

# LUNAR NEWS

No. 54

January 1993



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## How To Request Lunar Samples

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## Catalog of Apollo 17 Rocks Goes to Press!

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## Editor's Notes

"Lunar News" is published by the Office of the Curator, Solar System Exploration Division, Johnson Space Center of the National Aeronautics and Space Administration. "Lunar News" is intended to be a forum of facts and opinions regarding lunar sample study. It is sent free to all interested individuals. To be included on the mailing list, write to the address below. Your contributions to "Lunar News" on topics relating to the study of the Moon and comments about "Lunar News" and materials appearing here should be sent to:

Lunar Sample Curator  
Code SN2, NASA/JSC  
Houston, TX 77058-3696  
USA

## Curatorial Phone Numbers

### Lunar Samples, Thin Sections, All Sample Requests

Jim Gooding ..... (713) 483-5126  
Phone Mail Number ..... (713) 483-3274  
Bill Phinney ..... (713) 483-5310

### Antarctic Meteorites

Marilyn Lindstrom ..... (713) 483-5135

### Cosmic Dust and LDEF

Mike Zolensky ..... (713) 483-5128

### Educational Thin Sections

Jim Gooding ..... (713) 483-5126

### Loan Agreements and Records

Dale Browne ..... (713) 483-5132

### Facilities

Jim Townsend ..... (713) 483-5331

### Contamination Control

Dave Lindstrom ..... (713) 483-5012

**Mailing Address:** SN2 Lunar Sample Curator, NASA  
Johnson Space Center, Houston, Texas 77058-3696 USA

### Electronic Mail:

**Internet:** gooding@sn.jsc.nasa.gov  
**NSI/DECNET:** SN:: GOODING

**FAX:** 713-483-2911

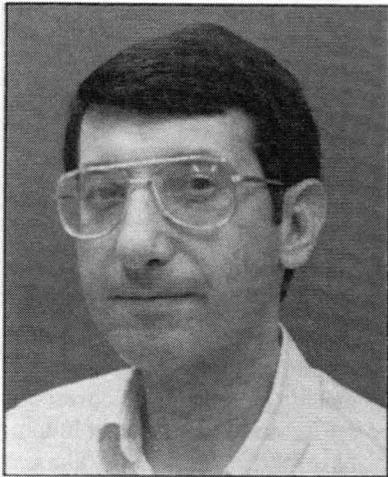
## New Assignments

**Chuck Meyer, Bill Phinney,  
Judy Allton and  
Allan Treiman**

Our previous Associate Curator of Lunar Samples, **Dr. Charles Meyer**, stepped into a new role in June 1992 as Program Scientist for the Artemis (Common Lunar Lander) project that comprises part of NASA's planing for future exploration of the Moon. Chuck is responsible for representing the interests of science in a project that is being driven by exploration requirements. He remains a members of the curatorial staff but serves as a full-time participant in the Exploration Program Office at JSC. As a long-time lunar sample investigator and advocate of lunar science, Chuck has actively pursued inputs from other members of the lunar science community. If you would like to help Chuck build the case for science on Artemis, please call him at (713) 483-5133.

To help fill the void left by Chuck's new assignment, **Dr. William Phinney** was reassigned as Associate Curator of Lunar Samples beginning in October 1992. Bill is well known as a petrologist with an extensive track record in lunar sample studies and in broader interdisciplinary studies of early crustal genesis on the Earth and Moon. In his long NASA career at JSC, he previously served as Chief of the former Geology Branch before returning to research as a senior staff scientist in the Planetary Science Branch. Bill is continuing his research but is now also responsible for daily oversight of the lunar sample processing laboratories and the custom thin-section laboratory.

*continued on page 3*



## Curator's Comments

By Jim Gooding  
NASA/JSC

In 1992, the curatorial operation was formally reconstituted as the Office of the Curator, thereby restoring planetary sample curation to a Branch-level organization within Johnson Space Center. The curation of lunar samples, Antarctic meteorites, cosmic (and other stratospheric) dust, and space-exposed hardware (most notably surfaces from the Long Duration Exposure Facility satellite) is now administratively unified with clear lines of responsibility. I now serve both as Lunar Sample Curator and as Manager of the Office of the Curator with supervisory responsibility for the other curatorial staff members. Despite the elevation of our organization, the civil service hiring freeze at Johnson Space Center means that we continue to operate, as we did through all of 1992, without a telephone receptionist or secretary. We regret any decline in our response to customer support that our staffing shortages might have produced.

I want to begin the new year by reaffirming that *Lunar News* is dedicated to reporting a digest of scientific information about the Moon, with emphasis on lunar geologic samples. The emphasis will be on keeping you, the sample- and data-user community, informed about what we are doing on your behalf. To make it a richer forum, I will solicit articles from individuals on topics that I would like to see more broadly publicized. If I should neglect to cover a topic that you think is important, however, please send me a draft article by paper mail, electronic mail, or facsimile transmission and I will reply. Good articles are always welcome.

Although we aim to publish *Lunar News* twice each year, we published only one issue in 1992 (*No. 53*, January 1992) in favor of greater attention to the Catalog of Apollo 17 Rocks, which has been a major effort. (Our progress on the catalog is reported elsewhere in this issue.) Therefore, even though you waited one year for *No. 54* to appear, rest assured that you did not miss any issues in the interim.

*continued from page 2*

Our Lockheed Engineering and Sciences Company (LESC) support contractor staff, with whom we work closely, added two new employees who can be expected to make significant contributions to our efforts on lunar sample curation. **Judith Allton** rejoined the curatorial team late in 1992 after spending a few years on exploration-related research and development projects. Judy will apply her extensive background in lunar sample processing as the newly appointed Archivist for Curatorial Practices. In that capacity, she will lead our efforts to improve preservation of the rationale for the elaborate procedures that we use in curation of lunar and other planetary samples. **Dr. Allan Treiman** joined LESG in January 1993 to work on topics related to advanced curation, including future sample handling at a lunar base or at ground-based facilities that will deal with future sample-return missions. He will also work part-time on a new education initiative in planetary sample science that is being led by **Dr. Marilyn Lindstrom**. Allan is well known as a meteorite petrologist and geochemist with extensive research and teaching experience.

## Recognition Grows for Lunar Sourcebook

By Dave Vaniman  
Los Alamos National  
Laboratory, New Mexico

In February 1984 a group of lunar scientists and interested engineers met at the Lunar and Planetary Institute in Houston to plan a book that would summarize current knowledge about the Moon. The goal of this meeting was to begin work on a single-volume reference that would satisfy the needs of a new generation of scientists, engineers, planners and managers charting the future of lunar exploration. The planned completion date for the book was 1986. Because it was written by a loose confederation of 25 authors on a volunteer basis, this early completion date was not realized and the book was not published until 1991 (*Lunar Sourcebook: A User's Guide to the Moon*, G. Heiken, D. Vaniman, and B. M. French, Eds., Cambridge University Press, 736 pp., ISBN 0-521-33444-6). The longer development time allowed complete redrafting of available figures, preparation of new figures, and preparation of camera-ready text by the Lunar and Planetary Institute with the support of NASA (contract NASW-4066) and the patient encouragement of Dr. William S. Quaide, who was then Chief Scientist for the Solar System Exploration Division.

The completed book has 11 chapters - an introduction, a summary of exploration and recent concepts, environment, surface processes, minerals, rocks, regolith, chemistry, physical properties, global and regional data (with 11

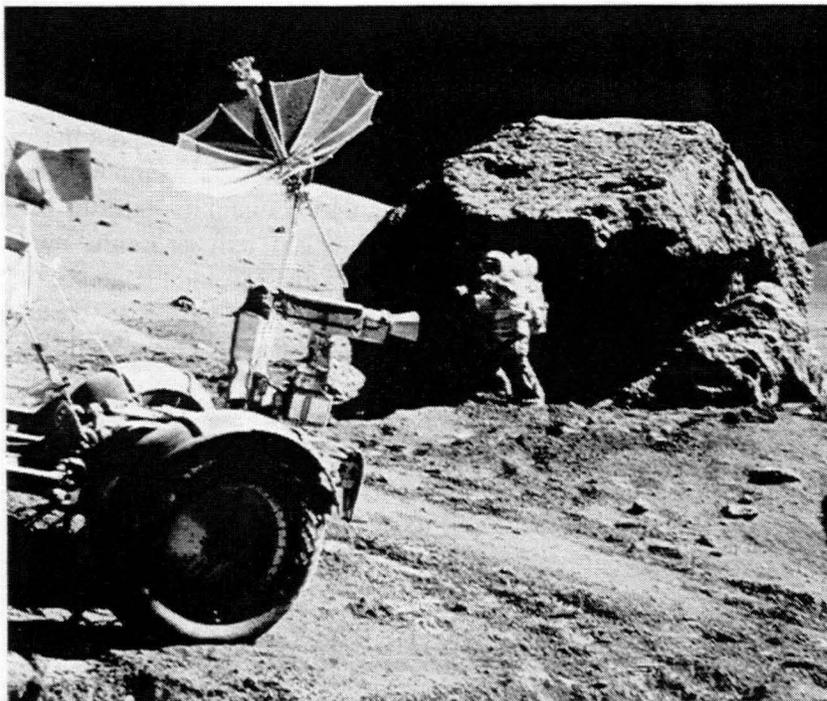
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## 20th Anniversary of Apollo 17 Celebrated with Geology Workshop

The Lunar and Planetary Sample Team (LAPST) and the Lunar and Planetary Institute (LPI) sponsored a workshop on the geology of the Apollo 17 landing site on December 2-4, 1992 — one week before the twentieth anniversary of the last Apollo mission to the Moon. The co-conveners were Harrison H. Schmitt (Apollo 17 lunar module pilot), Graham Ryder and Paul Spudis (LPI staff scientists).

The Apollo 17 site was specifically chosen for its geological diversity that is conducive to study of many aspects of lunar processes and history. For two and one-half days, a group of 78 lunar scientists gathered at the LPI to

review results of both photogeologic and sample studies of the Apollo 17 site and to debate their meanings. The topics covered crustal formation and evolution, basin-forming processes, lunar volcanism and tectonism, and surface modification processes and regolith evolution. In addition, a special session dealt with the future exploration and utilization of the Taurus-Littrow site. Accordingly, workshop attendees included workers from diverse disciplines such as photogeology, petrology, geochemistry, geophysics, remote sensing, and resource utilization. Attendees also took the opportunity to browse through preliminary copies of the first two volumes of



*Apollo 17 explores Taurus-Littrow; NASA Photo # AS17-146-22294*

the Catalog of Apollo 17 Rocks (see separate article on page 7).

The first morning of the workshop featured keynote reviews of the geologic setting of the Apollo 17 site and topical summaries of laboratory studies conducted on the returned studies. Most attendees agreed that the highlight was a joint presentation by Apollo 17 moonwalkers Gene Cernan and Jack Schmitt who captivated the audience with their recollections of both the geologic field observations and assorted anecdotes. The afternoon session covered the origin and evolution of the lunar crust as deciphered by petrology, geochemistry, and radiometric chronology of returned samples.

The second day addressed lunar highlands geology and basin formation (morning session) and mare volcanism (afternoon session). Sample-based studies were strongly represented but with substantial contributions by photogeologic and remote-sensing

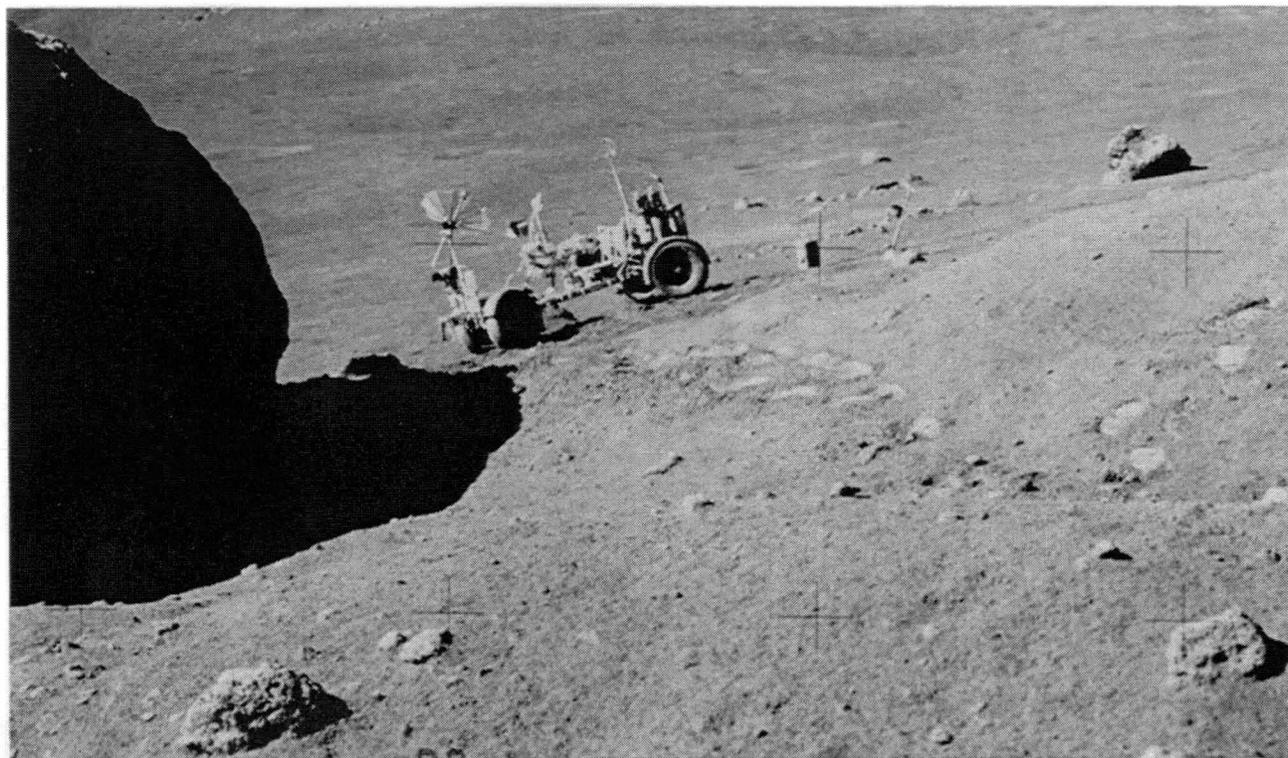
studies. The week after the workshop, the Galileo spacecraft acquired additional multispectral images of the Moon during its final flyby of the Earth on its way to Jupiter.

The third morning of the workshop began with a view of post-mare geological history through a combination of photogeologic and regolith geochemistry studies. The final session addressed the future of lunar exploration at the Apollo 17 site and the broader topic of extracting oxygen and other resources from lunar material.

A total of 32 technical presentations were made at the workshop and numerous vigorous exchanges of ideas occurred both during and between individual presentations. It is clear that 20 years after the mission, new information is still being extracted from the photographs and geologic samples that Apollo 17 returned to Earth. Less publicity is received now, com-

pared with 1972, because the easy and obvious discoveries have been made. Current research is tackling the fundamental questions that are more resistant to solution. Samples are being dissected into smaller pieces and analyzed with techniques that were not available in the 1970s. Also, selected areas of the Moon are being compositionally remapped using improved ground-based telescope systems and the wealth of thematic data gathered by the Galileo flybys.

Abstracts of papers presented at the workshop were published as LPI Technical Report Number 92-09, Part 1; Part 2 will include a formal summary. Please contact the LPI (telephone 713-486-2139; fax 713-486-2162) regarding availability of Part 1 of the report. For further information about the schedule for publication of the final report, please contact either Paul Spudis (telephone 713-486-2193) or Graham Ryder (telephone 713-486-2141).



*Sampling a boulder at Station 6; NASA Photo # AS17-140-21493*

color plates), and an afterword on future exploration. This is an attractive and useful reference work, thanks in large part to the efforts of the Lunar and Planetary Institute in careful production. Reviews of the book have been favorable, sales have been brisk, and a second printing is planned.

In June 1992, Lunar Sourcebook was selected by the Geoscience Information Society (GIS) to receive the annual Best Geoscience Reference Book Award. The award was presented at the GIS meeting in conjunction with the Geological Society of America annual meeting in Cincinnati, Ohio, on October 26, 1992.

Lunar Sourcebook is available from Cambridge University Press, 40 W. 20th St., New York, N. Y. 10011-4211; the discount price through December 1992 was \$47.96 plus \$2.00 shipping for the first book and \$0.75 handling for each additional book.

# Core Samples 68001 and 68002 To Be Dissected

The regolith double drive tubes 68001 and 68002 will be opened and dissected beginning in February with the first samples becoming available to investigators by March 1993. We are embarking on this important operation in response to a request from Professor Larry Haskin (Washington University, St. Louis) that was endorsed by our review committee, the Lunar and Planetary Sample Team (LAPST), and approved by NASA Headquarters in mid-1992.

Drive-tube samples 68001 (lower section) and 68002 (upper section), representing a combined length of about 62 cm, were

collected during the Apollo 16 mission at Station 8. The tubes were driven into the regolith by hammer at a location about 1-2 m from the edge of a crater that was 10-15 m in diameter. X-radiographs of the sealed core tubes indicate that the upper regolith sample is rich in coarse particles and notably fractured. In contrast, the lower section appears to be substantially finer-grained but with stronger suggestions of bedding. The total gross weight of the core sample is 1424 grams.

All requests for material from 68001/2 should be made following the normal procedure used for lunar sample requests (see separate article on page 8). It is anticipated that LAPST will review requests for 68001/2 samples at its June 1993 meeting.



# Catalog of Apollo 17 Rocks Goes To Press

This long overdue description of lunar rocks collected by the Apollo 17 mission is being published by the Office of the Curator at NASA/Johnson Space Center, Houston, Texas. Current knowledge about each rock will be summarized using text, photographs, and data plots based on information published in the open scientific literature through mid-1992. The coverage and projected publication date of each volume is given below.

Volume	Author(s)	Rocks Described	Expected Publication Date
1	Graham Ryder	72215-73285 (South Massif)	February 1993
2	Clive Neal and Larry Taylor	70017-71597 (Central Valley, Part 1)	February 1993
3	Clive Neal and Larry Taylor	72135-155; 74115-75115; 79035-537 (Central Valley, Part 2)	April 1993
4	Graham Ryder	76015-78599 (North Massif)	August 1993

Catalog volumes will be sent individually or as complete sets to each lunar sample principal investigator, lunar scientist, or technical librarian who makes a written request. For your convenience you may use the following order form or a copy made from it.

Please send me one copy of each of the following volumes from the Apollo 17 rock catalog when it is published:

Vol. 1  Vol. 2  Vol. 3  Vol. 4

Send to: Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_

Zip Code \_\_\_\_\_ - \_\_\_\_\_ Country: \_\_\_\_\_

Please return this catalog request to:

Lunar Sample Curator  
SN2/Office of the Curator  
NASA/Johnson Space Center  
Houston, TX 77058-3696 USA

Fax: 713-483-2911

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# How to Request Lunar Samples

NASA policies define lunar samples as a limited national resource and future heritage and requires 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 processes being focussed at the Johnson Space Center (JSC). Any and all individuals requesting a lunar sample should follow the steps given below for the appropriate category of sample.

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## 1. RESEARCH SAMPLES (including thin sections)

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NASA provides lunar rock, soil, and regolith-core samples for both destructive and non-destructive analysis in pursuit of new scientific knowledge. Requests are entertained for both basic studies in planetary science and applied studies in lunar materials beneficiation and resource utilization.

**A. The sample investigator submits a research proposal for formal evaluation by a recognized research program.** The programs customarily used for evaluating lunar sample research are the Lunar and Planetary Geosciences Review Panel (operated by NASA) or the National Science Foundation. Favorable peer reviews from other programs can also be considered as evidence for quality of the proposed work.

**B. 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 should be submitted directly to the Lunar Sample Curator at the following address:

Dr. James L. Gooding  
Lunar Sample Curator  
SN2  
NASA/Johnson Space Center  
Houston, TX 77058-3696  
USA  
Fax: (713) 483-2911.

For engineering and resource-utilization studies, the sample request should be submitted to the Lunar Simulant Curator at the following address:

Dr. Douglas W. Ming  
Lunar Simulant Curator  
SN4  
NASA/Johnson Space Center  
Houston, TX 77058-3696  
USA  
Fax: (713) 483-5347.

The Lunar Simulant Curator will arrange for a technical review of the applications-oriented sample request to assure that all necessary demonstration tests with simulated lunar materials have been satisfactorily completed. Requests determined to be sufficiently mature to warrant consideration for use of lunar materials will then be forwarded to the Lunar Sample Curator.

For new investigators, copies of relevant research proposals and tangible evidence of peer review (step A) would be important

attachments to the sample request. Investigators proposing the application of new analytical methodologies (not previously applied to lunar samples) also should submit test data obtained for simulated lunar materials. New investigators who are 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; ISBN 0-521-33444-6) as the best available reference on the chemical and physical properties of lunar materials.

**C. The Lunar Sample Curator will research the availability of the requested samples and decide whether a unilateral action can be taken or an outside scientific review is required.** 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 Curator forwards the original request, with background information, to the Lunar and Planetary Sample Team (LAPST), a standing committee of scientists who advise NASA on the care and use of lunar samples. LAPST checks for favorable peer review (step A) and appropriate sample selection (step B). For new investigators who have not yet passed peer review but who have proposed significant new work, LAPST may recommend temporary access to lunar samples until peer review can be completed in the next available proposal cycle.

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**D. Given LAPST endorsement and concurrence by NASA Headquarters, the Lunar Sample Curator will prepare a Lunar Sample Loan Agreement for signature by the investigator's institution. The agreement includes a simple security plan that prescribes precautions to minimize prospects for theft or unauthorized use of lunar samples.**

**E. Upon receipt of the properly executed loan agreement, the Lunar 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 U. S. diplomatic pouch mail to the American embassy nearest the requestor's location. Quantities larger than 10 grams must be hand-carried by the investigator or his/her representative.**

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## **2. PUBLIC DISPLAY SAMPLES**

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NASA provides for a limited number of rock samples to be used for both short-term and long-term display 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:

Mr. Boyd E. Mounce  
Lunar Sample Specialist  
AP4/Public Services Branch  
NASA/Johnson Space Center  
Houston, TX 77058-3696  
Fax: (713) 483-4876.

Requestors in foreign countries must contact the public affairs officer of the United States Information Service (USIS) at the nearest American embassy. The USIS will contact Mr. Mounce to determine whether the loan of a display sample is appropriate.

For both domestic and foreign requestors, Mr. Mounce will 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. Mr. Mounce will coordinate the preparation of new display samples with the Lunar Sample Curator.

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## **3. EDUCATIONAL SAMPLES** (disks and educational thin sections)

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### **A. Disks**

Small samples of representative lunar rocks and soils, embedded in rugged acrylic disks suitable for classroom use, are made available for short-term loan to qualified school teachers. Each teacher must become a certified user of the disks through a brief training program prior to receiving a disk. Educational sample disks are distributed on a regional basis from NASA field centers located across the United States. For further details, prospective requestors should contact the public affairs office at the nearest NASA facility or write to the following address:

Mr. Larry B. Bilbrough  
FEE/Elementary and  
Secondary Education  
NASA Headquarters  
Washington, DC 20546.

### **B. Thin Sections**

NASA prepared 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 (described above) and teaching materials. The typical loan period is two weeks, including round-trip shipping time. Each requestor must apply in writing, on college or university letterhead, to the following address:

Lunar Sample Curator  
SN2  
NASA/Johnson Space Center  
Houston, TX 77058-3696.

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

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# Accessing the JSC SN2 Curatorial Databases

The curatorial databases may be accessed as follows:

Via SPAN (NSI/DECNET)	1) Log onto your host computer. 2) Type <b>SET HOST 9300</b> at the system prompt. 3) Type <b>PMPUBLIC</b> at the <u>USERNAME:</u> prompt.  NOTE: Your system manager may add node CURATE to the DECNET database on your host computer; the SPAN node number is 9.84. You may then access CURATE by typing <b>SET HOST CURATE</b> instead of <b>SET HOST 9300</b> .
Via INTERNET	1) Type <b>TELNET 146.154.11.35</b> or <b>TELNET CURATE.JSC.NASA.GOV</b> . 2) Type <b>PMPUBLIC</b> at the <u>USERNAME:</u> prompt.
Via modem	The modem may be 300, 1200, or 2400 baud; no parity; 8 data bits; and 1 stop bit. If you are calling long distance, the area code is 713. 1) Dial 483-2500. 2) Type <b>SN_VAX</b> in response to the <u>Enter Number:</u> prompt. 3) Hit <CR> 2 or 3 times after the <u>CALL COMPLETE</u> message. 4) Type <b>J31X</b> in response to the # prompt. 5) Type <b>PUBLIC</b> in response to the <u>Enter Username&gt;</u> prompt. 6) Type <b>C CURATE</b> in response to the <u>Xyplex&gt;</u> prompt. 7) Type <b>PMPUBLIC</b> at the <u>USERNAME:</u> prompt.

For problems or additional information, you may contact:

Claire Dardano  
Lockheed Engineering & Sciences Company  
(713) 483-5329