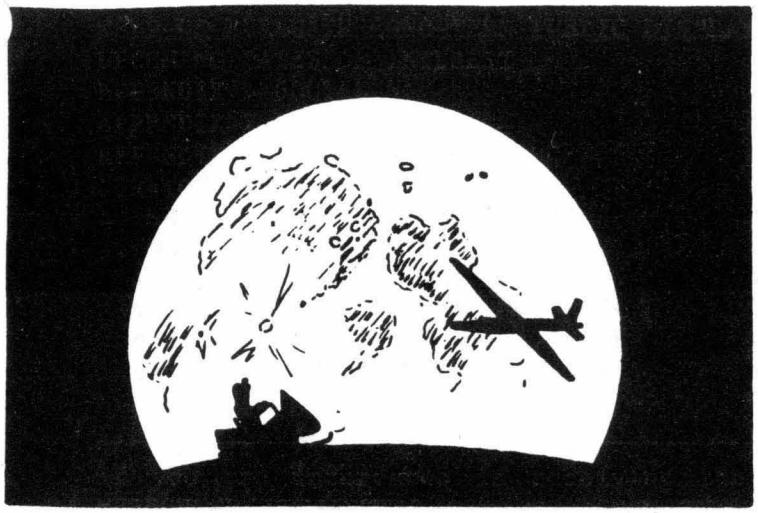

LUNAR SAMPLE NEWSLETTER

NUMBER 43

MARCH 8, 1985

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John W. Dietrich, Newsletter Editor
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Contents

If you are interested in receiving the LUNAR SAMPLE NEWSLETTER, ANTARCTIC METEORITE NEWSLETTER, or the COSMIC DUST COURIER and are not now on the approprite mailing list, please turn to the back cover of this newsletter.

NEW SURFACES ON LUNAR BRECCIAS 60016, 60019, and 72255

Preliminary studies of the new surfaces on three lunar breccias have been completed. Clasts exposed on these new surfaces may be requested now to support your studies. A black-and-white photograph, the clast distribution map, and descriptions of selected clasts on each surface of the sample are presented in the Appendix.

Lunar sample processors examined the surfaces while the samples remained in nitrogen cabinets of the Lunar Sample Processing Laboratory. They mapped the distribution of the larger clasts on each surface and described characteristics that could be observed under those restricting conditions. Similar clasts are identified by either a number or letter(s). A binocular microscope provided magnifications ranging from 6X to 50X. Thin section data, either from library sections or newly prepared sections, were used to supplement some descriptions.

Clasts on these new surfaces are now available for analysis. We believe the preliminary studies by the lunar sample processors will assist an investigator in the selection of clasts to support a specific line of research. We hope that having preliminary studies available will encourage participation by investigators who cannot invest the time required to prepare the maps.

We encourage consortium studies of these complicated breccias. The responsible leader of a consortium coordinates the sample analysis activities, integrates the results, understands the problems remaining to be studied, and (when necessary) recruits team members to address those problems. Coordination by a consortium leader is needed to insure the completeness of the study.

Would you like to adopt a rock? Sample 60016, 60019 and 72255 are looking for consortium leaders! Send in your request TODAY! If you do not want to lead a consortium, but need one or more clasts to support your research, please submit your request for the needed clasts. It will be turned over to the consortium leader or it will be reviewed separately if no consortium is formed.

NEXT LAPST MEETING WILL BE JUNE 7-9, 1985

The Lunar and Planetary Sample Team (LAPST) met at the Lunar and Planetary Institute February 15-17, 1985. LAPST reviewed eight requests for lunar samples and recommended allocation of 53 samples weighing 42.3 grams and 24 thin sections to the investigators. LAPST endorsed the curator's recommended allocation of 10 samples weighing 1.8 grams and 9 thin sections in response to lunar sample requests from five investigators between the November 1984 and February 1985 meetings.

Major requests supporting studies of the regolith and regolith breccias (two investigators) and samples from the Apollo 15 site (two investigators) accounted for about 90 percent of the mass. Studies of clasts from Lunar Highlands breccias generated requests from four investigators for a total of 14 samples.

Other requests supported:

- o Track studies
- o The continuing search for zircon crystals suitable for age dating
- o Chemical characterization of a sphere that may be high-silica glass

LAPST will next meet June 7-9, 1985; the following meeting is tentatively scheduled for late November. We encourage you to submit requests well ahead of the meeting so that adequate background materials can be assembled to support the LAPST deliberations. Your requests are welcome at any time; some allocations can be recommended by the Curator between LAPST meetings.

LAPST RECOMMENDS APOLLO 15 WORKSHOP

The Lunar and Planetary Sample Team reviewed the status of lunar science at the February meeting and identified several study areas that could yield significant results with additional emphasis. While preparing a long range plan for lunar sample science, there was general agreement that it would not be practrical to establish a new "initiative" for each area that needs emphasis. Instead, workshops probably will be the main mechanism for focusing lunar sample studies.

At the close of the meeting LAPST recommended that the LPI sponsor a topical workshop on the Apollo 15 site. The geology of that site remains poorly known in comparison to our current understanding of geology and samples of the Apollo 16 and Apollo 17 sites. A coordinated study of the Apollo 15 sample could shed new light on a number of major questions that apply to large areas of the moon.

A time near the end of 1985 appears right for a workshop on geology of the Apollo 15 site. The new catalog of Apollo 15 rocks will be available; the catalog and workshop should stimulate the kind of high-quality work and improved understanding of lunar geologic processes and history that followed the Apollo 16 workshop in 1980.

Paul Spudis and Graham Ryder have agreed to jointly convene the workshop.

LAPST HAS TWO NEW MEMBERS

Two new members joined the Lunar and Planetary Sample Team (LAPST) at the February meeting. Dave Vaniman, from the Los Alamos National Laboratory, is interested in the lunar regolith and in industrial applications of lunar material. Paul Spudis is from the U. S. Geological Survey, Flagstaff. His expertise is in photogeology and he is interested in the geological aspects of the Apollo 15 site. Paul is also involved in the orbital geochemical mapping of the moon.

They replaced Don Brownlee of the University of Washington and Genter Lugmair from the University of California at San Diego who rotated off LAPST after the November 1984 meeting. Don had been a member since May 1980. Gunter had served since November 1981. As a result of these changes in LAPST, the advocate list and several committee assignments were modified.

LAPST PANEL

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U. S. Geological Survey
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Planetary Sciences
Washington University
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Dr. Paul H. Warren
Institute of Geophysics
University of California
at Los Angeles
Los Angeles, CA 90024
(213) 825-2015

ADVOCATE LIST FOR LUNAR SAMPLE REQUESTS

L. Taylor	J. Taylor	P. Warren	G. Ryder
Delano	El Gorsey	Basu	Wasson
Marvin	James	Engelhardt/Arndt	Warren
Miura	Stolper	Hörz	Lugmair
Takeda	Longhi	Keil/Taylor J.	O'Keefe
Sato	McKay	Borg	Wasserburg
Walker D.	Drake	Papike	Tatsumoto
Wood	Haskin/Korotev	Stoffler	Nyquist
Smith	Walker R.	Taylor L.	Pillinger
	Ryder	Meyer	

R. Korotev	D. McKay	D. Vaniman	P. Spudis
Anders	Arnold	Pogard	Dollfus
Boynton	Brownlee	Burnett	Housley
Laul	Rao	Clayton	Strangway
Schmitt	Fireman	Epstein	Turner
Pepin	Hohenberg	Geiss	Grieve
Reynolds	Kirsten	Kerridge	Runcorn
Taylor S. R.	Marti	Reed	Woolum
Wanke	Signer	Moore	
	Thode		

LAPST SUBCOMMITTEES

REGOLITH	COSMIC DUST	SAMPLE DOCUMENT. AND CATALOG	LABORATORY
McKay, Chair	Brownlee, Chair	Taylor J., Chair	Korotev, Chair
Korotev	ex-officio	Ryder	Taylor L.
Warren	Zolensky	McKay	Ryder
Vaniman	McKay		
	others		

BRECCIAS	LUNAR SAMPLE UTILIZATION	LUNAR SAMPLE COMMUNITY	PUBLIC EDUCATION
Warren, Chair	Vaniman, Chair	Taylor L., Chair	Spudis, Chair
Taylor J.	McKay	Taylor J.	Meyer

FLOWER AND SCCIAL

Vaniman, Chair
Taylor, J.
Taylor, L.

HELP US EVALUATE LONG-TERM PUBLIC DISPLAYS

HELP! We would like your help in evaluating public displays of lunar samples. Please visit any of the long-term public displays listed below and send us your comments. These displays are the responsibility of the Public Affairs Office at JSC; however, the Curator, LAPST and NASA Headquarters have all had to give their approval before a sample was allocated for display. Actually we all feel a responsibility to have the best possible image for our national treasures and the science that has grown from their study.

Due to travel fund limitations, many of these displays have never been visited by a representative of the Curator. We would greatly appreciate your evaluation of any display that you can visit in your area or on your travels. The kinds of information we would like to obtain are:

- Does the scientific explanation make sense?
- Is the lighting adequate? Are there any bad reflections?
- If there is a thin section, how is it exhibited?
- Is there visible damage to the sample?
- Is the case scratched or damaged in any way?
- Is the sample a highlight of the museum, or does it seem to be overshadowed by the other exhibits?
- Can the sample be inspected at close range?
- Do you have any recommendations for improving the display?
- Does sample security seem adequate? Is an alert guard clearly visible? Is the sample case substantial?
- Are all the samples, as listed below, on display?
- Does the display give any hint of how the viewer could get additional information on lunar samples?

Some notes by earlier visitors to the long-term displays follow:

1) Kennedy Library. No copy of text panel is included. No mention of the lunar sample seems to be made in the brochure describing the library contents. The sample seems to be off in a fairly obscure corner.

2) National Geographic Society Explorers Hall. Text panel not available for evaluation.

3) Eisenhower Library. Not clear that display is anywhere identified as a moon rock. It certainly doesn't appear to be a featured part of any exhibit. It may be overlooked easily. Somewhat disheartening that moon rock appears to rate equal to a hard hat worn briefly by Eisenhower.

4) LBJ Library. Update of new exhibit would aid evaluation. Should include shots of the display area or floor plan or the like.

5) Wright-Patterson Air Force Museum. It would be desirable to add moon rock location to the brochure map of the museum.

6) World Intellectual Property Organization. Unfortunate that ropes keep viewers so far from sample.

7) Hansen Planetarium. Cood exhibit.

8) International Space Hall of Fame. Science spiel needs to be checked. Moon rocks are not organic in origin.

9) Peterson Air Force Museum. Text accompanying sample, map of exhibit, and museum brochure not available for evaluation.

10) Smithsonian National Air and Space Museum. It would be helpful to give a smore specific age on the touchstone panel. (This display is extremely effective.) Meteoric should be changed to meteoritic in several panels.

			Viewers per Year
Adler Planetarium 1300 South Lake Shore Dr. Chicago, IL 60605	15555,767	74 grams	600,000
Alabama Space & Rocket Museum Tranquility Park Huntsville, AL 35812	12065,15	449 grams	365,000
American Museum of Natural History Central Park West at 75th St. New York, NY 10024	70035,57 14305,30	112 grams 60015,179 135 grams 144 grams	2,500,000

			Viewers per Year
Armstrong Air & Space Museum Ohio Historical Society 1982 Velma Avenue Columbus, OH 43211	10017,35	115 grams	new
California Academy of Sciences Golden Gate Park San Francisco, CA 94118	70035,69 + thin section	102 grams	new
Edmonton Space Science Center Edmonton, Alberta T5M4A1	not delivered yet		
Eisenhower Library Abilene, KS 67410	15555,461	161 grams	150,000
Geological Museum Exhibition Road London, England SW7 2DE	60015,87	128 grams	
Hanson Planetarium 15 South State Street Salt Lake City, UT 84111	15555,464 + thin section	86 grams	176,000
Houston Museum of Natural Science Hermann Park Houston, TX 77004	12018,13	174 grams	600,000
International Aerospace Hall of Fame Balboa Park San Diego, CA 92101	70035,35	100 grams	191,000
International Space Hall of Fame Alamogordo, NM 88310	70215,93	113 grams	147,000
Lyndon B. Johnson Library University of Texas Austin, TX 78705	15555,161	157 grams	372,000
Kansas Cosmosphere & Discovery Center 1100 N. Plum Hutchinson, KS 67501	10020,57 Surveyor scoop	136 grams	new
John Kennedy Library Columbia Point Boston, MA 02125	15555,50	156 grams	300,000

			Viewers per Year
Michigan Space Center 2111 Emmons Road Jackson, MI 49201	15555,54 + thin section	94 grams	48,000
National Geographic Explorer's Hall Museum Washington, D.C. 20036	12053,93	134 grams	382,000
North Carolina Museum of Life and Science 433 Murray Avenue Durham, NC 27704	15459,173	86 grams	new
Peterson Museum NORAD Visitors Center Peterson AFB, CO 80914	15459,6	160 grams	20,000
Smithsonian Air & Space Museum Washington, D.C. 20560	15016,20 60025,53 70051,55 70215,84 79135,102	65 grams 33 grams 1 gram 38 grams 101 grams	10,000,000
Smithsonian Museum of Natural History Washington, D.C. 20560	14321,40 15499,10 60015,86 67020,6 70035,41 70051,51 76055,24 + 5 thin sections	616 grams 163 grams 118 grams 30 grams 118 grams 29 grams 211 grams	5,000,000
United Nations 799 UN Plaza New York, NY 10017	14321,86	100 grams	1,000,000
U.S.A.F. Museum Wright-Patterson AFB, OH 45433	67455,1	19 grams	1,000,000
Visitor's Center Johnson Space Center Houston, TX 77058	12022,92 15555,160	150 grams 182 grams	1,200,000
Visitor's Center Kennedy Space Center, FL 32899	15058,187	130 gram	1,200,000
Visitor's Center Langley Research Center Hampton, VA 23665	70017,138	160 grams	243,000

			Viewers per Year
Visitor's Center Lewis Research Center Cleveland, OH 44135	15015,79	175 grams	100,000
Visitor's Center Goddard Space Center Greenbelt, MD 20771	14310,215	100 grams	60,000
Visitor's Center National Space Technology Lab NSTL STA, MS 39529	15015,80	95 grams	50,000
Visitor's Center Wallops flight Facility Wallops Island, VA 23337	70035,59	64 grams	new
World Intellectual Property Organization 34 Chemin Colombettes 1211 Geneva 20 Geneva, Switzerland	15555,766	105 grams	10,000

UPCOMING DATES OF INTEREST

1985

March 11-15	Lunar and Planetary Science Conference XVI
March 13	Cosmic Dust Users Group - Organizational Meeting
March 25-27	Tenth Symposium on Antarctic Meteorities, Tokyo, Japan
Mar. 30 - Apr. 1	Spring Meeting of Meteorite Working Group
April 26	Deadline for LPSC XVI Papers
May 27-31	Am. Geophysical Union, Spring Meeting, Baltimore, MD
June 7-9	LAPST Meeting, Lunar and Planetary Institute
July 11-13	Antarctic Meteorite Workshop, Mainz, West Germany
July 16-19	Annual Meeting, Meteoritical Society, Bordeaux, France
August 5-9	Symposium: Microbeam Analysis Technicques in the Study of Lunar, Meteorite and Cosmic Dust, Louisville, KY
October 10-12	LPI Conference on Heat and Detachment in Crustal Extension on Continents and Planets, Sedona, AZ
November TBD	LAPST Meeting, Lunar and Planetary Institute

APPENDIX 1

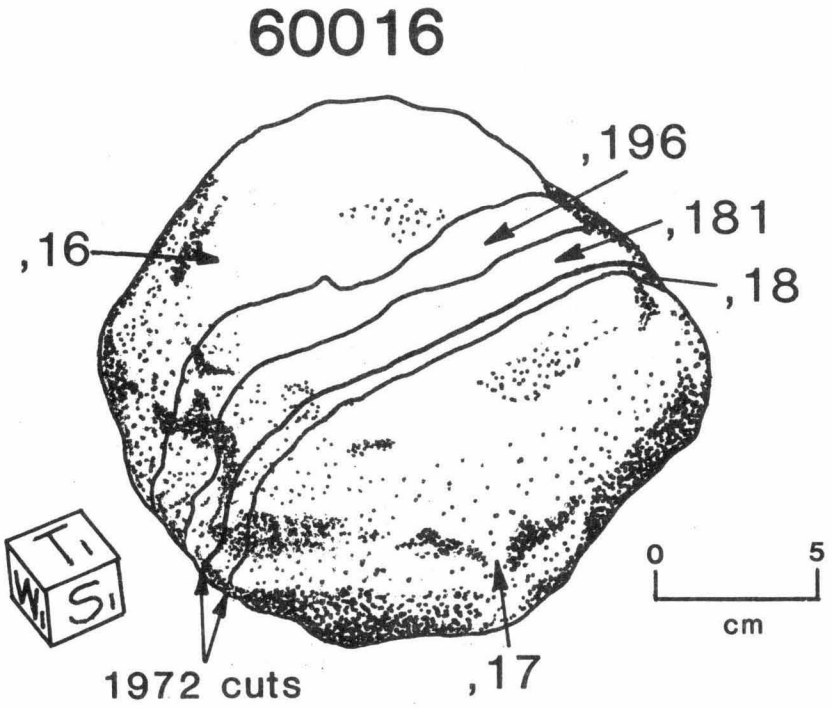
DESCRIPTION OF SAWED SURFACES OF FRAGMENTAL POLYMICT BRECCIA 60016,16

Rene R. Martinez

Sample 60016 is a polymict breccia that was collected near the Lunar Module at the Apollo 16 landing site. The light-gray, porous matrix is composed of crushed mineral and lithic fragments with a grain size up to 2mm. The matrix also contains abundant glass spheres ranging in size from 0.1mm to 1.5mm. It is extremely friable and sawing of this rock has exposed a variety of clasts that are loosely bound and easily extractable.

RESULTS OF SLABBING:

The weight of 60016,16 before slabbing was 3088.777g. The cuts that produced ,17 and ,18 were made in December 1972. These pieces have since been subdivided. Recently, two slabs were cut parallel to the S face of ,16. The clasts exposed have been described and classified. Maps of the newly exposed faces have been drawn from photographs and laboratory observations in order to document the character and distribution of clasts and to facilitate identification for sample requests. Thin sections or grain mounts have been made of each of the clast types as indicated. Clast designations may be repeated for clasts of the same type on different surfaces. Therefore, clasts must be refered to by clast number, slab number, and slab face.



APPENDIX 1

CLASSIFICATION OF CLASTS IN NEWLY EXPOSED FACES OF POLYMICT BRECCIA 60016

1. .....Dark grey to black vitreous, vesicular clasts. These have inclusions of euhedral, white plagioclase crystals as well as lithic fragments of fine-grained (chalky)feldspathic breccias. Metal occurs in these clasts as rounded blebs (droplets?).

   Also, gray clasts - groundmass is vitric, not vitreous. These also have white plagioclase poikiloblasts?, lithic inclusions, and some metal.

2. .....Grey to pale brown - these clasts are intermediate in grain-size between the grey vitric clasts and the coarse-grained (melts?). These have the highest content visible of metallic Fe and/ or sulfide. This metal is sometimes granular but also occurs as druzy linings.

   Also, coarse-grained grey clasts with igneous poikilitic texture. Plagioclase pyroxene and opaque mineral. These fragments are vuggy and have euhedral sulfide and/or Fe metal in vugs. Metallic crystals are larger than those in clasts with intermediate grain-size, but overall, metal is less abundant.

3. .....Anorthositic rocks or gabbros. These are highly fractured and show euhedral, coarse-grained plagioclase in varying modes with various mafics.

4. .....White feldspathic breccias, fine grained (up to 0.1mm) some show "stretch" features (see individual clast descriptions). These appear monominerallic.

5. .....White feldspathic breccias, very fine grained. These appear chalky and contain a flaky opaque mineral (ilmenite?) and abundant dull, pale yellow, rounded pyroxene fragments. These generally appear more severely crunched than the other feldspathic breccias.

6. .....Troctolitic clasts. Mode approximates 50:50 plagioclase:olivine. Grain size is <0.2 mm. Rare.

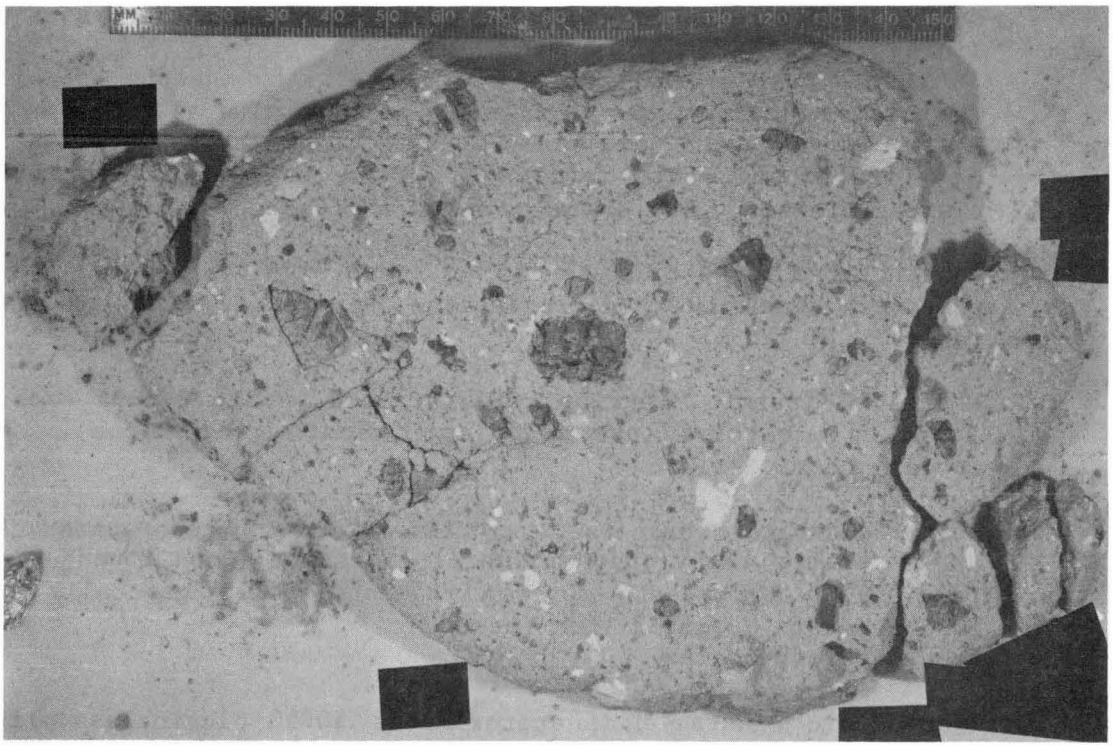
7. .....Glass fragments including green shards and black rounded fragments.

8. .....Light matrix breccias, very fine-grained.

9. .....Mineral fragments or irregular granular mineral aggregates including white plagioclase, a mineral that ranges from dull honey-brown to dull pale olive green to yellow (pyroxene?), and a pale yellow glassy mineral (olivine?)

APPENDIX 1

,181 SOUTH FACE



S-84-40923

APPENDIX 1

,181 SOUTH FACE SELECTED CLAST DESCRIPTIONS

1.A. This 5x7mm clast is highly fractured, as are most of this type. This clast should be noted for its high metal (or sulfide) content. Crystals up to 0.1mm are unevenly distributed, tending to line vugs.

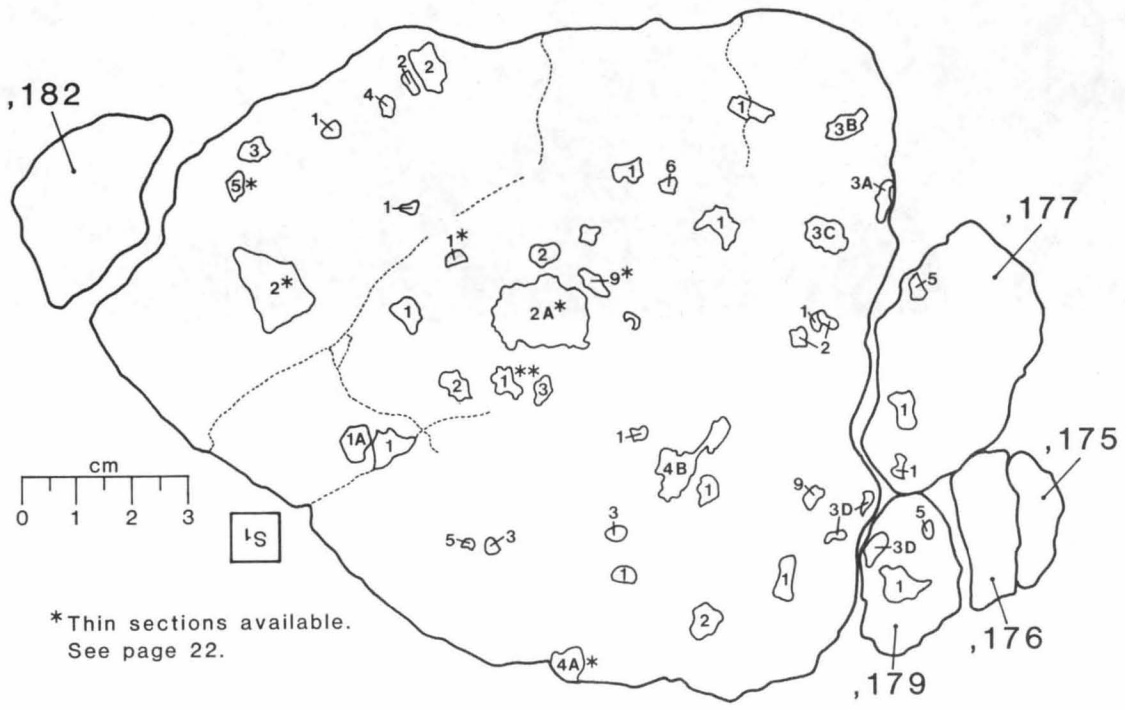
3.A. and 3.B. These two clasts are >90% plagioclase; cleavage planes are continuous across length of the clasts.

3.C. and 3.D. These clasts have a gabbroic texture with approximately 60% plagioclase and 40% honey-brown pyroxene. Clast 3.C. is about 5x5mm. It appears coherent and easily extractable for study.

4.A. This clast extends through the slab. On this face, the clast appears undeformed but the exposure on the North face,(4A ,181 North) appears "stretched".

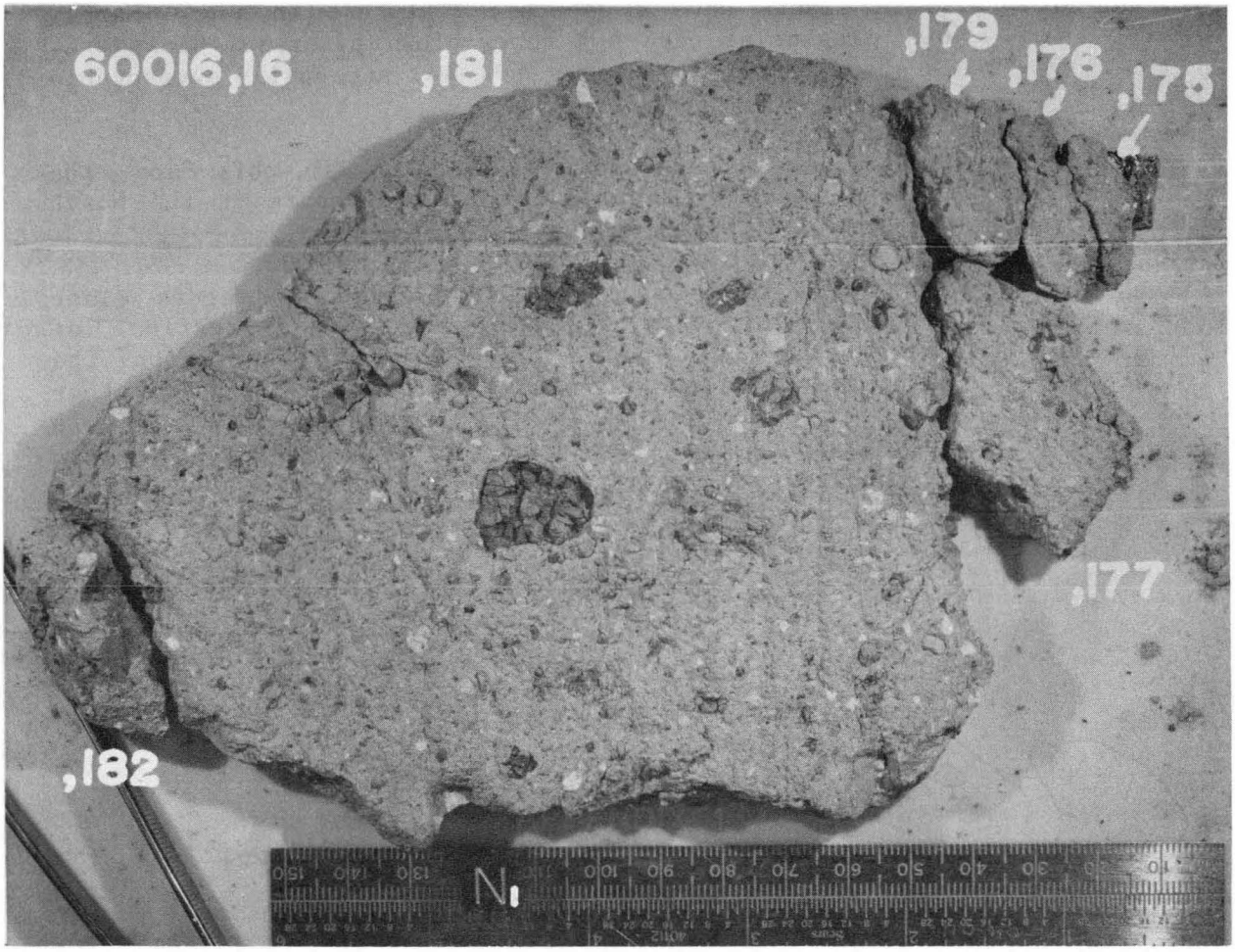
4.B. The shape of this elongated feldspathic breccia clast suggests in situ deformation. The direction of "stretching" of this clast is coincident with the deformational trend of clasts of the same type in other areas of the rock. No other clast types exhibit this deformation and there is no immediately apparent disturbance of matrix material in the vicinity of the clasts.

60016,181



APPENDIX 1

,181 NORTH FACE



S-84-40922

APPENDIX 1

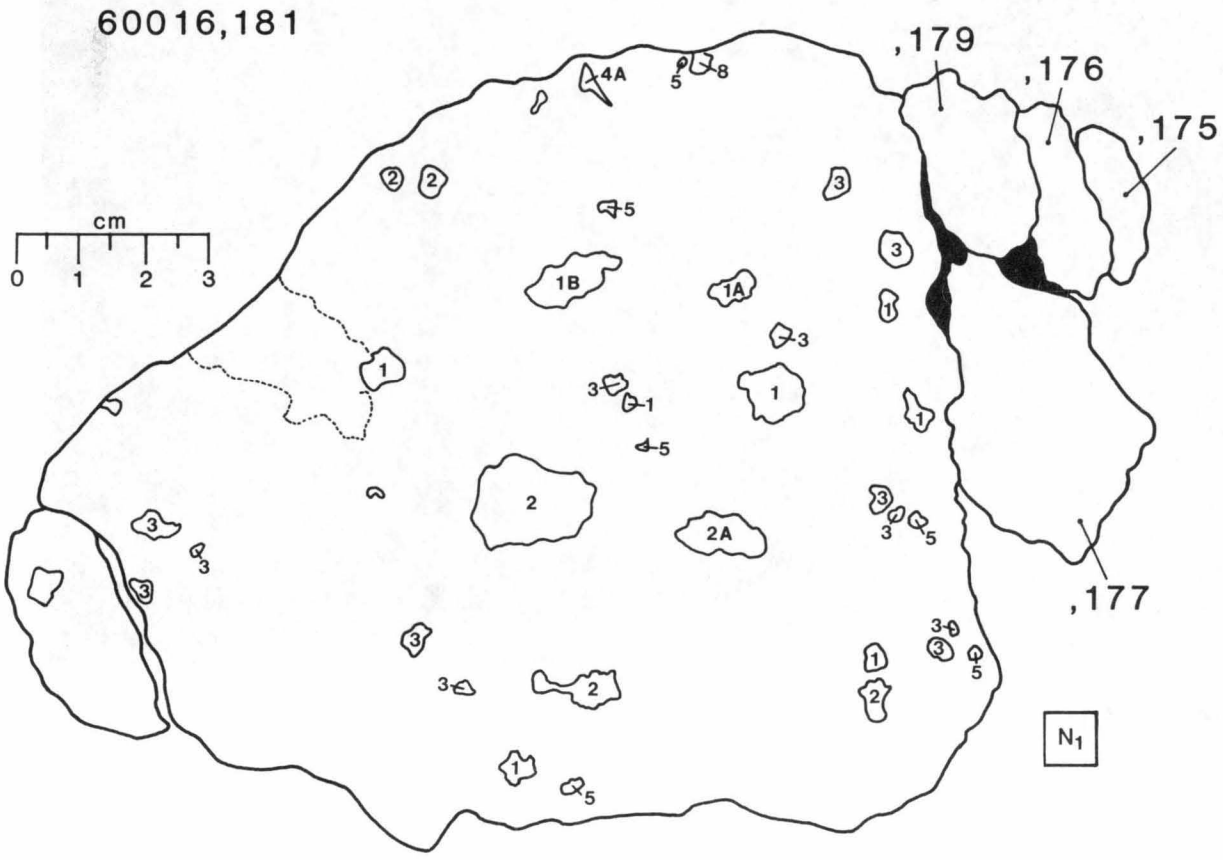
,181 NORTH FACE SELECTED CLAST DESCRIPTIONS

1.A. and 1.B. Vitric-matrix clasts with 1mm white plagioclase inclusions (xenocrysts?, poikiloblasts?).

2.A. A coarse-grained clast with texture grading into an unusual plagioclase and mafic-rich zone containing chains of opaque (ilmenite?) grains.

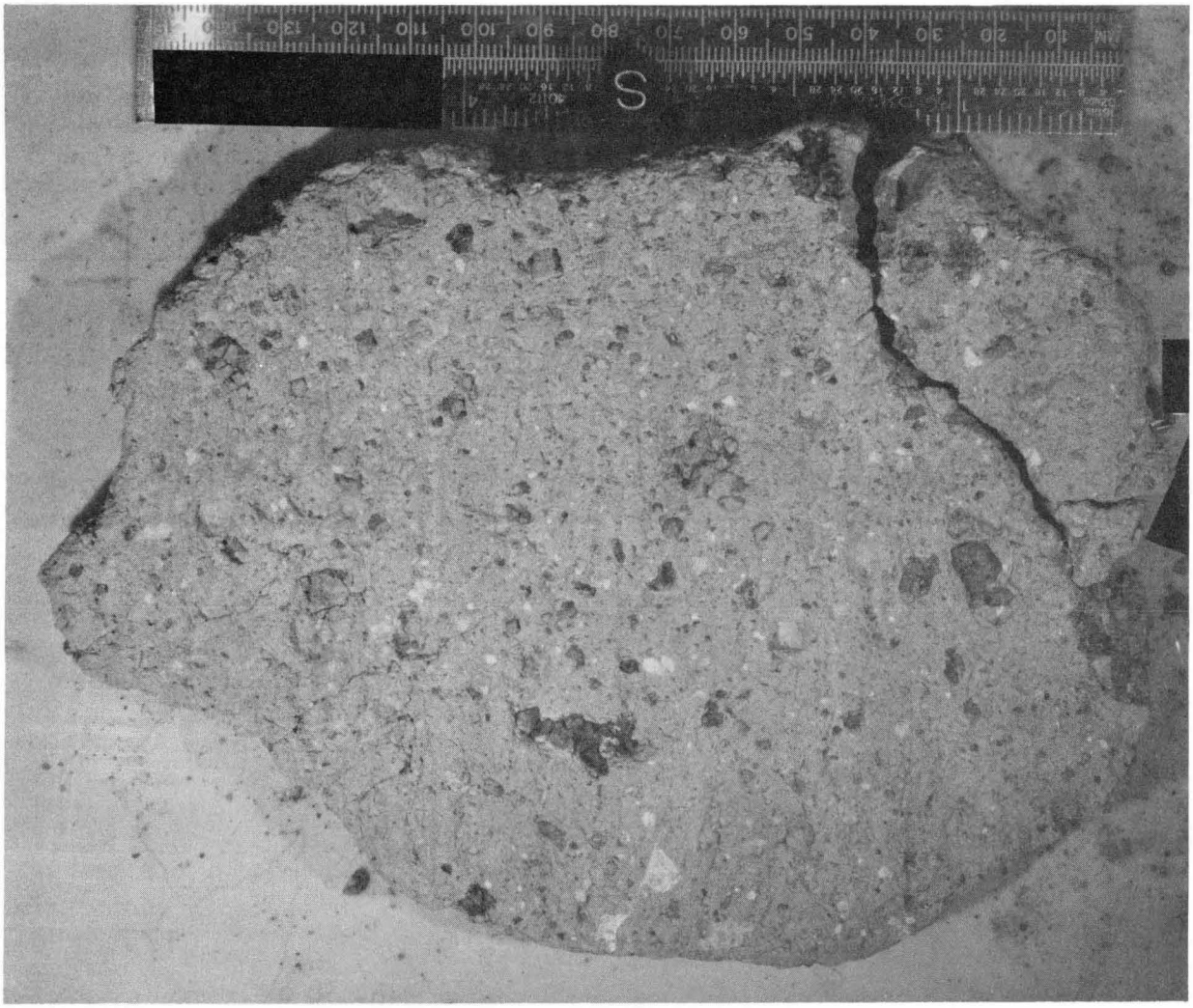
4.A. Clast extends through to the South face of this slab, approximately 3x5x20mm.

8. Breccia clast with a light gray, very fine-grained (<0.2mm) matrix. It is also exposed on the adjacent slab. These two pieces make up the only clast of this type found on the five newly mapped faces.



APPENDIX 1

,196 SOUTH FACE



S-84-40921

APPENDIX 1

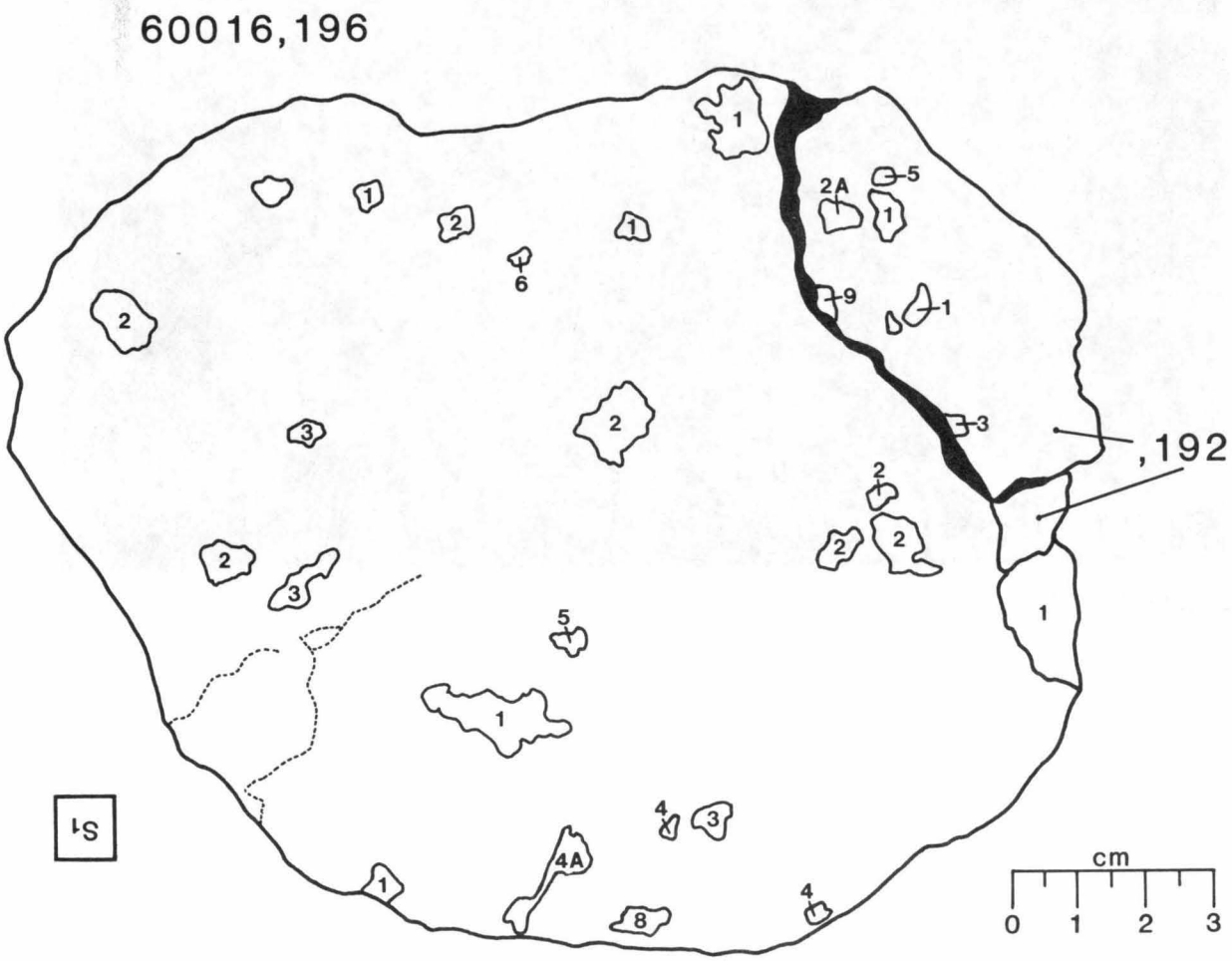
,196 SOUTH FACE SELECTED CLAST DESCRIPTIONS

2.A. This 5x7x5mm clast exhibits exceptionally abundant metal or sulfide grains. (These metallic grains are numerous in vugs of type 2 intermediate grain-size clasts and this clast is vuggy.)

4.A. This feldspathic breccia is the same clast mapped as 4A on the North and South faces of the adjacent slab ,181.

6. This clast may be a troctolite. It appears to be almost entirely pale yellow, glassy olivine with some white plagioclase and has a granular texture. The clast is friable and small but the more friable matrix recedes making this an easily extractable sample for study.

9. This 4x5mm olive green clast appears to be a single mineral fragment with no visible cleavage or color variations. It is one of the larger fragments of this type in this rock. Smaller fragments similar to this occur in abundance throughout the matrix. The clast has been plucked and is now a separate sample (60016,213).



APPENDIX 1

,196 NORTH FACE

S-84-40920

APPENDIX 1

,196 NORTH FACE SELECTED CLAST DESCRIPTIONS

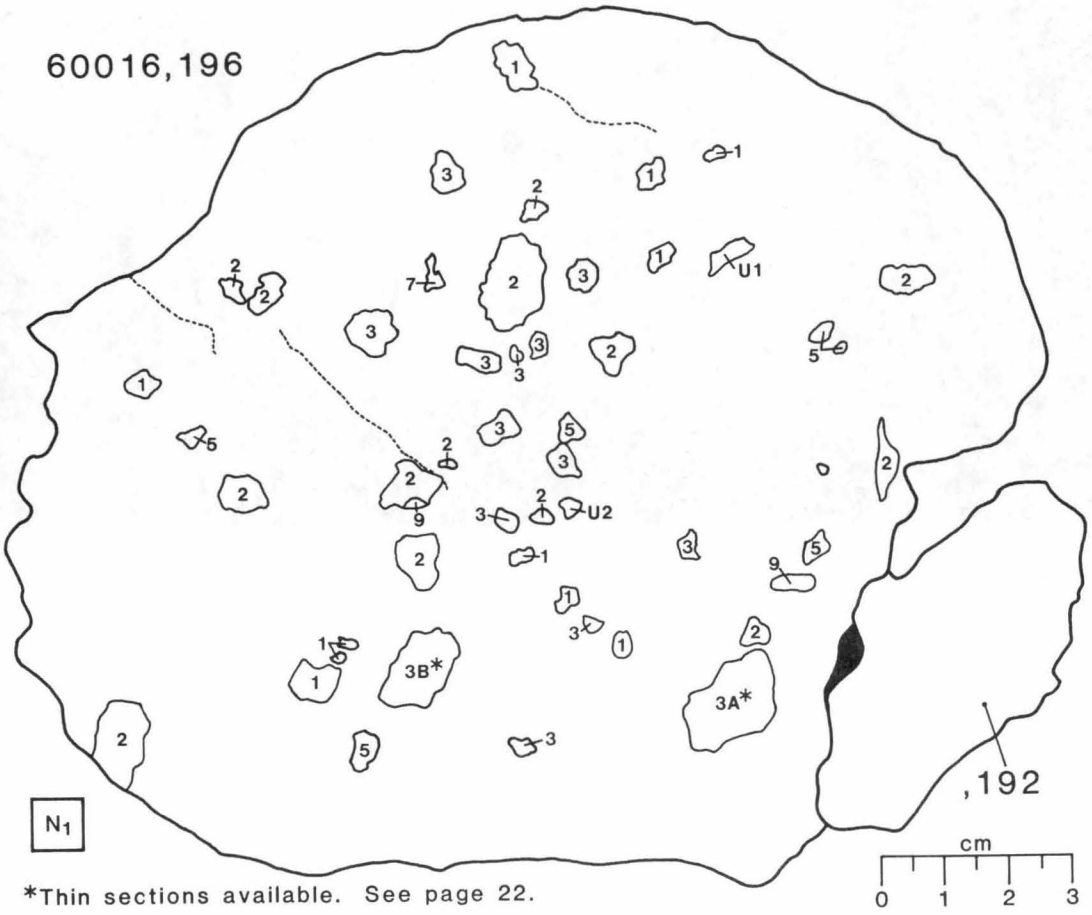
U.1. This clast is unique. It is granular and dark colored with a grain size of about 0.5mm and appears brecciated. Sampling of this clast could be difficult as the clast is friable and the host matrix appears to be holding it together.

U.2. This clast is unique. It is coarse grained with plagioclase, ilmenite and predominant dull, honey-brown pyroxene grains up to 1.2mm

3.A. Large (15x15x20mm) type 3 clast. Appears to be about 70% white milky plagioclase, and about 30% light brown and yellow pyroxene and/or olivine with minor opaques.

3.B. Large (11x14x20mm) type 3 clast. Mode appears to be >90% white milky plagioclase. Both 3.A and 3.B are fractured and loosely bound by the matrix. Clean samples can be picked from either of these.

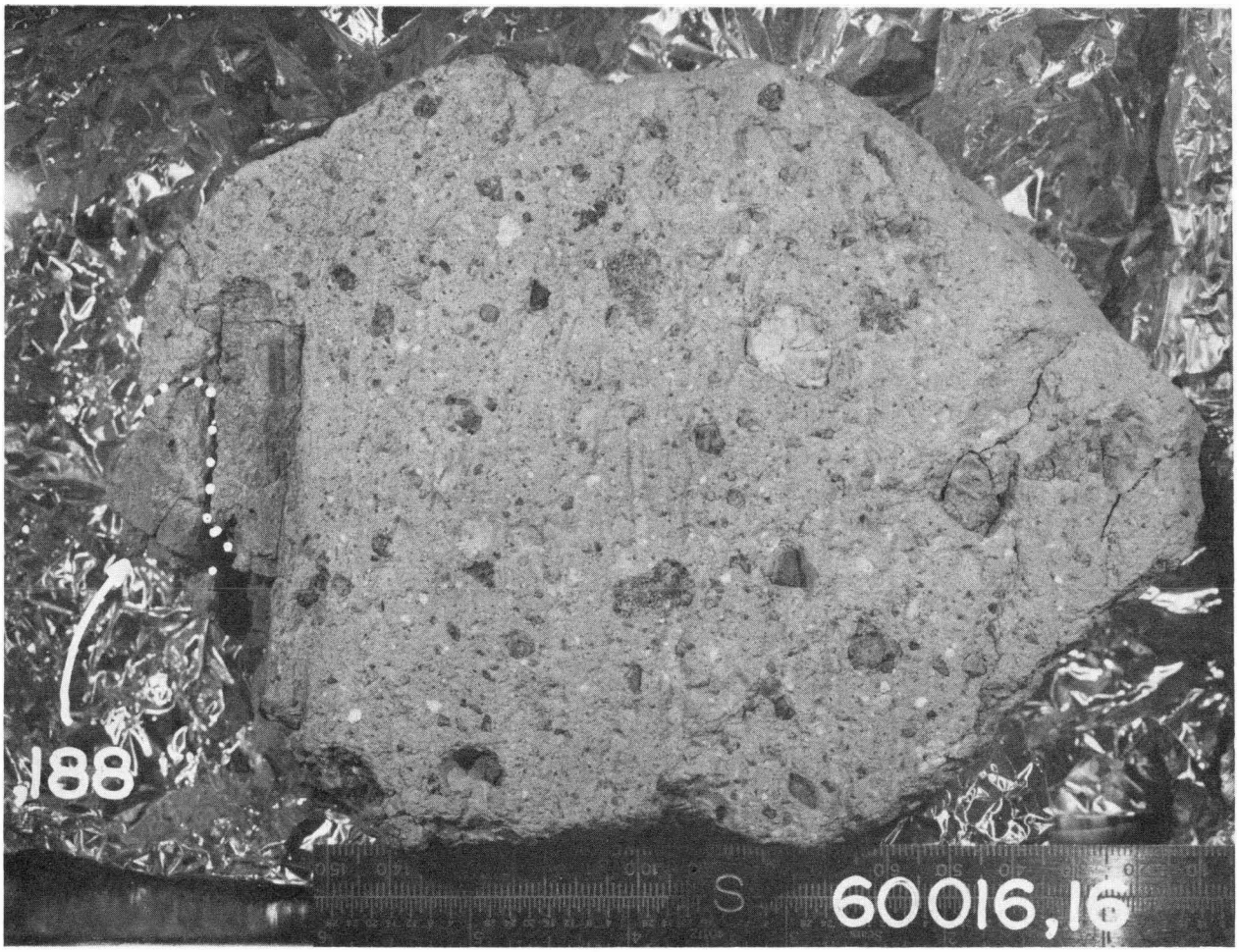
9. This is a large (approx. 7x3x3mm) dull, olive green mineral fragment (pyroxene?).



*Thin sections available. See page 22.

APPENDIX 1

,16 SOUTH FACE



S-84-40919

APPENDIX 1

,16 SOUTH FACE SELECTED CLAST DESCRIPTIONS

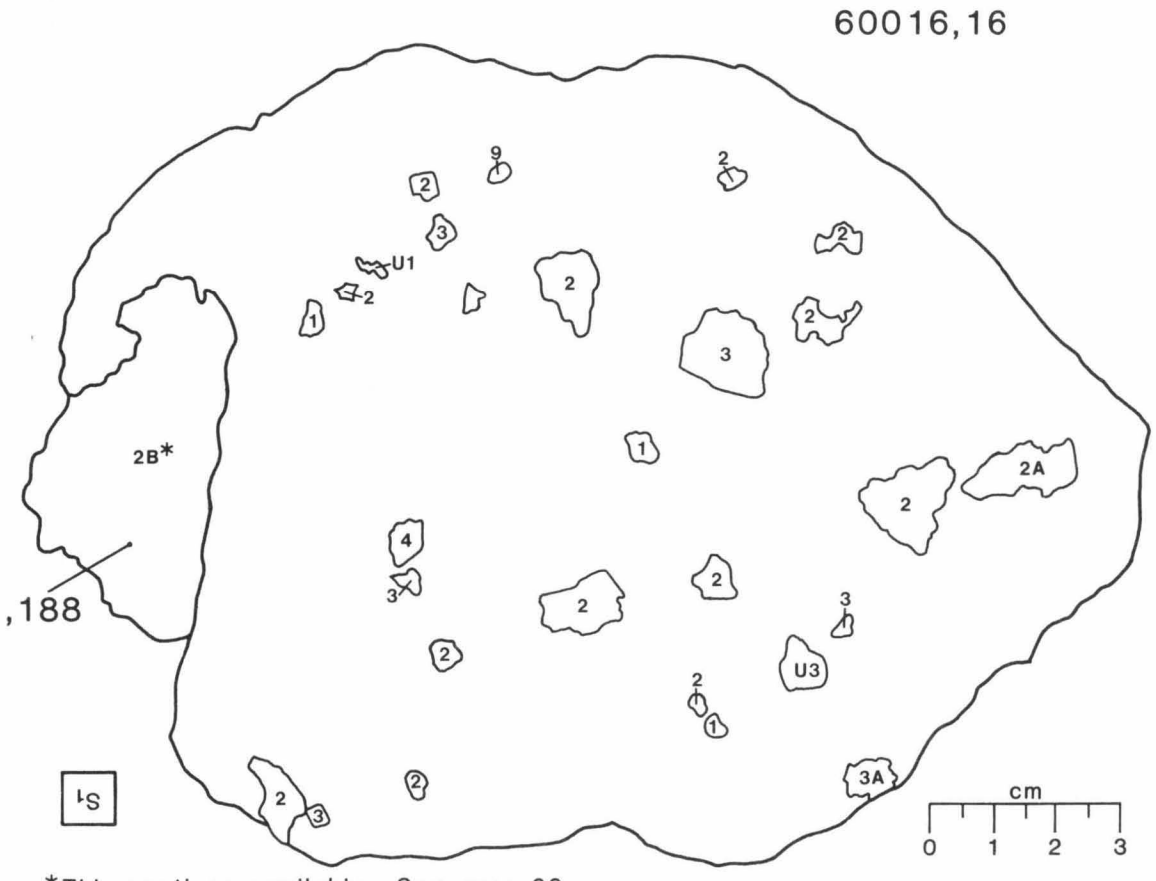
U.1. This is the same dark, fine-grained, granular clast described as U.1 in ,196 North face.

U.3. This 7x9x5mm clast is unique. It is almost entirely very coarse grained honey-brown pyroxene with 1mm ilmenite grains. The clast is loosely bound to the host matrix and is very coherent.

2.A. This coarse-grained clast is lighter in color than typical type 2's. It appears to be the same rock type as clast 2.B (sample number ,188).

2.B. This exceptionally large clast (30x55x60mm) has a coarse-grained igneous poikilitic texture like that of typical type 2's but much lighter in color and possibly slightly coarser grained. Euhedral troilite or metal crystals are nested in vug walls.

3.A. This clast exhibits an interesting mode and texture of approximately 70% plagioclase and 25% mafics(olivine?) with chains of opaques outlining mafic rich zones.



*Thin sections available. See page 22.

APPENDIX 1

THIN SECTIONS

SLAB	SIDE	CLAST NO.	TYPE	T.S. NO.
,181	South	1*	Dark vitreous breccia	,222
,181	South	1**	Dark vitric breccia	,223
,181	South	2A*	Medium grain-size poikilitic	,224
,181	South	2*	Coarse-grain poikilitic (dark)	,225
,181	South	5*	White feldspathic Bx. (chalky)	,226
,181	South	4A*	White feldspathic Bx. (fine)	,227
,181	South	9*	Green mineral	,208
,196	North	3B*	Anorthositic (gabbro?)	,228
,196	North	3A*	Anorthositic	,229
,188	South	2B*	Coarse-grain poikilitic (light)	,230

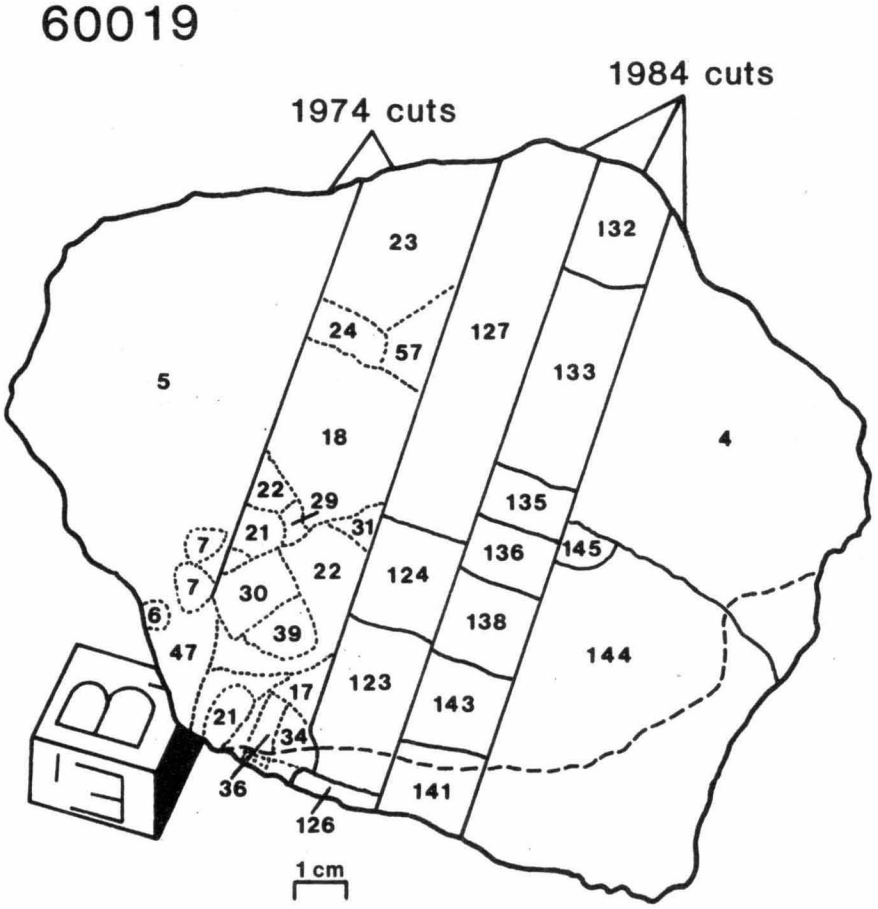
APPENDIX 2

REGOLITH BRECCIA 60019

Charles Galindo

Sample 60019 is considered a regolith breccia due to the abundant solar wind components; yet, unlike most regolith breccias it is very coherent. On the top side of the rock is a rind of black glass with numerous vesicles which also seems to line some of the clast boundaries located near the glass rind. The matrix is a dark aphanitic glassy ground mass with many glass-lined fractures and glass inclusions. The Apollo 16 astronauts collected this partially buried sample approximately 115 meters west south west of the Lunar Module.

The largest remaining piece (60019,4), weighing 1171 grams was the south end (lunar orientation) of the rock with a saw-cut north face previously mapped by Graham Ryder (personal notes). Two cuts parallel to the north face produced two new slabs approximately 1.5cm thick. The first slab (298g) consists of ,127 and four smaller pieces. The second slab broke into nine pieces totalling 224g. Finally, the end face consists of four pieces with a total weight of 542g. Clast types were categorized using Ryder's original mapping of 60019,4's north face and thin sections available prior to this study.



APPENDIX 2

GENERAL DESCRIPTION OF CLAST TYPES

WC---Milky white to greyish white coarse-grained clasts varying in size from 20x20mm to pieces smaller than one millimeter. Clast shapes are round to oblong and have sharp distinct boundaries with the matrix. Both plagioclase and pyroxene(?), indistinguishable in hand specimen appear as a milky white groundmass exhibiting a sugary texture with no visible orientation of crystals. Few crystal faces are discernible. Interwoven with the plagioclase and pyroxene zones are chains of shiny black opaques, predominately ilmenite(?). Opaques also occur as pinpoint inclusions scattered throughout the clasts. The percentage of plagioclase-pyroxene varies from 70 to 90% with 10 to 30% opaques and less than 1% metal inclusions. Metal appears as both blebs and pinpoint inclusions, sometimes within and occasionally bordering ilmenite zones. Much of the metal shows oxidation which occurs both as goethite(?) and rust-colored staining of the plagioclase-pyroxene zones surrounding the metal. Also within the clasts are a variety of sizes and shapes of pure plagioclase inclusions ranging in size from 1.1mm to smaller than 0.1mm.

WF---Greyish white fine-grained clasts varying in size from 10x15mm to less than a millimeter. Clast shapes are triangular and oblong to round with distinct to indistinct clast-matrix boundaries. Plagioclase and pyroxene, indistinguishable in hand specimen, occur as a crushed milky white to smokey white sugary texture containing pinpoint opaques scattered throughout. Occasionally opaques form chains as in the coarse grained clasts. (Some of these clasts appear to have little to no opaques and are probably not poikilitic.) The percentage of plagioclase-pyroxene varies from 60 to 90% with 10 to 40% opaques and less than 1% metal inclusions. Clasts also contain various sized pure plagioclase inclusions along with metal blebs and pinpoints exhibiting oxidation and plagioclase-pyroxene rust staining.

AN---Milky white to translucent, fine-grained pure plagioclase clasts exhibiting a sugary texture with no apparent crystal orientation. Clasts vary in size and are smaller than 5x5mm. Shapes vary from equant to oblong. Traces of pinpoint opaques are present and some clasts exhibit areas of plagioclase(?) with a vitreous luster. There are also occasional inclusions of translucent mineral grains which may be maskelynite.

AnP--Milky white to translucent, fine-grained, sugary plagioclase spotted with round to oblong yellow to translucent mineral grains (probably pyroxene or olivine). Occasionally yellow mineral occurs more as an area of yellow patches in which mineral boundaries are indistinguishable (may not be same clast type). All clasts have sharp boundaries with the matrix and vary in size up to 5x6mm.

Ba---Milky white, tan, black, both fine and coarse-grain plagioclase, pyroxene, and ilmenite(?) with a basaltic texture. The coarse grain clast contains minerals in zones larger than 1mm (including the ilmenite looking mineral) in contrast with the fine grain clast's minerals occuring in laths.

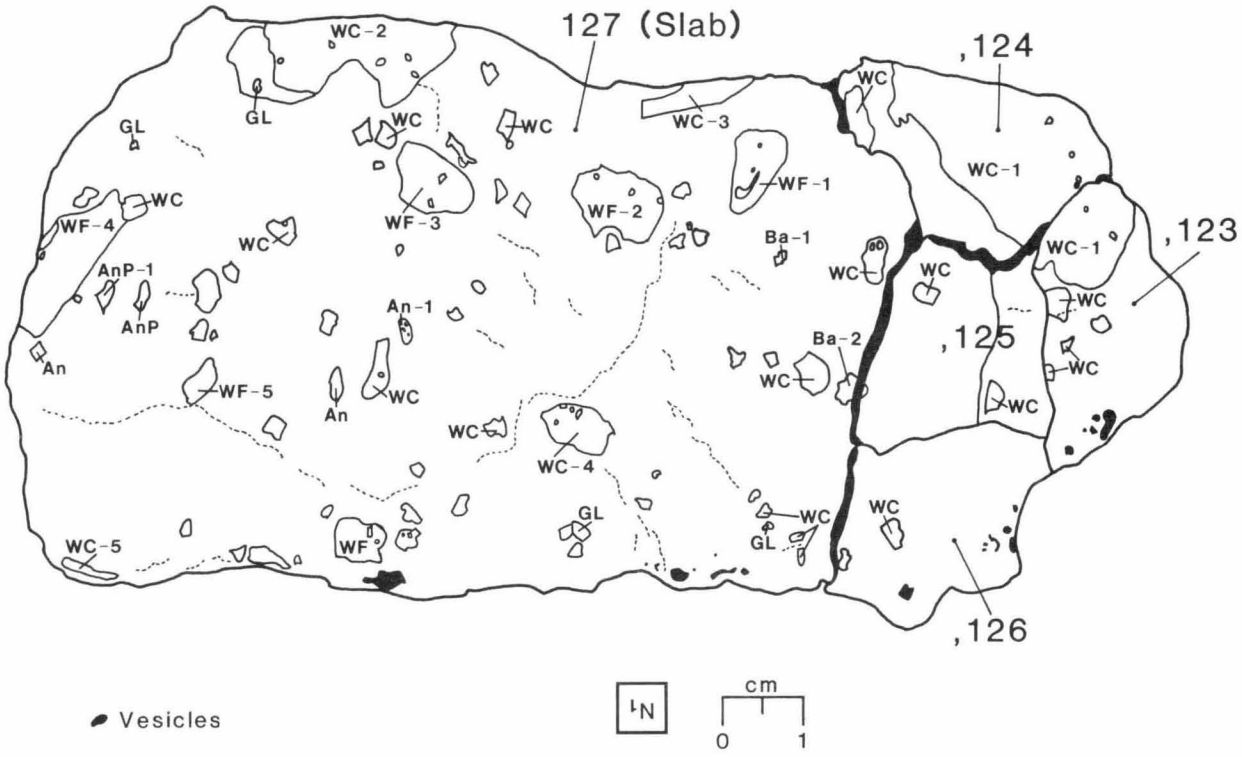
MF---Mineral fragments, usually less than one millimeter in diameter are present throughout the slabs. Pyroxene, spinel, maskelynite, and metal balls appear within matrix and along fractures.

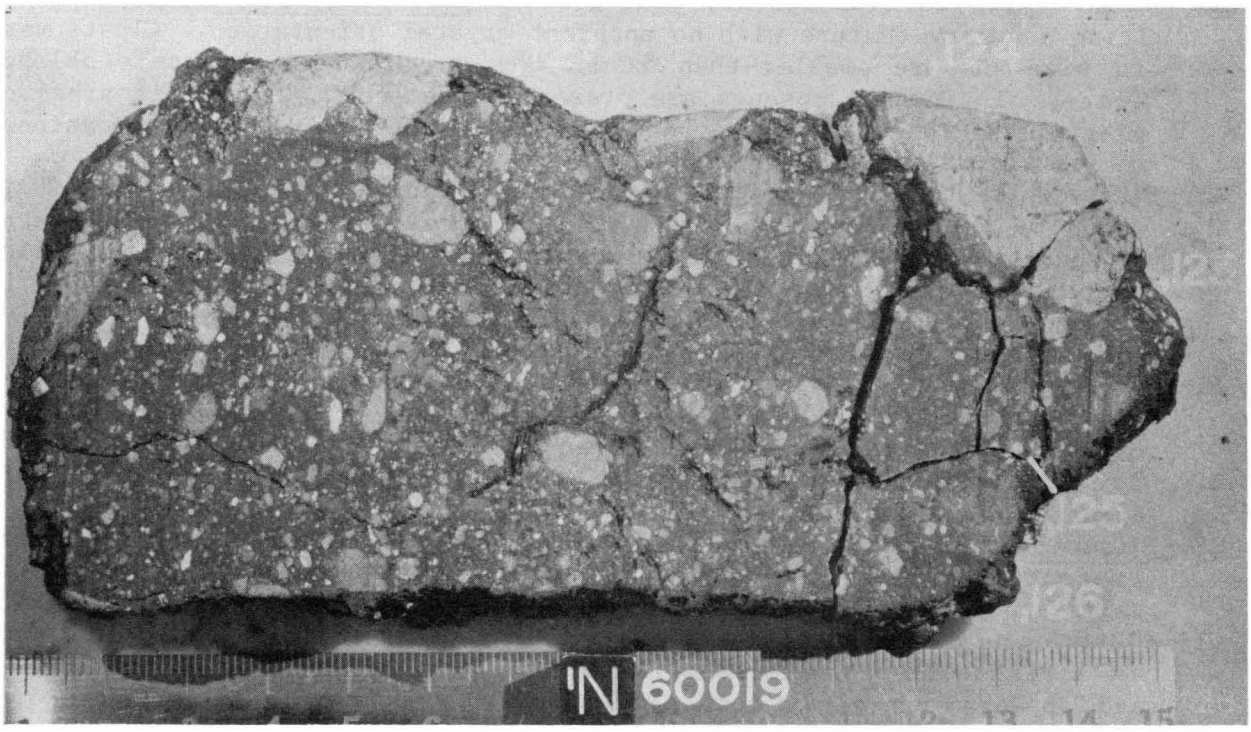
Gl---Glass occurs throughout the slabs within the matrix, along fractures, and as a rind with vesicles covering the top part of the rock. Black, brown, and apple green glass occur throughout the slabs as inclusions. Some glass appears crushed, with a chaotic texture; other glass exhibits a good conchoidal fracture.

APPENDIX 2

60019

Slab One North Face





S-84-46294

APPENDIX 2

SPECIFIC CLAST DESCRIPTIONS: SLAB ONE, NORTH FACE (,123-,127)

WC-1 ,123 & ,124 — (20 x 20 mm) Subrounded, whitish, coherent w/sharp boundary, 80% milky white crushed sugary plagioclase and pyroxene, occasionally translucent showing few crystal faces (plagioclase cannot be distinguished from pyroxene in hand specimen) with about 20% shiny black opaques, predominately ilmenite, distributed throughout the clast in chains. Less than 1% metal blebs, up to 0.25 mm in size, scattered throughout the clast occasionally exhibiting rust and rust-staining along plagioclase-pyroxene borders. Also within the clast are pure plagioclase inclusions (largest 0.5 mm). A glass rind partially lines the E1 side of this clast and the slab.

WC-2 ,127 — (11 x 23 mm) Subrounded, whitish, coherent with sharp boundaries along matrix, 80% plagioclase-pyroxene, 20% opaques, traces of metal blebs less than 0.05 mm as above. Pure plagioclase inclusions range from 0.25 to 1 mm in size and are abundant in this clast. Rust and rust-staining also present.

WC-3 ,127 — (15 x 3 mm) Oblong, whitish, coherent with sharp boundaries along matrix, 80% plagioclase, 20% opaques with traces of rusty metal blebs.

WC-4 ,127 — (9 x 6 mm) Subrounded, whitish, coherent with sharp boundaries along matrix, 70% plagioclase-pyroxene with 30% opaques. Also contains several pure plagioclase inclusions up to 1 mm in size. Traces of rusty metal blebs.

WC-5 ,127 — (1 x 7 mm) Oblong, white with yellow overtone, coherent with sharp matrix boundary. 85% milky white plagioclase and pyroxene with yellow overtone interwoven with 15% opaque chains and pinpoints. One metal bleb (0.5 mm x .63 mm) contains goethite(?) inclusion inside vug. Small pure plagioclase inclusions less than 0.1 mm also present.

WF-1 ,127 — (5 x 10 mm) Triangular with rounded base, whitish grey, coherent with distinct boundary. 60% sugary milky white plagioclase and pyroxene with 40% shiny black opaques, predominately ilmenite, occurring in zones and as pinpoint inclusions scattered throughout the clast. Also present are pure plagioclase inclusions from 0.5 to 2 mm long and less than 1% metal blebs containing rust, staining the plagioclase-pyroxene zones an orange-red.

WF-2 ,127 — (12 x 7 mm) Subrounded, whitish grey, coherent with distinct boundary. 60% plagioclase and pyroxene with 40% opaques as above. Traces of metal blebs exhibiting rust. Increase in pure plagioclase inclusions as large as 0.7 x 1.1 mm in size.

WF-3 ,127 — (8 x 7 mm) Subrounded, whitish grey, 60% plagioclase and pyroxene with 40% opaques as above, fewer metal and pure plagioclase inclusions.

APPENDIX 2

SPECIFIC CLAST DESCRIPTIONS: SLAB ONE, NORTH FACE (CON'T)

WF-4 ,127 — (8 x 17 mm) Elongated, whitish grey, coherent with distinct boundary. 70% plagioclase and pyroxene with 30% opaque chains making mafic-opaque zones distinguishable. Abundant metal blebs showing rust; traces of pure plagioclase inclusions. Also contains glass-lined zap pits along West edge of clast. (Different from most WF type clasts because opaques form chains instead of being pinpoint and bleb inclusions.)

WF-5 ,127 — (3 x 5 mm) Subrounded to elongated, whitish, coherent, 80% plagioclase-pyroxene with 20% interwoven shiny black opaque chains. Abundant metal blebs smaller than 0.125 mm in size. (Like WF-4 in opaque chains)

AnP-1 ,127 — (2 x 4 mm) Triangular with rounded base, white, coherent with distinct boundary. 70% milky white sugary plagioclase spotted with 30% yellow pyroxene(?). Traces of red spinel(?) and opaque inclusions.

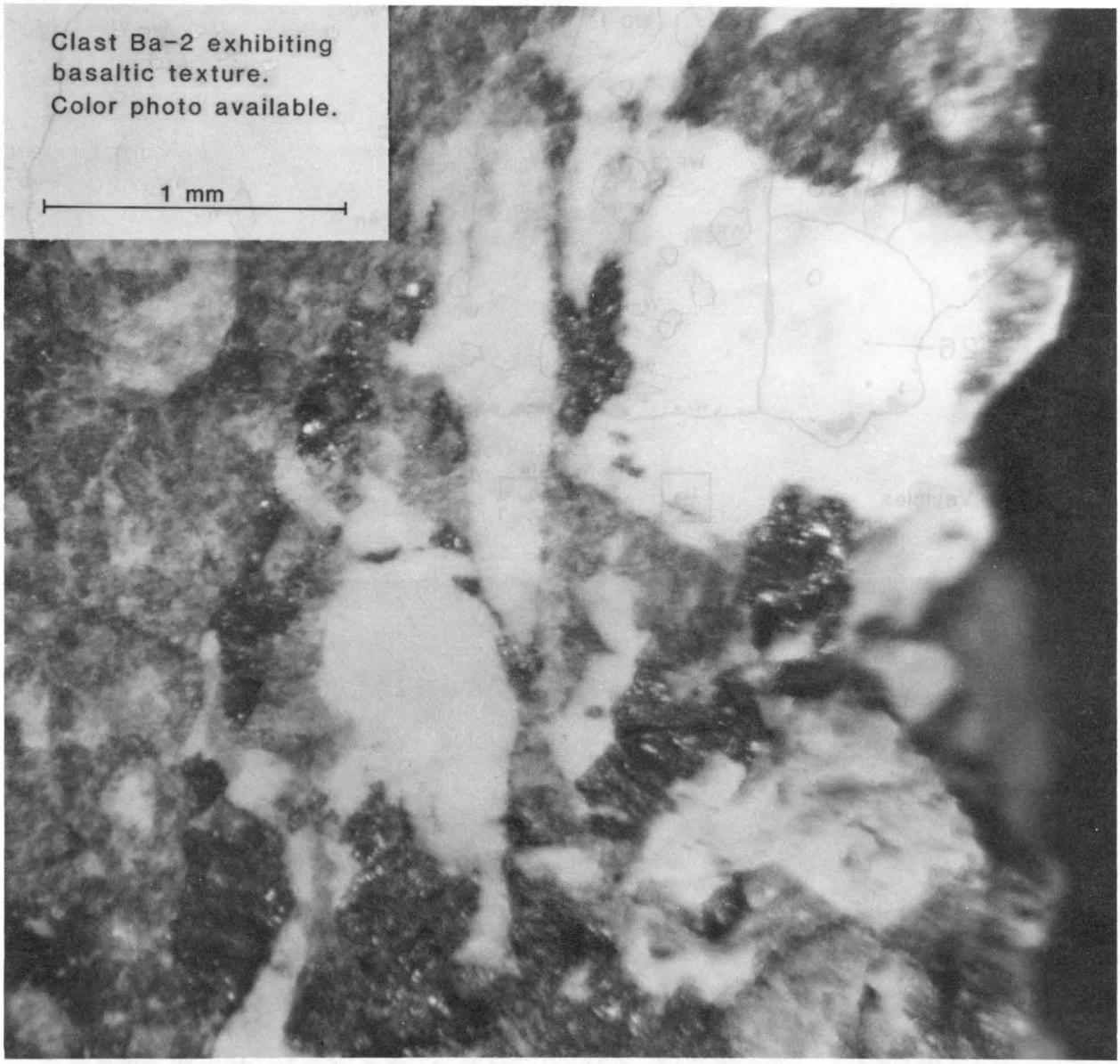
An-1 ,127 — (1.5 x 3.1 mm) Oval, milky white, coherent with sharp distinct boundary along matrix. Pure plagioclase clast with traces of pinpoint opaque inclusions. Has yellow overtone.

Ba-1 ,127 — (2.5 x 1.5 mm) Fine-grained, teardrop shape, coherent, white, black, tan, indistinct boundary. Opaques appear as laths (largest 0.1 x 0.6 mm) and as blebs (largest .25 x .5 mm). Plagioclase occurs as milky white laths about the same size as opaques. Pyroxenes (tan in color) seem to surround opaques and plagioclase laths.

Ba-2 ,125 & ,127 — (2.5 x 5 mm) Coarse-grained, granular, 1/2 oval shape, coherent, white, black, and tan, distinct boundary. Minerals appear to be more zoned than above clast. Milky white plagioclase occurs in laths and blobs while opaques and pyroxene tend to occur in blobs. Largest plagioclase blob (some lost along fracture) is 1.3 x 1.5 mm and laths 0.4 x 1.8 mm in size. Largest opaque zone measures 1.0 x 1.5 mm and pyroxene as large as 1.0 x 1.0 mm. Thin section available. See photo below.

APPENDIX 2

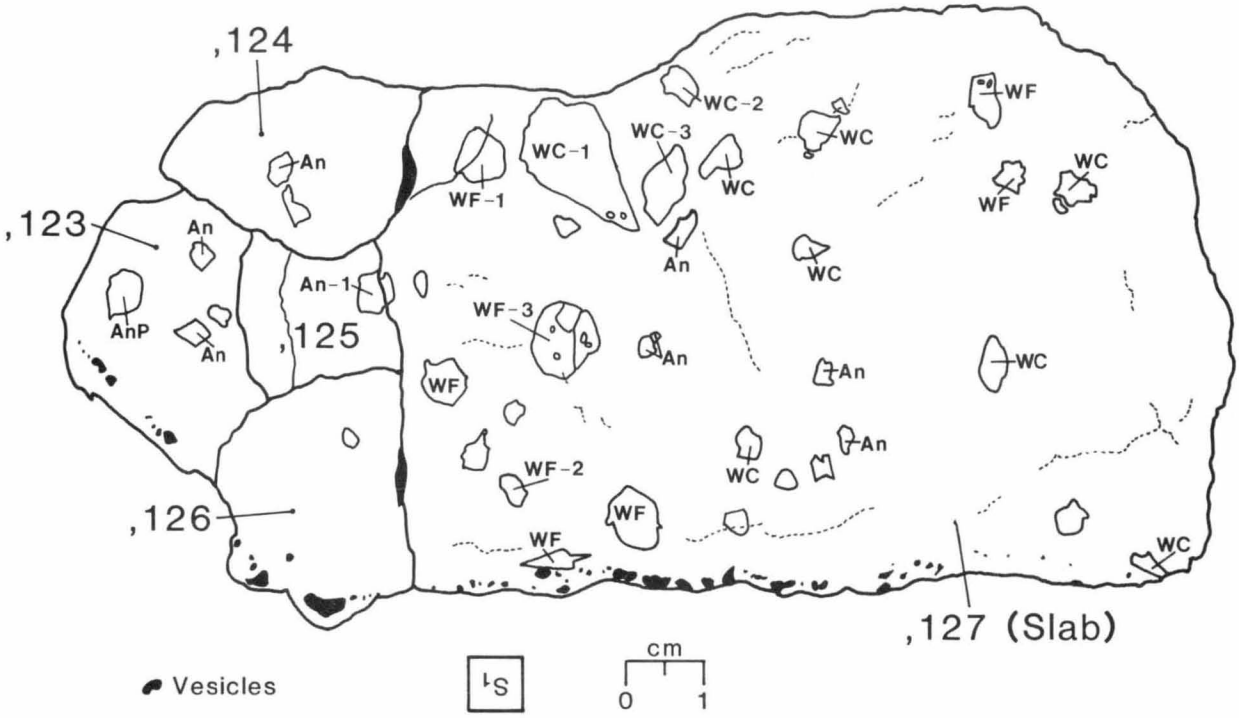
CLAST Ba-2

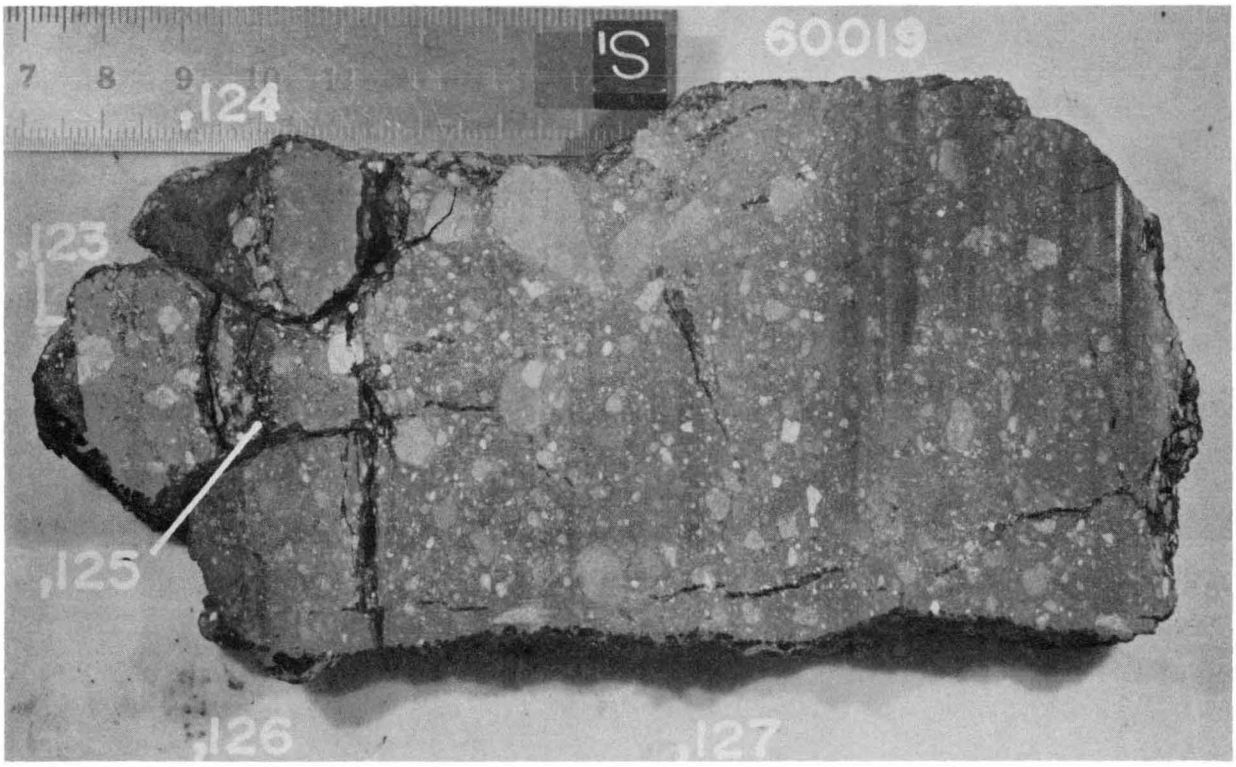


S-85-27089

60019

Slab One South Face





S-84-46297

APPENDIX 2

SPECIFIC CLAST DESCRIPTIONS: SLAB ONE SOUTH FACE (,123-,127)

WC-1 ,127 — (11 x 20 mm) Teardrop, greyish white, coherent with distinct boundary. 70% milky white to translucent, sugary plagioclase and pyroxene mixture (indistinguishable under hand specimen examination) interwoven with 30% shiny black opaques, predominantly ilmenite, in chains and less than 1% metal grains. Few pure plagioclase inclusions are present (the largest, 1.1 x 0.6 mm). One metal bleb present along with many minute pinpoint metal inclusions. Rust staining present along metal-plagioclase boundaries.

WC-2 ,127 — (4 x 4 mm) Equant with rounded corners, greyish white, coherent with distinct boundary. 80% plagiclase and pyroxene with 20% opaques in chains. One large pure plagioclase inclusion. Traces of metal inclusions with rust.

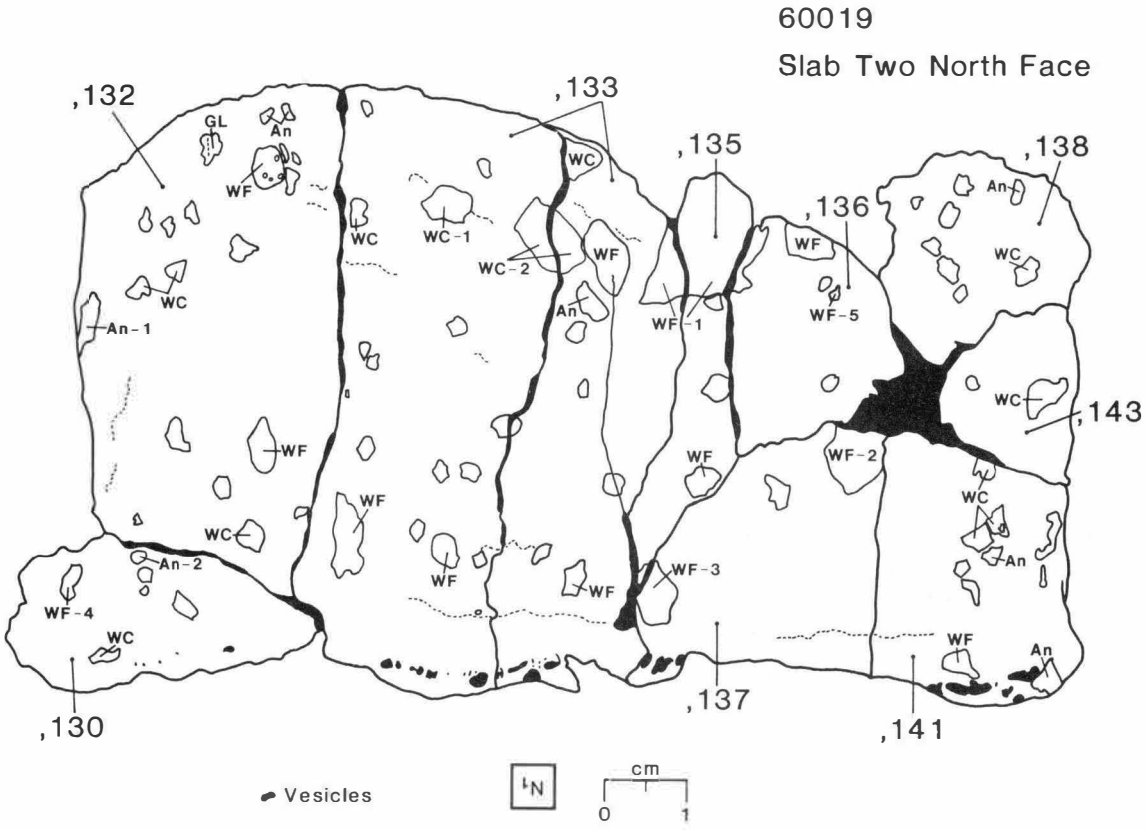
WF-1 ,127 — (6 x 7 mm) Subround, greyish white, coherent with distinct boundary. 90% smokey white to milky white, very fine-grained plagioclase and pyroxene mixture with 10% shiny black pin point opaques and traces of metal. Several pure plagioclase inclusions present. Mineral boundaries in clast are hard to distinguish.

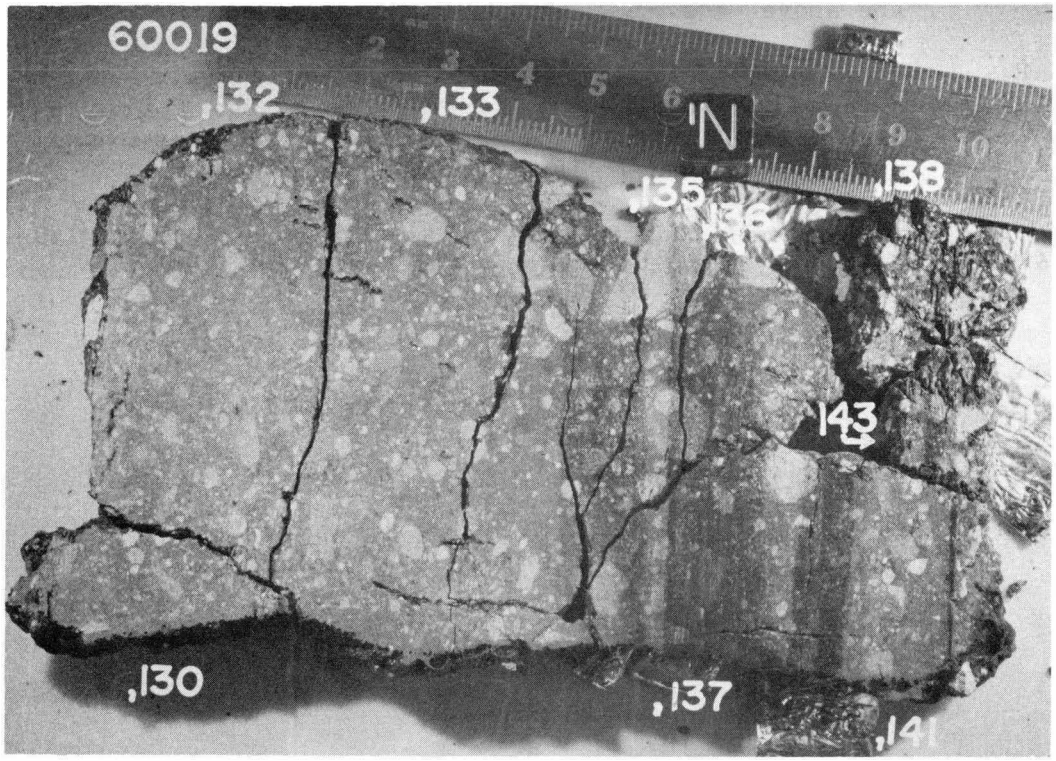
WF-2 ,127 — (2.5 x 5 mm) Subround, greyish white, coherent with in distinct boundary. 70% plagioclase and pyroxene with 30% opaques. Plagioclase and pyroxene(?) occur in spots surrounded by chains of opaques. More coarse-grained than the above WF's.

AnP ,123 — (5 x 6 mm) Subround, coherent with distinct boundary. 70% dull milky white, very fine-grained, sugary plagioclase(?) with 30% yellow to translucent, fine-grained pyroxene(?) with a vitreous luster. Traces of opaques.

An-1 ,125 & ,127 — (5 x 5 mm) Equant, dull milky white pure plagioclase with traces of pinpoint opaques. Thin section available.

APPENDIX 2





S-84-46302

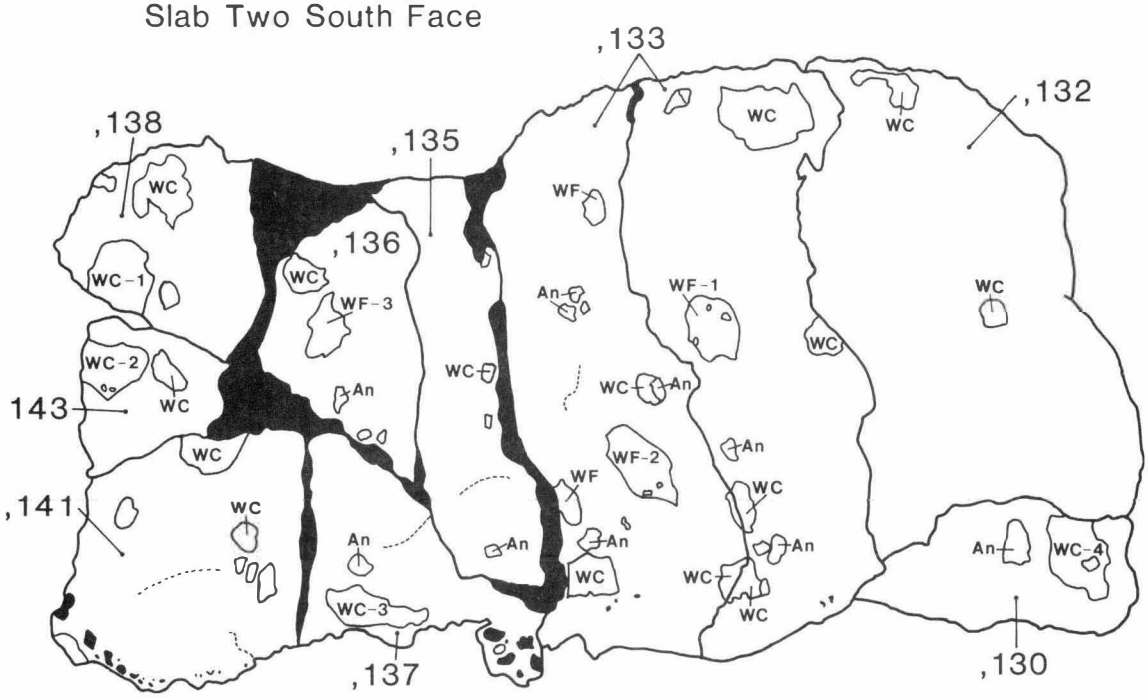
APPENDIX 2

SPECIFIC CLAST DESCRIPTIONS: SLAB TWO NORTH FACE (,130 ,132 ,133 ,135-,138 ,141 ,143)

WC-1 ,133	(6 x 4.5 mm) Subround, whitish, coherent with sharp boundary. 60% sugary, milky white plagioclase and pyroxene with 40% shiny black opaque chains, predominantly ilmenite, and traces of minute metal inclusions occasionally exhibiting rust and rust staining. A few pure plagioclase inclusions are present.
WC-2 ,133	(5 x 9 mm) Rectangular with rounded corners, coherent with sharp boundary. 60% plagioclase and pyroxene with 40% opaques as above.
WF-1 ,133 & ,135	(10 x 15 mm) Subangular, whitish grey, 80% sugary milky white plagioclase and pyroxene mixture with 20% shiny black opaques occurring in chains. Few pure plagioclase inclusions along with one metal bleb (0.6 x 0.6 mm) and several smaller metal blebs showing rust.
WF-2 ,138	(6 x 7 mm) Subround, whitish grey. 90% milky white plagioclase and pyroxene mixture with 10% shiny black opaques, mostly as pinpoints, scattered throughout the clast, and less than 1% metal blebs. One large opaque inclusion (0.4x0.5 mm) shows pinpoint metal inclusions surrounding its border with rust staining the plagioclase-pyroxene zone along top edge.
WF-3 ,137	(4 x 7 mm) Subround, greyish white, coherent with indistinct boundary. 80% greyish white, sugary plagioclase and pyroxene mixture with 20% opaques occurring as both pinpoint inclusions and zones, one as large as 0.7 x 0.25 mm in the shape of a teardrop having metal flake inclusions. There are two large pure plagioclase inclusions (0.8 x 0.8 mm, oval). Traces of rust staining throughout clast.
WF-4 ,130	(4 x 7 mm) Subround, greyish white, indistinct boundary. 70% plagioclase and pyroxene with 30% opaques. Traces of metal with little rust. One green-yellow inclusion (less than 0.1mm in size) is present in upper left side of clast. Thin section available.
WF-5 ,136	(2 x 1 mm) Subround, greyish white, indistinct boundary. 90% white to translucent and smokey white plagioclase and pyroxene mixture with 10% pinpoint opaques. Mineral boundaries within clast are hard to distinguish.
An-1 ,132	(2 x 6 mm) Rectangular, milky white to translucent, coherent, distinct boundary. Traces of pinpoint opaques.
An-2 ,130	(2.5 x 2 mm) Subround, milky white with yellow overtone in some areas. Traces of pinpoint opaques. Deep red spinel(?) inclusion in lower left hand corner.

60019

Slab Two South Face



Note: Clast shapes distorted by saw fracturing.

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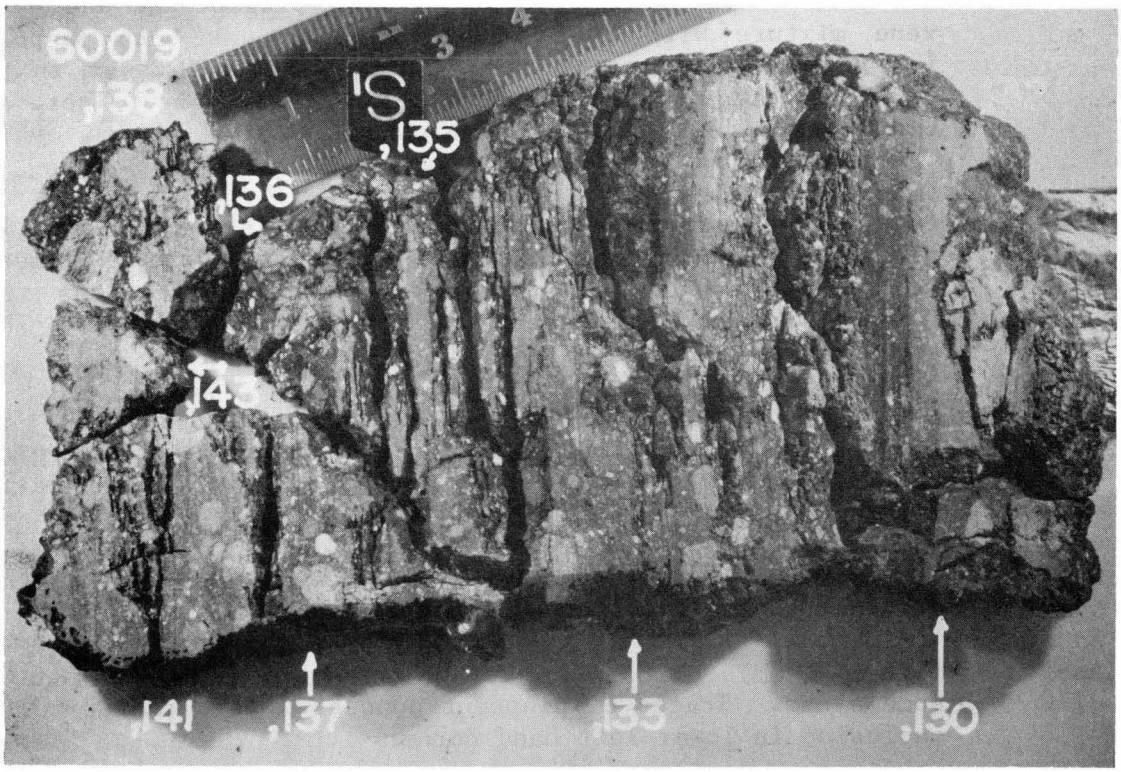
Vesicles



S-84-46301

APPENDIX 2

SPECIFIC CLAST DESCRIPTIONS: SLAB TWO SOUTH FACE (,130 ,132 ,133 ,135-,138 ,141 ,143)

WC-1 ,138 — (7 x 8 mm) Round, milky white with vitreous luster, coherent with distinct boundary. 90% milky white to translucent plagioclase-pyroxene mixture with 10% shiny black opaque chains. Traces of metal pinpoint inclusions.

WC-2 ,143 — (8 x 5 mm) Subround, grey and white, coherent with indistinct boundary. 60% rectangular, oval, and round plagioclase(?) inclusions randomly oriented and surrounded by 40% black vitreous looking opaques (does not look like ilmenite) mixed with plagioclase. Traces of pinpoint metal inclusions. (Plagioclase spot inclusions, 0.5 x 0.2 mm average size, are surrounded by a glassy looking groundmass mixed with plagioclase.) Thin section available.

WC-3 ,137 — (12 x 5 mm) Teardrop with truncated small end, milky white. 85% dull milky white plagioclase and pyroxene mixture, occasionally translucent with 15% very thin shiny black opaque chains. Traces of metal pinpoint inclusions and a metal ball with goethite(?) inclusion. Rust staining occurs in adjacent plagioclase and pyroxene. Thin section available.

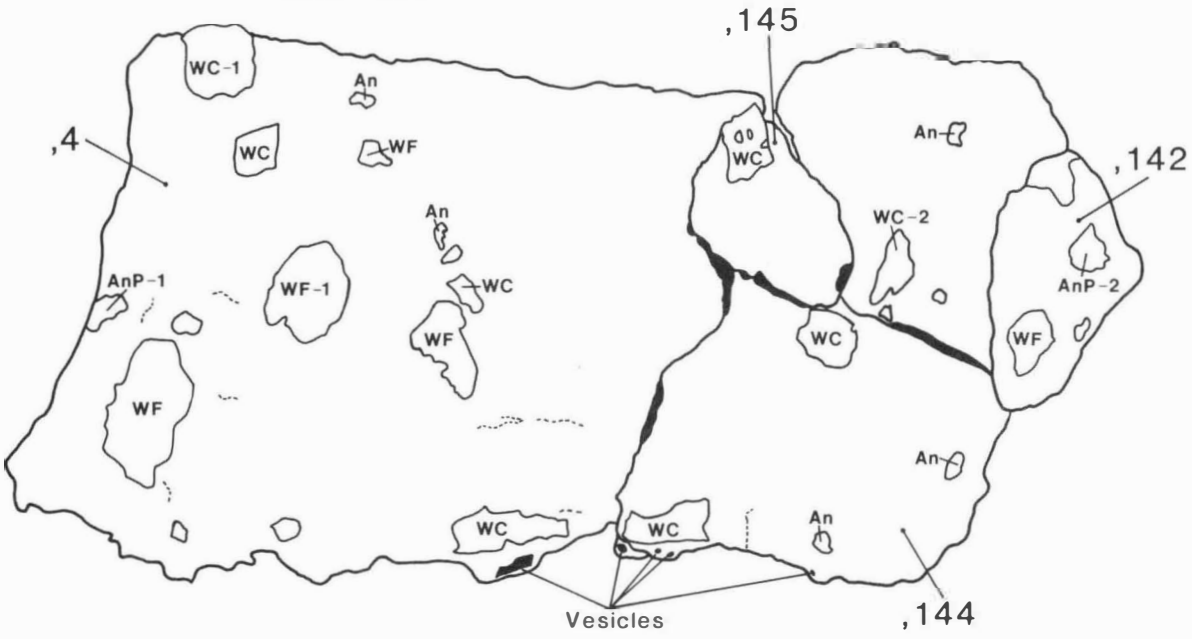
WC-4 ,130 — (7 x 8 mm) Subround, 80% plagpyroxene zone with 20% opaque chains. Few pure plagioclase inclusions. Thin section available.

WF-1 ,133 — (6 x 7 mm) Rounded, smokey white, distinct boundary, 90% smokey white and white plagioclase and pyroxene zone with 10% opaque pinpoint inclusions. Several pure plagioclase inclusions up to 2 x 1.2 mm and a large opaque inclusion (1x0.5 mm). Doesn't look poikilitic. Thin section available.

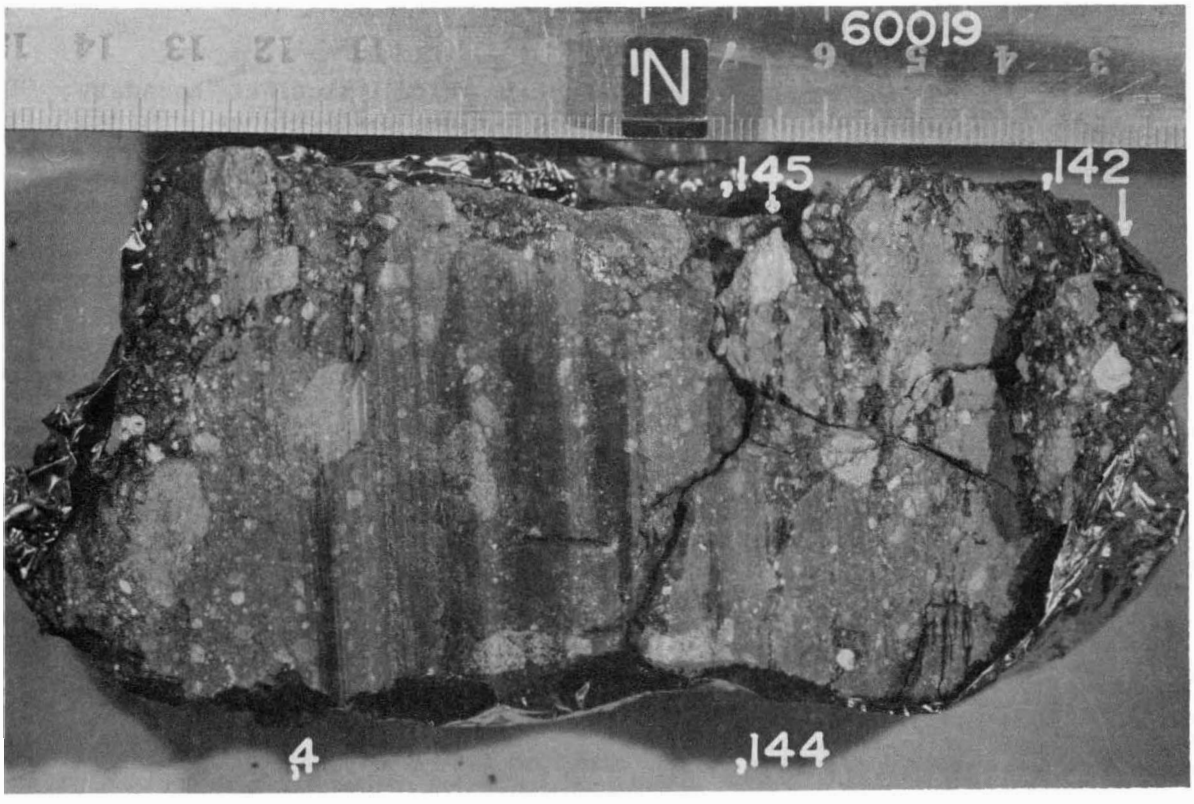
WF-2 ,133 — (7 x 12 mm) Oblong, greyish white, distinct boundary. 60% pure plagioclase(?) inclusions in all shapes, average size 1.5 x 1.5 mm, in a groundmass of black vitreous-looking opaques mixed with crushed sugary grey and white plagioclase(?). Looks like a finer-grained WC-2 on this face.

An — Various shapes and sizes, all milky white with dull luster. Occasional vitreous luster and translucent crystals. Traces of pinpoint opaque inclusions in some clasts.

60019
End Piece North Face



Note: Clast shapes distorted by saw fracturing.



S-84-46299

APPENDIX 2

SPECIFIC CLAST DESCRIPTIONS: END PIECE, NORTH FACE(,4 ,142 ,144 & ,145)

WC-1 ,4 — (7 x 8 mm) Rounded, greyish white, coherent, distinct boundary. 80% dull milky white to greyish white plagioclase and pyroxene groundmass with 20% shiny black opaque chains, predominantly ilmenite, with some pinpoint metal inclusions. Several vitreous luster, milky white to translucent, pure plagioclase inclusions as large as 1 mm are present. Traces of pinpoint metal inclusions, some showing rust staining. A small red to reddish brown inclusion about 0.1 diameter is present. Thin section available.

WC-2 ,144 — (3 x 7 mm) Elongated, 90% milky white plagioclase and pyroxene and 10% shiny black opaques in chains scattered throughout the clast. Plagioclase-pyroxene areas exhibit a yellow overtone in some areas. Traces of rust staining on plagioclase-pyroxene zones. Thin section available.

WF-1 ,4 — (7 x 11 mm) Round, greyish white. 90% smokey white and milky white mixture of plagioclase and pyroxene groundmass with less than 10% shiny black pinpoint opaque inclusions. Several pure plagioclase inclusions, less than 0.5 mm in size are present. Thin section available.

AnP-1 ,4 — (4 x 2 mm) Oblong, milky white fine-grained sugary plagioclase with several yellow to translucent, crystalline coarser grained pyroxene(?) or olivine(?) inclusions up to 0.1 mm in size. Traces of ilmenite(?) and metalic pinpoint inclusions.

AnP-2 ,142 — (4 x 6 mm) Subround, distinct boundary. Milky white, fine-grained, sugary plagioclase(?) with a yellow overtone make up most of the clast. Traces of pinpoint opaques and rust staining. Thin section available.

An-gen — (3 x 3 mm) Round, milky white to translucent fine-grained, sugary pure plagioclase with traces of shiny black pinpoint opaques.

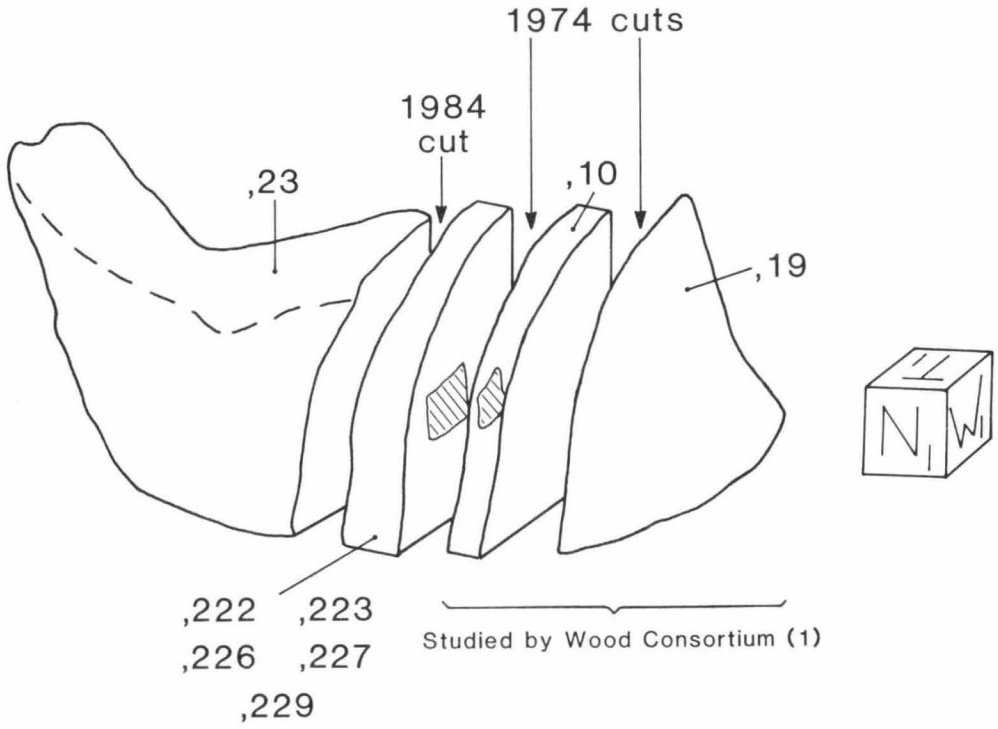
APPENDIX 3

EXAMINATION OF NEW FACES OF 72255
by Andrea B. Mosie

Clasts previously exposed during sawing of slab 72255,10 in 1974 were described and studied by a Consortium led by Wood (1). 72255,23 was separated by one additional saw cut in 1984. Examination of the two new faces revealed no new clast types. The 1.5 cm thick slab broke into five pieces during sawing. The Civet Cat, a "lunar pristine" norite clast described by Wood et al., does not extend to the new saw cut. Although this clast has been studied extensively, additional sample splits are stored in the lunar vaults. More aphanitic clasts were exposed, but the anorthositic clasts are rare and small. The E1 face reveals only a few clasts, which are indistinct. Both the dark gray aphanitic clasts and the anorthositic clasts were described previously by Wood et al. (1974).

Reference:
(1) Wood J.A. et al. (1974) Boulder 1 Sta. 2 Apollo 17, 1, pp. 29-33.

THE CUTTING OF 72255



APPENDIX 3

72255 ABBREVIATIONS

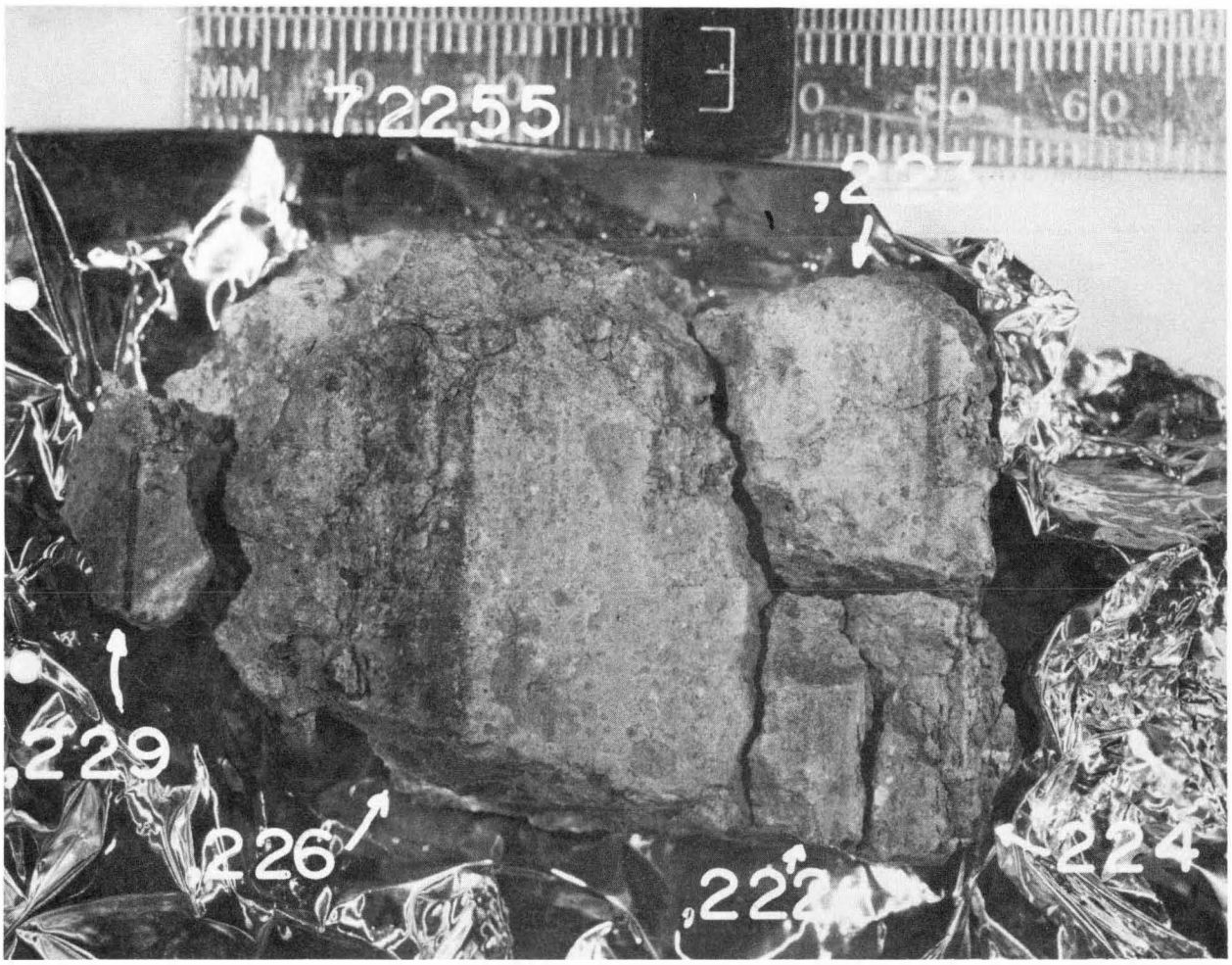
DG	Dark Gray Aphanitic Clasts
W	White Anorthositic Clasts
LGM	Light Gray Matrix
DGM	Dark Gray Matrix
CC (1)	Civet Cat Norite Clast: Fine-grained, dark gray with white inclusions.

Reference:

(1) Wood J.A. et al. (1974) Boulder 1 Sta. 2 Apollo 17, 1, p. 33

APPENDIX 3

72255 EAST FACE

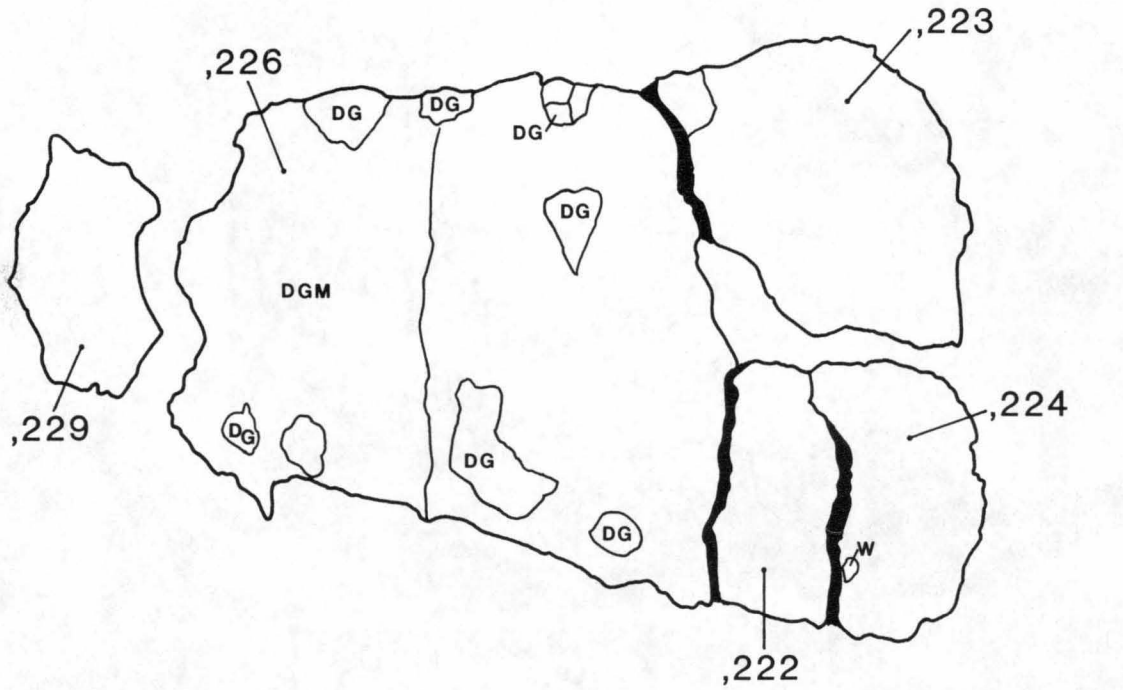


S-84-41707

APPENDIX 3

72255 EAST FACE

72255



"Backside" of Civet Cat Slab Face

APPENDIX 3

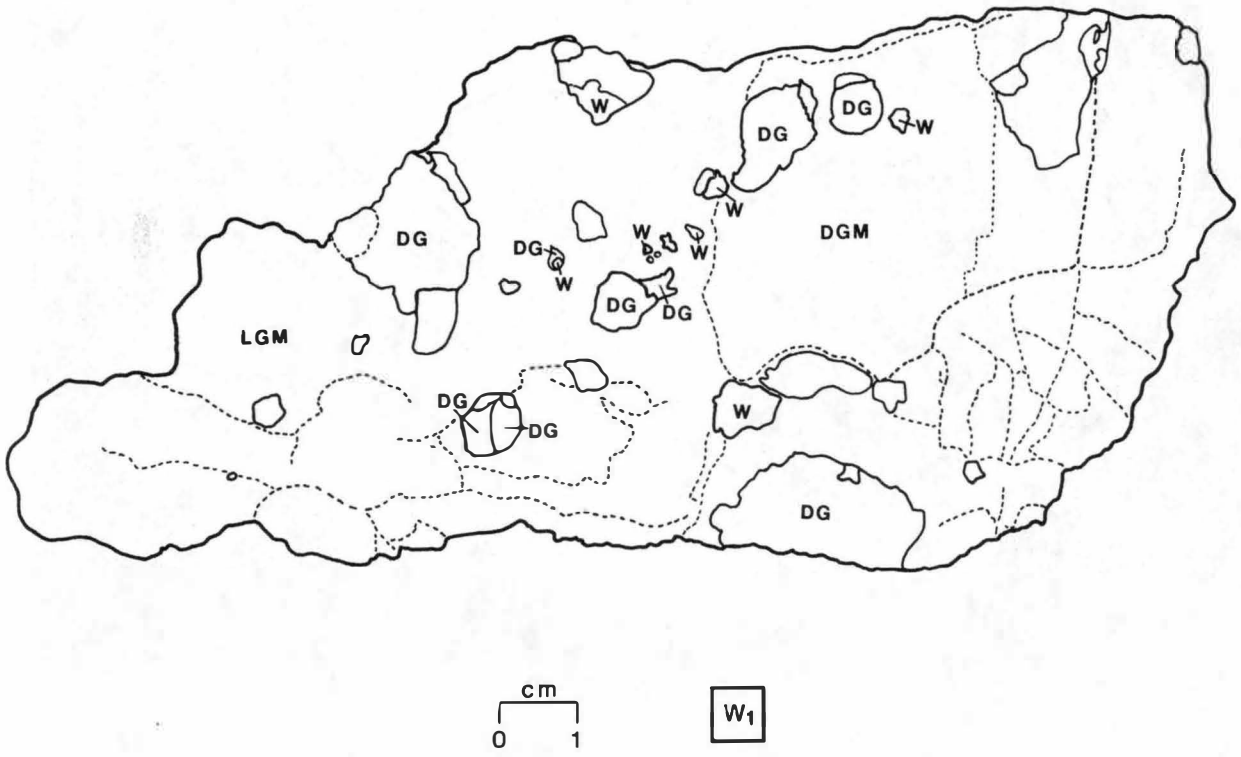
72255,23 WEST FACE

S-84-41704

APPENDIX 3

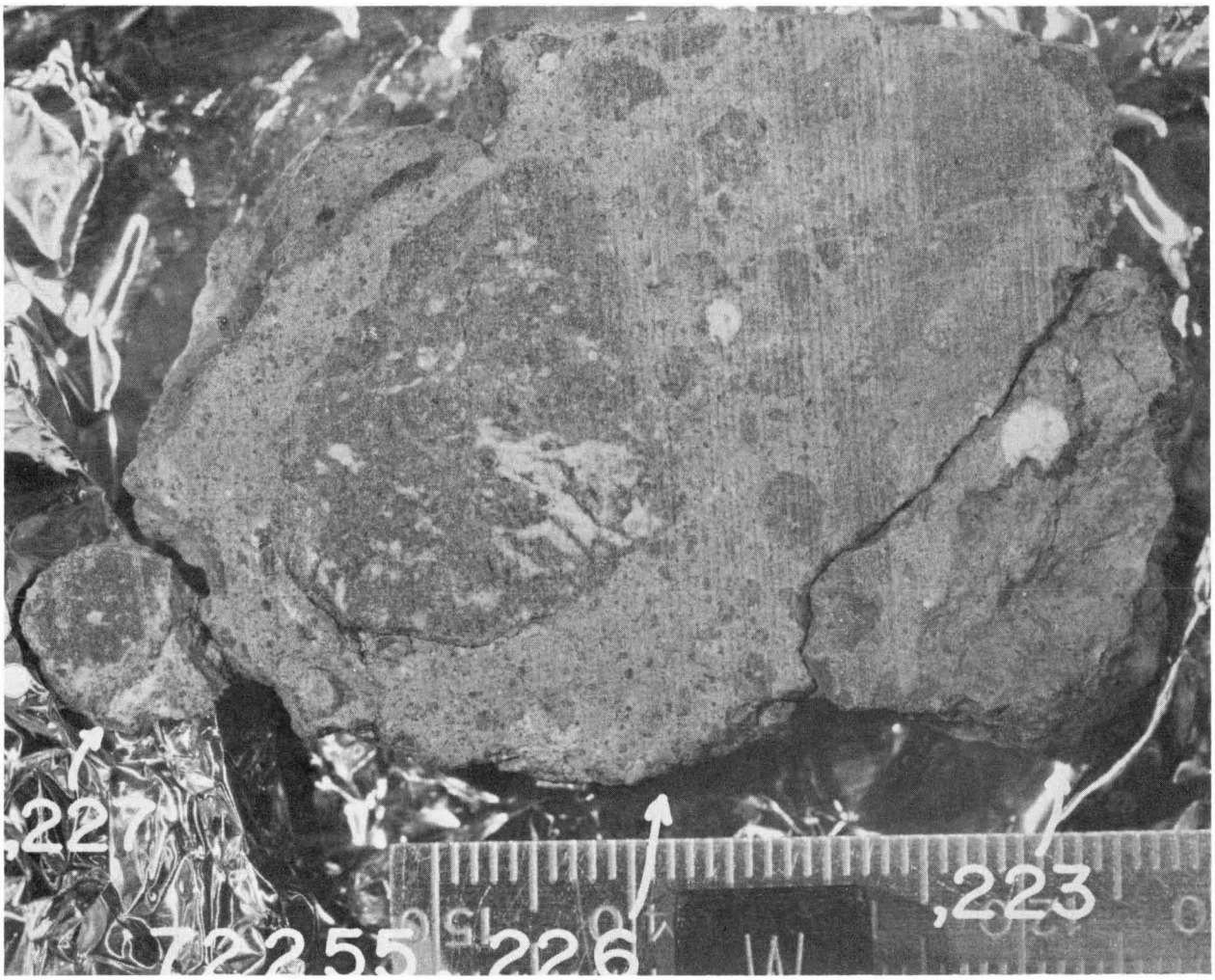
72255,23 WEST FACE

72255,23



APPENDIX 3

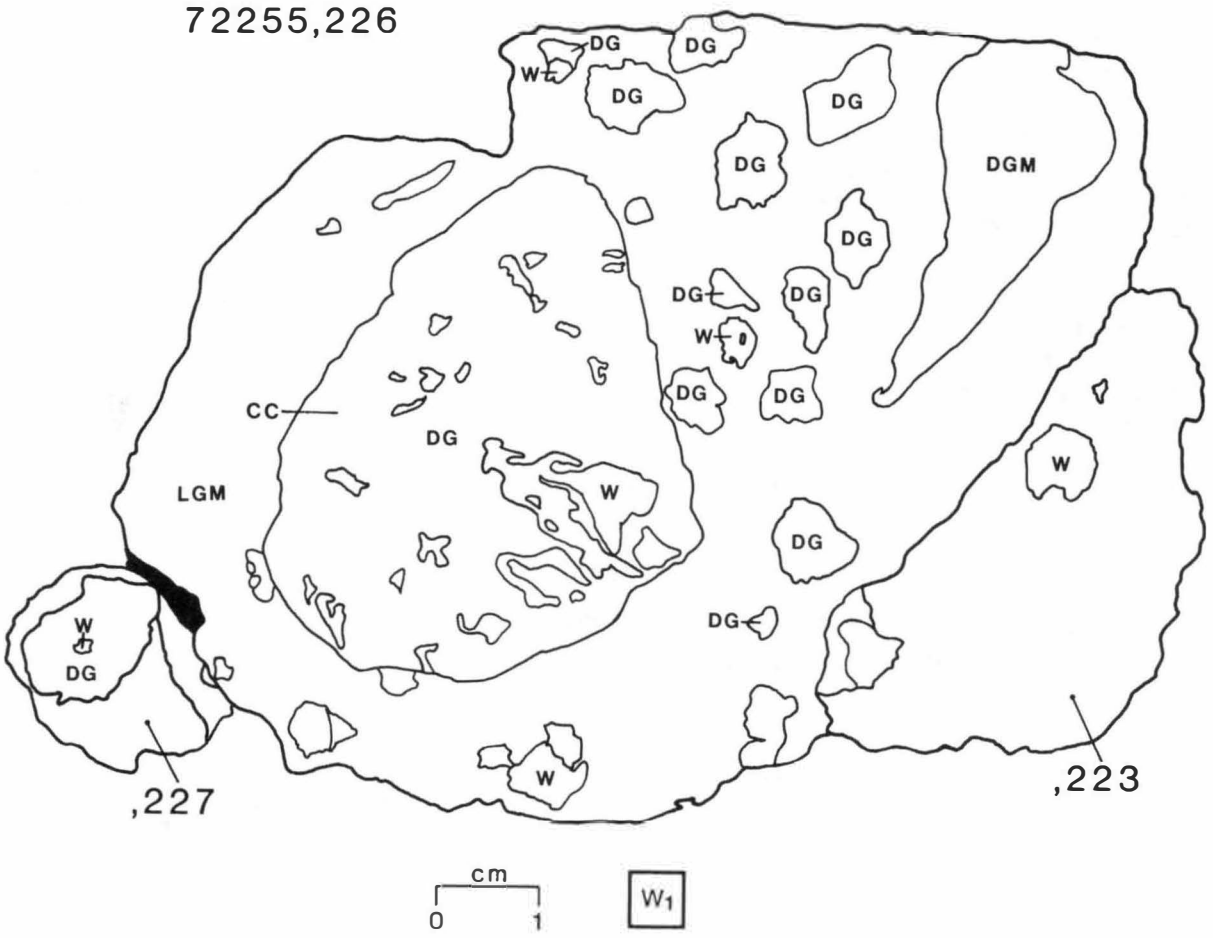
72255,226 WEST FACE



S-84-41706

APPENDIX 3

72255,226 WEST FACE



CURATORIAL NEWSLETTERS

Planetary Materials Branch personnel prepare three newsletters directed to investigators and other individuals interested in the three types of planetary materials stored and processed at the Johnson Space Center. The **Lunar Sample Newsletter** is published about mid way between meetings of the Lunar and Planetary Sample Team. In recent years the LAPST has met four times a year.
The **Antarctic Meteorite Newsletter** is published six to eight weeks before each meeting of the Antarctic Meteorite Working Group. The AMWG currently meets twice a year.

The **Cosmic Dust Courier** will be published about twice a year on an irregular schedule.

If you are interested in receiving any of the above newsletters and are not now on the appropriate mailing list, please fill out the following request and mail to the Lunar Sample Curator. Or, you can drop it at the Curator's table at LPSC XVI.

Lunar Sample Curator
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NASA Johnson Space Center
Houston, TX 77058

Please add my name to the mailing list for:

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_____ Antarctic Meteorite Newsletter
_____ Cosmic Dust Courier

_____ name

PLEASE

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