LUNAR *NEWS*

No. 61 September 1997

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Lunar News Mission

The purpose of "Lunar News" is to provide a newsletter forum for facts and opinions about lunar sample studies, lunar geoscience, and the significance of the Moon in solar system exploration.

Editor's Notes

"Lunar News" is published by the Planetary Missions and Materials Branch, Earth Science & Solar System Exploration Division, Johnson Space Center of the National Aeronautics and Space Administration. It is sent free to all interested individuals. To be included on the mailing list, write to the address below. Please send to the same address any comments on "Lunar News" or suggestions for new articles.

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Meet the Staff!

Carl Allen, Planetary Geologist

Carl Allen is a Planetary Geologist on the staff of the Lunar Curator. He was born in San Antonio and grew up “back East.” Carl returned to Texas to study Chemical Physics at Rice. Shortly after graduation he met and married Jaclyn, a geologist who caused him to see the error of his ways and turn to geology. After a stint in the Navy, the Allens headed for Arizona where they brought forth daughter Ruth and Carl’s PhD in planetary science. On a roll by then the family moved on to New Mexico, a postdoc and daughter Joan. A serious downturn in the outlook for space research sent the Allens to the Hanford Nuclear Reservation in Washington for ten dynamic years of work in nuclear and chemical waste disposal. Carl and Jaclyn returned to their planetary geology roots in 1991, joining the Lockheed staff at JSC to pursue research and science education.

Much of Carl’s work has focused on the resources of the Moon and planets. He demonstrated the extraction of oxygen from lunar soil and volcanic glass samples as well as from carbon dioxide, the

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Curator's Comments

Chuck Meyer
NASA JSC

On August 1, Jim Gooding announced that he had accepted a challenging job managing research at Enron. This abrupt transition has left the Curator's Office in temporary disarray, partly because Jim was so good at what he did. We have divided up the activities and with the help of everyone are continuing to try to provide the expected high level of professional service to the community. Dale Browne is acting Branch Chief, while Chuck Meyer is acting Lunar Sample Curator and Eileen Stansberry is mission lead. It is thought that JSC may hire a Mars Curator sometime soon to continue to advocate for Mars Sample Return and advanced curation at JSC.

We have recently prepared and delivered to the Smithsonian, four new displays of lunar samples. They will be opening a new, improved hall of minerals, that will include first class displays of lunar samples. Be sure to visit. We would like to hear your impression.

September 6, 1997

Dear Colleague,

The deadline for requests for lunar samples is September 24. We need time to research these requests prior to the next meeting of CAPTEM. Please submit requests to us as soon as possible so that we don't have to prepare them all at once for the committee's consideration.

You may fax your request to (281) 483-5347, but please confirm by phone at 483-3274. However, you must also submit your official request (signed) on letterhead to arrive by mail. The official request should be identical to your faxed request.

Professor James Papike is the new chairman for CAPTEM.

Detailed information on how to request lunar samples can be found at our web site;

http://www-curator.jsc.nasa.gov/curator/lunar/samreq/samreq.htm

Sincerely,

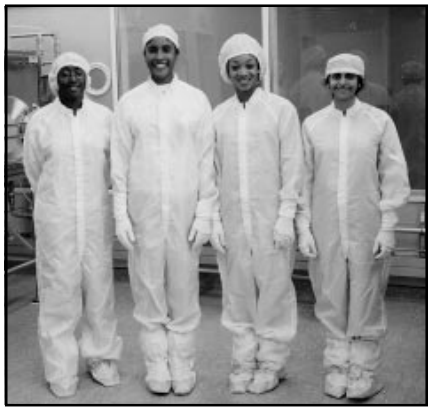
Charles Meyer
Acting Curator

Lunar Prospector is scheduled to take off next month (see article on page 6). It is one of the first Discovery missions, done much more cheaply than in the past. They will map the whole Moon for Th and several other elements. We wish them success. ❑

1997 Summer Highlights

As the end of summer is upon us, there once again was the mad rush to view the "moon rocks" and the lunar processing facility. The summer faculty, summer interns, and NRCs all look forward to donning the bunnysuits, hat, gloves, and booties to gaze upon our national treasures. Some of them have worked with PIs, scientists, and technicians on small portions of samples over the past months, but lab tours show the big picture. The efforts of the men and women who have dedicated so much of their lives to the care of these samples have assisted in providing and producing tangible results that have positively impacted the lives of all human kind. The precision handling and special care that is taken to preserve the condition of the rocks makes an impression to visitors to the lab. ❑

Below: *The Lunar Growth Chamber Project is a joint project with Space Center Houston, Clear Creek ISD, and NASA JSC. These student participants took a break from planning plant growth experiments to tour the lunar sample facility.*



Top Right: *From left to right, Jessie Hendrick (JSC EEO), Robert Thompson (Intern), Chris Barrett (Intern), and Geri Spratlin (Interpreter) tour the lunar lab.*

Bottom Right: *Summer Hight School Apprentice Research Program (SHARP) students from Booker T. Washington School of Engineering and Clear Lake Intermediate School.*

Shannon Colton, Summer Intern

I grew up in Sioux City, Iowa. I now live in San Antonio, Texas. I am the daughter of Sue and Milo Colton, and the sister of Chase, Starlight, and Dallas Colton.

I received my high school diploma from James Madison High School in San Antonio. I am currently pursuing a Bachelor of Science degree in geology at the University of Texas at San Antonio, where my professors have opened my eyes to many facets of geology.

Planetary geology, in particular, has always left me in awe. I remember the day my geology professor, Dr. Eric Swanson, described impact craters on the Moon, near-Earth asteroids, and Antarctic meteorites. My awareness that Earth is not an isolated entity, but a member of a dynamic solar system, has fostered my interest in planetary geology.

I have spent two summers working for Dr. James Gooding at the Planetary Missions and Materials Branch, NASA JSC. Dr. Gooding has involved me in projects that provide tools for deciphering Martian mineralogy. In both, I have written Excel macros. One spreadsheet stores chemical composition data, and plots samples on a graph with the axes Al/(Al+Mg+Fe) and (Na+K+Ca)/Si; the other stores principal wavelength positions and relative absorption strengths of minerals anticipated on Mars. While completing these projects, I have gained a basic understanding of Martian geochemistry. I also helped index documents for archives maintained by our division. Working here has been the most challenging, and fulfilling experience of my life; I am now dedicated to a career in planetary geology.

In my spare time I enjoy visiting parks, camping, and hiking in northern New Mexico.

I plan to graduate in the summer of 1998, and attend graduate school in planetary geology the following Fall. ❑

Christopher Barrett, Summer Intern
High School/High Tech Program

My name is Christopher Barrett. I was born on February 8, 1981, in Houston, Texas. I live with my parents, Jack and Carol Barrett. I have an older brother, Michael, who is 20 years old. We all live in Clear Lake in the Middlebrook Subdivision. I like to go out with my friends and play basketball. I also like to go out at night and play pool. Next year I will be a Junior at Clear Lake High School. I cannot wait to graduate high school and go to college. I want to work at NASA and become a Engineer (or something like that). I think it's pretty interesting when some new discoveries are made! I would like to see some new things that people have never seen or heard of. Being a High School-High Tech. student gives me good experience for the future and it will look very good on my résumé. I think it's a good idea to work around NASA. I'm glad that I had this opportunity! ❑

Meet the Staff
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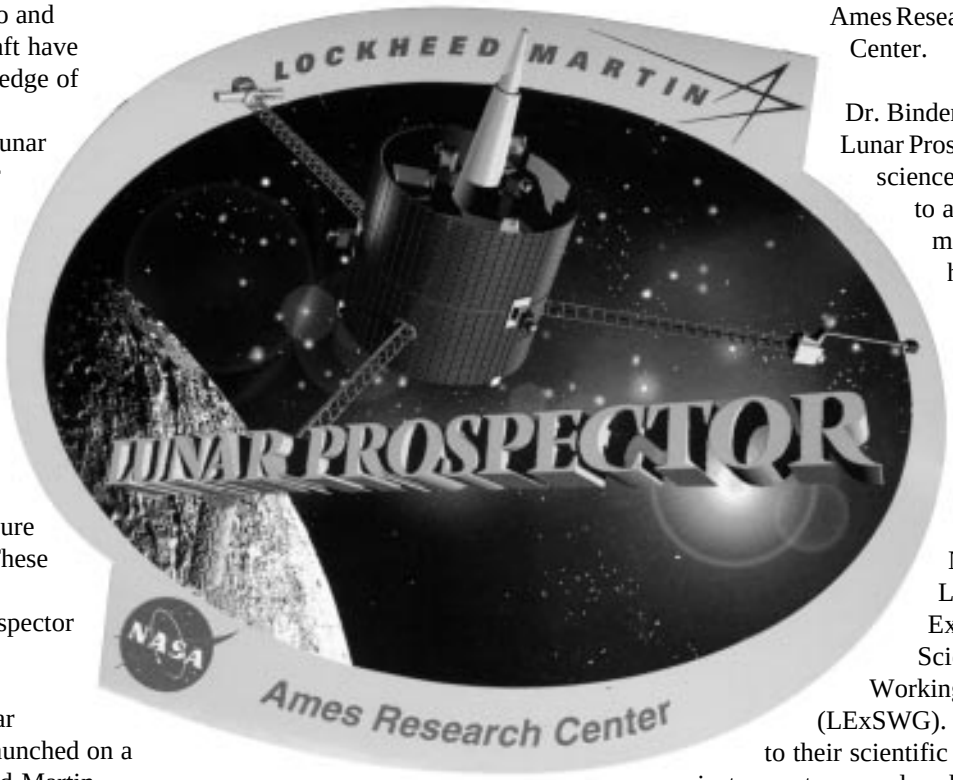
main component of Mars' atmosphere. With the exciting announcement of possible relic life forms in a martian meteorite, Carl has turned his work toward the search for fossilized bacteria in Earth's geologic record. Carl and Jaclyn recently helped produce a popular planetarium show which depicts NASA's current strategy for the human exploration of Mars.

Carl serves as the Lunar Curator's Science Observer, verifying that investigators receive the best possible samples for their research. He is also deeply involved in planning for biological screening and curation of the martian rock and soil samples scheduled to be returned early in the next decade.❑

Prospecting the Moon

by John Gruener
Lockheed Martin Space Mission Systems and Services

Lunar sample analyses have often been used to correlate lunar remote sensing data from spacecraft and earth-based measurements. During the Apollo program, roughly 20% of the lunar surface was chemically mapped from orbit by scientific instruments in the command/service module. More recently, data from the Galileo and Clementine spacecraft have increased our knowledge of the global chemical composition of the lunar surface. Now, Lunar Prospector is ready to continue the exploration of our nearest planetary neighbor. Is there water ice on the moon? How did the Moon evolve? Are there resources on the Moon that could be used by future human explorers? These are only a few of the questions Lunar Prospector hopes to answer.



On October 24, Lunar Prospector will be launched on a three-stage Lockheed-Martin Launch Vehicle Two (LMLV2) from Spaceport Florida's Pad 46 at Cape Canaveral. This will be the first commercial launch from the Florida Spaceport complex and the first spacecraft that NASA has sent to the Moon since the Apollo program. One hour after launch, a Star 37 solid rocket motor will provide the trans-lunar injection (TLI) burn over Borneo and the South Pacific that will propel Prospector towards the Moon. During the approximately 123 hour flight to the Moon, Prospector will establish its cruise attitude, deploy its science booms, turn on the science instruments, and fires its onboard thrusters to correct any launch errors.

As it nears the Moon, Prospector will fire its onboard thrusters to accomplish lunar orbit insertion (LOI). Initially, Prospector will be placed in a 12-hour elliptical lunar orbit. The spacecraft will then be lowered to a 3.5-hour elliptical orbit, and finally to 100 km circular polar orbit. This polar orbit will have an orbital period of 118 minutes and will be the primary mapping orbit for Lunar Prospector's one year mission.

Dr. Alan Binder of the Lunar Research Institute (LRI) is the Principal Investigator for the Lunar Prospector mission and leads the project team that includes personnel from NASA, Lockheed-Martin, Los Alamos National Laboratory, JPL, the University of California at Berkeley, and the University of Arizona. The Lunar Prospector mission will be controlled from Ames Research Center.

Dr. Binder designed Lunar Prospector's science payload to address many of the highest priority experiments proposed for lunar mapping missions by NASA's Lunar Exploration Science Working Group (LExSWG). In addition to their scientific value, the instruments were also chosen based on their ability to operate on a simple, spin-stabilized spacecraft, and for their low mass, power, and data rate requirements.

The instrument that will likely generate the most interest early in the mission is the neutron spectrometer (NS). The primary goal of this experiment is to map the

hydrogen abundance on the lunar surface, and in particular locate water ice deposits that may be present in the permanently shadowed regions near the lunar poles. The sensitivity of NS is such that it can detect a cup full of water in one cubic meter of regolith. Two other spectrometers with Apollo heritage will also be flying on Prospector. The gamma ray spectrometer (GRS) will gather data on the distribution of the elements U, Th, K, Fe, Ti, Si, O, and Al in the lunar surface to a depth of > 10 cm. It may also be possible to map the distribution of Ca and Mg. The Prospector GRS bismuth-germanate crystal is about twice as sensitive as the Apollo sodium-iodide GRS. The third spectrometer is an alpha particle spectrometer (APS) and will be used to detect releases of radioactive ^{222}Rn and ^{210}Po gas. Though these gases are released in very small amounts (as measured by the Apollo APS), it is believed that they could act as tracer gases for other carrier gases such as N_2, CO, CO_2 that may be coming out of the Moon in larger, useable amounts. While Lunar Prospector is in its 100 km orbit, the spatial resolution of the three spectrometers will be about 150 km. However, a lower orbit in an extended mission could improve this resolution.

Other science experiments that will be conducted by Lunar Prospector include mapping the global magnetic and gravity environments. The magnetometer/electron reflectometer (MAG/ER) will measure the magnetic field flux at both the orbital altitude and on the lunar surface. The MAG measures vector fields at orbital altitudes with about 0.01 nT accuracy and thus provides the directions of the lunar fields. ER magnetometry is a remote sensing technique to map the surface magnetic field strength with high spatial resolution (down to about 3 km) and very high sensitivity (about 0.01 nT at the surface averaged over the resolution element). Data from the magnetic experiments will also address the issues of magnetic anomalies on the lunar surface and the existence of a lunar core. Finally, the Doppler shift of Prospector's communications signal will be used to map the global lunar gravity field, which is known to be non-uniform as a result of mass concentrations distributed below the surface of the moon. The Doppler data will have a surface resolution of 200 km from the nominal 100 km mapping orbit.

If all goes well during the primary mapping mission, an extended mission will have Prospector lowering its orbit to get better spatial resolution for the science instruments. One possibility would be to put the spacecraft into an elliptical orbit with periselene altitudes down to 10 km. This would greatly enhance locating any ice deposits detected in the polar regions or correlating gas release events or magnetic anomalies with specific surface features.

You can follow the Lunar Prospector mission or lunar exploration in general at these websites:

NASA Ames Research Center
http://lunarprospector.arc.nasa.gov

Lockheed Martin
http://juggler.lmsc.lockheed.com/lunar

Lunar and Planetary Institute
http://www.lpi.usra.edu/moon.html

International Lunar Exploration Working Group
http://ilewg.jsc.nasa.gov ❑

Thirteenth Lunar Meteorite Found

Bischoff and Weber have reported that a meteorite from the Moon was found in the Sahara Desert on March 23 of this year (Meteor. & Planet. Sci., 32, A13). It is 7.3 cm in largest dimension and weighs 513 grams. It is a moderately weathered, polymict breccia apparently from the lunar highlands. Its clast population is dominated by feldspathic clasts. It is cut by veins of impact glass. The name of this sample of the Moon is Dar Al Gani 262. It is apparently owned by a private dealer in Germany.

The 29th Lunar and Planetary Science Conference

March 16-20, 1998
Houston, Texas

You are encouraged to submit ideas and suggestions for plenary or theme sessions to either David Black at *black@lpi.jsc.nasa.gov* or Doug Blanchard at *dblanch@ems.jsc.nasa.gov* by Oct. 6, 1997 so they can be considered, planned, and publicized.

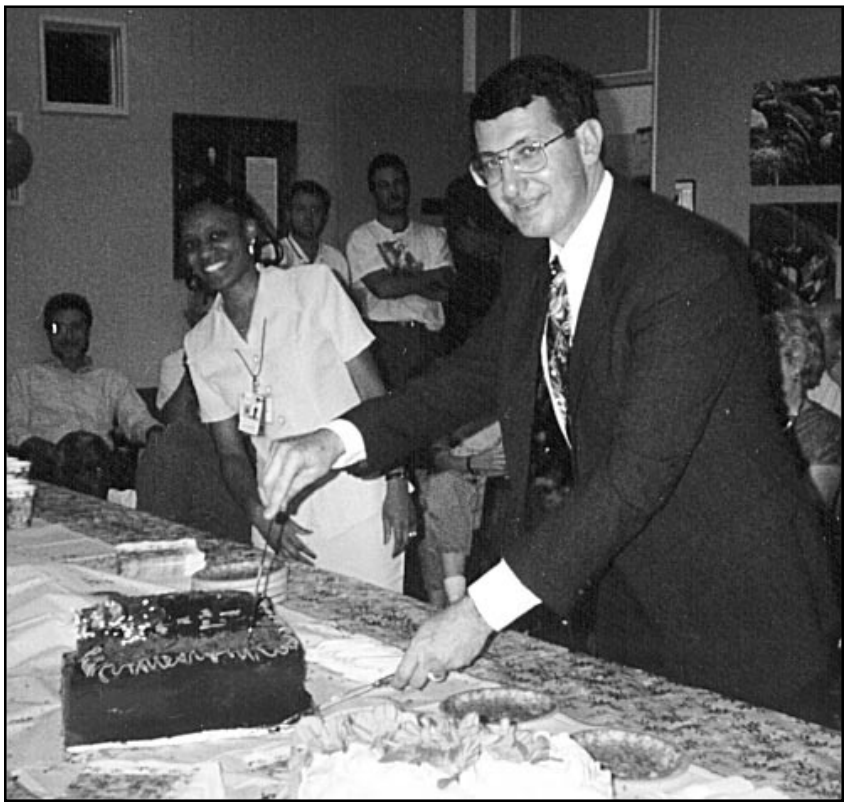
http://www.lpi.usra.edu/meetings/LPSC98/

Jim Gooding Launches New Career in Energy Industry

In August the curation troops were stunned by Jim Gooding's sudden announcement that he was leaving. After serving as the seventh Lunar Sample Curator, since January 1992, and as Chief of the Planetary Missions and Materials Branch, since June 1994, Jim Gooding resigned from NASA service on August 15, 1997 to pursue a new career as Research Manager, Capital and Trade Resources, for the Enron Corporation.*

After moving from the Jet Propulsion Laboratory to JSC in 1981, Jim served in a succession of roles as a planetary materials curator while separately pursuing original research on the thermodynamic properties of meteoritic minerals and the mineralogy of water-based precipitates in Martian meteorites. Jim says he feels privileged to have held significant responsibilities in the interplanetary dust and meteorite programs as well as the lunar program. As Lunar Sample Curator, Jim encouraged technical innovation. One of his central themes was modernization of curatorial facilities to include expanded use of computers to archive and distribute electronic data records. All facets of JSC sample curation have been enriched by Jim's expertise—cosmic dust, meteorites, lunar samples.

As Chief of the Planetary Missions and Materials Branch, he emphasized preparation for future sample-return missions, including several candidates under the Discovery program as well as the larger scope of Mars sample return. Gooding's highly-respected knowledge of meteorites and Martian alteration products made him an effective spokesperson for sample science in planning Mars sample return missions, especially future sample curation.



Although Jim remains keenly interested in planetary exploration, he decided to accept an unexpected opportunity for professional and personal growth in private industry. In his new position with Enron, Jim and his team are responsible for gathering, filtering, analyzing, and reporting real-time market intelligence relating to global energy supply and demand, including the development and use of proprietary electronic databases and analytical tools.

Jim was glowing with enthusiasm for the challenge, and the curation folk did indeed celebrate his new good fortune and commemorate his

Left: *Jim slices cake at hs formal going away party at JSC.*

accomplishments with a formal going away party followed the next day by a much less formal occasion for the curation "family."

At the official gathering, Jim was presented with photos and mementos of his service to the planetary science community on behalf of an over-capacity crowd of well-wishers. Later the "family" transformed the conference room into a 1960s coffeehouse in which young student, Jim Gooding, has a conversation with young student, Bill Clinton, and both are entertained by singing groups bearing a very distant resemblance to Peter, Paul and Mary, and Bob Dylan. A good time was had by all.

Jim's departure leaves a very big vacancy in the leadership of sample curation and Mars sample return curation planning, resulting in anticipated reorganization of the curation and sample return function. To say 'he will be missed' is a classic understatement. Jim departs with sample curation in good order, leaving a legacy of honesty, keeping promises, serving customers and highest regard for the integrity of the sample collections.

For those of us in curation, Jim has been a leader, advisor and friend. We are grateful for his contributions. He can be reached by e-mail at jgoodin@ect.enron.com. ❑

*Enron Corp., based in Houston, is one of the world's largest integrated natural gas and electricity companies.

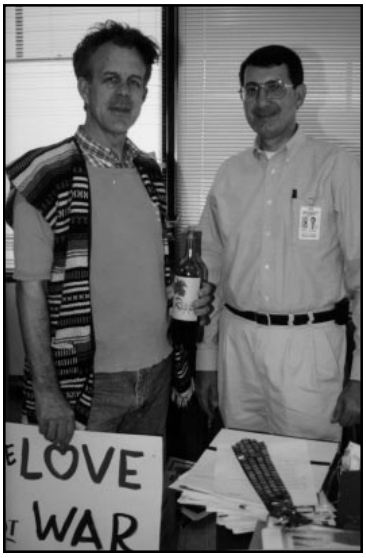
Right: *The Peter, Paul, and Mary soundalikes: from left to right, Linda Watts, Bill Williams, Cecilia Satterwhite, Andrea Mosie, and Kim Willis.*

Jim Gooding's Legacy

to Planetary Sample Curation

Planning for Mars Sample Return
Paperless Documentation & Archiving
Electronic Communication - On the Internet!
New Technology Cleaning with Ultra Pure Water
Stricter Sample Accounting
Orderly Planning Process

Right: *Young Jim Gooding (Eileen Stansbery, right) and coffee house waitress (Jackie Allen, left).*



Young Bill Clinton (Carl Allen) chats with Gooding after party.

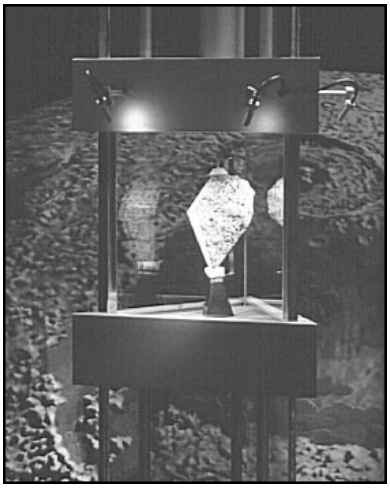
Singer Bob Z. Gooding (Rene Martinez) and his back-up singers Tari Mitchell (L) and Anita Dodson (R).

New Lunar Sample Display at the Smithsonian

Janet Annenberg Hooker Hall of Geology, Gems, and Minerals
Opens September 20, 1997
At The Smithsonian's National Museum of Natural History

"The Janet Annenberg Hooker Hall of Geology, Gems, and Minerals, the most comprehensive Earth science complex of its kind containing some of the most dazzling gems and crystals in the world, opens at the Smithsonian's National Museum of Natural History at noon on Saturday, September 20, 1997."

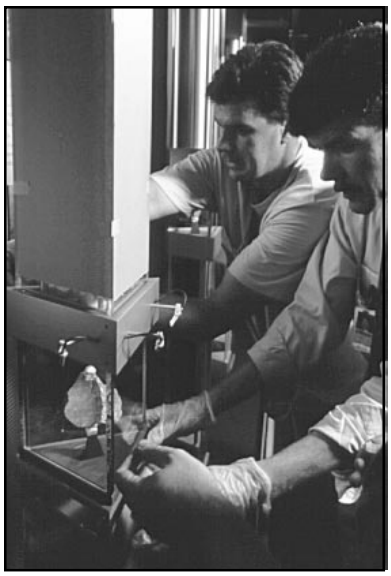
"The 20,000-square foot hall, closed since 1995 for the renovation, features the renowned Hope Diamond along with the museum's unparalleled collection of gemstones and jewelry pieces, including important new donations never displayed before. The exhibition also contains 2,500 minerals and gems in spectacular colors and shapes, about a third of which are on public view for the first time; a re-creation of four mines, lit by state of the art fiber optics, with dioramas that show how minerals appear underground; a major new exhibition on plate tectonics, demonstrating how the sliding and shifting of Earth plates cause earthquakes and volcanoes and showing the world's "hot spots*"; and a gallery devoted to the moon, meteorites and the solar system*, where visitors will be able to touch meteorites, in addition to discovering moon rocks and other out-of-this world objects."*



Lunar sample 15555,880. *A medium grained olivine mare basalt.*

The Moon, Meteorite and Solar System Gallery is an exploration of the birth of our solar system and its evolution, through films, computer interactives and touchable specimens. This gallery features four lunar samples representing the lunar crust, mare basalts and impact breccias. They were mounted in triangular, glass prisms in nitrogen cabinets in the Lunar Sample Facility at NASA JSC. Although the samples had been prepared some months, the new display cases came together only shortly before the deadline, resulting in a massive team effort to get the displays ready in time. The displays were hand carried to Washington by four couriers who used charm, diplomacy and brute strength (the sample boxes are bulky and heavy) to personally convey the samples through airports and airplane. The couriers were met at Washington National Airport by Smithsonian curator Tim McCoy. The samples were received at the Smithsonian by Glenn MacPherson and staff who were eagerly awaiting their arrival. The lunar displays were mounted into the Smithsonian's gallery the following morning with appropriate ceremony!

The new exhibit is a wonderful showing of the world's most famous meteorites and examples of each meteorite class are set in the context of planetary evolution. For example, five-foot polished slabs of irons are not only beautiful, but serve to illustrate grain size variation. Planetary processes and interiors are enhanced by bringing field specimens into the exhibit hall - an actual K-T boundary section from Raton, New Mexico, and San Andreas fault cross-section are on display. The Smithsonian's planning and effort since 1989 has resulted in an excellent exhibit, which is worth a special trip to Washington to experience.



Above: *Glenn McPherson (on right) is assisting in the installation of the lunar display sample.*

Right: *Putting on the final touches to the new lunar sample display.*

Left: *Final stages of sample display installation.*

MacPherson sent his thanks to Jim Gooding for his assistance in the initial work and planning of this request, CAPTEM for their approval and Doug Blanchard and his staff.

Left: *Tari Mitchell and Andrea Mosie preview the exhibit.*

**Information from a Press release from the Smithsonian Institute (NMNH)*

Display Assembly
Linda Watts
Kathleen McBride
Carol Schwarz
Andrea Mosie

Curatorial Support
Dale Browne
Jim Townsend

Operations Support
Terry Parker
Bill Williams
Ron Bastien
Billy Satterwhite
Jimmy Holder
Ed Cornitius

Couriers
Andrea Mosie
Kathleen McBride
Lisa Prejean
Tari Mitchell

Revised: August 1996

How to Request 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 processes being focused at the Johnson Space Center (JSC). Individuals requesting a lunar sample should follow the steps given below for the appropriate category of sample.

1. RESEARCH SAMPLES (including thin sections)

NASA provides lunar rock, soil, and regolith-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 and resource utilization.

A. The sample investigator demonstrates favorable scientific peer review of the proposed work involving lunar samples. The required peer review can be demonstrated in either of two ways: (1) A formal research proposal recommended by NASA's Lunar and Planetary Geosciences Review Panel (LPGRP) or an equivalent scientific peer-review panel, within the past three years; (2) Submittal of reprints of scientific articles, as published in peer-reviewed professional journals that directly pertain to the specific sample requested.

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. Charles Meyer
SN2/Acting Lunar Sample Curator
NASA/Johnson Space Center
Houston, TX 77058-3696
USA
Telephone: (281) 483-3274
Fax: (281) 483-5347

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
SN4/Lunar Simulant Curator
NASA/Johnson Space Center
Houston, TX 77058-3696
USA
Telephone: (281) 483-5839
Fax: (281) 483-5347

The Lunar Simulant Curator will 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, tangible evidence of favorable peer review (step A) should be attached to the sample request. Each new investigator should also submit a résumé.

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.

Investigators with access to the World Wide Web on the Internet also can find updated information at the following URL: http://www-sn.jsc.nasa.gov/curator/curator.htm. The home page cited above provides links to sample databases and other information of use to sample requestors.

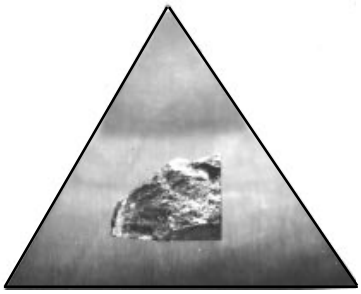
C. The Lunar Sample Curator will research the availability of the requested samples and decide whether a unilateral action can be taken or an outside scientific review is required. Outside review is prescribed for all new investigators and for most established investigators except where returned (previously used) samples are being requested. For outside review, the Curator forwards the original request, with background information, to the Curation and Analysis Planning Team for Extraterrestrial Materials (CAPTEM), a standing committee of scientists who advise NASA on

the care and use of lunar samples. CAPTEM checks for favorable peer review (step A) and appropriate sample selection (step B).

D. Given CAPTEM 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.

F. Continuation as a Lunar Sample Investigator. An investigator's privilege for retention and use of lunar samples is contingent upon continued good standing with the Office of the Curator. The investigator will remain in good standing by fulfilling the following obligations: (1) Maintenance of, and adherence to, the lunar sample loan agreement and security plan; (2) Timely cooperation with annual lunar sample inventory; (3) Timely cooperation with sample recalls.



2. PUBLIC DISPLAY SAMPLES

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

Mr. Boyd E. Mounce
Lunar Sample Specialist
AP4/Public Services Branch
NASA/Johnson Space Center
Houston, TX 77058-3696
Telephone: (281) 483-8623
Fax: (281) 483-4876

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.

3. EDUCATIONAL SAMPLES
(disks and educational thin sections)

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 nearest NASA facility as follows:

IF YOU LIVE IN:

Alaska	*Nevada*
Arizona	*Oregon*
California	*Utah*
Hawaii	*Washington*
Idaho	*Wyoming*
Montana	

NASA Teacher Resource Center
Mail Stop T12-A
NASA Ames Research Center
Moffett Field, CA 94035-1000
Phone: (415) 604-3574

IF YOU LIVE IN:

Connecticut	*New Hampshire*
Delaware	*New Jersey*
New York	*Maine*
Pennsylvania	*Maryland*
Rhode Island	*Massachusetts*
Vermont	
District of Columbia	

NASA Teacher Resource Laboratory
Mail Code 130.3
NASA Goddard Space Flight Center
Greenbelt, MD 20771-0001
Phone: (301) 286-8570

IF YOU LIVE IN:

Colorado	*North Dakota*
Kansas	*Oklahoma*
Nebraska	*South Dakota*
New Mexico	*Texas*

NASA Teacher Resource Room
Mail Code AP-4
NASA Johnson Space Center
Houston, TX 77058-3696
Phone: (281) 483-8696

IF YOU LIVE IN:
Florida
Georgia
Puerto Rico
Virgin Islands

NASA Educators Resource Laborarory
Mail Code ERL
NASA Kennedy Space Center
Kennedy Space Center, FL 32899-0001
Phone: (407) 867-4090

IF YOU LIVE IN:
Kentucky
North Carolina
South Carolina
Virginia
West Virginia

NASA Teacher Resource Center
for Langley Research Center
Virginia Air and Space Center
600 Settler's Landing Road
Hampton, VA 23669-4033
Phone: (804) 727-0900 x757

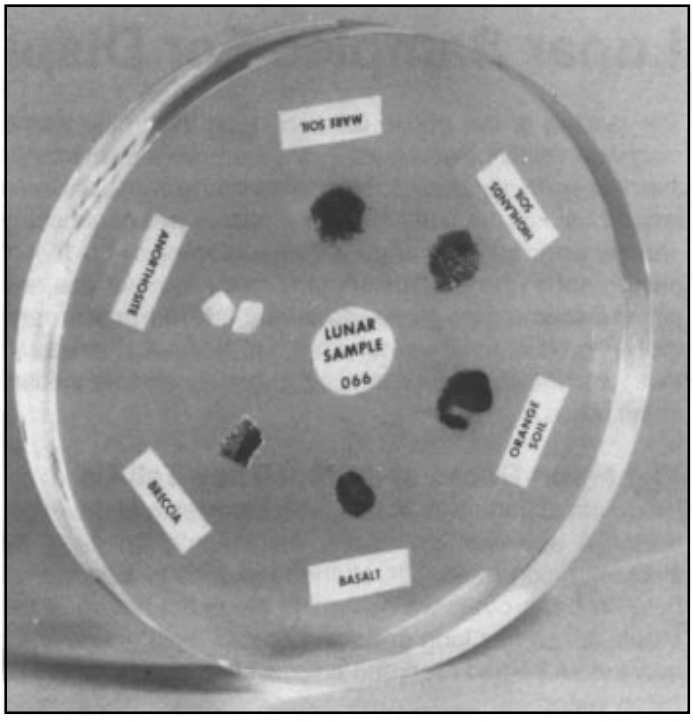
IF YOU LIVE IN:

llinois	*Minnesota*
Indiana	*Ohio*
Michigan	*Wisconsin*

NASA Teacher Resource Center
Mail Stop 8-1
NASA Lewis Research Center
21000 Brookpark Road
Cleveland, OH 44135-3191
Phone: (216) 433-2017

IF YOU LIVE IN:

Alabama	*Louisiana*
Arkansas	*Missouri*
Iowa	*Tennessee*



NASA Teacher Resource Center
for Marshall Space Flight Center
U.S. Space and Rocket Center
P.O. Box 070015
Huntsville, AL 35807-7015
Phone: (205) 544-5812

IF YOU LIVE IN:
Mississippi

NASA Teacher Resource Center
Building 1200
NASA John C. Stennis Space Center
Stennis Space Center, MS 39529-6000
Phone: (601) 688-3338

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:

SN2/Lunar Sample Curator
NASA/Johnson Space Center
Houston, TX 77058-3696
Telephone: (281) 483-3274
Fax: (281) 483-5347

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. ❑

Accessing the JSC SN2 Curatorial Databases

The curatorial databases may be accessed as follows:

Via INTERNET	1) Type **TELNET 139.169.126.35** or **TELNET CURATE.JSC.NASA.GOV**. 2) Type **PMPUBLIC** at the USERNAME: prompt.
Via WWW	1) Using a Web browser, such as Mosaic, open URL **http://www-curator.jsc.nasa.gov** 2) Activate the ***Curatorial Databases*** link.
Via modem	The modem may be between 1200 and 19200 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 for 1200-9600 bps, V.32bis/V.42bis, or 483-9498 for 1200-19200 bps, V.32bis/V.42bis. 2) Once the connection is made, press <CR>. Type **INS** in response to the Enter Number: prompt. 3) Press <CR> twice quickly until the XYPLEX#> prompt displays. 4) Type **C CURATE.JSC.NASA.GOV** at the XYPLEX#> prompt. 5) Type **PMPUBLIC** at the USERNAME: prompt.

For problems or additional information, you may contact: Claire Dardano, Lockheed Martin Space Mission Systems and Services, (281) 483-5329, cdardano@ems.jsc.nasa.gov.

Visit the Curator's home page by opening the URL http://www-curator.jsc.nasa.gov