

**JSC-06090**  
**Revision F**

# **LUNAR SAMPLE ALLOCATION**

# **GUIDEBOOK**

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Astromaterials Acquisition and Curation Office  
Astromaterials Research and Exploration Science Directorate

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National Aeronautics and  
Space Administration

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## 1.0 INTRODUCTION

### 1.1 Purpose

The Lunar Sample Allocation Guidebook is a reference source for lunar sample investigators and prospective investigators, and includes descriptions of specific procedures and requirements, as well as Lunar Curatorial and other facilities available to support lunar sample investigators.

### 1.2 Overview of the Apollo Lunar Sample Collection

The Apollo missions to the Moon included six piloted landings in 1969-72 that returned to Earth a total of 382 kilograms (842 pounds) of geologic samples consisting of 2,196 separate specimens. Table 1 summarizes the original collection on a mission-by-mission basis. Recognizing that the scientific value of the samples can be maximized only by intensive study of the materials, NASA continuously has made available subsamples of lunar material to qualified investigators. Results of those studies have been published by teams of investigators, as well as by individual investigators, in the open scientific literature. An authoritative digest of those findings can be found in *Lunar Sourcebook: A User's Guide to the Moon* (G. Heiken, D. Vaniman, and B. M. French, Eds.; Cambridge University Press, 736 pp.; 1991; ISBN 0-521-33444-6) and the *New Views of the Moon* (B. Jolliff, M. Wieczorek, C. Shearer, and C. Neal, Eds.; Mineralogical Society of America Reviews in Mineralogy & Geochemistry, Vol. 60, 772 pp.; 2006; ISBN 0-939-95072-3). Although samples have been provided to thousands of different research projects, conservation of the sample collection has assured that substantial amounts of pristine sample material remain available for continuing and future studies.

Table 1. Summary of Apollo lunar sample collection returned from the Moon.

Mission	Rocks		Core samples		Regolith Fines		Mission Total	
	No	Mass(g)	No	Mass(g)	No	Mass(g)	No	Mass(g)
AP 11	50	9685.717	2	98.2	16	11770.625	68	21554.542
AP 12	49	27682.04	4	427.1	16	6242.4	69	34351.54
AP 14	151	28629.81	6	377.59	70	13277.31	227	42284.71
AP15	267	58578.16	11	4645.0	179	140887.4	457	77310.56
AP16	544	70069.321	16	7050.7	282	18594.43	842	95714.451
AP17	335	73712.513	17	7337.28	398	29468.421	750	110518.214
TOT.	11396	268357.561	56	19935.87	961	93440.586	2413	381734.017

## 2.0 ACCESS TO LUNAR SAMPLES

NASA policies define lunar samples as a limited national resource and future heritage, and require that samples be released only for approved applications in research, education, and public display. To meet that responsibility, NASA carefully screens all sample requests with most of the review process delegated to the Curation Analysis and Planning Team for Extraterrestrial Materials (CAPTEM) and the Apollo Sample Curator. All individuals requesting a lunar sample should follow the steps given below for the appropriate category of sample.

### 2.1 Research samples

NASA provides lunar rock, regolith, and core samples for both destructive and non-destructive analysis in pursuit of new scientific knowledge. Requests are considered for both

basic studies in planetary science and applied studies in lunar materials beneficiation, resource utilization, and human spaceflight.

**2.1.1 The sample investigator must demonstrate favorable scientific peer review of the proposed work involving lunar samples.**

The required peer review can be demonstrated in any one of three ways: (1) a formal research proposal recommended by any NASA funding program for planetary or program science within the past three years; (2) a formal research proposal recommended and funded by any government or nonprofit funding agency, foreign or domestic; or (3) submittal of a proposal for the research supported by reprints of scientific articles pertaining directly to the specific research methods to be applied to the samples (step 2.1.2), and published in peer-reviewed professional journals.

New investigators not familiar with lunar materials should consult *Lunar Sourcebook: A User's Guide to the Moon* (G. Heiken, D. Vaniman, and B. M. French, Eds.; Cambridge University Press, 736 pp.; 1991) and the *New Views of the Moon* (B. Jolliff, M. Wieczorek, C. Shearer, and C. Neal, Eds.; Mineralogical Society of America Reviews in Mineralogy & Geochemistry, Vol. 60, 772 pp.; 2006). See also [www.lpi.usra.edu](http://www.lpi.usra.edu).

**2.1.2 The investigator submits a written request specifying the numbers, types and quantities of lunar samples needed as well as the planned use of the samples.**

For planetary science studies, the sample request proposal should be submitted directly to the Apollo Sample Curator at the follow address:

Ryan A. Zeigler  
Apollo Sample Curator  
Mail Code KT  
NASA Johnson Space Center  
2101 NASA Parkway  
Houston, Texas 77058-3696  
USA  
Office: 281-244-6923  
Fax: 281-483-5347  
E-Mail: [ryan.a.zeigler@nasa.gov](mailto:ryan.a.zeigler@nasa.gov)

The sample request must present the scientific or technological justification, the scientific or technological methods, and the scientific or technological benefits. The request will be considered favorably if preliminary work has been completed on terrestrial, meteoritic, or lunar simulant materials using proposed peer-reviewed methods. Requests determined to be sufficiently mature to warrant consideration for use of lunar materials will be forwarded to CAPTEM by the Apollo Sample Curator.

For new investigators, tangible evidence of favorable peer review (step 2.1.1) should be attached to the sample request proposal together with appropriate résumés. Investigators proposing the application of new analytical methodologies (not previously applied to lunar samples) should submit test data obtained for simulated lunar materials including meteoritic and carefully selected terrestrial materials.

The Curation Web site contains a summary of the requirements for lunar sample requests:

<http://curator.jsc.nasa.gov/lunar/sampreq/index.cfm>

**2.1.3 The Apollo Sample Curator will research the availability of the requested samples and decide whether the request can be processed without further action or if the request is to be reviewed by CAPTEM.**

Outside review is prescribed for all new investigators and for most established investigators except where returned (previously used) samples are being requested. For outside review, the Lunar Sample Curator forwards the original request, with background information, to CAPTEM, a standing committee of scientists (with rotating membership) who advise NASA on the care and use of lunar samples. CAPTEM checks for favorable peer review (step 2.1.1) and appropriate sample selection (step 2.1.2).

**2.1.4 Given CAPTEM endorsement and concurrence by NASA Headquarters, the Apollo Sample Curator will prepare a Lunar Sample Loan Agreement for signature by the investigator's institution.**

The agreement delineates the responsibilities of the new investigator and includes a security plan that prescribes precautions to minimize prospects for theft or unauthorized use of lunar samples. A PI's privilege for retention and use of lunar samples is contingent upon continued compliance with the Lunar Sample Loan Agreement. The PI will remain in good standing by fulfilling the following obligations: (1) maintenance of, and adherence to, the lunar sample loan agreement; (2) timely cooperation with annual lunar sample inventory; and (3) timely cooperation with sample recalls.

**2.1.5 Upon receipt of the properly executed loan agreement, the Apollo Sample Curator prepares the authorized samples and sends them to the investigator.**

Quantities less than 10 grams can be sent directly by U. S. registered mail to domestic investigators. Shipments to foreign investigators are sent by an international courier service, e.g. FedEx. *Quantities larger than 10 grams will usually be hand-carried by the investigator or a designated representative; exceptions to this requirement will be considered by the Apollo Sample Curator.*

**2.1.6 Continuation as a Lunar Sample PI.**

A PI's privilege for retention and use of lunar samples is contingent upon continued good standing in the Lunar Sample Program. The PI will remain in good standing by fulfilling the following obligations: (1) maintenance of, and adherence to, the lunar sample loan agreement; (2) timely cooperation with annual lunar sample inventory; and (3) timely cooperation with sample recalls.

**2.2 Public Display Samples**

NASA provides for a limited number of rock samples to be used for either short-term or long-term displays at museums, planetariums, expositions, or professional events that are open to the public. Requests for such display samples are administratively handled by the JSC Public Affairs Office (PAO). Requestors located in the United States should apply in writing to the following address:

Elizabeth LeBlanc  
JSC Exhibits Manager  
Mail Code AD  
Office of Public Affairs  
NASA Johnson Space Center  
2101 NASA Parkway  
Houston, TX 77058-3696  
USA  
Email: [elizabeth.s.leblanc@nasa.gov](mailto:elizabeth.s.leblanc@nasa.gov) Office: 281-244-5088  
Fax: 281-483-3741

For both domestic and foreign requestors, Ms. LaBlanc will pass along the request to CAPTEM, via the Apollo Sample Curator, for advice on available samples and the suitability of the request. She will then advise successful applicants regarding provisions for receipt, display, and return of the samples. All loans will be preceded by a signed loan agreement executed between NASA and the requestor's organization. Ms. LeBlanc will coordinate the preparation of new display samples with the Apollo Sample Curator.

The Curation Web site contains a summary of the requirements for lunar sample display requests:

<http://curator.jsc.nasa.gov/lunar/sampreq/index.cfm>

### **2.3 Educational Thin Sections Packages**

NASA prepared polished thin sections of representative lunar rocks on rectangular 1 x 2-inch glass slides, with special safety frames, that are suitable for use in college and university courses in petrology and microscopic petrography for advanced geology students. Each set of 12 slides is accompanied by a sample disk of representative lunar rocks and soils, embedded in rugged acrylic disks suitable for classroom use and teaching materials. The typical loan period is two weeks. The Thin Section Package is sent 10 days in advance by registered mail. Each requestor must apply in writing, on college or university letterhead, to the following address:

Mary Luckey  
Education Sample Curator  
Mail Code KT  
NASA/Johnson Space Center  
2101 NASA Parkway  
Houston, TX 77058-3696  
USA  
Email: [mary.k.luckey@nasa.gov](mailto:mary.k.luckey@nasa.gov)  
Office: 281-483-3154  
Fax: 281-483-5347

For each approved user, the Curation Office will prepare a loan agreement to be executed between NASA and the requestor's institution prior to shipment of the thin section package.

### **3.0 LUNAR SAMPLE ACCOUNTABILITY AND SECURITY**

Lunar samples are the property of the United States Government, and it is NASA's policy that lunar sample 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 lunar materials. The elements of these procedures, described in the next sections, are (1) lunar sample loan agreement, (2) PI accounting procedures for lunar samples, and (3) annual lunar sample inventory.

Failure to abide by the elements of these procedures in a timely manner will result in the recall of all Apollo samples from a PI.

A program is in place for spot checks, by the Apollo sample curator, the JSC Security Division, and the International Relations Division of NASA Headquarters, for investigator adherence to procedures described in this guidebook, adherence to the provisions of security conditions within the loan agreement, and adherence to the requirement for annual sample inventories.

#### **3.1 Lunar Sample Loan Agreements**

A current loan agreement is a condition for the receipt and use of lunar research samples and lunar educational samples. These legally binding agreements specify the conditions for the loan of lunar samples, including security measures for safeguarding the samples, the return of loaned samples to NASA and, for research samples, an annual inventory of samples in the PI's possession. Appendix A1, *Domestic Lunar Sample Loan Agreement* and Appendix A2, *International Lunar Sample Loan Agreement* are examples of a loan agreement for research on lunar samples. Appendix B, *Lunar Petrographic Thin Section Package Loan Agreement*, is an example of a loan agreement for educational samples. Typically, research samples are loaned for a period of five years. At the end of the five year plan, the samples need to either be returned or an extension requested from the Apollo Sample Curator. Educational samples are loaned for a standard period of two weeks, unless other time periods are justified by the requestor and approved by the Apollo Sample Curator who may seek guidance from CAPTEM in this decision.

#### **3.2 Lunar Sample Security**

A lunar sample PI is responsible for the control and safeguarding of all lunar samples consigned to his/her custody. In the event a sample is missing, lost, or cannot be accounted for, the PI must immediately report it to the local law enforcement agency and to the Apollo Sample Curator. A delay in reporting could seriously impede efforts to locate and recover the sample.

To ensure that appropriate procedures and safeguards are carried out in the PI's laboratory, and at the laboratories of his/her co-investigators if different from his/her own, a sample security plan is required. For research samples, the security plan is delineated in the "Responsibilities" section (particularly section 2) of the lunar loan agreement as shown in Appendix A1, *Domestic Lunar Sample Loan Agreement* or A2, *International Lunar Sample Loan Agreement*. For educational samples, the security plan is incorporated in the loan agreement as shown in Appendix B, *Lunar Petrographic Thin Section Package Loan Agreement*.

It is recognized that security plans may differ somewhat between investigators, but every plan must incorporate the elements of security outlined in the *Lunar Sample Loan Agreement*. Changes in security plans are considered to be changes in scope of a contractual agreement, and must be submitted in writing to the Apollo Sample Curator for approval. The elements of an

appropriate security plan include maintenance of an inventory log, keeping lunar samples under continual supervision, keeping lunar samples under the control of the PI and/or his designate. In no case may the lunar samples be stored with money, precious stones or minerals, classified material, or any other item that is considered to be of high theft value.

### **3.3 Lunar Sample Accountability**

Lunar sample investigators are expected to maintain complete records of the use of lunar samples in their possession. The samples become the PI's responsibility when delivery of the samples from NASA has been accepted, and that responsibility ends only when (1) the samples have been returned to NASA in the manner authorized, and (2) all sample material has been accounted for. The following sections specify requirements of sample accountability which must be met by a lunar sample PI.

#### **3.3.1 Sample Transfer Documentation for Research and Educational Samples**

All sample transfers between the Apollo Sample Curator and PIs must be documented. By signing the Sample Assignment Form (Appendix C), the recipient investigator becomes accountable for the sample. A PI may delegate authority to another person to receive samples in his/her name. Such a delegation of authority must be in writing and a copy must be on file with the Apollo Sample Curator. A delegation of authority does not relieve the PI of responsibility for samples received by the delegated alternate or Co-Investigator.

Research samples transmitted by the Apollo Sample Curator are accompanied by a *Lunar Sample Assignment* form, an example of which is shown as Appendix C. Educational samples transmitted by the Apollo Sample Curator are accompanied by a *Lunar Petrographic Thin Section Package Sample Assignment* form, an example of which is shown as Appendix D. Upon receipt of samples, the appropriate form must be signed by the PI and returned to the Apollo Sample Curator.

Sample transfers are generally not permitted between or among PIs. The permanent transfer of samples to another PI should be completed by returning the samples to JSC. Samples will be reissued to the new PI. If a portion of an allocated sample is to be transferred to a new PI the sample is to be returned to JSC with an F-75 (Appendix G) documenting the splitting of the original sample. The returned sample will be given a new number and allocated to the new PI. In rare instances it is prudent to make a direct PI to PI transfer. This should only be done with the approval of the Apollo Sample Curator and an F-75 documenting the splitting of the original sample should be sent to the Apollo Sample Curator.

#### **3.3.2 Sample Return Documentation for Research and Educational Samples**

All lunar samples and residues remaining at the completion of experiments or investigations are to be returned to the Apollo Sample Curator. Upon the receipt of the samples and sample accountability and history documentation (section 3.3.3) from an investigator, the database will be updated and the Apollo Sample Curator will issue a *Lunar Sample Return Receipt* (Appendix E) for research samples, and a *Lunar Petrographic Thin Section Package Sample Receipt* (Appendix F) for educational samples.

#### **3.3.3 Sample Accountability and History Documentation for Research Samples**

A summary of sample accountability information and a brief history of sample treatment must be returned to the Apollo Sample Curator whenever sample materials are returned. *Lunar Curatorial Form F-75, Return Sample Accountability & History* (Appendix G), has been

designed to simplify the accounting for allocated sample mass and the handling history of the lunar material while in the investigator's possession.

The sample history should be presented on *Lunar Curatorial Form F-75* as brief narrative describing actions that could have degraded the sample (e.g., processed in air, washed in acetone, crushed, sieved, etc.). Accurate documentation permits reallocation of samples not compromised by tests and handling, to other investigators for research.

Instructions for completing *Lunar Curatorial Form F-75* and for the packaging and mailing of samples to the Apollo Sample Curator will be provided to every investigator. An example of these instructions is shown as Appendix H. An electronic version of the F-75, the continuation sheet F-75c, and the instructions can be downloaded - <http://curator.jsc.nasa.gov/lunar/samretins.cfm>

### **3.4 Lunar Sample Inventory for Research samples**

Annually, the Apollo Sample Curator will provide each PI with a complete inventory listing of samples in the investigator's possession for which the investigator is accountable. The PI is expected to review and verify the listing of current sample holdings to ensure (1) that all samples are appropriately listed, and (2) that all sample weights are correct. If the weight of a sample has changed as a result of destructive analysis, this fact must be documented and an F-75 submitted to change the accountable weight of the sample. The annual inventory must be supervised by the Principal Investigator and witnessed by a security official or other official of the investigator's institution. The verified inventory listing is to be promptly returned to the Apollo Sample Curator.

Where samples are in the possession of a Co-Investigator at the time of the annual inventory, the PI may authorize (in writing) the Co-Investigator to conduct the inventory and account for those samples in the possession of the Co-Investigator. That properly witnessed verification must be provided to the PI who will transmit it to the Apollo Sample Curator as part of the total inventory verification. In no case will the verification of sample inventory by any person other than a PI or an authorized Co-Investigator be accepted by the Apollo Sample Curator.

## **4.0 SAMPLE ALLOCATIONS**

Samples, including thin sections, are allocated to PIs on the recommendation of CAPTEM. Sample requests are reviewed by CAPTEM and approval is based on the premise that the PI is attempting to solve some specific lunar science or comparative planetology problem or an engineering study critical to future robotic or human missions. CAPTEM will usually respond directly to the PI requests, but on occasion may suggest alternative science strategies or samples based on its experience with lunar samples. The PI is not obligated to accept the recommendations in which case the PI and CAPTEM may need to negotiate a final allocation plan. Allocation plans are reviewed and approved by the Associate Administrator of the Science Mission Directorate at NASA Headquarters.

### **4.1 Sample Requests**

It is essential that sample requests include a scientific discussion of the specific problem(s) that will be pursued in the sample studies and how the requested sample bear on the problem(s). Samples may be requested at any time. CAPTEM meets twice per year; one meeting is usually associated with the Lunar and Planetary Science Conference in March and the

other usually occurs some time during October. Some requests will be evaluated between meetings. These requests include those from existing PIs requesting samples for previously approved projects, requests for thin sections only, requests for returned lunar samples. As a general guideline, no lunar sample will be allocated that reduces the remaining pristine sample below 50% by weight. Exceptions are granted based on the importance of the scientific problems being studied.

#### **4.1.1 Thin Sections**

Thin section requests will be completed immediately to approved investigators with current Lunar Sample Loan Agreements, if the material is available. Requests for specific thin sections can be made, but general requests can be filled more promptly. If 1” round sections are required for the study that fact should be specified. A library of lunar thin sections is maintained and PIs can come to the Curation Facility to examine thin sections. Foreign visitors need to request access well in advance of their visit (2-3 months) to allow for badging security checks. We will request the necessary information once we receive the request. The PI can receive an immediate allocation of library thin sections for a period of 6 months. A long-term allocation of thin sections usually requires the fabrication of a new thin section.

Thin section studies are predicated on the assumption that the thin section will not be damaged in any way. Polished surfaces may be immersed in oil for microscopic observation, may be carbon coated for electron microprobe analysis, and may be gently cleaned and repolished in the course of these operations. Studies that require severe degradation of the surface such as ion microprobe or laser ablation inductively coupled plasma mass spectrometry analysis require permission of the Apollo Sample Curator.

#### **4.1.2 Guidelines for Allocating Lunar Samples for Resource, Engineering, and Life Science Studies**

Studies of resource utilization, engineering, and life science applications using lunar samples are encouraged. Lunar samples are, however, a scarce and precious national resource, and limited amounts of material are available for any type of study. Requests for samples must demonstrate knowledge of the lunar collection and be consistent with NASA policies concerning the heritage value of lunar samples.

All processes, procedures, and expected technical outcomes of the proposed tests must be described clearly in the sample request. The request must document the expertise of the team involved in the experiments. NASA funding for the proposed tests may be considered as evidence of expertise but is not a pre-requisite for receiving an allocation of lunar samples.

Prior tests using appropriate simulants are expected and must be documented. The request should identify specific properties of lunar material that make simulants unsuitable for the proposed tests. It is the responsibility of the requestor to obtain appropriate lunar simulants that have been characterized in the open literature, or provide to the Apollo Sample Curator all relevant and necessary information regarding physical or chemical properties of simulants prepared in-house.

The request must demonstrate efforts to downsize the scale of the tests for use of lunar material. Further, the proposers must verify that the request is for the minimum mass of lunar material that will yield useful results.

Test results on extraterrestrial materials are expected to be made available in the open scientific or technical literature. There is no propriety claim on data derived from tests on extraterrestrial materials allocated by NASA.

## 5.0 SAMPLE USE GUIDELINES

### 5.1 Numbering of Samples

Permanent numbers for samples are assigned by the Apollo Sample Curator's staff. Samples returned by investigators may be assigned new numbers when they are re-inventoried upon return to JSC. Investigators are required to identify all daughter samples by an unambiguous numbering system and account for them in their sample history. This numbering scheme must be explicitly written and available for inspection by NASA when security and inventory spot checks are conducted.

The Apollo Sample Curator's staff maintains sample records in a computer database. The computer programs accept the Apollo Sample Curator's numbering scheme, and no other. This numbering scheme is organized in such a manner that each individually separate sample is assigned a double number, the parts separated by a comma (e.g., 14026,34). The two parts are defined as the generic and specific numbers, (also parent, daughter) respectively.

The generic number has been assigned by the Apollo Sample Curator. All samples from the same mission begin with an identical code, as shown in the following table.

<u>Mission</u>	<u>Number</u>
Apollo 11	10XXX
Apollo 12	12XXX
Apollo 14	14XXX
Apollo 15	15XXX
Apollo 16	6XXXX
Apollo 17	7XXXX
Luna 16	21XXX
Luna 20	22XXX
Luna 24	24XXX

Each generic number represents a single rock or soil sample. Some samples are homogeneous; others exhibit a high degree of variability.

On later missions (i.e., Apollo 15 and subsequent), numbering gives an indication of the type of sample represented, such as unsieved soil, sieve fractions, or rocks. Further, for these missions, sample numbers close to one another often indicate that the samples were collected at the same or adjacent lunar sites. These codes are explained fully in the lunar sample catalogs developed for each mission.

The specific number refers to an individual fraction of the whole, and numbers are assigned consecutively by the Lunar Curatorial staff as they are generated and entered in the Lunar Curatorial database.

## **5.2 Disposing of Samples Other Than by Return to Apollo Sample Curator**

The process of analysis, or other operation involving lunar samples, may render them unrecognizable as lunar samples (note: loss of sample labels does not count as rendering samples as unrecognizable). The Apollo Sample Curator may authorize disposal other than by return. With respect to such a disposal, the PI is to inform the Apollo Sample Curator of (a) the identity of the subject lunar sample(s) or lunar sample material(s), (b) the pertinent facts supporting the request for disposal rather than return, (c) a plan for the disposal of the subject material, and (d) submission of the requisite forms detailing the method of destruction, the sample number and type, and the mass involved.

The Apollo Sample Curator must approve all plans to destroy lunar samples in lieu of return to Curation Office. CAPTEM may be consulted for specific cases, if necessary.

### **5.2.1 Criteria for Samples that may be Destroyed in Lieu of Return to Apollo Sample Curator**

a. Sample destruction and disposal must take place by one of the accepted methods for destruction listed below.

b. In every case, destruction and disposal of the samples must be documented as described below.

### **5.2.2 Acceptable Methods for Lunar Sample Destruction**

a. Dissolve the samples completely in acid.

b. Dilute the lunar material in and thoroughly mix with similar terrestrial material such that the lunar sample makes up <30% of the final, homogeneous mixture.

c. Other methods may be approved after discussions between the PI and the Apollo Sample Curator (and CAPTEM if requested by the Apollo Sample Curator).

### **5.2.3 Documentation of Sample Destruction**

The sample history form (F-75) will be used to document what samples are destroyed. Documentation must include:

a. The identity of the sample, including if it is a split of an originally allocated sample.

b. The weight of the sample that was destroyed (the split weight if appropriate, or the original weight if the entire sample has been destroyed).

c. The method of destruction.

d. The method of disposal.

### **5.2.4 Disposal of Containers, Trash, etc.**

Disposable material of small value which comes in contact with lunar samples, such as containers, tools, paper, gloves, etc., should be treated as lunar material. Since lunar dust adheres to most surfaces, these items have potential collector item value. The PI should provide a disposal plan similar to that in section 5.2 or return all items to the Apollo Sample Curator for disposal. Under no circumstances are such items to be handled in a less secure manner than lunar samples themselves.

### **5.3 Acceptable Methods for Handling Extensively Subdivided Lunar Samples that do not Meet the Criteria for Destruction**

Many lunar samples have been extensively subdivided, but do not meet the criteria for destruction discussed above. Nominally each split requires a separate sample history form (F-75). Completion of these largely duplicate forms is a large drain on PI and Curation resources. In some cases, this task may present an impediment to the return of samples. In most cases these samples are of limited value to other scientists. Whether there is value in the sample splits will be determined by consultation and discussion of the nature of the samples between the PI and the Apollo Sample Curator.

#### **5.3.1 For Splits Determined Not to Have Significant Scientific Value**

The splits can be recombined in a single vial and a gross weight determined. The gross weight of the recombined sample and the amount of sample lost to attrition can then be entered on the sample history form, F-75.

#### **5.3.2 For Samples That Do Have Scientific Value**

The splits will be returned as individually contained samples. A single F-75 will describe the process by which the samples were processed and any contamination information. An attachment should list weights of individual samples and describe further individual processing.

### **5.4 Sample Transfers**

Samples that weigh 10 grams or less may be transferred by registered mail between locations in the United States. All samples weighing more than 10 grams are usually hand carried. Because of the ever changing conditions for air travel, exceptions to this requirement will be considered by the Apollo Sample Curator. Specific procedures follow for various cases encountered.

#### **5.4.1 Transfers by Mail from the Apollo Sample Curator to Domestic Investigators**

Samples transferred from the Apollo Sample Curator to a PI are addressed to “(PI name) RESTRICTED DELIVERY.” The RESTRICTED DELIVERY provision allows the PI to authorize someone else to pick up samples at the post office by depositing a letter of authorization at his local post office.

Registered mail will be held by a post office for ten days. If an investigator, who is expecting samples, will not be available to pick up mail for a longer period and has not designated an alternate to pick up RESTRICTED DELIVERY mail, the investigator should notify the Apollo Sample Curator so that samples will not be mailed.

#### **5.4.2 Transfers by Courier from the Apollo Sample Curator to U.S. Investigators**

If the aggregate sample weighs more than 10 grams, the Apollo Sample Curator will attempt to arrange courier service for the sample, but will generally contact the PI for assistance. A PI may request delivery of a sample to self or a designated courier at the Apollo Sample Curator's office at the JSC. A letter of authorization is required to identify a courier who is not a PI. The letter must contain the signature of both the PI and the courier. Because of the ever changing conditions for air travel, exceptions to this requirement will be considered by the Apollo Sample Curator. Specific procedures follow for various cases encountered.

If requested with adequate prior notification, the Apollo Sample Curator's staff will identify the package containing lunar samples for airline officials and will provide identifying documents for the courier's protection. It is recommended that PIs arrange for a similar letter from their own institution which will serve to identify a courier returning samples to JSC. Such a letter will prove valuable in expediting airport security check. An example of a letter provided by the Apollo Sample Curator is shown as Appendix I. Hand-carried samples must remain in the possession of the courier at all times. The courier's home institution should be advised of scheduled departure and arrival times and any changes or delays in order to prevent an overdue delivery going unnoticed. Most samples can be carried to the final destination in a few hours. In the event the courier must stop overnight, care must be taken to protect the samples. During an overnight stay, arrangements should be made to store the samples as safely as possible. Options include a hotel safe or at a local police station. It is recommended that a simple hand receipt be obtained if such storage is necessary. Every situation is different and the courier must use discretion to choose in their estimation the most prudent method of overnight storage. If such storage cannot be secured, the samples must be kept in courier's possession at all times. These caveats do not include lunar display, education, or education thin section samples.

#### **5.4.3 Transfers from the Curation Office to Foreign Investigators**

Samples for foreign investigators are shipped by an International Courier Service (e.g., FedEx) if the samples weigh 10 grams or less. On the inside package a label will be attached that indicates the foreign investigator's name and address. If the samples weigh more than 10 grams they will be hand carried as per domestic investigators, see above.

#### **5.4.4 Transfers from Domestic and Foreign Investigators to the Curation Office**

A PI should notify the Apollo Sample Curator by letter, phone, email, or FAX when a package of lunar samples has been sent for return to JSC. Samples are to be returned to the Apollo Sample Curator in containers that do not degrade the samples further than the experiments to which they have been subjected. Two layers of protection, such as a sample vial within a plastic bag, should be provided at a minimum. If requirements appear to be special, the Apollo Sample Curator should be contacted. The Apollo Sample Curator can also provide cleaned containers on request. One month should be allowed for delivery.

Packages containing no more than 10 grams of lunar materials may be mailed. They should be sent by REGISTERED MAIL "RETURN RECEIPT REQUESTED" to the following address:

REGISTERED MAIL  
NASA Johnson Space Center  
Attn: KT/Dr. Ryan A. Zeigler  
2101 NASA Parkway  
Houston, Texas 77058

Samples returned by foreign investigators should be sent by international courier service (e.g., FedEx).

NASA Johnson Space Center  
Attn: KT/Dr. Ryan A. Zeigler  
Bldg. 31, Room 250  
2101 NASA Parkway  
Houston, Texas 77058  
USA  
281-244-6923

Packages containing more than 10 grams of lunar materials should not be mailed or sent by international courier service and must be hand carried, see 5.4 above.

The U.S. Government acts as a self-insurer, therefore investigators should not obtain postal insurance for lunar samples transmitted by U.S. mail service.

#### **5.4.5 Transfer of Radioactive Materials**

To transfer lunar samples to an irradiation facility in accordance with the provisions of section 5.4, the PI must obtain a security plan from the irradiation facility that describes the safeguarding of the samples upon arrival at the facility, storage prior to and after irradiation, and the procedures to be used for return of the samples to the PI. At a minimum, the plan must include all of the provisions under “Responsibilities” in Section 2 of the Loan Agreement (Appendix A), and the following for shipment of the samples from the facility to the PI:

- a. Irradiated materials, packaged in accordance with the requirements of the Interstate Commerce Commission, will be sent from the irradiation facility to the PI via a commercial carrier who provides a means of controlling the movement of the container within and between terminals, whether by signature or armed guard service.
- b. The Bill of Lading will **not** identify the shipment as lunar samples.
- c. The PI will be notified of the expected time of arrival of each shipment.
- d. The Apollo Sample Curator will be notified immediately in the event a shipment is lost, and details of the loss will be confirmed in writing.
- e. The shipments will be subject to inspection by Apollo on a spot-check basis.
- f. A written statement will be submitted to the Lunar Sample Curator by the responsible irradiation facility personnel, through the PI, that the procedures outlined in section 5.4 of this guidebook are being observed.

### **6.0 PROCESSING, PACKAGING, AND REMOTE STORAGE OF LUNAR SAMPLES**

The conditions under which lunar samples are processed, stored, and packaged, as well as the capabilities of the Apollo Sample Curator’s office to provide special samples to PIs, are described in the following paragraphs.

## **6.1 Lunar Sample Processing**

### **6.1.1 Pristine Lunar Samples**

Most lunar material is stored and processed in a dry nitrogen atmosphere in stainless steel glove boxes. The only materials allowed inside the cabinets, in the form of tools and containers, are stainless steel, aluminum, polyethylene vials, Teflon, and Viton A. The cabinets are equipped for binocular microscopy and photography to support descriptive studies.

Sub-samples are obtained by scooping or splitting samples of fines, and by chipping or sawing rocks. All of these operations are carried out within glove cabinets that contain dry nitrogen. No cooling agent is used in sawing operations. There are no facilities to sieve samples of fines other than the routine splits of <1mm, 1-2mm, 2-4mm, and 4-10mm. Samples can be shaped only with straight saw cuts; there is no capability of preparing circular disks. The success of rock sawing varies from rock to rock. Pieces as small as 1 mm thick can be cut from hard rocks, but it may be impossible to cut a slice thinner than 1 cm for incoherent/friable rocks. Requests for special sample configurations will be considered in association with review of sample requests. Contaminants from sawing are the materials of the blades: diamonds set in stainless steel for the band saws, and diamonds set in copper wire for the wire saws.

PI's are invited to examine rocks in nitrogen cabinets at the Lunar Curatorial Facility. Access to the collection must be requested in writing with justification, and is subject to scheduling by the Apollo Sample Curator. Foreign visitors need to request access well in advance of their visit (2-3 months) to allow for badging security checks. We will request the necessary information once the request is received. In general, technicians working in the Lunar Curatorial Facility will provide actual manipulation of the samples, and can support a variety of photographic requests. Requests to remove material from any sample must be approved in advance as described in Section 2.1.

### **6.1.2 Other Lunar Samples**

A small quantity of sample material is stored in a helium atmosphere and has never been exposed to other gases since initial handling in the Lunar Sample Curatorial Facility. Two Apollo 16 and 17 core tubes are being maintained under vacuum in unopened condition.

Many samples returned by PIs, and a few other special samples, have been exposed to air and can be studied on laminar-flow clean benches. Requests for such inspections should be made in writing to the Apollo Sample Curator, with a statement of the scope, of the reasons for and the requirements of the proposed work. The Apollo Sample Curator will schedule visits to the facility as time and personnel allow. Special samples that fall into this category are coarse-fines (limited amounts of 1-2 mm fines that are available for the selection of specific types of material), and core tube peels (impregnated strips from core tubes, available for binocular microscope study).

## **6.2 Lunar Sample Packaging**

Packaging of lunar samples is designed to provide the maximum protection of samples consistent with the amount of sample and the experiment to be performed. Samples are transmitted to investigators in containers of Teflon, aluminum, stainless steel, or polyethylene with protective layers that usually maintain the sample in nitrogen. Special packaging requirements can be designed to meet the requirements of lunar sample investigators as long as

those requirements do not call for materials other than stainless steel, Teflon, aluminum, polyethylene, or Viton to be introduced into the cabinets.

### **6.3 Remote Sample Storage**

Approximately 14 percent by weight of the lunar sample collection is stored in a vault at White Sands Test Facility near Las Cruces, New Mexico. The collection includes representatives of each lithology recognized during preliminary examination, pieces from most of the large lunar rocks, sub-samples from many lunar soils, and an unopened core segment. Samples in remote storage are generally unavailable for scientific study (see also Section 7.3).

## **7.0 LUNAR CURATORIAL FACILITIES**

### **7.1 Lunar Sample Curatorial Facility**

The Lunar Sample Curatorial Facility and the Sample Information and Control Center are located in a specially designed building constructed to provide secure storage for the Apollo lunar sample collection and to protect the collection from contamination during storage and processing for transfer to laboratories for analysis. The building was designed to protect the lunar samples from theft, damage by natural hazards such as tornadoes and hurricanes, and contamination that would affect the interpretation of geochemical tests. Specially designed vaults with thick, reinforced concrete walls provide secure storage for the samples. The vault doors remain closed except for removal or storage of samples. All pipes and openings into the vaults close automatically if there is any disturbance in the building, such as fire or intrusion. Two vaults are used, one to store samples that have not been out of the sample laboratories and the other for samples that have been returned by investigators after analysis. In that way, "pristine" samples can never become mixed with "used" samples. The elevation of the vault floor is above the level of the highest expected storm surge at this location. All materials used in constructing the building (such as floor coverings, walls, plumbing, light fixtures, and paint) and equipping the laboratories were selected because they contain the lowest concentrations of critical elements such as lead, gold, and the rare earth elements.

Adjacent to the sample processing laboratory is a special experiment room for tests and measurements on particularly large or rare lunar specimens. Visiting scientists working with these specimens can take advantage of the facility's unique environmental controls, as well as the assistance of people experienced in the care of lunar materials.

A number of measures are taken to control airborne particles in the vaults and laboratories. The air is circulated through special filters to remove suspended particles and to maintain Class 10,000 or better conditions. The pressure of the filtered air in the lunar sample areas is kept slightly higher than the outside air pressure to keep unfiltered air from leaking into the laboratories. Persons entering the area wear nylon coveralls, shoe covers, caps, and gloves to reduce contamination by particles from clothing, shoes, hair, and skin.

Lunar samples are stored and processed in cabinets filled with positive pressure of dry nitrogen gas (<10 ppm water and oxygen) to prevent any reaction of the samples with the oxygen and water vapor in the Earth's atmosphere. An automatic monitoring system samples the gas in each cabinet once an hour to determine the oxygen and water content, and activates visual and audible alarms if either gas exceeds the preset limit.

Most of the samples sent to a PI's laboratory are exposed to the Earth's atmosphere during analysis. When returned, those samples are examined and packaged in filtered air on a flow

bench. Other laboratory equipment includes balances, heat sealers, microscopes, fiber optic lighting systems, film and digital cameras, strobe lights, a band saw, and tools for subdividing the samples.

## **7.2 Lunar Thin Section Laboratory**

The Lunar Thin Section Laboratory (TSL) was built to support the study of lunar samples through petrographic thin section research. In this laboratory, doubly polished thin sections are produced in accordance with the security and cleanliness rules and restrictions for lunar samples. The porous areas in samples are first filled with epoxy by vacuum or pressure impregnation. The samples are sawed to the right size and then attached with epoxy to glass microscope slides. TSL personnel use a combination of machine and hand polishing to produce sections with extremely flat, highly polished surfaces. High quality polishes are required for transmitted and reflected light microscopy at high magnification as well as for electron and ion microbeam analyses.

Most of the samples prepared in this laboratory are for distribution to scientists worldwide in the lunar sample science program. The TSL is not available for work outside the lunar sample program, because of the security requirements needed for sample control. Thin sections of lunar meteorites are made in our meteorite thin section lab.

## **7.3 Remote Lunar Sample Storage Facility**

The Remote Lunar Sample Storage Facility, located at White Sands Test Facility (WSTF) near Las Cruces, New Mexico, is designed to protect a representative portion of the Apollo lunar sample collection from natural and man-made catastrophic incidents that might occur at JSC. As at JSC, this facility also provides for a secure and clean storage environment that is designed to protect the samples from terrestrial contamination.

Samples representative of the total Apollo lunar sample collection are stored in stainless steel leak-tight cabinets and maintained in a gaseous nitrogen environment to prevent degradation due to chemical changes and contamination by terrestrial sources. To maintain the effectiveness of this nitrogen blanket, the cabinets are purged with high-purity dry nitrogen approximately every six months. The vault and adjoining rooms are maintained in a high-level clean condition at all times.

## **7.4 Sample Control and Data Center**

The Sample Control and Data Center (SCDC) is the archive for all of the primary data associated with the curation of the Apollo lunar sample collection. The SCDC is the shipping and receiving station for all lunar samples distributed by JSC. The center maintains current inventories of holdings and receives samples that are sent back from investigators. The SCDC administers the lunar thin section education program and houses the thin section library for lunar samples. Many documents associated with the historical curation effort are archived in the SCDC. Documents relevant to advanced planetary mission planning and general planetary science are also held in the SCDC to support the work by scientists and planners in NASA.

# **8.0 LUNAR INFORMATION SOURCES**

## **8.1 Lunar News**

*Lunar News* is an electronic newsletter whose purpose is to provide a forum for facts and opinions about lunar sample studies, lunar geoscience, and the significance of the Moon in solar

system exploration. *Lunar News* is published by the Office of the Apollo Sample Curator and is sent via e-mail free to all interested individuals, and is available on the Curation web site at: <http://curator.jsc.nasa.gov/lunar/lnews/lnews.cfm>. To be included on the e-mailing list, direct a request to the Apollo Sample Curator (see section 2.1.2 for contact details).

## **8.2 Lunar Curatorial Databases**

The Office of the Apollo Sample Curator maintains an extensive database for tracking lunar samples as they are subdivided and allocated to scientists around the world. The database is currently not available via computer links as it once was because of computer security concerns. The database is currently being migrated to a new program that will eventually allow access through special servers placed outside the JSC firewall and not linked to the active database for security. The content available will be comparable to the current database.

## **8.3 Lunar and Planetary Institute**

The Lunar and Planetary Institute (LPI) is a non-profit research institute operated by a consortium of U.S. and Canadian universities under contract with NASA, and is located near the JSC. In addition to conducting a research program, LPI operates a Visiting Scientist Program and maintains a comprehensive library of publications on lunar science and maps and photographs of the Moon. More details can be found at [www.lpi.usra.edu](http://www.lpi.usra.edu).

## **8.4 Lunar Surface Information**

The principal sources of information describing the local features of each Apollo landing site are contained in reports published by the U.S. Geological Survey and by NASA. Most are out of print, but copies can be examined in the SICC of the Office of the Apollo Sample Curator, or at the LPI. Most of these documents are available on the Apollo Surface Journal web site: <http://www.hq.nasa.gov/office/pao/History/alsj/frame.html>

## **8.5 Lunar Sample Information**

### **8.5.1 Mission Catalogs**

A lunar sample catalog containing sample descriptions has been published following each mission. The Apollo 11, 12, and 15 catalogs are out of print, but catalogs are available for Apollo 14, 16, and 17 from the Apollo Sample Curator. The catalogs are being published in electronic format may be available on the curation web site (<http://curator.jsc.nasa.gov>). The catalogs are also available at the Apollo Surface Journal web site; the images, however, are degraded by the copying process.

### **8.5.2 Special Sample Publications**

Publications of special sample reports are provided to investigators by the Apollo Sample Curator. Such publications include descriptions of Apollo 12, 15, 16, and 17 4-10 mm coarse fines, Apollo 16 and 17 rake fragments, breccia samples from several missions, and descriptions of dissected cores.

### **8.5.3 Lunar Sample Photographs**

A large collection of rock and thin section photographs are available for inspection in the SICC of the Office of the Apollo Sample Curator. Photographs can be ordered from:

National Space Science Data Center  
NASA Goddard Space Flight Center 1601.1  
Greenbelt, Maryland 20771

#### **8.5.4 Preliminary Examination Team Reports - Preliminary Science**

A limited number of reprints of Preliminary Examination Team Reports from most Apollo missions are available from the Apollo Sample Curator. Preliminary Science Reports (90-day reports) for each mission containing descriptions of preliminary results from all Apollo experiments can be ordered from the Superintendent of Documents. The Preliminary Science Report incorporates the Preliminary Examination Team Reports. These reports are available on the Apollo Surface Journal web site.

#### **8.5.5 Lunar Sample Compendium (draft edition available)**

The data for a select group of lunar rocks (about 150) has been compiled in the Lunar Sample Compendium – available on line at:  
<http://curator.jsc.nasa.gov/lunar/compendium.cfm>

#### **8.5.6. Lunar List Server**

([LUNAR-L@LISTSERV.ND.EDU](mailto:LUNAR-L@LISTSERV.ND.EDU))

This e-mail list server links lunar scientists, engineers, educators, and enthusiasts worldwide. For more information contact Clive R. Neal at [neal.1@nd.edu](mailto:neal.1@nd.edu) or go to the LPI web site ([www.lpi.usra.edu/captem](http://www.lpi.usra.edu/captem)).

**Appendix A1**

**\*\*\*SAMPLE DOMESTIC TEMPLATE\*\*\***

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LUNAR SAMPLE LOAN AGREEMENT

between

NASA Johnson Space Center

and

**[INSTITUTION NAME]**

**[PRINCIPLE INVESTIGATOR NAME]**

Principal Investigator

## LUNAR SAMPLE LOAN AGREEMENT

# **Nonreimbursable Agreement between the National Aeronautics and Space Administration Johnson Space Center and [Principal Investigator Name] and [Institution Name] for the Loan of Lunar Samples**

### **Authority and Parties**

In accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113), this Loan Agreement is entered into by the National Aeronautics and Space Administration Johnson Space Center, located at Houston, Texas (hereinafter referred to as “NASA” or “JSC”), Principal Investigator [Principal Investigator Name] located at [Institution Name] (hereafter referred to as “PI”), and [Institution Name] in [Institution Location] (herein referred to as “the Institution”). NASA, the PI and the Institution may be individually referred to as a “Party” and collectively referred to as the “Parties.”

### **PURPOSE**

Lunar samples distributed by Johnson Space Center of the National Aeronautics and Space Administration, hereinafter referred to as JSC, are property of the US Government and are under the custody and curatorial control of JSC.

The Johnson Space Center of the National Aeronautics and Space Administration, a Federal Agency, desires to enter into a Loan Agreement and to make certain Lunar samples available to the PI. The PI proposes to use the said Lunar samples to undertake, at his / her own direction, scientific investigations. These investigations are described in a sample request submitted by the PI to the Apollo Sample Curator. Approval of a sample request is a prerequisite to this Loan Agreement and subsequent loan of the Lunar samples.

The use of the Lunar samples will permit beneficial contact among representatives of JSC, the PI and the Institution; will provide opportunities for discovery and dissemination of information to the scientific community and to the general public; will promote the maximum utilization of Lunar samples by JSC; and will provide opportunities for dissemination of information concerning the activities of NASA.

## **RESPONSIBILITIES:**

The Parties Agree to the Following:

1. The Lunar samples made subject to this Loan Agreement shall be assigned to the PI on sample assignment forms signed by the Apollo Sample Curator and the PI.
  
2. The Lunar samples are the property of the United States Government, and are therefore made available to investigators only under a carefully controlled and monitored program. It is therefore essential that rigorous security and accountability procedures be followed by all persons who have access to the Lunar samples. The PI and the Institution shall be responsible for the receipt, use (including security during use), and accountability of the Lunar samples, as follows:
  - a. As determined by NASA, the Lunar samples shall be either hand-carried, at the expense of the Institution, by an authorized official of the Institution, or mailed at JSC's expense, to the PI via registered mail or by a shipping service approved by JSC. JSC reserves the right, at the expense of the Institution, to direct the mode of transportation for the return of the Lunar samples.
  - b. Only the PI or the PI's Designee may receive and open the package. The PI or Designee shall record all of the Lunar samples promptly upon receipt, and a record of receipt shall be maintained while the Lunar samples are in the custody, possession or control of the PI.
  - c. During the use for research purposes, the Lunar samples must be under the constant control of the PI or Designee. At the end of each use of the Lunar samples, an inventory of the investigated samples shall be made.

- d. When not being actively investigated, the Lunar samples must be locked in a safe or secure storage cabinet equipped with a combination padlock or equivalent. The combination to the storage safe or cabinet shall be under the exclusive control of the PI and, if appropriate, the Institution security organization. If a controlled environment is required for scientific purposes, samples not being actively investigated must be stored in a locked laboratory.
- e. In no case may astromaterials on loan from NASA be stored with money, precious stones or minerals, classified material or any other item that is considered to be of high theft value.
- f. To insure that appropriate security arrangements are followed, the storage space holding the Lunar samples shall be subject to inspection by NASA representatives upon request.
- g. The PI shall report immediately the loss or damage of the Lunar samples to the Apollo Sample Curator.

3. The PI shall be responsible for accurate accounting of all Lunar samples by sample name / number and location. The PI shall perform an inventory of the Lunar samples on an annual basis using the sample inventory form provided by the Apollo Sample Curator, and submit this form to the Apollo Sample Curator in a timely manner. This inventory includes any samples consumed or destroyed in the course of the research. This inventory shall be signed by the PI and certified by an official or security representative of the Institution. At the termination of this Loan Agreement, unless an extension of the loan has been granted, the Lunar samples shall be returned to JSC with a full accounting of such Lunar samples, using the sample return form provided by the Apollo Sample Curator.

4. The PI may use the Lunar samples at his/her own Institution, or may carry the samples to use them at other locations consistent with the approved sample request. If the approved sample request entails collaborative work at another institution, the Lunar samples shall be either hand-carried, at the expense of the Institution, by an authorized official of the Institution, or mailed at the Institution's expense, via registered mail or by a shipping service approved by JSC. The PI shall keep a record of all such transfers, inform the Apollo Sample Curator when such transfers

occur, and note them in the annual inventory. When the samples are in use by a collaborator, the original PI is responsible for extending the security requirements set forth in this agreement and shall retain responsibility for the Lunar samples. When the collaborator has finished planned work on the samples, they must be immediately returned to the PI.

5. This Loan Agreement is not transferable to another institution or investigator. If the PI relocates to another institution and wishes to continue research on the Lunar samples, a new Loan Agreement must be completed among the PI, the new Institution, and NASA before Lunar samples can be transferred. If the PI is finished with a sample, but another investigator is interested in studying this sample, a new sample request must be submitted to the Apollo Sample Curator, and if approved a new Loan Agreement must be completed by the new Investigator.

6. Return of samples to JSC may arise from several circumstances. If the PI completes or terminates research on Lunar samples, the samples must be returned to the Apollo Sample Curator. If the PI relocates to a new institution without executing a new loan agreement, the samples must be returned. Upon the circumstances of death or incapacitation of the PI, the Institution will be responsible for returning the Lunar samples. Finally, if this agreement expires without renewal or is terminated by any of the Parties, the Lunar samples must be returned.

7. The use of Lunar samples shall be solely for the purposes set forth in the approved sample request. This Loan Agreement does / or does not allow the PI to use destructive analytical procedures, as specified in the approved sample request. The PI may request from the Apollo Sample Curator an amendment to the sample request in order to perform additional research on the samples.

8. When requested to do so during the period of the use, the PI or the Institution shall provide to representatives of JSC a copy of any publication(s) resulting from the research and confer any scientific knowledge acquired as a result of such use, provided that no proprietary knowledge shall be disclosed involuntarily in the discharge of this obligation.

9. Title to the Lunar samples shall remain with the US Government and shall not be affected by the incorporation, attachment, or mixture thereof to or with property not owned by NASA.

10. NASA, the PI or the Institution may, consistent with Federal law and this Loan Agreement, release general information regarding their own participation in this Loan Agreement as desired.

#### LIABILITY AND RISK OF LOSS

1. Notwithstanding any other provision of this Agreement, the PI and / or the Institution shall not be liable for loss of or damage to the Lunar samples, except that the PI and / or the Institution shall be responsible for any such loss or damage:

a. which results from willful misconduct, lack of good faith, or negligence on the part of the PI and / or the Institution's directors or officers, or on the part of any of the Institution's superintendents or any other equivalent representatives, who have supervision or direction of all or substantially all of the Institution's business; or

b. which results from a failure on the part of the PI and / or the Institution due to the willful misconduct, lack of good faith, or negligence on the part of any of the Institution's directors, officers, or other representatives mentioned in (a) above (i) to maintain and administer, in accordance with the provisions of this Loan Agreement the program for delivery, protection, and preservation of Government property, or (ii) to take all reasonable steps to comply with any written directions from JSC with respect to the delivery, protection, and preservation of Government property.

Loss or damage to the Lunar samples caused by failure to follow proper safeguarding standards as set forth in this Loan Agreement shall be considered in selecting recipients for future Lunar sample loans.

2. NASA, its officers, and employees shall not be liable for any loss, damage, expense, or liability of whatsoever nature or kind arising out of, or as a result of, or in connection with the possession or use of the samples during the term of the loan or any extension thereof.

3. The PI and the Institution hereby waive any claims against NASA, its employees, its related entities, (including, but not limited to, contractors and subcontractors at any tier, grantees, investigators, customers, users, and their contractors and subcontractors, at any tier) and employees of NASA's related entities for any injury to, or death of, Institution employees or the employees of the Institution's related entities, or for damage to, or loss of, the Institution's property or the property of its related entities arising from or related to activities conducted under this Loan Agreement, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct. The Institution further agrees to extend this unilateral waiver to its related entities by requiring them, by contract or otherwise, to waive all claims against NASA, its related entities, and employees of NASA and employees of NASA's related entities for injury, death, damage, or loss arising from or related to activities conducted under this Loan Agreement.

## **FINANCIAL OBLIGATIONS**

There shall be no transfer of funds between the Parties under this Agreement and each Party shall fund its own participation. 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).

## **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, the PI 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 Parties, NASA, in its sole discretion, shall determine the priority as between those Parties. This Agreement does not obligate NASA to seek alternative government property or services under the jurisdiction of NASA at other locations.

### **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.

### **USE OF NASA NAME, INITIALS, AND EMBLEM**

The PI or the Institution 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. The PI or the Institution must submit any proposed public use of the NASA name or initials (including press releases and all promotional and advertising use) to the NASA Assistant Administrator for the Office of Communication or designee (“NASA Communications”) for review and approval. Approval by NASA Communications shall be based on applicable law and policy governing the use of the NASA name and initials.

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. The PI or the Institution must submit any proposed use of the emblems to NASA Communications for review and approval.

### ***TERMS OF AGREEMENT -- DURATION, TERMINATION, AND MODIFICATION***

This Loan 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 the Parties hereto, or five years from the effective date. If the PI still holds Lunar samples, a new or renewal Loan Agreement must be agreed upon by NASA and the PI or the samples must be returned to the Apollo Sample Curator. If the Lunar samples are required for additional research the PI may

request, in writing, a loan extension from the Apollo Sample Curator. If the request is approved, the loan period shall be extended by the amount of time agreed to by the Apollo Sample Curator.

The Parties may unilaterally terminate this Loan Agreement by providing thirty (30) calendar days written notice to the other Parties. Upon termination the PI or the Institution must return the Lunar samples held to the Apollo Sample Curator within thirty (30) days. However, if any provision of this Loan Agreement is violated, NASA may request the return of all the Lunar samples and the PI or the Institution shall return the Lunar samples immediately. Any modification to this Agreement shall be executed, in writing, and signed by the PI and an authorized representative of the Institution and of NASA.

***POINTS OF CONTACT***

The following personnel are designated as the Points of Contact among the Parties in the performance of this Agreement:

<u>Principal Investigator</u>	<u>Institution Official</u>
Name	Name
Title	Title
Email	Email
Telephone	Telephone
Fax	Fax
Address	Address

Apollo Sample Curator

Name: Ryan Zeigler  
Email: [ryan.a.zeigler@nasa.gov](mailto:ryan.a.zeigler@nasa.gov)  
Telephone: (281) 244-6923  
Fax: (281) 483-5347  
Address: NASA – JSC, Mail Code KT  
2101 NASA PKWY  
Houston TX 77058

***DISPUTE RESOLUTION***

All disputes concerning questions of fact or law arising under this Loan Agreement shall be referred by the claimant in writing to the appropriate persons identified in this Agreement as the “Points of Contact.” The persons identified as the “Point of Contact” for NASA, the PI and the Institution shall consult and attempt to resolve all issues arising from the implementation of this Loan Agreement. If the Parties are unable to resolve the dispute, then the NASA signatory or that person’s Designee, as applicable, shall issue a written decision that shall be the final agency decision for the purpose of judicial review. Nothing in this article limits or prevents any of the Parties from pursuing any other right or remedy available by law upon the issuance of the final NASA decision.

**APPLICABLE LAW**

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

**SIGNATORY AUTHORITY**

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

**Principal Investigator**

**Institution Official**

\_\_\_\_\_  
**Name**

\_\_\_\_\_  
**Name**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Date**

**Apollo Sample Curator**

\_\_\_\_\_  
**Name**

\_\_\_\_\_  
**Date**

Appendix A2

**\*\*\*SAMPLE INTERNATIONAL TEMPLATE\*\*\***

INTERNATIONAL LUNAR SAMPLE LOAN AGREEMENT

between

NASA Johnson Space Center

and

[INSTITUTION NAME]

[PRINCIPLE INVESTIGATOR NAME]

Principal Investigator

**Agreement between the National Aeronautics and Space Administration Johnson Space Center and [Principal Investigator Name] and [Institution Name] for the Loan of Lunar Samples**

**Authority and Parties**

In accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113), this Loan Agreement is entered into by the National Aeronautics and Space Administration Johnson Space Center, located at Houston, Texas (hereinafter referred to as “NASA” or “JSC”), Principal Investigator [Principal Investigator Name] located at [Institution Name] (hereafter referred to as “PI”), and [Institution Name] in [Institution Location] (herein referred to as “the Institution”). NASA, the PI and the Institution may be individually referred to as a “Party” and collectively referred to as the “Parties.”

**PURPOSE**

Lunar samples distributed by Johnson Space Center of the National Aeronautics and Space Administration, hereinafter referred to as JSC, are property of the US Government and are under the custody and curatorial control of JSC.

The Johnson Space Center of the National Aeronautics and Space Administration, a Federal Agency, desires to enter into a Loan Agreement and to make certain Lunar samples available to the PI. The PI proposes to use the said Lunar samples to undertake, at his / her own direction, scientific investigations. These investigations are described in a sample request submitted by the PI to the Apollo Sample Curator. Approval of a sample request is a prerequisite to this Loan Agreement and subsequent loan of the Lunar samples.

The use of the Lunar samples will permit beneficial contact among representatives of JSC, the PI and the Institution; will provide opportunities for discovery and dissemination of information to the scientific community and to the general public; will promote the maximum utilization of Lunar samples by JSC; and will provide opportunities for dissemination of information concerning the activities of NASA.

## **RESPONSIBILITIES:**

The Parties Agree to the Following:

11. The Lunar samples made subject to this Loan Agreement shall be assigned to the PI on sample assignment forms signed by the Apollo Sample Curator and the PI.

12. The Lunar samples are the property of the United States Government, and are therefore made available to investigators only under a carefully controlled and monitored program. It is therefore essential that rigorous security and accountability procedures be followed by all persons who have access to the Lunar samples. The PI and the Institution shall be responsible for the receipt, use (including security during use), and accountability of the Lunar samples, as follows:

- h. As determined by NASA, the Lunar samples shall be either hand-carried, at the expense of the Institution, by an authorized official of the Institution, or mailed at JSC's expense, to the PI via registered mail or by a shipping service approved by JSC. JSC reserves the right, at the expense of the Institution, to direct the mode of transportation for the return of the Lunar samples.
- i. Only the PI or the PI's Designee may receive and open the package. The PI or Designee shall record all of the Lunar samples promptly upon receipt, and a record of receipt shall be maintained while the Lunar samples are in the custody, possession or control of the PI.
- j. During the use for research purposes, the Lunar samples must be under the constant control of the PI or Designee. At the end of each use of the Lunar samples, an inventory of the investigated samples shall be made.

- k. When not being actively investigated, the Lunar samples must be locked in a safe or secure storage cabinet equipped with a combination padlock or equivalent. The combination to the storage safe or cabinet shall be under the exclusive control of the PI and, if appropriate, the Institution security organization. If a controlled environment is required for scientific purposes, samples not being actively investigated must be stored in a locked laboratory.
- l. In no case may astromaterials on loan from NASA be stored with money, precious stones or minerals, classified material or any other item that is considered to be of high theft value.
- m. To insure that appropriate security arrangements are followed, the storage space holding the Lunar samples shall be subject to inspection by NASA representatives upon request.
- n. The PI shall report immediately the loss or damage of the Lunar samples to the Apollo Sample Curator.

13. The PI shall be responsible for accurate accounting of all Lunar samples by sample name / number and location. The PI shall perform an inventory of the Lunar samples on an annual basis using the sample inventory form provided by the Apollo Sample Curator, and submit this form to the Apollo Sample Curator in a timely manner. This inventory includes any samples consumed or destroyed in the course of the research. This inventory shall be signed by the PI and certified by an official or security representative of the Institution. At the termination of this Loan Agreement, unless an extension of the loan has been granted, the Lunar samples shall be returned to JSC with a full accounting of such Lunar samples, using the sample return form provided by the Apollo Sample Curator.

14. The PI may use the Lunar samples at his/her own Institution, or may carry the samples to use them at other locations consistent with the approved sample request. If the approved sample request entails collaborative work at another institution, the Lunar samples shall be either hand-carried, at the expense of the Institution, by an authorized official of the Institution, or mailed at the Institution's expense, via registered mail or by a shipping service approved by JSC. The PI shall keep a record of all such transfers, inform the Apollo Sample Curator when such transfers

occur, and note them in the annual inventory. When the samples are in use by a collaborator, the original PI is responsible for extending the security requirements set forth in this agreement and shall retain responsibility for the Lunar samples. When the collaborator has finished planned work on the samples, they must be immediately returned to the PI.

15. This Loan Agreement is not transferable to another institution or investigator. If the PI relocates to another institution and wishes to continue research on the Lunar samples, a new Loan Agreement must be completed among the PI, the new Institution and NASA before Lunar samples can be transferred. If the PI is finished with a sample, but another investigator is interested in studying this sample, a new sample request must be submitted to the Apollo Sample Curator, and if approved a new Loan Agreement must be completed by the new Investigator.

16. Return of samples to JSC may arise from several circumstances. If the PI completes or terminates research on Lunar samples, the samples must be returned to the Apollo Sample Curator. If the PI relocates to a new institution without executing a new loan agreement, the samples must be returned. Upon the circumstances of death or incapacitation of the PI, the Institution will be responsible for returning the Lunar samples. Finally, if this agreement expires without renewal or is terminated by any of the Parties, the Lunar samples must be returned.

17. The use of Lunar samples shall be solely for the purposes set forth in the approved sample request. This Loan Agreement does / or does not allow the PI to use destructive analytical procedures, as specified in the approved sample request. The PI may request from the Apollo Sample Curator an amendment to the sample request in order to perform additional research on the samples.

18. When requested to do so during the period of the use, the PI or the Institution shall provide to representatives of JSC a copy of any publication(s) resulting from the research and confer any scientific knowledge acquired as a result of such use, provided that no proprietary knowledge shall be disclosed involuntarily in the discharge of this obligation.

19. Title to the Lunar samples shall remain with the US Government and shall not be affected by the incorporation, attachment, or mixture thereof to or with property not owned by NASA.

20. NASA, the PI or the Institution may, consistent with Federal law and this Loan Agreement, release general information regarding their own participation in this Loan Agreement as desired.

#### LIABILITY AND RISK OF LOSS

1. Notwithstanding any other provision of this Agreement, the PI and / or the Institution shall not be liable for loss of or damage to the Lunar samples, except that the PI and / or the Institution shall be responsible for any such loss or damage:

a. which results from willful misconduct, lack of good faith, or negligence on the part of the PI and / or the Institution's directors or officers, or on the part of any of the Institution's superintendents or any other equivalent representatives, who have supervision or direction of all or substantially all of the Institution's business; or

b. which results from a failure on the part of the PI and / or the Institution due to the willful misconduct, lack of good faith, or negligence on the part of any of the Institution's directors, officers, or other representatives mentioned in (a) above (i) to maintain and administer, in accordance with the provisions of this Loan Agreement the program for delivery, protection, and preservation of Government property, or (ii) to take all reasonable steps to comply with any written directions from JSC with respect to the delivery, protection, and preservation of Government property.

Loss or damage to the Lunar samples caused by failure to follow proper safeguarding standards as set forth in this Loan Agreement shall be considered in selecting recipients for future Lunar sample loans.

2. NASA, its officers, and employees shall not be liable for any loss, damage, expense, or liability of whatsoever nature or kind arising out of, or as a result of, or in connection with the possession or use of the samples during the term of the loan or any extension thereof.

3. The PI and the Institution hereby waive any claims against NASA, its employees, its related entities, (including, but not limited to, contractors and subcontractors at any tier, grantees, investigators, customers, users, and their contractors and subcontractors, at any tier) and employees of NASA's related entities for any injury to, or death of, Institution employees or the employees of the Institution's related entities, or for damage to, or loss of, the Institution's property or the property of its related entities arising from or related to activities conducted under this Loan Agreement, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct. The Institution further agrees to extend this unilateral waiver to its related entities by requiring them, by contract or otherwise, to waive all claims against NASA, its related entities, and employees of NASA and employees of NASA's related entities for injury, death, damage, or loss arising from or related to activities conducted under this Loan Agreement.

## **FINANCIAL OBLIGATIONS**

There shall be no transfer of funds between the Parties under this Agreement and each Party shall fund its own participation. 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).

## **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, the PI 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 Parties, NASA, in its sole discretion, shall determine the priority as between those Parties. This Agreement does not obligate NASA to seek alternative government property or services under the jurisdiction of NASA at other locations.

### **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.

### **USE OF NASA NAME, INITIALS, AND EMBLEM**

The PI or the Institution 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. The PI or the Institution must submit any proposed public use of the NASA name or initials (including press releases and all promotional and advertising use) to the NASA Assistant Administrator for the Office of Communication or designee (“NASA Communications”) for review and approval. Approval by NASA Communications shall be based on applicable law and policy governing the use of the NASA name and initials.

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. The PI or the Institution must submit any proposed use of the emblems to NASA Communications for review and approval.

### ***TERMS OF AGREEMENT -- DURATION, TERMINATION, AND MODIFICATION***

This Loan 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 the Parties hereto, or five years from the effective date. If the PI still holds Lunar samples, a new or renewal Loan Agreement must be agreed upon by NASA and the PI or the samples must be returned to the Apollo Sample Curator. If the Lunar samples are required for additional research the PI may

request, in writing, a loan extension from the Apollo Sample Curator. If the request is approved, the loan period shall be extended by the amount of time agreed to by the Apollo Sample Curator.

The Parties may unilaterally terminate this Loan Agreement by providing thirty (30) calendar days written notice to the other Parties. Upon termination the PI or the Institution must return the Lunar samples held to the Apollo Sample Curator within thirty (30) days. However, if any provision of this Loan Agreement is violated, NASA may request the return of all the Lunar samples and the PI or the Institution shall return the Lunar samples immediately. Any modification to this Agreement shall be executed, in writing, and signed by the PI and an authorized representative of the Institution and of NASA.

***POINTS OF CONTACT***

The following personnel are designated as the Points of Contact among the Parties in the performance of this Agreement:

Principal Investigator

Name  
Title  
Email  
Telephone  
Fax  
Address

Institution Official

Name  
Title  
Email  
Telephone  
Fax  
Address

NASA Headquarters, Office of International  
and Interagency Relations

Name  
Email  
Telephone  
Fax  
Address

NASA Apollo Sample Curator

Name: Ryan Zeigler  
Email: [ryan.a.zeigler@nasa.gov](mailto:ryan.a.zeigler@nasa.gov)  
Telephone: (281) 244-6923  
Fax: (281) 483-5347  
Address: NASA – JSC, Mail Code KT  
2101 NASA PKWY  
Houston TX 77058

***DISPUTE RESOLUTION***

All disputes concerning questions of fact or law arising under this Loan Agreement shall be referred by the claimant in writing to the appropriate persons identified in this Agreement as the “Points of Contact.” The persons identified as the “Point of Contact” for NASA, the PI and the Institution shall consult and attempt to resolve all issues arising from the implementation of this Loan Agreement. If the Parties are unable to resolve the dispute, then the NASA signatory or that person’s Designee, as applicable, shall issue a written decision that shall be the final agency decision for the purpose of judicial review. Nothing in this article limits or prevents any of the Parties from pursuing any other right or remedy available by law upon the issuance of the final NASA decision.

**APPLICABLE LAW**

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

**SIGNATORY AUTHORITY**

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

**Principal Investigator**

**Institution Official**

\_\_\_\_\_  
**Name**

\_\_\_\_\_  
**Name**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Date**

**NASA HEADQUARTERS, OFFICE OF  
INTERNATIONAL AND INTERAGENCY  
RELATIONS**

**NASA APOLLO SAMPLE  
CURATOR**

\_\_\_\_\_  
**Name**

\_\_\_\_\_  
**Name**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Date**

## Appendix B

### LUNAR PETROGRAPHIC THIN SECTION PACKAGE LOAN AGREEMENT

The Johnson Space Center of the National Aeronautics and Space Administration, a Federal Agency, hereinafter referred to as JSC, desires to enter into a Loan Agreement and to make certain material available to [NAME OF INSTITUTION], hereinafter referred to as the INSTITUTION. The INSTITUTION proposes to use said material to undertake, at its own direction, scientific instructions in the area of lunar petrology.

The use of the material by the INSTITUTION will permit beneficial contact between representatives of JSC and the INSTITUTION; will promote a fuller awareness among young scientists of the importance of Government science, thereby enhancing the scientific recruitment possibilities for Government Agencies; will provide opportunities for dissemination of information concerning the activities of the National Aeronautics and Space Administration; and will promote maximum utilization of the material by JSC.

It therefore is agreed as follows:

1. The samples (hereinafter referred to as the PROPERTY) made subject to this agreement are: one Lunar Thin Section Set, containing 12 lunar sections, and one Educational Disk, containing 6 lunar samples.
2. The PROPERTY is the property of the United States Government, is considered irreplaceable, and is therefore made available to users only under a carefully controlled and monitored program. It is therefore essential that rigorous security and accountability procedures be followed by all persons who have access to the PROPERTY. As an integral part of this agreement, the INSTITUTION will designate one individual to be responsible for the receipt, use (including security during use), accountability, and return of the PROPERTY at the end of the designated time. The INSTITUTION will agree to strictly adhere to the following procedures for the security of the PROPERTY:
  - a. The PROPERTY shall be either hand-carried by the INSTITUTION's authorized official or mailed to the INSTITUTION via registered mail at JSC's expense. The JSC reserves the right at the INSTITUTION's expense, to direct the mode of transportation for the return of the PROPERTY.
  - b. Only the authorized official may receive and open the registered package. The authorized official shall record all of the PROPERTY promptly upon receipt, and it shall be so identified so long as it remains in the custody, possession, or control of the INSTITUTION.
  - c. During use for instructional purposes, the PROPERTY must be under the constant control of the authorized official. At no time may the PROPERTY be left unattended. At the end of each use of the PROPERTY, an inventory shall be made to insure the accountability of the PROPERTY. Such inventories shall be maintained as a permanent record and shall be made accessible to NASA at all reasonable times.
  - d. When not in use, the PROPERTY must be locked in a safe or secure storage cabinet equipped with a combination padlock.
  - e. Combination to the storage safe or cabinet will be under the exclusive control of the authorized official.
  - f. In no case may the PROPERTY be stored with money, precious stones or minerals, classified material, or any other item that is considered to be of high theft value.



FOR: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

\_\_\_\_\_  
Education Sample Curator  
Johnson Space Center

\_\_\_\_\_  
Date

FOR: [INSTITUTION]

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

I hereby designate [CUSTODIAN] to be the recipient of the samples, to assume the responsibility of same and their ultimate return to the Johnson Space Center, National Aeronautics and Space Administration.

\_\_\_\_\_  
Signature

## Appendix C

### LUNAR SAMPLE ASSIGNMENT

[Investigator Name] has been assigned the following sample(s):

GENERIC	SPECIFIC	PARENT	CONTAINER	WEIGHT GRAMS	NOTES
62255	87	51		0.10	

\_\_\_\_\_  
Lunar Sample Curator

Issue Date:  
Request:

I acknowledge receipt of the above sample(s):

\_\_\_\_\_  
Signature & Date

\_\_\_\_\_  
Recipient's name, printed or typed

By accepting custody of the above sample(s), the recipient understands that it is furnished pursuant to, and is fully subject to, the terms and conditions of the grant or contract under which the related lunar sample analysis is to be performed, including all terms and conditions which may be incorporated in such contract or grant by reference.

**UPON RECEIPT OF THE SAMPLE(S), PLEASE SIGN THIS FORM  
AND RETURN IT TO THE LUNAR SAMPLE CURATOR, MAIL  
CODE KT, JOHNSON SPACE CENTER, HOUSTON, TX 77058.**

## Appendix D

### LUNAR PETROGRAPHIC THIN SECTION PACKAGE SAMPLE ASSIGNMENT

[Investigator Name] has been assigned a Lunar Petrographic Thin Section Package containing:

Lunar Thin Section Set Number 21 containing:

12002,395  
14305,245  
15299,174  
60025,239  
65015,156  
68501,164  
68501,169  
68501,209  
70017,212  
70181,49  
71061,32  
74220,333

Lunar Educational Disk Number 112

\_\_\_\_\_  
Lunar Sample Curator

Issue Date:

I acknowledge receipt of the above sample(s):

\_\_\_\_\_  
Signature & Date

\_\_\_\_\_  
Recipient's name, printed or typed

By accepting custody of the above sample(s), the recipient understands that it is furnished pursuant to, and is fully subject to, the terms and conditions of the grant or contract under which the related lunar sample analysis is to be performed, including all terms and conditions which may be incorporated in such contract or grant by reference.

**UPON RECEIPT OF THE SAMPLE(S), PLEASE SIGN THIS FORM  
AND RETURN IT TO THE EDUCATION SAMPLE CURATOR, MAIL  
CODE KT, JOHNSON SPACE CENTER, HOUSTON, TX 77058.**

## Appendix E

### LUNAR SAMPLE RETURN RECEIPT

The Curator acknowledges receipt of materials identified by the following sample numbers:

FROM: [Investigator Name]

ON: [Date]

GENERIC	SPECIFIC
72435	59
72435	60
73155	29
73155	30
76055	73
76055	75
77115	55

**These samples are being processed back into the active collection and will be cleared from your inventory.**

---

Lunar Sample Curator

## Appendix F

### LUNAR PETROGRAPHIC THIN SECTION PACKAGE SAMPLE RECEIPT

The Curator acknowledges receipt of an educational package containing the following:

FROM: [Investigator Name]                      ON:    [Date]

Lunar Thin Section Set Number 6 containing:

12002,318  
12005,36  
14305,177  
15299,148  
60025,161  
65015,124  
68501,232  
70017,5  
70181,89  
72275,509  
74220,356  
78235,99

Lunar Educational Disk Number 112

**Your accountability for these items has been cleared.**

---

Lunar Sample Curator

**Appendix G: Examples of Curatorial Forms F-75 & 75c. Use forms downloaded from Curation Web Site: <http://curator.jsc.nasa.gov>**

**CURATORIAL FORM F-75**

**RETURN SAMPLE ACCOUNTABILITY & HISTORY**

PARENT SAMPLE _____, _____
PAGE _____ OF _____

Please complete one form for each sample on your inventory listing that you are returning. Use Form F-75, Continuation Sheets to document any subsamples that you have created from this sample. In the comments blocks, describe the history of contamination that each sample has experienced. Refer to the instructions for returning samples for more complete details.

A. INFORMATION PROVIDED BY SAMPLE INVESTIGATOR		
Item	Mass (g)	9. History/Contamination & PI Comments
1. Mass of Sample as Issued by Sender _____ <small>Name of Sender (If not Curator)</small>		
2. Mass of Sample as Measured by You		
3. Total of Sample Mass Consumed		
4. Sample Mass Previously Returned to Curator		
5. Total Sample/Residue Mass Retained		
6. Sample Mass Transferred to Other PI's		
7. Total Sample Mass Returned to Curator		
8. Mass % of Admixed Material	%	
9. Sample Mass Not Accounted For		_____ PI Signature

B. FOR USE BY SAMPLE CURATOR ONLY						
<b>PARENT SAMPLE PROCESSING</b>			<b>WEIGHT BALANCE ACCOUNTING</b>		<b>CO Number</b>	
<b>Inventory Data</b>		<b>Item</b>	<b>Mass (g)</b>	<b>Item</b>	<b>Mass (g)</b>	<b>Processor</b>
Sample #		Gross		Issue		<b>Date Processed</b>
Container		Container		Transferred to Other PI's		
Description		Dunnage		Previously Returned		
Flags		Sample		Current Inventory		
Location		Bagged		Total Return (current)		
				Retained by PI		
Container Sample Returned In				<b>CONSUMED</b>		
Sample Rebagged In		Air <b>Error!</b>	GN <sub>2</sub> <b>Error!</b>	(Split #)	_____	<b>Curatorial Representative</b>
<b>PROCESSOR COMMENTS:</b>						

**CURATORIAL FORM F-75, Continuation Sheet  
RETURN SAMPLE ACCOUNTABILITY & HISTORY**

PARENT SAMPLE \_\_\_\_\_,  
PAGE \_\_\_\_\_ OF \_\_\_\_\_

PLEASE COMPLETE ONE BLOCK FOR EACH SPLIT RETURNED			FOR USE BY SAMPLE CURATOR ONLY			
Split #	Mass (g)	History/Contamination & PI Comments	Rec.	Inventory	Item	Mass (g)
				Sample #	Gross	
				Container	Container	
				Description	Dunnage	
				Flags	Sample	
				Location	Bagged	
				Sample #	Gross	
				Container	Container	
				Description	Dunnage	
				Flags	Sample	
				Location	Bagged	
				Sample #	Gross	
				Container	Container	
				Description	Dunnage	
				Flags	Sample	
				Location	Bagged	
				Sample #	Gross	
				Container	Container	
				Description	Dunnage	
				Flags	Sample	
				Location	Bagged	

SPLIT #	MASS	History/Contamination & PI Comments	Rec.	Inventory		Item	Mass (g)
				Sample #		Gross	
				Container		Container	
				Description		Dunnage	
				Flags		Sample	
				Location		Bagged	

JSC Form 1609A (Rev Jan 97)

## Appendix H

### INSTRUCTIONS FOR THE RETURN OF LUNAR PLANETARY SAMPLES TO NASA JOHNSON SPACE CENTER

#### 1. ACCOUNTABILITY & HISTORY

1. Use Curatorial Form F-75. Complete one Curatorial Form F-75, Return Sample Accountability & History (Part A only) for the return of each sample which appears on your inventory listing. You do not need to complete the form to return samples which were issued to you as thin sections or probe mounts unless they were used in analysis by ion probe, proton probe, or other destructive technique.

Use Form F-75, Continuation Sheet to list any sub-samples that you have derived from the samples that you were assigned. If you have not made any splits, only the first page of the form need be used. If you have made more than 5 splits of any sample, you may either reproduce the Continuation Sheet yourself, or you may obtain additional copies from the Curator by contacting the Sample Control Center.

2. Use Official Sample Numbers According to Your Sample Inventory. You may obtain a current listing of your samples by contacting the Sample Control Center at 281-483-2254 or FAX 281-483-5347.
3. Document Sample Utilization According to Mass. Enter the appropriate mass for each item in the spaces provided in Part A, lines 1-8. The masses should refer to the entire sample which appears on your inventory listing. Note that the masses which appear on the inventory reflect the amounts for which you are currently accountable, and may differ from the original masses which you were issued. Such differences reflect transfers of portions of the samples which were authorized by the Lunar Sample Curator, any amounts consumed which you reported as the result of an annual inventory, or parts of the samples which you previously returned.
4. Document Sample History with Regard to Contamination or Modification. Document the contamination history for each sample in the spaces provided as block 9 of Part A. The following questions should be used as guidelines:
  1. Has the sample been chemically degraded by exposure to or admixture with major or trace elements, organic or inorganic liquids, or heavy metals?
  2. Has the sample been exposed to an electromagnetic field?
  3. Has the sample been separated based on mineralogical or petrological properties, grain size, density, or magnetic properties?

4. Has the sample been exposed to gases other than dry nitrogen, such as air, inert gases, or halogens?
5. Has the sample been heated, fused or dissolved, or otherwise undergone any thermodynamic change in state?
6. Has the sample been irradiated or undergone neutron activation?
7. Has the sample been affixed to or imbedded in a substrate such as glass or epoxy? Samples degraded in this manner will include thin sections, probe mounts, potted butts, grain mounts, etc. Please be specific as to the current state of the sample.
8. If the sample is a thin section or probe mount, has it been subjected to ion-probe analysis, proton-probe analysis, or other destructive method?

## 2. PACKAGING

1. Use Double Containers for Samples. As a minimum, provide two layers of protection against contamination, such as a sample vial within a plastic bag. Contact the Curator's office regarding special requirements; cleaned containers can be provided on request. Allow one month for delivery.
2. Package for U.S. Registered Mail or the Equivalent. Prepare packages so that they are strongly resistant to damage. Container strength and sealing provisions should be compatible with requirements of registered mail with the U.S. Postal Service.

## 3. TRANSMITTAL BY INVESTIGATORS IN THE UNITED STATES

1. Hand-Carry Large Samples. Samples that weigh more than 10 grams, individually or in total, must be hand-carried to the Sample Curator unless the Curator provides a written exemption in advance.
2. Send Small Samples by Registered Mail. Samples weighing less than 10 grams may be mailed from points within the U.S. You may request NASA official business return mailing labels from the Curator's Office; you must add your name clearly to the labels. (In the event that the Post Office will not accept these labels, you are required to pay the postage.) Send the samples by REGISTERED MAIL, RETURN RECEIPT REQUESTED to the following addresses:

**For Lunar Samples send to:**

Dr. Ryan A. Zeigler  
National Aeronautics and Space Administration  
Lyndon B. Johnson Space Center  
Mail Code KT  
2101 NASA Parkway  
Houston, Texas 77058-3696 USA

The U.S. Government acts as a self-insurer. Do not obtain postal insurance for planetary materials samples transmitted by the U.S. Postal Service.

## **TRANSMITTAL BY INVESTIGATORS OUTSIDE THE UNITED STATES**

1. Hand-Carry Large Samples. Samples that weigh more than 10 grams, individually or in total, must be hand-carried to the Lunar Sample Curator unless the Curator provides a written exemption in advance.
2. Use International Courier Service, e.g. FedEx to return sample to the Lunar Sample Curator that weigh less than 10 grams singly or in the aggregate. Samples packaged separately can be placed in different packages to keep the weight under 10 grams. Address package to:

Dr. Ryan A. Zeigler  
National Aeronautics and Space Administration  
Lyndon B. Johnson Space Center  
Mail Code KT  
2101 NASA Parkway  
Houston, Texas 77058-3696 USA  
Telephone: 281-244-6923  
FAX: 281-483-5347

## **INFORMATION**

If you require help in any aspect of your sample return, please use one of the following points of contact:

**Telephone:** 281-244-6923

**FAX:** 281-483-5347

**E-mail:** [ryan.a.zeigler@nasa.gov](mailto:ryan.a.zeigler@nasa.gov)

## Appendix I

### EXAMPLE OF COURIER LETTER

[DATE]

KT-[NUMBER]

TO: Airline Officials, U. S. Customs, and Law Enforcement Personnel

FROM: KT/Astromaterials Acquisition and Curation Office

SUBJECT: Transport of Lunar Samples by Courier

This letter, when accompanied by positive personal identification, will identify [NAME OF COURIER] of the [INSTITUTION], [CITY, STATE OR COUNTRY], as a courier of Lunar Samples that are the property of the National Aeronautics and Space Administration (NASA), an Agency of the Federal Government of the United States of America. The courier is transporting rock samples from Johnson Space Center, Houston, Texas to [INSTITUTION], [CITY, STATE OR COUNTRY] on [DATE]. The samples consist of small amounts of lunar soil or rocks contained in plastic vials or bags, aluminum or stainless steel containers. The samples may have the following numbers:

10057,40	119.100g
10084,18	100.180g
12001,114	100.000g

These samples are considered invaluable, irreplaceable national treasures; therefore, it is requested that the courier be permitted to hand-carry the above-described material to his destination at the [INSTITUTION]. The courier has been instructed to keep the materials in his personal custody at all times.

If additional verification is required, please contact a representative of the NASA Lyndon B. Johnson Space Center at one of the telephone numbers listed.

Normal Duty Hours: 8:00 a.m. - 5:00 p.m., Central Standard Time, Monday - Friday:  
Ryan A. Zeigler, Apollo Sample Curator 281-244-6923  
Carlton C. Allen, Manager 281-483-5126 / 5033  
Astromaterials Acquisition and Curation Office

Night/Other Hours Contact:

Ryan A. Zeigler	314-306-8404
Carlton Allen	281-992-3772

Your cooperation in expediting the courier's boarding of the aircraft and protecting the integrity of this material will be greatly appreciated.

Ryan A. Zeigler  
Apollo Sample Curator  
Astromaterials Acquisition and Curation Office