# CURATORIAL NEWSLETTER

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ATTACHMENTS



## LAPST AND REQUESTS FOR SAMPLES

The Lunar and Planetary Sample Team (LAPST) met August 16-19, and recommended allocation of 161 samples to 11 Principal Investigators. Their next meeting will be November 16-19, 1979, following the Conference on the Lunar Highlands. Please submit requests for samples at least a week or two in advance of the meeting dates to allow time for assembly of background information. Also, remember to include your schedule for studying the samples so appropriate priorities can be set for their preparation.

## LUNAR HIGHLANDS CONFERENCE

Abstracts for 59 papers have been accepted for presentation at the Conference November 14-16 at The Lunar and Planetary Institute in Houston.

## CORES

Members of the Curatorial Laboratory's Core Corps., S. Nagle and J. Allton, have prepared a large exhibit on lunar cores and core science. They will attend The Lunar and Planetary Institute's Conference on the Ancient Sun October 16-19, 1979, in Boulder, Colorado. With the exhibit and supporting material, they will constitute an important information resource on the cores.

When Nagle and Allton return from Colorado in October, they will extrude and start dissection of the 4 cm diameter Apollo 15 drive tubes 15008 and 15009. Subsamples may be requested now and should be distributed for study late this year. (The core status and schedule are in Newsletter No. 19, April 1978. Updated versions will be in the next issue - No. 26.)

## CORE PEELS: AVAILABLE FOR STUDY

After cores have been dissected, a hemicylined about 1/3 the core diameter thick is left to show the structure and fabric of the core. This material is stabilized, first by covering a plastic strip with methacrylate cement and turning it gently upside down on the dissected surface, quickly followed by removal and reinversion to produce a "peel" sample consisting of a thin layer of core sample, several mm thick. The remaining core is stabilized by vacuum impregnation with epoxy, and can then be sawed and used to prepare petrographic thin section strips that provide continuous coverage along the length of the core.

To date, all allocations for study of structure and fabric have been made from the epoxy-impregnated portion of cores. (The peels were originally designed to provide a backup in case anything went amiss with the impregnation. Now that confidence has been built up in the reliability of the impregnation method, the peel-taking has been continued because it "freshens" the uppermost surface that is unavoidably smeared in the dissection process. The post-peel surface is the best for photographic recording of the core.) The peels may be more appropriate for some studies than the impregnated cores. Individual grains are readily removed, for example. In fact, the peels are rather fragile for this reason. Proposals to study peel material are invited. Examination of peels in the Curatorial Laboratory is easily arranged.

## LUNAR SAMPLE BUILDING

All of the pristine and returned samples stored in building 31 have been moved to cabinets in the storage vaults of the Lunar Sample Building. Sample processing has just begun in the new pristine sample laboratory.

Final cleanup of the sample areas was done in the first two weeks of August in a massive effort that involved, on some days, as many as 30 people - managers, clerks, sample processors, scientists, typists, as well as technicians - on hands and knees scrubbing. Nitrogen cabinets were installed in the pristine sample vault shortly afterward. Then in the last week of August, with Hurricane D79 possibly ten days away with an arrival several days after Labor Day, movement of samples was rehearsed Tuesday, started Wednesday, and completed shortly after noon Friday, August 31. Everyone enjoyed the holiday weekend much more knowing that the samples were safe in a nitrogen atmosphere in the new vault.

The returned samples were moved the second week in September. The final moves will be to reconsolidate the collection dispersed in vaults in three other Johnson Space Center buildings. These moves should be completed by the year's end. (The representative 15% of the collection in a vault at Brooks Air Force Base, San Antonio, Texas, will remain there.)

## RESTRICTED ACCESS MATERIAL (RAM)

The LAPST subcommittee on RAM, headed by M. Lipschutz, prepared the following for consideration by investigators of lunar samples:

"Completion of the new Lunar Facility gives us a better means of preserving unique, rare, or fragile lunar samples, the Restricted Access Material (RAM) collection.

As the name suggests, these samples would be located in storage areas that are not accessed on a routine basis. Within the new curatorial facility, special storage cabinets will be provided for this collection; one in the Pristine Sample Vault,

one in the Returned Sample Vault. Access to these cabinets will be restricted to the Curator alone. The RAM cabinets will be sealed in such a way that the samples will not be handled during inventory.

The types of samples anticipated for the RAM collection include:

1. Oriented samples with well-documented cutting plans where significant value lies in the geometric relationships of subsamples and where there is potential for loss of this information.

2. Surfaces of oriented samples that would be degraded by handling.

3. Unique samples of any kind, parts of which should be preserved.

It is understood that portions of those samples designated RAM will generally reside outside the RAM collection and will be available for study. Samples can be added to or removed from the RAM collection by LAPST action. Sufficient documentation as to need and the requirements of the unique property of a candidate will be required before approval by LAPST for RAM status. This documentation will be added to the data pack. Samples can be allocated or even deleted from RAM status with LAPST approval.

We request your help in expanding the RAM collection by pointing out potential candidates to the Curator."

## BRECCIA GUIDEBOOKS AND CONSORTIUM STUDIES

Issue No. 2 of the Lunar Highlands Newsletter described and invited participation in making guidebooks for individual breccias. Consortium studies of breccias were also encouraged, but their relationships to guidebooks were not addressed in the Newsletter. In its August meeting, the LAPST reviewed all past guidelines affecting consortium studies, made some modifications, specified conditions for guidebook studies, and laid out the relationships between guidebook and consortium studies. These recommendations are attached (Attachment B) and will be followed by the Curator.

## PRESERVATION OF EXTRATERRESTRIAL SAMPLES

At its August meeting, the Lunar and Planetary Sample Team made a strong recommendation that the Curator obtain information on reactions of lunar samples with terrestrial gases, and on ways of preventing such reactions. The LAPST memorandum is reproduced below. Comments and suggestions to the Curator on this matter would be most welcome.

"The extraterrestrial samples now in our possession are an extremely valuable and practically irreplaceable source. The interests of the scientific community demand that they be carefully protected. Next to allocation, preservation is the most important aspect of curation.

To be both effective and efficient, preservation should be based on as thorough knowledge as possible both of sample characteristics and of scientific requirements. Both are rapidly evolving. Current sample storage and processing techniques were largely developed nearly ten years ago when much less was known about either.

Of the possible degradation processes now apparent, hydration of silicates is probably the most threatening. It is known that at lease olivine, feldspar, and glass are subject to such hydration, but nothing is known about the rates in samples of lunar composition. Minor minerals such as $FeCl_2$ and $ZnCL_2$ hypothesized to be, or have been,

present are also subject to hydration and it is now known what maximum water pressure must be maintained to prevent it.

Hydration of chlorides poses a special threat since they can then hydrolize to release HCl, which in turn can initiate or catalyze a number of additional reactions

Metal and sulfides can oxidize.

Hydration reactions could compromise studies of solar wind gases, amorphous rims on grains, and latent tracks in micron size grains. In short they pose a threat to all studies aimed at learning about the ancient history of the Sun.

Hydration reactions of minor minerals could make it impossible to definitively establish vapor transport processes active during lunar volcanism and in the highlands crust.

We recommend that the Curator proceed promptly and vigorously to obtain information on the following topics:

1. The hydration rate and current extent of hydration of lunar minerals.

2. The water vapor pressure below which hypothesized minor phases are stable and the current extent of hydration in lunar samples.

3. Possible steps such as sample cold storage, the use of chemical drying agents or modification of cabinets or procedures that might be initiated to improve preservation if warranted."

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| Gibson | Meyer | Laul | Pepin | Lal |
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Spetzler
Strangway
Tittman
Uhlmann

## BRECCIA GUIDEBOOKS AND CONSORTIUM STUDIES: RELATIONSHIPS AND GUIDELINES

The Highlands Initiative has focused upon study of selected lunar breccias. As the first stage of this study, a guidebook for each breccia is being prepared by a particular investigator. As a consequence of this, it is reasonable that most, if not all, of these investigators will wish to carry on their studies as consortium leaders. To clarify duties at particular stages of the natural progression, LAPST wishes to specify conditions associated with this investigation.

### A. Thin Section Study

In preparing the guidebook, the investigator may study thin sections by electron microprobe. In this event, microprobe results or a summary of them should be included in the guidebook. Later, these or other PTS may be used as part of the consortium study.

### B. Transition Period

If the investigator charged with guidebook preparation wishes to continue as consortium leader, he or she should request this privilege of LAPST after completing the guidebook. LAPST will generally approve this request. If the preparer of the guidebook does not wish to undertake this task, the Curator will announce the availability of this breccia for consortium study to the PI community and others may request LAPST approval as a consortium leader. As part of the request, each potential consortium leader shall submit:

1. A sampling plan indicating the particular portions of the breccia to be studied and

2. A consortium plan indicating the members of the consortium and their roles.

LAPST may approve this plan or may require additions or changes before approving it.

### C. Consortium Study

Duties, responsibilities, and conditions.

1. General.

a. All examination of the rock will be done in a nitrogen cabinet at JSC.

b. The consortium leader or a designated representative will select, with the assistance of the Curator, the portion of the rock to be sawn and the cutting plan must be approved by LAPST.

c. If the slab contains material from exterior surfaces, investigators requiring this material have priority even if they are not members of the consortium.

d. After the slab has been examined, the leader of the consortium may select portions (slablets) of the slab to be removed by the Curator for detailed study. The slablets must then remain in the possession of the consortium leader during the time designated for study of the rock.

2. Consortium Leader. The consortium leader has the following responsibilities:

a. To handle the slab under the clean-room conditions. The slab should not be treated under conditions which would compromise the experiments of any consortium member or the remainder of the material for future experiments.

b. To produce high-quality photographs of the faces of the sample before any material is removed and as required during disaggregation, and to produce overlays documenting the removal of each piece taken. The complete photographic record will be provided to the Curator when material remaining is return Curator.

c. To keep records of the disaggregation of the sample. A complete sample history will be provided to the Curator.

d. To insure that the total weight of material that is consumed in the course of the experiments does not exceed the total permitted for various members who are working with material.

e. To select and describe the samples from the consortium and allocated to PI's who are not members of the consortium.

f. To coordinate the design of the experiments, making sure that all members of the consortium have the opportunity to view the sample before any of it is sampled and to partake in the design of experiments. The experimental design should minimize the amount of material consumed. In no case may more than 50% of a given clast be allocated.

g. To coordinate a petrographic description of the material after the slab has been sampled. A set of thin sections representative of the slab will be provided to the consortium leader.

h. To keep the Curator informed about sample transfers to designated members of the consortium and to non-consortium PI's to whom the Curator requests

the consortium leader to furnish samples. The Curator will provide appropriate transfer forms to be completed for each transfer.

i. To see that unused material is maintained in chemically uncontaminated condition and returned to the Curator at his request, whenever the sonsortium members have finished using it or when the allocated material has been consumed.

j. To mediate and, if necessary, decide in cases of a dispute among consortium members wishing to use any given piece of the slab for mutually incompatible purposes.

k. To notify LAPST of changes in consortium membership or plan.

3. Consortium Members. Each designated member of the consortium will be provided material that he may consume in destructive operations. From this material he is expected to provide the basic data pertinent to his field of expertise. In addition, he may generate whatever other studies on his portion of the material that he wishes in the normal bounds stipulated by the guidelines.

4. Sample Consumption. The consortium should, of course, destroy only the minimum amount of material that is consistent with its needs. The slablets must remain with the leader until returned to the Curator. All transfers of material from the consortium slablets among the members of the consortium are to be done according to the normal guidelines for sample transfer.

The Consortium Leader shall estimate the amount of each clast to be studied and is estimated to weigh 0.5g or more and is restricted from removing more than 50% of each clast. The remainder shall be carefully documented and, if removed from the sample, shall be returned to the Curator promptly. Clasts weighing less than 0.5g must be considered specifically by LAPST before allocations are permitted. PTS information should be provided LAPST to aid in its deliberations.

Any request for additional allocations from the slab for destructive operations must be made in writing through the consortium leader to the Curator. Such requests must include a detailed justification for the additional material. At the request of the consortium leader, the Curator will provide standard, pre-cleaned vials for storage and transfer of samples.

5. Destructive and Non-Destructive Operations. It is not possible to define simply or unambiguously destructive and non-desctructive operations on the slab. The following examples may help. Undocumented removal of material from the slab is forbidden. Disaggregation of the slab into individual fragments (which naturally will include a small amount of dust) that are documented and stored in clean individual polystyrene, stainless steel, or aluminum containers is not considered a destructive operation. Pulverization and seiving of material are considered destructive operations even when the material used is from one of the documented fragments. Chemical contamination of any portion of the slab is considered destructive.

6. Publication of Results. Each member of the consortium may publish at his discretion the results obtained from his work on the consortium rock. Simultaneous publication of a series of papers on the consortium rock in a single journal is encouraged because of the coherent body of information on the rock that will result.