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Microparticle Impact Curation Investigator's Guidebook

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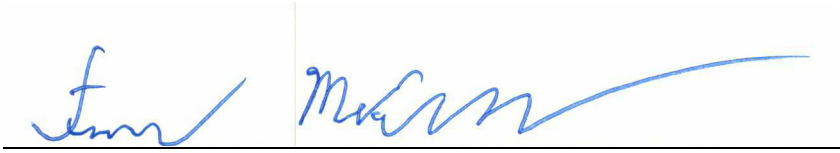

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NASA Astromaterials Curator

REVISIONS AND CHANGES

REV LTR	CHANGE NO.	DESCRIPTION	DATE
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1.0 PURPOSE OF THIS GUIDEBOOK

The Microparticle Impact Investigator's Guidebook is a reference source with descriptions of specific procedures for requesting samples and requirements for care of any samples allocated. Further information concerning these and other collections of space-exposed hardware and extraterrestrial samples is online at http://curator.jsc.nasa.gov/

2.0 OVERVIEW AND DOCUMENTATION

2.1 Microparticle Impacts on Space Exposed Hardware

NASA policy directs the Astromaterials Acquisition and Curation Office at the Johnson Space Center to curate all of NASA's astromaterials samples. Space-flown hardware parts, if properly documented, collected and curated, can provide excellent collection surfaces for extraterrestrial materials, and also preserve samples of space- or spacecraft-induced contamination that will facilitate detailed analyses. Towards this goal, relevant space-flown hardware should be well curated and accessible to the astromaterials community. Beginning in 1985, a large variety of space-exposed materials from spacecraft and satellites containing documented space-exposure features have been selected and carefully curated in, first, the Facility for the Optical Inspection of Large Surfaces (FOILS Lab), in 2004 the Space-Exposed Hardware Laboratory (SEH Lab), and starting in late 2015 the Microparticle Impact Curation (MIC) Lab located in the Curatorial Facility at the Johnson Space Center (JSC). The current sources of these harvested materials are:

Long Duration Exposure Facility (LDEF)
Solar Maximum Satellite (SolarMax)
European Recoverable Carrier (EURECA)
Trek blanket from the MIR space Station
Hardware from the Hubble Space Telescope
Materials exposed to space from the cargo bay of Space Shuttles
Surveyor III parts retrieved during the Apollo 12 mission
Sample return capsule (SRC) parts from the Stardust and Genesis Spacecraft

The current holdings are described at http://curator.jsc.nasa.gov/mic/index.cfm.

The use of these space exposed materials for elucidating the nature of astromaterials represents low-cost, bonus science for the original space missions, and for some spacecraft (i.e. LDEF) represent an essential product of the original mission. The curated samples do not include electronic components, pyros, batteries or other potentially hazardous materials.

The diversity of the current space exposed hardware collections offers the opportunity to study a variety of extraterrestrial materials including micrometeorites, solar and galactic cosmic rays.

These microparticle-bearing space-exposed materials are curated in addition to lunar samples, Antarctic meteorites, interplanetary dust, Stardust, Genesis and Hayabusa mission samples as a critical source of extraterrestrial materials for scientific study. All selected surfaces have been stored in the MIC Lab, which is a dedicated facility for the storage and preliminary examination of microparticle-bearing space-exposed surfaces, and occupies a class 10,000 (ISO Class7) clean room. The cleanliness of this facility thus exceeds that provided by the class 100,000 (ISO Class 8) clean room used to house most space hardware during integration and de-integration activities.

The Genesis and Stardust Mission materials are mentioned in this guidebook, but their allocations are handled by the independent Genesis and Stardust Curators, and Investigators seeking these materials must apply to those Curators rather than the Microparticle Impact Curator. Similarly, the Surveyor III materials are controlled by the Lunar Curator.

2.2 Documentation

The Microparticle Impact Curator maintains databases documenting the spacecraft hardware and its processing. These databases are supplemented by extensive photographic records. Investigators should contact the Curator for copies of these records to support hardware requests and subsequent testing. The documentation for Stardust, Genesis and Surveyor III Hardware are also incorporated into catalogs of the curated Stardust, Genesis, and Lunar samples. Investigators should contact the respective Curators for copies of these records to support hardware requests and subsequent testing, as mentioned above.

3.0 REQUESTS FOR SAMPLES

Returned spacecraft hardware is a limited national resource and a future heritage. Samples are released only for approved applications in research, and, very rarely, public display. To meet that responsibility, NASA carefully screens all sample requests. The review process is delegated to the Curation and Analyses Planning Team for Extraterrestrial Materials (CAPTEM), and appropriate subcommittees thereof. Allocation Committee recommendation of a request, followed by approval by the appropriate NASA Curator (Stardust, Genesis, Lunar or MIC), and concurrence from NASA Headquarters, authorizes the Microparticle Impact Curator to prepare and allocate samples.

Requests for tests that do not involve removal of the spacecraft hardware from JSC, nor alteration of the hardware, may be assessed solely by the appropriate Curator. These requests are still required to include detailed plans and procedures, as described below. In such cases, the Curator shall fully inform the appropriate Allocation Committee.

4.0 SUBMITTING SAMPLE REQUESTS

Sample requests (except those for Stardust, Genesis or Surveyor III hardware) should be submitted directly to the Microparticle Impact Curator at the following address:

Dr. Michael Zolensky
Microparticle Impact Curator
Mail Code XI2
NASA Johnson Space Center
2101 NASA Parkway
Houston, TX 77058

281-483-5128 voice 281-483-5347 fax
michael.e.zolensky@nasa.gov

Receipt of requests will be confirmed by the Curator. Requests determined to be sufficiently mature to warrant consideration will be forwarded to the appropriate Allocation Committee. Electronic submissions are the norm and will expedite the allocation review process. The Allocation Committee will process applications on an ongoing basis, as received. All individuals requesting Stardust, Genesis, or Surveyor III Hardware samples should follow the requirements and guidelines given in the appropriate Guidebook, located on the JSC Astromaterials website: http://curator.jsc.nasa.gov/.

4.1 Statement of objectives and description of the analyses to be conducted

State the analysis objectives and describe the analyses in sufficient detail to permit an in-depth review. State whether the analyses will be destructive or non-destructive, and the hardware required. State how the results will be reported.

4.2 Sampling Plan

Provide a detailed plan for sampling the hardware, including specific parts or locations, procedures, and tools required. The sampling plan should be discussed with JSC Curatorial personnel prior to submission of the request.

4.3 Shipping and return plan

Provide a shipping and return plan, including any requirements for specialized containers. Investigator-supplied shipping containers are encouraged. The design of such containers should be worked out in advance with JSC Curatorial personnel. The Investigator should provide an estimate of the date by which the Hardware will be returned to JSC.

5.0 LOAN AGREEMENTS AND SAMPLE TRANSFERS

5.1 Loan Agreements

Following Allocation Committee recommendation, and concurrence by NASA Headquarters, the Microparticle Impact Curator will prepare a Loan Agreement for signature by the Investigator. This Agreement delineates the responsibilities of the Investigator, including precautions required to minimize the possibility of theft or unauthorized use of the hardware. Loan Agreement forms are available at the JSC Astromaterials website: http://curator.jsc.nasa.gov/mic/index.cfm. Upon receipt of the properly executed Loan Agreement, the Curator will prepare the authorized samples and ship them to the Investigator. Requestors for Stardust, Genesis or Surveyor III hardware must, instead, sign and submit the appropriate Loan Agreement for that particular mission (there are links to these at http://curator.jsc.nasa.gov/).

5.2 Sample transfers

Hardware analysis may require the analytical capabilities of several institutions applied to an individual piece, requiring transfer among Investigators at different locations. The Investigator signing the Loan Agreement is the Accountable Investigator responsible for the security and tracking of the specimens assigned to him or her. If the Accountable Investigator sends the hardware to a Collaborator at another location, that Collaborator must be made aware of the security and handling protocols that are required. This is accomplished by having each Collaborator sign, and place on file with the Curator prior to receipt of hardware, a PI-to-PI Transfer Form (available at http://curator.jsc.nasa.gov/mic/index.cfm). A PI-to-PI Transfer Form details the handling, storage, and transfer protocols required to protect the Hardware from theft or loss. A signed facsimile on file with the Curator is adequate until a paper copy arrives. Note: the Accountable Investigator remains responsible for the hardware, even if is temporarily transferred to a Collaborator.

6.0 CONTINUATION AS A SAMPLE INVESTIGATOR

An Investigator's privilege for retention and use of samples is contingent upon fulfilling the following obligations: (1) maintenance of, and adherence to, the Loan Agreement; (2) timely cooperation with the annual inventory; (3) timely cooperation with sample recalls, if necessary, and d) continued need for retention of hardware for planned, timely analyses.

7.0 SECURITY AND ACCOUNTABILITY

Space exposed hardware is the property of the United States Government, and it is NASA's policy that these materials will be used only for authorized purposes. It is therefore essential that rigorous accountability and security procedures be followed by all persons who have access to this material.

7.1 Security

The Investigator is responsible for the control and safeguarding of all materials allocated to his or her custody. Keeping these materials under supervision or control of the Investigator and/or their Designee during use is required. When not in use, the hardware must be locked in a safe or secure storage cabinet equipped with a combination padlock, or, if a controlled environment is required, in a locked laboratory. Combinations to the storage safe or cabinet will be under the exclusive control of the Investigator and/or their Designee. At the end of each use an inventory shall be made to insure accountability of the hardware. Such inventories shall be maintained as a permanent record and shall be made accessible to NASA upon request. In no case may the space exposed hardware be stored with money, precious stones or minerals, classified material, or any other item that is considered to be of high theft potential. In the event a piece of space exposed hardware is missing, lost, or cannot be accounted for, the Investigator must immediately report the loss to the Microparticle Impact Curator. The form for doing this is available at: http://curator.jsc.nasa.gov/mic/index.cfm.

Investigators shall maintain complete records of the use of space exposed hardware in their possession. These materials become the Investigator's responsibility when he or she accepts delivery from NASA, and that responsibility ends only when (1) the material has been returned to NASA in the manner authorized, and (2) all material has been accounted for. The following sections specify requirements for Hardware accountability which must be met by an Investigator.

7.1.1 Use of Electronic Documents

Electronic documents may be used to increase efficiency under these conditions: a) verification of sample transfers by electronic media shall be from Investigators using institutional computer accounts secured with password protection under the exclusive control of the Investigator, b) facsimile copies must be signed and be comparable to a signature on record with the Curator (for example, the Loan Agreement). The Curator will print paper copies of transfer documents and other documents for inclusion in the Curator's permanent record for Investigators. Paper documents for the Loan Agreement and the annual inventory are required.

7.1.2 Documentation of Hardware Transfers Between Curator and Investigator

All hardware transfers between the Curator and each Investigator must be documented. By

signing the sample Assignment form, which will accompany each allocated sample, the Investigator becomes accountable for the hardware. An Investigator may designate to another person to receive samples in his or her name. Such a designation must be in writing and a copy must be on file with the Curator (e-mail to the Curator is acceptable and will be printed for the file copy). A Delegation of Authority does not relieve the Investigator of responsibility for samples received by his or her Designee.

7.1.2.1 **Hardware transmitted by the Curator is accompanied by an Assignment form.**

Upon receipt of microparticle-bearing space exposed hardware, the form must be signed by the Investigator and returned to the Curator (signed facsimile is acceptable; however, the Investigator assumes the responsibility of verifying that the form was received by the Curator).

7.1.3 Return Documentation

All samples and created subsamples remaining at the completion of testing are to be returned to the Curator. Upon the receipt of the sample and accountability and history documentation from an investigator, the database will be updated and the Curator will issue a Return Receipt. The form for doing this is available at: http://curator.jsc.nasa.gov/mic/index.cfm.

For each piece of hardware returned to the Curator, a history of the handling by the Investigator shall be provided. This history shall include handling and analytical procedures applied to the hardware and exposure to any environments or chemicals that may alter the material. If all or parts of the hardware are consumed during testing, this shall be documented.

8.0 SAMPLE INVENTORY

Annually, during the first half of the calendar year, the Curator will provide each Investigator with a complete inventory listing of samples for which the Investigator is accountable. The Investigator shall review and verify the listing of current holdings to ensure that all are appropriately listed. The annual inventory must be supervised by the Investigator and witnessed by a security official, or other official of the Investigator's institution. The verified inventory listing shall be promptly returned to the Curator. Failure to promptly return the signed Inventory will result in the recall of all allocated samples.

If pieces of hardware are in the possession of a collaborator at the time of the annual inventory, the Investigator may authorize (in writing; signed facsimile is adequate) the Collaborator to conduct the inventory and account for those pieces. That properly witnessed verification must be provided to the accountable Investigator who will transmit it to the Curator as part of the total inventory verification. In no case will the verification of the inventory by any person other than an Investigator or Collaborator, having a valid User Agreement, be accepted by the Curator.

9.0 NUMBERING OF SAMPLES AND SUB-SAMPLES

Permanent numbers for individual pieces of hardware are assigned by the Curator's staff. Investigators are required to identify all splits they create, as created, to the Curator, who will issue new split numbers. The Curator will enter the each description and number into the database. Investigators cannot assign their own sample numbers.

10.0 SHIPPING

Pieces of hardware may be transferred by Federal Express or equivalent reliable courier service that provides online, real-time tracking of shipments. The process for shipping has three steps. First, the shipper (usually the Curation staff) communicates with the recipient to verify that someone will be there to accept delivery on a certain date. Second, the shipper sends an e-mail announcing that the package has been sent for delivery on a certain date. This message includes the tracking number and a reminder that the recipient should promptly acknowledge receipt of package. Third, if no response is received on delivery date from the recipient, the shipper will send an e-mail query asking for confirmation of delivery. A search shall begin immediately, if needed.

Fed Ex forms require a value of package contents. This value shall be recorded as "zero". To preclude inadvertent opening by mail room employees, place inside the box a prominent message "MAIL ROOM EMPLOYEES: THIS PACKAGE CONTAINS MATERIALS TO BE OPENED ONLY IN A CLEANROOM.