Requesting Asteroid Bennu Samples from the NASA OSIRIS-REx Curation Laboratory. K. M. Pando[1], N. G. Lunning[2], and J. Davidson[2], [1]The Aerospace Corporation (Houston, TX, kellye.pando@nasa.gov), [2]Astromaterials Acquisition and Curation Office, NASA Johnson Space Center (Houston, TX nicole.g.lunning@nasa.gov and jemma.davidson@nasa.gov).

Introduction: In September of 2023, the Origins, Spectral Interpretation, Resource Identification, and Security-Regolith Explorer (OSIRIS-REx) spacecraft, delivered approximately 120g of sample from the asteroid Bennu to the Earth [1]. Abundant care has been taken by the curation team at NASA Johnson Space Center (JSC) to carefully curate the returned asteroid sample and preserve its integrity and scientific value, allowing for current and future discoveries [2]. Sample types include particles and aggregates collected from the Touch-and-Go Sample Acquisition Mechanism (TAGSAM) head and associated stainless-steel contact pads as well as witness plates and other flight hardware components [3]. Twice per year, The Astromaterials Newsletter is released [4] which provides updates from the OSIRIS-REx curator along with sample request deadlines and other pertinent information. The newsletter release is accompanied by updates to the OSIRIS-REx Sample Catalog, which lists newly characterized pieces of the asteroid sample and can be found on the Astromaterials OSIRIS-REx website (https://curator.jsc.nasa.gov/osirisrex/). These sources of information can be used to determine which individual sample would best suit any intended research goals. The curation team at NASA JSC seeks to provide direction about how to prepare sample requests for review, and clarification about the allocation process so that the most appropriate samples can be provided to allow for effective and informative analysis to further our understanding of asteroid bodies and their place in our solar system.

Sample Request Form: The official sample request form on the curation website, in conjunction with the checklist detailing the specific kinds of information to include, should be used to submit requests for allocation of Bennu samples for study. The request form consists of different sections that include all the necessary information needed for an effective review of the sample request once it has been submitted. Requestors should provide their name, affiliation, and contact information and identify the specific sample being requested along with the amount and type (e.g. chip, thin section, thick section, etc.) necessary for any planned analyses. The remainder of the request should provide an explanation of the specific research that is being planned, why the particular sample is being requested, why a particular quantity of the sample is needed (including if replicate analyses are needed), what kinds of analyses will be conducted, the effects that those analyses will have on the sample, and if any special considerations need to be taken into account while processing and allocating the requested samples. In addition, any collaborators and their roles should be listed on the form. Taking the time to provide clear and detailed explanations of the planned research and well-defined justifications for the samples to be used for such research will allow for a more comprehensive review of the request. If requestors have questions or need clarification on any part of the request process, they are very welcome to email the OSIRIS-REx Collection Curator.

Polished Sections: Under most circumstances, all sectioning of Bennu samples must be performed by JSC curation staff. This includes mounting, sectioning, and polishing of samples. If a sectioned sample is required for analysis, then PIs should request to have a thin or thick section made at JSC to be allocated. If, however, the research requires a PI to conduct some analyses on a particle first before having it sectioned, then the sample will need to be sent back to JSC for sectioning and then returned to the PI for additional analysis. There are some very rare circumstances that would allow for a PI to complete this type of work, such as polishing in an anoxic environment, but any request to complete sectioning work outside of JSC would require rigorous justification by the PI in their submitted sample request. Generally thick sections, between 100-150 μm, are the default option when it comes to allocating sectioned Bennu samples, however standard thin sections of 30 μm can be made when necessary [5] and PIs should clearly specify in their request what thickness will be required to conduct their planned analyses. It should also be noted that gold coating of sections is not usually approved and will require rigorous justification.

Special Preparations: Any special sample preparation that is required should be noted in sample requests. JSC curation takes steps to process samples in a manner that best suits the needs of the PI, however there are some limitations. JSC curation is unable to provide homogenous powders, and any powdering of a sample will need to be completed by the PI when approved to do so. Additionally, JSC curation is not able to provide any guarantees as to the specific mineral phases that any particular sample may contain, especially if those phases are uncommon or rare in Bennu samples. In most cases, only a visual characterization of the exterior and XCT data of the

interior is collected on particles and the results of those should not be considered definitive of any mineral or chemical composition of the samples. Another special preparation to consider is the need to have samples shipped in nitrogen sealed containers. In some cases, it may be necessary to prevent environmental contamination that could occur during the shipping process and in those instances, JSC curation does have the ability to seal samples in stainless steel containers that can hold a nitrogen atmosphere for up to six months. This allows samples to be kept in anoxic conditions until they are in the possession of the PI. As we approach the end of mission, we are moving toward allocating samples in sealed stainless steel containers only when requested and justified. These containers are reusable and should be returned to NASA curation to ensure we are able to continue providing this option to the community. There are resources available that instruct on how to properly open these sealed containers without compromising the sample inside [6].

Restrictions on XCT Scanning: In order to obtain as much information as possible about the Bennu samples, it is a common practice to XCT scan particles (aggregates are not typically XCT scanned) before allocation [7]. This means that pristine XCT data may be collected on samples before they are containerized and delivered. Since this is the case, it is important that PIs indicate in their sample request whether XCT scanning could negatively affect their proposed scientific research. There is an opportunity to answer a question about this on the sample request form and PIs should be sure to specify if they prefer to not have their samples XCT scanned prior to allocation. In any case where a PI has stated that XCT scanning could have undesirable effects on their proposed research, JSC curation will work to ensure that samples will not be scanned prior to allocation.

Request Review Process and Allocations: After the request deadline passes, all the submitted requests are carefully reviewed by the Carbonaceous Asteroid Allocation Panel (CAAP) of the Astromaterials Allocation Review Board (AARB). Only a limited mass of Bennu samples can be allocated in each round as indicated in the Sample Conservation Plan [8]. The AARB review panels, including CAAP, are comprised of scientific experts who utilize the information in that plan and in the requests to determine if they meet the standards and necessary criteria to allow for allocation. Once all the requests have been reviewed and decisions about allocations have been finalized, the OSIRIS-REx Collection Curator will notify each requestor with the status of their request. Possible outcomes include the request being fully approved, approved with qualifications, selectable, selectable with qualifications or denied. Any qualifications will be discussed with the Principal Investigator (PI) and selectable requests will only be allocated if time permits after the requests that were approved and approved with qualifications have been allocated. If a request is designated a status of approved or selectable, the PI will need to establish a loan agreement between their institution and NASA before any samples can be allocated. After a loan agreement is in place, the approved samples can be processed by the curation team at JSC and allocated to the PI. Typically, sample processing of all the approved requests can take as long as six months so PIs will be given estimates of when they will likely receive their samples and updated when the processing is complete, and the samples are ready for shipment. Processing for selectable sample requests follows processing for approved requests from the same round of review and may take longer than six months to allocate. The efforts by requestors to submit well developed requests will allow for a more efficient and thorough review process and most appropriate allocation of samples.

References: [1] Lauretta, D.S., et, al. (2024) *Meteoritics & Planetary Science* 59:2453-2486. [2] Righter, K., et, al. (2023) *Meteoritics & Planetary Science* 58(4):572-590. [3] Lunning N.G. et al. (2025) *LPSC LVI,* Abstract #1496. [4] Davidson, J. (2025) Astromaterials Newsletter 7(1): https://ares.jsc.nasa.gov/astromaterials-newsletter/vol7-no1/astromaterials-news.cfm. [5] Harrington, R. et al. (2025) *LPSC LVI,* Abstract #1960. [6] Rivera, E.V., et al. (2025) *Workshop on Bennu and Ryugu: Samples from the Early Solar System,* Abstract #2027. [7] Eckley, S.A., et al. (2025) *Workshop on Bennu and Ryugu: Samples from the Early Solar System,* Abstract #2018. [8] Lunning, N.G, et. al. (2024) Sample Conservation Plan for the NASA OSIRIS-REx Collection: Revision A. https://curator.jsc.nasa.gov/osirisrex/forms/OREx_ConservationPlan_20240501.pdf.