, if necessary, adjust the conditions for remaining experiments contingent on the earlier results.

9. Conduct thirteen (13) separate experiments to be performed in sets ("subseries") that will be specified in conjunction with WUSTL

10. Conduct first three experiments at stresses of 5, 15, and 30 gigapascals and return samples to WUSTL for analysis. These results will dictate the conditions set by WUSTL for the next set of experiments. Repeat this process of "shock then analyze" until all 13 experiments are completed.

B. Partner will use reasonable efforts to:

1. Provide NASA JSC ARES with those detailed objectives and sample-handling requirements necessary to maximize the likelihood of successful experimentation.

2. Provide NASA JSC ARES with all samples to be shocked, along with instructions for appropriate storage both before and after being shocked.

3. Support tag-up meetings as needed via teleconference between WUSTL and EIL personnel, providing prompt assessments of preliminary analyses as they might apply to subsequent experiments and the remaining portions of the plan and schedule.

4. Analyze returned samples from first three experiments to determine conditions for second set of experiments and communicate to NASA JSC. Repeat this process of "shock then analyze" for each set of samples until all 13 experiments are completed.

ARTICLE 4. SCHEDULE AND MILESTONES

The planned major milestones for the activities defined in the "Responsibilities" Article are as follows:

WUSTL will provide to NASA all samples, information, and data necessary for successful execution of the 13 shock experiments.

Upon approval of this SAA by both parties.

NASA will conduct 13 shock experiments with the Flat-Plate Accelerator. The first three experiments (at stresses of 5, 15, and 30 gigapascals) will be conducted and the samples returned to WUSTL for analysis. Those results will dictate the conditions for the second set of experiments. This process of "shock then analyze" will continue until all 13 experiments are completed.

According to the mutually acceptable schedule.

NASA will machine the shocked sample holders to facilitate removal of the samples after they arrive at WUSTL; machined sample holders will be sent to WUSTL.

At the conclusion of each experimental subseries.

WUSTL will provide assessments of the validity of the remaining plan and schedule following preliminary examination of shocked samples. Any adjustments to the plan and/or schedule will be discussed and mutually approved with NASA.

Four to six weeks following delivery of each set of shocked samples.

NASA and WUSTL will conduct a final review meeting to discuss the program's results and any open questions and/or issues. Four to six weeks following delivery of the last set of shocked samples.

NASA will stand ready to answer any questions regarding conduct of the experiments, laboratory procedures, or any other matters related to the project to support publication of the results. As needed.

ARTICLE 5. FINANCIAL OBLIGATIONS

A. Partner agrees to reimburse NASA an estimated cost of \$34,074.10 for NASA to carry out its responsibilities 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 on behalf of the Partner.

B. Payment shall be payable to the National Aeronautics and Space Administration through the NASA Shared Services Center (NSSC) (choose one form of payment): (1) U.S. Treasury FEDWIRE Deposit System, Federal Reserve Wire Network Deposit System; (2) online at <https://www.nasa.gov/specials/nssc-pay/> and select the appropriate NASA Center for the agreement and Advances from the drop down; or (3) check. A check should be payable to NASA and sent to: NASA Shared Services Center FMD – Accounts Receivable For the Accounts of Lyndon B. Johnson Space Center Building 1111, Jerry Hlass Rd., Stennis Space Center, MS 39529 Payment by electronic transfer (#1 or #2, above), is strongly encouraged, and payment by check is to be used only if circumstances preclude the use of electronic transfer. All payments and other communications regarding this Agreement shall reference the Center name, title, date, and number of this Agreement.

C. NASA will not provide services or incur costs beyond the existing payment. 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 Agreement will be accomplished for the above 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 has the option of canceling the remaining effort, or providing additional funding in order to continue the proposed effort under the revised estimate. Should this Agreement 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 Agreement, and promptly thereafter return any unspent funds to Partner. 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).

D. Notwithstanding any other provision of this Agreement, all activities under or pursuant to this Agreement are subject to the availability of funds, and no provision of this Agreement shall be

interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, (31 U.S.C. § 1341).

ARTICLE 6. PRIORITY OF USE

Any schedule or milestone in this Agreement is estimated based upon the Parties' current understanding of the projected availability of NASA goods, services, facilities, or equipment. In the event that NASA's projected availability changes, Partner shall be given reasonable notice of that change, so that the schedule and milestones may be adjusted accordingly. The Parties agree that NASA's use of the goods, services, facilities, or equipment shall have priority over the use planned in this Agreement. Should a conflict arise, NASA in its sole discretion shall determine whether to exercise that priority. Likewise, should a conflict arise as between two or more non-NASA Partners, NASA, in its sole discretion, shall determine the priority as between those Partners. This Agreement does not obligate NASA to seek alternative government property or services under the jurisdiction of NASA at other locations.

ARTICLE 7. NONEXCLUSIVITY

This Agreement is not exclusive; accordingly, NASA may enter into similar agreements for the same or similar purpose with other private or public entities.

ARTICLE 8. LIABILITY

A. Partner hereby waives any claims against NASA or one or more of its Related Entities for any injury to, or death of, Partner or one or more of its Related Entities, or for damage to, or loss of, Partner's property or the property of its Related Entities, arising from or related to activities conducted under this Agreement, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct. For purposes of this Agreement, "Related Entities" shall mean contractors and subcontractors of a Party at any tier; grantees, investigators, customers, and users of a Party at any tier and their contractors or subcontractor at any tier; or, employees of the Party or any of the foregoing.

B. Partner further agrees to extend this unilateral waiver to its related entities by requiring them, by contract or otherwise, to waive all claims against NASA and its Related Entities for injury, death, damage, or loss arising from or related to activities conducted under this Agreement. In the event the U.S. Government incurs any liability based upon Partner's failure to provide for the waiver by Partner's Related Entities set out above, Partner agrees to indemnify and hold the U.S. Government harmless against such liability, including costs and expenses incurred by the U.S. Government in defending against any suit or claim for liability by Partner's Related Entities.

C. In the event U.S. Government property is damaged as a result of activities conducted under this Agreement, except in the case of gross negligence or willful misconduct by NASA, Partner shall be solely responsible for the repair and restoration of such property subject to NASA direction; however, Partner's liability for such repair and restoration shall not exceed \$3000.

D. Notwithstanding the other provisions of this Article, the waiver of liability set forth in this section shall not be applicable to:

- i. Claims between Partner and its own Related Entity or between its own Related Entities;
- ii. Claims made by a natural person, his/her estate, survivors, or anyone claiming by or through him/her (except when such person or entity is a Party to this Agreement or is otherwise bound by the terms of this waiver) for bodily injury to, or other impairment of health of, or death of, such person;
- iii. Claims for damage caused by willful misconduct;
- iv. Intellectual property claims;
- v. Claims for damage resulting from a failure of Partner to extend the waiver of liability to its Related Entities, pursuant to paragraph B of this Article; or
- vi. Claims by Partner arising out of or relating to NASA's failure to perform its obligations under this Agreement.

ARTICLE 9. LIABILITY - PRODUCT LIABILITY

With respect to products or processes resulting from a Party's participation in an SAA, each Party that markets, distributes, or otherwise provides such product, or a product designed or produced by such a process, directly to the public will be solely responsible for the safety of the product or process.

ARTICLE 10. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

Information and data exchanged under this Agreement is exchanged without restrictions unless required by national security regulations (e.g., classified information) or as otherwise provided in this Agreement or agreed to by the Parties for specifically identified information or data (e.g., information or data specifically marked with a restrictive notice).

ARTICLE 11. INTELLECTUAL PROPERTY RIGHTS - INVENTION AND PATENT RIGHTS

A. "Related Entity" as used in this Invention and Patent Rights Article means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Partner assigned, tasked, or contracted with to perform activities under this Agreement.

B. The invention and patent rights herein apply to employees and Related Entities of Partner. Partner shall ensure that its employees and Related Entity employees know about and are bound by the obligations under this Article.

C. NASA has determined that 51 U.S.C. § 20135(b) does not apply to this Agreement. Therefore, title to inventions made (conceived or first actually reduced to practice) under this Agreement remain with the respective inventing party(ies). No invention or patent rights are exchanged or granted under this Agreement. NASA and Partner will use reasonable efforts to report inventions made jointly by their employees (including employees of their Related Entities). The Parties will consult and agree on the responsibilities and actions to establish and maintain patent protection for joint invention, and on the terms and conditions of any license or

other rights exchanged or granted between them.

ARTICLE 12. USE OF NASA NAME AND NASA EMBLEMS

A. NASA Name and Initials Partner shall not use “National Aeronautics and Space Administration” or “NASA” in a way that creates the impression that a product or service has the authorization, support, sponsorship, or endorsement of NASA, which does not, in fact, exist. Except for releases under the “Release of General Information to the Public and Media” Article, Partner must submit any proposed public use of the NASA name or initials (including press releases and all promotional and advertising use) to the NASA Associate Administrator for the Office of Communications or designee (“NASA Communications”) for review and approval. Approval by NASA Office of Communications shall be based on applicable law and policy governing the use of the NASA name and initials. B. NASA Emblems Use of NASA emblems (i.e., NASA Seal, NASA Insignia, NASA logotype, NASA Program Identifiers, and the NASA Flag) is governed by 14 C.F.R. Part 1221. Partner must submit any proposed use of the emblems to NASA Communications for review and approval.

ARTICLE 13. RELEASE OF GENERAL INFORMATION TO THE PUBLIC AND MEDIA

NASA or Partner may, consistent with Federal law and this Agreement, release general information regarding its own participation in this Agreement as desired. Pursuant to Section 841(d) of the NASA Transition Authorization Act of 2017, Public Law 115-10 (the “NTAA”), NASA is obligated to publicly disclose copies of all agreements conducted pursuant to NASA’s 51 U.S.C. §20113(e) authority in a searchable format on the NASA website within 60 days after the agreement is signed by the Parties. The Parties acknowledge that a copy of this Agreement will be disclosed, without redactions, in accordance with the NTAA.

ARTICLE 14. DISCLAIMER OF WARRANTY

Goods, services, facilities, or equipment provided by either Party under this Agreement are provided “as is.” Neither Party makes any express or implied warranty as to the condition of any such goods, services, facilities, or equipment, or as to the condition of any research or information generated under this Agreement, or as to any products made or developed under or as a result of this Agreement including as a result of the use of information generated hereunder, or as to the merchantability or fitness for a particular purpose of such research, information, or resulting product, or that the goods, services, facilities or equipment provided will accomplish the intended results or are safe for any purpose including the intended purpose, or that any of the above will not interfere with privately-owned rights of others. Neither the government nor its contractors, nor Partner, shall be liable for special, consequential or incidental damages attributed to such equipment, facilities, technical information, or services provided under this Agreement or such research, information, or resulting products made or developed under or as a result of this Agreement.

ARTICLE 15. DISCLAIMER OF ENDORSEMENT

NASA does not endorse or sponsor any commercial product, service, or activity. NASA’s

participation in this Agreement or provision of goods, services, facilities or equipment under this Agreement does not constitute endorsement by NASA. Partner agrees that nothing in this Agreement will be construed to imply that NASA authorizes, supports, endorses, or sponsors any product or service of Partner resulting from activities conducted under this Agreement, regardless of the fact that such product or service may employ NASA-developed technology.

ARTICLE 16. COMPLIANCE WITH LAWS AND REGULATIONS

A. The Parties shall comply with all applicable laws and regulations including, but not limited to, safety; security; export control; environmental; and suspension and debarment laws and regulations. Access by a Partner to NASA facilities or property, or to a NASA Information Technology (IT) system or application, is contingent upon compliance with NASA security and safety policies and guidelines including, but not limited to, standards on badging, credentials, and facility and IT system/application access, including use of Interconnection Security Agreements (ISAs), when applicable. B. With respect to any export control requirements: 1. The Parties will comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 C.F.R. Parts 120 through 130, and the Export Administration Regulations (EAR), 15 C.F.R. Parts 730 through 799, in performing work under this Agreement or any Annex to this Agreement. In the absence of available license exemptions or exceptions, the Partner shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data and software, or for the provision of technical assistance. 2. The Partner shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of work under this Agreement or any Annex under this Agreement, including instances where the work is to be performed on-site at NASA and where the foreign person will have access to export-controlled technical data or software. 3. The Partner will be responsible for all regulatory record-keeping requirements associated with the use of licenses and license exemptions or exceptions. 4. The Partner will be responsible for ensuring that the provisions of this Article apply to its Related Entities. C. With respect to suspension and debarment requirements: 1. The Partner hereby certifies, to the best of its knowledge and belief, that it has complied, and shall comply, with 2 C.F.R. Part 180, Subpart C, as supplemented by 2 C.F.R. Part 1880, Subpart C. 2. The Partner shall include language and requirements equivalent to those set forth in subparagraph C.1., above, in any lower-tier covered transaction entered into under this Agreement. D. With respect to the requirements in Section 889 of the National Defense Authorization Act (NDAA) for Fiscal Year 2019, Public Law 115-232: 1. In performing this Agreement, Partner will not use, integrate with a NASA system, or procure with NASA funds (if applicable), “covered telecommunications equipment or services” (as defined in Section 889(f)(3) of the NDAA). 2. The Partner will ensure that the provisions of this Article apply to its Related Entities.

ARTICLE 17. TERM OF AGREEMENT

This Agreement 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 two years from the Effective Date, whichever comes first.

ARTICLE 18. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Agreement by providing thirty (30) calendar days written notice to the other Party. In the event of such termination, Partner will be obligated to reimburse NASA for all costs for which the Partner was responsible and that have been incurred in support of this Agreement up to the date the termination notice is received by NASA. Where Partner terminates this Agreement, Partner will also be responsible for termination costs.

ARTICLE 19. CONTINUING OBLIGATIONS

The rights and obligations of the Parties that, by their nature, would continue beyond the expiration or termination of this Agreement, e.g., “Liability and Risk of Loss”, “Intellectual Property Rights”-related clauses, and “Financial Obligations” shall survive such expiration or termination of this Agreement.

ARTICLE 20. POINTS OF CONTACT

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

Management Points of Contact

NASA Lyndon B. Johnson Space Center

Dr. Justin R. Filiberto
Chief, Astromaterials Research Office
Mail Stop: XI3
2101 NASA Parkway
Houston, Texas 77058
Phone: 281-483-8924
Justin.R.Filiberto@nasa.gov

Washington University

Joint Research Office for Contracts
Megan M. White, Director Research Contracts
MSC 1054-87-1600
1 Brookings Drive
St. Louis, MO 63130-4899
Phone: 314-747-5292
researchcontracts@wusm.wustl.edu

Technical Points of Contact

NASA Lyndon B. Johnson Space Center

Dr. Mark Cintala
AST, PLANETARY STUDIES
Mail Suite: XI3
2101 NASA Parkway
Houston, Texas 77058
Phone: 281-483-5032
mark.j.cintala@nasa.gov

Washington University Department of Physics

Dr. Jeffrey J. Gillis-Davis
1 Brookings Drive
St. Louis, MO 63130-4862
Phone: 314-935-6206
J.Gillis-Davis@wustl.edu

ARTICLE 21. DISPUTE RESOLUTION

Except as otherwise provided in the Article entitled “Priority of Use,” the Article entitled “Intellectual Property Rights – Invention and Patent Rights” (for those activities governed by 37 C.F.R. Part 404), and those situations where a pre-existing statutory or regulatory system exists (e.g., under the Freedom of Information Act, 5 U.S.C. § 552), all disputes concerning questions of fact or law arising under this Agreement shall be referred by the claimant in writing to the appropriate person identified in this Agreement as the “Points of Contact.” The persons identified as the “Points of Contact” for NASA and the Partner will consult and attempt to resolve all issues arising from the implementation of this Agreement. If they are unable to come to agreement on any issue, the dispute will be referred to the signatories to this Agreement, or their designees, for joint resolution. If the Parties remain unable to resolve the dispute, then the NASA signatory or that person’s designee, as applicable, will issue a written decision that will be the final agency decision for the purpose of judicial review. Nothing in this Article limits or prevents either Party from pursuing any other right or remedy available by law upon the issuance of the final agency decision.

ARTICLE 22. MODIFICATIONS

Any modification to this Agreement shall be executed, in writing, and signed by an authorized representative of NASA and the Partner.

ARTICLE 23. ASSIGNMENT

Neither this Agreement nor any interest arising under it will be assigned by the Partner or NASA without the express written consent of the officials executing, or successors, or higher-level officials possessing original or delegated authority to execute this Agreement.

ARTICLE 24. APPLICABLE LAW

U.S. Federal law governs this Agreement for all purposes, including, but not limited to, determining the validity of the Agreement, the meaning of its provisions, and the rights, obligations and remedies of the Parties.

ARTICLE 25. INDEPENDENT RELATIONSHIP

This Agreement is not intended to constitute, create, give effect to or otherwise recognize a joint

venture, partnership, or formal business organization, or agency agreement of any kind, and the rights and obligations of the Parties shall be only those expressly set forth herein.

ARTICLE 26. LOAN OF GOVERNMENT PROPERTY

The parties shall enter into a NASA Form 893, Loan of NASA Equipment, for NASA equipment loaned to Partner.

ARTICLE 27. SIGNATORY AUTHORITY

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

NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER

The WASHINGTON UNIVERSITY

BY: _____
For Burt Laws
Acting Director, Exploration Architecture,
Integration, and Science

DATE: _____


BY: _____
Megan White
Director of Research Contracts, Joint Research
Office of Contracts

Digitally signed by Megan M.
White, Director Research
Contracts

Date: 2023.06.08 15:29:14 -05'00'

DATE: _____