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APOLLO 17 VOICE TRANSCRIPT PERTAINING TO THE  
GEOLOGY OF THE LANDING SITE

N. G. Bailey, et al

Geological Survey  
Flagstaff, Arizona

1975

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APOLLO 17 VOICE TRANSCRIPT  
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Pertaining to the geology of the landing site

by

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Branch of Astrogeology  
Flagstaff, Arizona

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## INTRODUCTION

The sixth and last of the Apollo program manned lunar landings occurred on December 11, 1972 when the lunar module Challenger landed in the Taurus-Littrow region of the Moon. The Apollo 17 crew spent 22.1 hours in surface exploration and traversed approximately 35 km with the lunar roving vehicle.

This document is an edited record of the conversations between astronauts Eugene A. Cernan and Harrison H. Schmitt on the lunar surface and EVA capcom Robert A. Parker at Mission Control in Houston during the descent, landing, and 75 hours of lunar stay time. It also contains landing site observations from the orbiting command module America by command module pilot Ronald E. Evans while the LM was on the Moon, by all three astronauts prior to command module-lunar module separation, and after docking and reentry of the surface explorers back into the command module. Conversations of interest are also included from the transearth phase of the mission. It is a condensation hopefully of all the verbal data having geologic significance. All discussions and observations documenting the lunar landscape, its geologic characteristics, the rocks and soils collected, and the photographic record are retained along with the supplementary remarks essential to the continuity of events during the mission. We have deleted the words of mechanical housekeeping and engineering data while attempting not to lose the personal and philosophical aspects of the exploration.

The sources of this voice transcript are the complete audio and video tapes recorded during the EVAs and the Technical Air-to-Ground Voice Transcription prepared by NASA. The voice record is listed chronologically with each individual comment preceded by the day, hour, minute and, occasionally, second when the statement was made. These times are Apollo Elapsed Time (AET) which is the true mission-elapsed time after liftoff from Cape Kennedy at 12:33 a.m. E.S.T. on December 7, 1972.

Figure 1 shows the landing site area that was described, sampled, and photographed by the Apollo 17 crewmen.

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GLOSSARY OF TERMS, ABBREVIATIONS, ACRONYMS, AND SYMBOLS

APOLLO 17 CREW

CC	Capsule Communicator (Robert A. Parker during EVAs, other astronauts during other time periods)
CDR	Commander (Eugene A. Cernan)
CMP	Command Module Pilot (Ronald E. Evans)
LMP	Lunar Module Pilot (Harrison H. Schmitt)
MCC	Mission Control Center (unidentified voice)
AET	Apollo Elapsed Time - after launch from earth (days-hrs-mins-secs)
ALSEP	Apollo Lunar Surface Experiments Package
B & W	Black and White
BLSLS	Buddy Secondary Life Support System
CM, CSM	Command Module, Command Service Module, "America"
COMP	Comprehensive Sample - sample reference in transcript keywording
CONT	Contingency Sample - bag of soil and rocks collected early in the EVA - sample reference in transcript keywording
Cape	Cape Kennedy
Core	Drive tube coring device for collecting soil samples
CRE (Cosmic Ray)	Cosmic Ray Experiment
CSVC	Core Sample Vacuum Container - for storage of chemically ultraclean drive tube sample
DAC	Data Acquisition Camera, 16 mm
DOC	Documented Sample - soil and/or rocks that are documented by photography before and after sampling
DSEA	Data Storage Equipment Assembly
EP 4	Explosive Package number 4 of Seismic Profiling Experiment

GLOSSARY CONT'D.

ETB	Equipment Transfer Bag for transport of items between LM hatch and lunar surface
EVA	Extravehicular Activity - astronaut activities on the lunar surface
FSR	Football-Sized Rock
GCTA	Ground Controlled Television Assembly
HFE	Heat Flow Experiment
IPS	Inches Per Second
ISA	Interim Storage Assembly
L and A	Landing and Analysis training display at Cape Kennedy
LCG	Liquid Cooled Garment
LEAM	Lunar Ejecta and Meteorites experiment
LEC	Lunar Equipment Conveyor
LM	Lunar Module, "Challenger"
LMS	Lunar Mass Spectrometer
LOS	Loss of signal
LRV	Lunar Roving Vehicle - "Rover"
LSG	Lunar Surface Gravimeter
LSPE	Lunar Seismic Profiling Experiment
LSRK	Loose Rock
Mag/Mags	Magazine/Magazines - photographic
MESA	Modularized Equipment Storage Assembly - a storage area on the LM that contains science equipment

GLOSSARY CONT'D.

MOCR	Mission Operations Control Room
Neutron Flux	Lunar Neutron Probe Experiment
PAN	Panorama of 70-mm photographs
PLSS	Primary Life Support System for space suit
PHO	Photo, photograph
RMSSC	Right Hand Side Storage Console
RTG	Radioisotope Thermoelectric Generator
S-1VB	Saturn 4B Rocket
SCB	Sample Collection Bag
SEP	Surface Electrical Properties experiment
SESC	Special Environmental Sample Container
SRC	Sample Return Container, "Rock Box"
Strut	One of four legs on the LM
Plus-Z Strut	Forward leg on which the ladder is mounted
Minus-Z Strut	Rear leg of LM
Plus-Y Strut	Right leg of LM
Minus-Y Strut	Left leg of the LM
SMP	SMP crater just west of Station B
T 38	Jet training plane
TCA	Time Centered Above
TGE	Traverse Gravimeter Experiment
VIP (site)	"Very Important Place" - final parking site of LRV

GLOSSARY CONT'D.

- \*\*\* Garbled or clipped transmission
- - - Deletions between statements of statements that are not technologically relevant
- Pause by speaker
- Interruption by another speaker, or abrupt termination of a recording
- (words) Explanation of words probably said that were garbled during transmission, or additional explanation by editor
- (words?) Explanation of words possibly said that were garbled during transmission, or additional explanation by editor



The photographic base for this map is Apollo 17 panoramic camera frame AS17 2309. The station locations and traverse routes are from compilations by the Apollo Field Geology Investigations Team under Contract No T 5874A

LM coordinates 20 17°N Latitude  
30 77°E Longitude



Figure 1. Apollo 17 landing site showing LM location and area traversed by astronauts during EVAs.



GEOLOGIC CONDENSATION OF THE APOLO 17 VOICE TRANSCRIPT

\* \* \* \* \* DESCENT \* \* \* \* \*

04 14 18 17 CDR Okay, I got the South Massif. (DESCENT)  
-- --

04 14 18 35 CDR Okay, Gordo, I've got Nansen; I've got Lara; and (DESCENT)  
I've got the scarp. Oh, man, we're level with the  
top of the massifs, now.

-- --

04 14 19 21 CDR And there it is, Houston. There's Camelot! Right (DESCENT)  
on target.

-- --

04 14 19+ LMP I see it. (DESCENT)

04 14 19+ CDR We got them all. (DESCENT)

-- --

04 14 19 54 CDR Okay, I've got Barjea; I've got Poppy! I've got the (DESCENT)  
triangle.

-- --

04 14 19+ LMP Contact. (DESCENT)

\* \* \* \* LM WINDOW \* \* \* \*

04 14 22+ CDR Okay, Houston. The Challenger has landed! (LM WINDOW)

04 14 22+ CDR Jack, are we going to have some nice boulders in this area. (LM WINDOW)

04 14 23+ CDR Oh, man. Look at that rock out there. (LM WINDOW)

04 14 23+ LMP Absolutely incredible. Absolutely incredible. (LM WINDOW)

04 14 23+ CDR I think I can see the rim of Camelot. (LM WINDOW)

04 14 23+ LMP Hey, you can see the boulder tracks. (LM WINDOW)

04 14 23+ LMP There are boulders all over those massifs. (LM WINDOW)

04 14 23+ CDR I shot for a spot around 2 o'clock from Poppy. There's a number of boulders out at 12 o'clock from Poppy, and I really think I'm probably not more than about 100 meters out in front of it - and slightly to the north. Actually, I may be a little bit closer to Trident than I expected Poppy to be. I think I've got Trident right out the left window. And our first cut at the mobility around here in the Rover. It ought to be super. (LM WINDOW)

04 14 24+ LMP I tell you, the massifs and Bear mountain are two different products. (LM WINDOW)

04 14 24+ CDR Do look it, don't they? (LM WINDOW)

04 14 24+ LMP Of course, they're different slopes, too. (LM WINDOW)

04 14 24+ CDR I think that may be Rudolph, right there, Jack, out your window. I was looking more at those boulders and trying to stay in the spots between them - (LM WINDOW)

-- --

04 14 25+ CDR There was practically no dust, just a little bit of a film; all the way to the ground. (LM WINDOW)

-- --

04 14 26+ CDR You can't see into Camelot, Jack; that rim - is Camelot out in front of us. (LM WINDOW)

04 14 26+ LMP Yes. (LM WINDOW)

-- --

04 14 29+ CDR Okay. I can see the scarp. I can see Hanover. Good thing we didn't plan to go to Hanover. It's steep. (LM WINDOW)

04 14 29+ LMP Look at the boulder - halfway up the hill. (LM WINDOW)

-- --

04 14 29+ CDR The boulder tracks - they're beautiful. (LM WINDOW)

04 14 29+ LMP It's sitting right there in the end of the tracks. There are tracks all over that hillside. There's a boulder came right down to the surface there. See it? (LM WINDOW)

04 14 29+ CDR Yes. (LM WINDOW)

04 14 29+ LMP That one right through that little crater - - sitting right there for us to sample. Look at it. (LM WINDOW)

04 14 29+ CDR Yes, sir. I'll bet Bear mountain and the Sculptureu Hill's are the same. (LM WINDOW)

04 14 29+ LMP Yes. Well, the slope's different. We'll have to look at it from outside. You may be right. Now I see why they call them sculptured. My gosh, they're so hummocky that there's shadow all over them. (LM WINDOW)

04 14 29+ CDR Yes. (LM WINDOW)

04 14 29+ LMP There are some holes and rocks around here. Who told me this was a flat landing site? (LM WINDOW)

04 14 29+ CDR It is flat. For crying out loud. What do you want, (LM WINDOW) an airtight guarantee?

04 14 30 14 LMP Let's see, we got about 2 degrees left and about 5--degrees pitchup. (LM WINDOW)

04 14 30+ CDR We're about what - about 100 meters from Trident? (LM WINDOW)

04 14 30+ LMP Yes, less than that, I think Trident's right here. Our shadow's about 100 feet, Geno, I think. (LM WINDOW)

04 14 30+ CDR Yes, we're \*\*\* less than 100 meters then. (LM WINDOW)

04 14 30+ LMP Yes, there are some holes I'm glad I didn't land in around here, I'll tell you. (LM WINDOW)

04 14 30+ CDR Now, if you look at the massif, Jack \*\*\* you see, they are almost like a series of linear boulder tracks. but they come crossways down the slope. So it looks like there may very definitely be some jointed - there's outcrop on top the massif, too. (LM WINDOW)

04 14 30+ LMP Oh, it sure looks like it, gray outcrop. And there's a bluish-gray compared to the brown or tan-gray of the massif side. (LM WINDOW)

04 14 30+ CDR And a lot of that outcrop down on the bottom is boulder. (LM WINDOW)

04 14 30+ CDR Yes. Do you know what that reminds me of, way up or top - that outcrop? It reminds me of Sunset where you could just get a little piece of outcrop around the corner. (LM WINDOW)

04 14 30+ LMP That's right. (LM WINDOW)

- - -

04 14 43+ CDR The L and A are the landing site, from a relief point of view, I think, are identical. I actually didn't look around nearly as much as I thought I

would, or as I wanted to, because I had fixation on a reasonable spot to land. They're not all reasonable in that there's some very subtle hummocky-like craters right in and around where we are. And there's not a lot of boulders laying on the surface, but there's a lot of what appear to be boulders that are covered up by some of the dark mantle. Numerous enough that you could not like to take a chance at putting a pad down on one of them or in one of those hummocky subtle craters.

- - -

04 14 43+ CDR (LM WINDOW)

I guess the thing that probably surprised me most about the site, as far as landing is concerned, is the fact that there were these - I hesitate to say they're outcrops but certainly they're buried massive pieces of rock - whether they're boulders or not, we'll have to find out - out here in the plains area, partially covered and filleted by the dark mantle. And I expected to find a number of craters, but I guess I really didn't expect to find the rock tyres around. And we're talking about anywhere from 1 to 2 meters down to - oh, 2 or 3 feet, which when they're sticking out and on the sides of some of these subtle craters look pretty menacing.

04 14 45 49 CDR (LM WINDOW)

The visibility prior to pitchover was such that I could see Nansen. I could see the scarp. I could see Lara. I could not see Camelot until after pitchover. Even at 6000 feet, the small triangle with Frosty and Rudolph and Punk were visible to me. I had Poppy from orbit, so it was easy to see. Barjee was a very sharp round crater just as depicted on the L and A. The thing I really didn't get a good look at, because I didn't pay too much attention to it, was from Trident on to the south.

- - -

04 15 50 17 CDR (LM WINDOW)

My best guess is 150 meters from Poppy at 1 to 2 o'clock.

- - -

04 15 50+ CDR (LM WINDOW)

Mostly west, but slightly north.

-- --

04 15 50+ CDR We're just about abeam of Trident 1. I can see it out there, but I can't really define Trident 1 from Trident 2. And the thing that is a little different is that I appear to be closer to it than I normally would have expected to be. (LM WINDOW)

-- --

04 16 01+ CDR I thought Rudolph was right out there at 3 o'clock. Jack's looking at it and he said, yes, that is Rudolph right at 3 o'clock out his right-hand window. (LM WINDOW)

-- --

04 16 01+ CDR The shadow of the LM, the rendezvous radar antenna, is pointing about one-third of the way down from the peak of Family. I must be right here abeam of Trident 1. I guess it's close to 100 meters - 80 meters anyway - to where the rim of Trident 1 falls off. And I am abeam of the center of Trident 1, and that's the only possible thing it could be. And that would put Poppy just about where I expected it to be. (LM WINDOW)

04 16 01+ CC You're referring to Trident 1 as the easternmost part of Trident, is that right? (LM WINDOW)

04 16 01+ CDR No, it's always been the westernmost part of Trident. The landing site was on a line between Trident 1 and Rudolph and judging from what Jack's got on his right-hand window and what I got on my left-hand window we're right there, except possibly a skosh further south on that line. (LM WINDOW)

-- --

04 16 01+ LMP We can't see into Camelot; we can just see the rim of it. It's at least 200 meters - 2 to 300 meters up there, I expect. (LM WINDOW)

04 16 01+ CC What o'clock position is the nearest part of the rim of Camelot? Or maybe if it's better defined -- (LM WINDOW)

04 16 01+ LMP Twelve o'clock. (LM WINDOW)

04 16 01+ CC - - define the south rim. Can you see the south rim (LM WINDOW)  
of it?

04 16 01+ CDR Yes, Gordy, but it blends in so well; all we're (LM WINDOW)  
seeing is an undulating high as the rim. And to the  
best of my knowledge, we've got the east rim right  
at 12 o'clock.

04 16 01+ LMP Hey, Gordy, right at 12 o'clock also is a boulder (LM WINDOW)  
that's at least 3 meters and maybe 5, and I wouldn't  
be a bit surprised if you can find it. It's on a  
line between us and the intersection of the South  
Massif and the Family mountain horizon. Just  
slightly left of that line or south of that line.  
And that boulder ought to show up on your best  
photography.

- - -

04 16 01+ LMP That boulder's at least 200 meters away. (LM WINDOW)

- - -

04 16 01+ CDR The west rim of Trident, which, by the way, is full (IM WINDOW)  
of outcropping-looking boulders, is at 10 o'clock.

04 16 01+ CDR I can look back around the corner now and I can see (IM WINDOW)  
where Trident I rose up to its rim on the east side,  
and I would say we're abreast of a point one-third the  
way from east to west up the center of Trident; that  
is, we've covered one-third of Trident I and we're  
abreast of a point of a line that goes through the  
one-third point from east to west of Trident I.

- - -

04 16 01+ CDR I think it's very close to our planned landing site. (LM WINDOW)

- - -

04 16 16+ LMP I took the binocs and looked at some large boulders (LM WINDOW)  
at our 12 o'clock position. They're probably on the  
order of a half meter to 2 meters, buried but  
without strong filleting. And most of them that I

could see had the same mottled light-gray and medium-gray texture, and it looked like there's a lineation in it. And whatever the mottling is, it's on a grain-size, or fragment-size, of a few centimeters, and it looks as if it's very uniform in that mottling; that is, there's one fragment size.

04 16 16+ LMP There are a few near one crater out at 12 o'clock - dark-gray rock that may be glass-coated. One of them looks like it's right at the rim and might have been part of a projectile that made the crater. (LM WINDOW)

04 16 17 47 LMP The large boulder that I mentioned that's several meters in diameter - I'm not even sure it's a boulder - it does have a well-developed fillet. It's highly fractured. It looks like the fractures generally are north-south. At least we can't see end on into the fractures. And it's too far away to be sure, but it looks like it's mottled also, although there did appear in the monocular to be a more heterogeneous mottling. It might be a breccia. (LM WINDOW)

04 16 17+ LMP That boulder ought to be very close to the ALSEP site. (LM WINDOW)

04 16 17+ CDR In reference to these boulders, everywhere I can see out of my left window and out ahead of me in referring to that boulder Jack's talking about which is just a little bit on my side at 12 o'clock it appears that the dark mantle has filleted and, for the most part, covered part of, or is up on top of, some of the crevices and the crannies in the boulders themselves, even the very small ones. I'd say from a population point of view, boulders of the size Jack's talking about that are visible through the surface anywhere from 1 to 2 to 3 meters - a very small percentage, but when you look at them at our level, it looks like they are quite populous. I'd say there are maybe about 25 of them in view between myself and where the horizon falls off down away from us towards the South Massif. The area back towards Station 1, at least the other side of Trident, looks like it's more heavily strewn with some of these filleted and partially mantled large fragments. (LM WINDOW)



(LM WINDOW)

To say that there is a boulder, as such, actually sitting on the surface, I really can't find one, unless they're around something very small and possibly younger craters. But I think for the most part everything is somewhat mantled.

04 16 17+ LMP

(LM WINDOW)

Gordy, I think maybe the predictions of a fairly thin regolith were good. I have a crater at about 130 feet. It looks like it's not more than a meter deep. It's very fresh, has a bright halo around it, and it's very rocky in its interior and has some rocks that are at least 10 or 20 centimeters in diameter on the rim. It looks like it's penetrated into some much rockier substrate than what we're seeing on the surface. The surface itself looks like probably 15 percent fragments greater than half a centimeter.

04 16 20 48 LMP

(LM WINDOW)

I don't see any general size, Gordy. I do have a crater out here that's - maybe a meter in diameter - fairly fresh, although not bright halo - that has not penetrated to blocky material. And it looks like the saturation crater size is very small in the area we can see; that is, there don't seem to be any old or very subdued craters. It's obviously saturated with craters a few centimeters in diameter, but when you get bigger than that, there seems to be more of a clear distribution rather than a saturation.

04 16 20+ LMP

(LM WINDOW)

Let me give you a quick far horizon. At 12 o'clock, I've got Family mountain. It and South Massif are a replica from their plane form from where I am, except that Family mountain is much more symmetrical and rounds off to a very more definite peak. The South Massif, in turn, has got a high plateau, a high flat peak on top. My far horizon then, from about 12 to 11:30 is dominated by Family mountain. I hate to use the word anorthosite without getting out of the spacecraft, but it sure is white. It sure is white, but it's varied shades of white - with sort of a tendency on its southern or southeastern slope to be marbled with a darker material much the same color as the mantle that we've landed on. The Family mountain disappears

04 16 23 02 CDR

just about at the level of the rim of Camelot on my far horizon and just in front of it - that's at about 11 o'clock - just there is where the South Massif starts up very abruptly - I'd say certainly 30 degrees, - very abruptly to a very impressive altitude. It plateaus off from about 10:30 to about 9:30, and then it starts sloping back down towards the east at about the same angle. Very symmetrical. There are several places where you can see what appear to be outcrops. I say several - about a dozen anyway, where you can see relatively large areas of outcrop on the South Massif. That outcrop is a darker-gray color than the white-gray of the massif itself. The one most dominant outcrop is right at the change in slope to the west, where it goes upslope and then plateaus off, and there is a definite outcrop. And you can see several boulders on all levels of the massif that have come apparently from outcrops and I feel certain we will be able to get to some of those that have come all the way down. South Massif, too, appears to be in areas marily caked dirty, such as if it was sprinkled with a dirty or a darker covering, and that covering is more evident as it slopes back here towards the east. At the far horizon now, I can see South Massif all the way to 9 o'clock, but then behind it, there's just a little breadloaf-type dome of a much darker, much more hummocky mound back there, relatively big. It's probably, from where I stand, at least 10 percent the size of the South Massif. Gray in texture. There appears to be some lineations dipping down into the west at about 20 degrees, but that may be a sun-angle problem. But they're definitely there. And then, contrasting that is Bear mountain which is also much darker-gray, much different than the massif from where I stand, much more hummocky surface. It appears to be to me what I would expect Sculptured Hills to be like. One other thing about the South Massif is that at about 9:30 to 10:30, there is a little knob of the South Massif that sort of flows towards the east or slightly towards the northeast. That's the one that tends to be a little bit more heavily covered with the - darker dusty material -

(LM WINDOW)

04 16 28+ CDR I can see a couple of places where craters have penetrated very small craters and penetrated the massif - craters maybe a meter or two in size, some 5 meters, and there's a lot of rock debris around them, which tends to believe that there is very little, if any, soft covering on that massif.

04 16 28+ LMP Just a couple more words about the North Massif. It looks like a good distribution of boulder tracks. Many of the boulders are accessible. The tracks can be traced up, at least to midslope. That's at my 3 o'clock position. And occasionally, at that mid-slope position, particularly northwest of Henson, you can see abundant boulders suggestive of outcrop. That's something that we had missed seeing on the pre-mission photos. And it isn't as abundant as on the South Massif, but there are apparently ledges forming about mid-slope.

- - -

04 16 31 03 LMP There's also a few very bright sparkles from the surface - not abundant, but a few.

- - -

04 18 09+ CDR From the looks of that soil out there, that drill may have a job ahead of it.

04 18 09+ LMP Yes, I don't think the regolith is very thick, and I think you've got rocks below it.

\* \* \* \* EVA 1 \* \* \* \*

04 18 21 32 LMP Okay. I'll start my watch. (LM)

--  
04 18 23 58 CDR It's open now. (LM)

--  
04 18 31 09 CDR I'm on the footpad. We landed in a very shallow depression. That's why we've got a slight pitch-up angle. Very shallow, dinner-plate-like dish crater just about the width of the struts. (LM)

--  
04 18 32+ CDR Do we have boulder tracks coming down? I think I may be just in front of Punk. (LM)

--  
04 18 32 53 CDR On the North Massif, we've got very obvious boulder tracks. A couple of large boulders come within 20 or 30 feet of where we can get to them, but there's a couple I know we can get to. The sun angle is such that, what I saw on the South Massif earlier I can't see very well. But, I know there were boulder tracks over there. Boy, it's hard to look to the east. Bear mountain and the Sculptured Hills have a very similar texture on the surface. The Sculptured Hills is like the wrinkled skin of an old, old, 100-year-old man. Very very hummocky, but smoothly pockmarked. I do not see any boulders up by the Sculptured Hills from here. But it's awful hard to look to the east and to the southeast. (LM)

--  
04 18 34 09 CDR We didn't have an awful lot of dust on landing; but I can dig my foot in 8 or 10 inches, and I know we're at least that thick. There's a small little 1-meter crater right in front of us with a whole mess of glass right in the middle. That's right in front of the MESA, as a matter of fact. Right where I want to park the Rover. (LM)

-- --  
04 18 34+ CDR I'm going to take a quick look back. I think this (LM)  
is Poppy.  
-- --  
04 18 35 01 LMP Oh, I'm on the porch. Who said this place was (LM)  
smooth?  
04 18 35+ CDR There's a lot of local depressions here I didn't (LM)  
figure existed.  
-- --  
04 18 35+ CDR I'm east of the LM now. The LM straddles this (LM)  
crater I talked about, and that's where we get the  
pitch angle; the back strut is probably right down  
in the eastern one-third of that crater. Just a  
little - very subtle crater.  
-- --  
04 18 35+ CDR Boy, I look at some of these rocks that are filleted (LM)  
here, and there sure are a lot of sparklies in them.  
04 18 35+ LMP You landed in a crater! (LM)  
-- --  
04 18 36 39 CDR All these little craters have got glass in the (LM)  
bottom of them. Here's another one.  
04 18 36+ CDR There's very clear sweeping of the surface by the (LM)  
descent plume out about 15 meters.  
-- --  
04 18 37 28 CDR I tell you where I think I landed - about 100 meters (LM)  
from Poppy at 10 o'clock.  
-- --  
04 18 37+ LMP That's an awful big hole. (LM)  
04 18 37+ CDR Well, I know. I got to look around a little more. (LM)

04 18 37+ LMP You sure it's not Trident? (LM)  
 -- --

04 18 37+ CDR It might be part of Trident. (LM)  
 -- --

04 18 37+ LMP The surface is moderately cohesive, which holds a pretty good bootprint - very fine grain. Gene's \*\*\* looks very much like previous soils. (LM)  
 -- --

04 18 40 20 CDR Man, there's sparklies in the soil. You can just look at it. See them all over? Very fine-grained. It's sparkly. (LM)  
 -- --

04 18 40+ CDR See the soil sparkles? (LM)

04 18 40+ LMP Yes, I think that's a little glass. (LM)  
 -- --

04 18 40+ CDR I'll show you that crater that's got nothing but glass in the bottom. (LM)

04 18 40+ LMP That's a vesicular rock of some kind there. It almost looks like Mono craters - pumice, but don't quote me. (LM)

04 18 41 01 CDR Even the very small - the 1- and 2-inch - 3-inch fragments that are laying around here have been dusted and fluted - with the dark mantle. (LM)

04 18 41+ CDR And that sweeping by the descent stage goes all the way out there to where we were, which was about 50 meters, I guess. These rocks almost have a very light pinkish hue to them, and they're not obviously breccia. Now, that's like a breccia there. But this stuff is something else again. (LM)

04 18 41+ CDR I don't think there is any place you could land around here where you wouldn't have one foot in the crater. (LM)

04 18 41+ LMP Looks like a vesicular, very light-colored porphyry (LM)  
of some kind; it's about 10 or 15 percent vesicles.  
I'm right in front of the LM. Quite a few of the  
rocks look of that type. Sort of a pinkish hue to  
them. The texture is coarse, but I'm not sure how  
crystalline they are, yet.

--

04 18 42+ CDR There's craters all over here. (LM)

--

04 18 46+ CDR This place is not locally level. (LM)

04 18 46+ LMP You're right. (LM)

04 18 46+ CDR There's not many places you could put the LM down (LM)  
and have it be zero, zero, zero.

--

04 18 48+ LMP Got a different breed of rock up here. The stuff's (LM)  
sticking through this thin regolith - or regolith  
period. I don't know whether it's thin or thick  
yet.

--

04 18 50 32 LMP I think it's safe to say this surface was not formed (LM)  
yesterday. There is a regolith; it looks classic.  
Area distribution of particles up to 2 or 4  
centimeters, anyway. Then you start to get maybe a  
selective distribution of larger fragments.

--

04 18 51+ LMP Here's a couple of different looking rocks. One's (LM)  
very white; one's quite dark. But we do have a  
general rock type, I think, in the area - of the big  
boulders.

--

04 18 52+ LMP A glass-bottom crater with a little bench. Looks like one of the Flagstaff explosion craters except for the glass in it. Right out at 12 o'clock. That's the one I was talking about, about having a bright halo. (LM)

--

04 18 55+ CDR There's a piece of glass I picked up. I'm going to set it right on the floor of the Rover. (LM)(SAMP 70018)

--

04 18 59+ CDR I put a little piece of glass I picked up right by the Rover, here. (LM)(SAMP 70018)

04 18 59+ CDR Just a little piece. I'm going to leave it right behind your footstool. It just sparkled at me I had to pick it up. (LM)(SAMP 70018)

04 19 03+ LMP The old 4 o'clock pan. (LM)(PHO 147 22492-520)

--

04 19 10 09 LMP The basic material around the LM is just what I said (LM) - a fine-grained, medium-gray, regolith-appearing material that is the standard area's population. The craters, though, bigger than about a meter in diameter, seem to - get to - rock fragments - which I haven't yet learned how to pick up.

--

04 19 10+ CDR I'm parked right next to Barjoo. And we are from Barjoo, 12 o'clock. I guess about 150 meters due west of Barjoo. And that's why we looked so close to Trident. I'm coming right up on Poppy. No question about where I am now. I've got Trident. We are about of Trident I, just where I said we were. I'm right at Poppy. We're about 100 meters just about due west of Poppy, which is almost in line with Barjoo, of course, but basically on that line, I think, between Rudolph and Trident I. And as I look at it in the cross section, about 100 meters north of Trident I. That's the landing point. (LM)



04 19 10+ CDR Sure get dirty fast. That is Trident right here (LM)  
that we walked over to.

04 19 10+ LMP I just got my first initiation to getting very (LM)  
dirty.

--

04 19 10+ CDR I'm very firm of that now. I'm almost positive. (LM)  
Unless I'm awfully mistaken about Trident. I don't  
see how I could be from here.

04 19 10+ LMP At the sacrifice of my cleanliness, Houston, the (LM)  
basic bright-colored rock type in the area looks  
very much like the cristobalite gabbros of the - I  
didn't see cristobalite, but it looks like the  
gabbros in the mare basalt suite. The coarse  
-grained clinopyroxene plagioclase rocks.

--

04 19 13 50 CDR Am I gonna screw up that little crater with glass in (LM)  
it if I park there?

--

04 19 14 LMP I haven't quite learned how to pick up rocks with my (LM)  
hands yet, Bob, or I would of had you a sample.  
That's why I fell down. It's an old blue-traverse  
gravimeter.

04 19 14 CDR Okay. On the plains of Taurus-Littrow. What a (LM)  
valley. I'd like to cut down through here, with a T  
38 sometime.

--

04 19 14 LMP Well I haven't learned to pick up rocks, which is a (LM)  
very embarrassing thing for a geologist.

--

04 19 19 34 LMP Houston, I've seen an awful lot of rocks, as I (LM)  
worked here. They look just like those pyroxene  
gabbros that I mentioned. The pyroxene's  
iridescent in the bright sun. The grain size -

maybe the mean is 2 millimeters with max maybe up at 3 or 4. And it looks like predominantly a pyroxene plagioclase rock - clinopyroxene, but I haven't looked at it real closely.

--  
04 19 24+ LMP You did a great job of parking, so I was standing in (LM)  
a hole.  
04 19 24+ CDR Don't want to mess up all those good looking craters (LM)  
around here.  
--  
04 19 26+ CDR Okay, here we go. Coming up. I've got the TV (LM)  
camera in my hand, Bob. Oh, man. Hey, Jack, just  
stop. You owe yourself 30 seconds to look up over  
the South Massif and look at the Earth.  
--  
04 19 26+ LMP You've seen one earth, you've seen them all. (LM)  
--  
04 19 28 56 LMP SCB 3 is on the handheld. (LM)  
--  
04 19 36+ CDR SRC is closed. And the organic sample has been (LM)(SAMP ORGANIC)  
sealed.  
--  
04 19 36+ CDR I'm taking SCB 1 to the tool gate. (LM)  
--  
04 19 39+ CDR Okay, Jack. How about the flag right over here in (LM)  
this little mound?  
--  
04 19 40+ CDR Yes. Hey, you're in the edge of the crater though. (LM)  
That's no test.

-- --  
04 19 40+ CDR Okay, let me give it a few whacks. Baloney. (LM)  
-- --  
04 19 40+ CDR I don't know how far we could drill, but we hit something solid with that one. (LM)  
04 19 40+ LMP No, it was still going. (LM)  
04 19 40+ CDR Yes, but did you ever see a vibrator like that? (LM)  
-- --  
04 19 40+ LMP Take a couple this way, and we'll take a couple that (LM)(PHO 134 20377-87) way. How's that?  
-- --  
04 19 40+ LMP Okay, you're - it's partially covering the Rover, but I think it's a pretty good shot. How's that? Let me get the focus right. (LM)(PHO 134 20377-87)  
-- --  
04 19 40+ LMP All right I got you reaching for the flag. (LM)(PHO 134 20377-87)  
-- --  
04 19 40+ LMP That's very good, Gene. Let me get it in stereo. (LM)(PHO 134 20377-87)  
-- --  
04 19 43+ LMP I don't - I don't think it's going - you're a little close, maybe. Get them both in focus. (LM)(PHO 134 20377-87)  
-- --  
04 19 47+ LMP I'll take the old CDR's camera. Not a bad camera to take. (LM)  
-- --

04 19 50+ LMP Hey, Bob - - just behind the LM in that fairly fresh crater, I picked up an example of the kind of gabbro I was talking about. And I'll stick it in the big bag, except the big bag has disappeared. (LM)(SAMP LSRK2 NOT RETURNED)

- - -

04 19 50 51 CDR 670, 003, 101. That's 670, 003, 101. (LM)

04 19 50+ CDR Jack, I put that there to hold the SRC down. (LM)(SAMP LSRK2 NOT RETURNED)

04 19 50+ LMP That's alright, I just put our sample in it. It's in the bottom of the bag. It's about 8 by 5 centimeters by 3 centimeters. Slightly tabular. (LM)(SAMP LSRK2 NOT RETURNED)

04 19 50+ CC We copy that. It's in the big bag. (LM)(SAMP LSRK2 NOT RETURNED)

- - -

04 19 54+ CDR The shade is deployed facing deep space. (LM)

04 19 54+ CC Understand, the Cosmic Ray. (LM)

04 19 54+ CDR The antenna is deployed. It's not on the position yet, but it's deployed. (LM)

04 19 54+ CDR I think - just about got - the sunside deployed, just as perpendicular to the Sun as I think anybody could do. (LM)

- - -

04 20 06 01 CDR It's 570, 017, 201; 670, 017, 201. And it was about 75 percent in the shade of the Rover. (LM)

04 20 06+ CC And now we're ready for bias. (LM)

04 20 06+ CDR A bias coming at you on the ground. (LM)

- - -

04 20 09+ LMP I'm moving down-sun, and where we've walked, we stir up darker material - just slightly, but it's darker. The same old thing, that most mature - that most regoliths have. (LM)

04 20 09+ CC Have you got a bias reading there, Gene? (LM)

04 20 11 54 CDR Yes, 337, 454, 501 - that's 337, 454, 031. (LM)

- - -

04 20 11+ LMP Bob, texturally, some of these rocks that I believe (LM)  
are gabbros - have a texture not unlike a welded  
tuff. But I know they're not. But they've got some  
mottled characteristic to them that I haven't yet  
figured out.

- - -

04 20 11+ CC I say there, Jack that looks like a big rock there (LM)  
beyond you.

04 20 11+ LMP That's the one we were talking about. Earlier. (LM)

- - -

04 20 11+ LMP Okay, Bob. I think I'm going to move a little bit (LM)  
to the northwest of my present position in order to  
get a little farther away from that big rock.

04 20 11+ LMP And to get out of the shallow depression - that's (LM)  
here.

04 20 11+ CC Roger. It's not so shallow. You disappeared out of (LM)  
sight from the last \*\*\*

04 20 16 10 LMP Well it's shallow relative to other depressions I've (LM-ALSEP)  
been in.

- - -

04 20 16+ LMP I've not seen any sign of layering in any of the (LM-ALSEP)  
craters. In their walls.

04 20 16+ LMP The rocks still seem to be - the pinkish-gray gabbro (LM-ALSEP)  
out here.

- - -

04 20 19+ LMP Central Station is near a crater. Going to put (LM-ALSEP)  
your drill in a little too close to that rock,  
though. Bob. Mark if he's worried about rocks  
as much as craters.

04 20 19+ LMP I've got a rock about 2 meters in diameter, partially buried - that one of the probes may be near. (LM-ALSEP)

04 20 19+ CC Stand by and define near. (LM-ALSEP)

04 20 19+ LMP Well it could be 10 feet. (LM-ALSEP)

04 20 19+ LMP I can move a little more south. (LM-ALSEP)

04 20 19+ CC If you're about 3 meters from the rock, that's no problem. (LM-ALSEP)

04 20 19+ LMP Okay, this is it. (LM-ALSEP)

- - -

04 20 19+ LMP It looks like the probes are going to be in a shallow depression. I'll try to improve that a little. It's not a real crater - it's just a shallow depression. (ALSEP)

04 20 19+ CC Okay, shallow depression's all right, Jack, don't worry about it. (ALSEP)

04 20 19+ LMP It's not more than a meter deep. (ALSEP)

04 20 19+ CC Stay there. (ALSEP)

04 20 19+ LMP All righty. It looks pretty good to me. (ALSEP)

- - -

04 20 19+ LMP The meter and half-meter scale relief is a little more than we can stand here for a good site. But I think this will be all right. (ALSEP)

- - -

04 20 24+ CDR Okay, Jack, I'm on the way. (LM-ALSEP)

- - -

04 20 29+ CC Okay, we'd like you to park facing the Sun. (LM-ALSEP)

04 20 29+ CC About 60 feet north of the Central Station. (LM-ALSEP)

- - -  
 04 20 30 04 LMP Okay, ALSEP is connected, RTG is connected. (ALSEP)  
 - - -  
 04 20 30+ LMP Okay, about 60 feet northeast. How does it look (ALSEP)  
 behind you? (LRV parked at ALSEP).  
 - - -  
 04 20 46 17 CDR 670, 002, 601 - 670, 002, 601. (ALSEP)  
 - - -  
 04 20 52+ CC - and Geno, you're leaning pretty heavy forward on (ALSEP)  
 that drill.  
 04 20 52+ CDR She's going in like she's in some pretty dead stuff, (ALSEP)  
 and then I hit some rock here.  
 - - -  
 04 20 52+ CDR It sounds to me like she's chipping away through (ALSEP)  
 rock. May be just a little longer drilling hole  
 than I was at the Cape.  
 04 20 55 14 CDR Bob, she's going in - but not without a little bit (ALSEP)  
 of resistance.  
 - - -  
 04 20 55+ CDR Every once in a while, she breaks through a soft (ALSEP)  
 spot.  
 05 20 55+ LMP Bob, I'll tell you, this Central Station's a bear to  
 get level. Well, I just got dust on it now. It's  
 just too soft.  
 04 20 55+ CDR That sure was drilling in hard stuff because it took (ALSEP)  
 a lot to get it off.  
 - - -  
 04 20 59+ LMP Yes, I think I lost all the time I might have made (ALSEP)  
 up.

04 20 59+ CDR It's obvious that I'm going through some pretty tough stuff. Consolidated material, like rock fragments, and then it breaks through; and then it jumps for about 3 or 4 inches and then I hit some more fragments. (ALSEP)

04 21 02+ CDR Man, is that thing biting. (ALSEP)

04 21 02+ CDR I'm in something tough down there now. Whew! (ALSEP)

--

04 21 05 10+ CDR I'm into the white mark; it depends on what you want to call the surface. I can - give or take 6 or 8 inches. (ALSEP)

--

04 21 05+ LMC Gene, is the dust coming up changing color on you at all? (ALSEP)

04 21 05+ CDR No, Jack. It isn't changing color. I can't even tell where it's coming up. (ALSEP)

04 21 05+ CDR I don't think it is coming up. I think I'm just pushing it aside. (ALSEP)

--

04 21 11+ CDR Now this one down to FI. Would you believe FI? (ALSEP)

04 21 11+ CDR Bob, in this soil, best number I can give you is about an inch below the white spots - or Bravo I. (ALSEP)

--

04 21 11+ CDR Hey, can you see this big mound that I just walked - it's just to the north - not the mound - the depression that's just to the north of me? (ALSEP)

04 21 05+ CDR It's probably behind the Rover. Well, how's that look for the core? (ALSEP)

--

04 21 15 26 CC Does it look like it's 80 feet or so? (ALSEP)



04 21 15+ CDR Yes. (ALSEP)  
04 21 15+ CC Then that sounds good. (ALSEP)  
-- --  
04 21 15+ CDR If you're looking at me, what I'm talking about is (ALSEP)  
this depression in here for the core - oh, maybe 15,  
20 meters out in here. Jack, what did you have in  
mind for the Neutron Flux?  
04 21 15+ LMP Either the one you're down in there, or next one (ALSEP)  
over behind that rock in front of you over there.  
-- --  
04 21 15+ LMP Either way I think is fine, Gene. But I would (ALSEP)  
suggest behind a rock.  
04 21 15+ CDR - - for a neutron flux, huh? (ALSEP)  
04 21 15+ LMP Yes, sir; and the core. (ALSEP)  
04 21 15+ CDR I thought they wanted a core in that depression. (ALSEP)  
-- --  
04 21 15+ CDR I'll go behind that rock; that looks good from here. (ALSEP)  
-- --  
04 21 15+ CDR The long bore's in. (ALSEP)  
04 21 15+ CC Looked like that one went in fairly well. (ALSEP)  
04 21 15+ CDR Well probably about like the other one did. Not too (ALSEP)  
bad.  
-- --  
04 21 20+ LMP Bob, I've got a rock about 10 feet southeast of my (ALSEP)  
LEAM location. I can move a little more north and  
get 15 feet from that.  
04 21 20+ CC How big is the rock there, Jack? (ALSEP)

04 21 20+ LMP It's a meter wide and stands about a third of a meter high. (ALSEP)  
 -- --

04 21 20+ CDR Hoc's that for soil mechanics? I pulled the first bore right on out trying to get this thing on right. (ALSEP)  
 -- --

04 21 20+ CDR Right now I'm interested in getting this second bore on. Now, let's see if I can get it back in. Well, not quite as far, but high enough for me to reach the - it still feels, Bob, like there's a lot of fragmental material down there.  
 -- --

04 21 20+ CDR Bob, I occasionally hit stuff and it splits this whole drill back at me. Knocks it back about a half an inch or so, and then it will bite through it. (ALSEP)

04 21 20+ CDR My general impression is that there is an awful lot of fragments I'm busting up down there. (ALSEP)

04 21 20+ CDR That last 6 inches, I really came into something hard; but it's down all the way.  
 -- --

04 21 35+ CDR Let me give you another one here. I'm in to the bottom of the white marks, and that's about Bravo I again. (ALSEP)

04 21 35+ CDR Now the bore stem is in to the top of the white marks; I'm still putting the probe down. (ALSEP)

04 21 35+ CDR And the top of the white marks is about Bravo I. (ALSEP)

04 21 35+ CDR Here goes the probe. (ALSEP)  
 -- --

04 21 36+ CDR Papa I. (ALSEP)  
 -- --

04 21 38+ CDR Okay. I'm going to go behind a rock over there - - (ALSEP)(SAMP CORE 70001-09) (PHO 136 20720)

in that depression. Bob you do want the core in a depression, right?

04 21 38+ CC That's affirmative, Geno. (ALSEP)(SAMP CORE 70001-09)

- - -

04 21 38+ CDR This is right in line with the shallow depression; (ALSEP)(SAMP CORE 70001-09)

and it's right in line with RTG, with a rock in the middle.

- - -

04 21 38+ CDR That's where you're going to get it. Let me see (ALSEP)(SAMP CORE 70001-09)

what I need. Drill rack, core bag, drill at 1 IPS. Okay. Let's go do it right.

04 21 42 29 CDR I'm going to put it right in this depression. (ALSEP)(SAMP CORE 70001-09)

04 21 42+ LMP There, get the middle of that. (ALSEP)(SAMP CORE 70001-09)

04 21 42+ CDR It's a shallow one. If I go over there, I'm not (ALSEP)(SAMP CORE 70001-09)

shielded, Jack.

04 21 42+ LMP No, that's good. Get in the middle. Get it in that (ALSEP)(SAMP CORE 70001-09)

place.

04 21 42+ CDR It's only about a 4-meter depression. (ALSEP)(SAMP CORE 70001-09)

04 21 42+ LMP Oh, wait a minute - oh, you're on the other side of (ALSEP)

the rock. Okay.

04 21 42+ CDR Yes, yes. Yes, I want to get back here. (ALSEP)

04 21 42+ LMP That's good. (ALSEP)

04 21 42+ LMP All of these big boulders around here that I've (ALSEP)

looked at, are the same rock type.

- - -

04 21 42+ CDR All these little craters are filled with glass. (ALSEP)

- - -

04 21 42+ LMP I've seen glass covers. (ALSEP)

04 21 42+ LMP As I was saying, Bob, all these big blocks that I've (ALSEP)  
 looked at look like the gabbroic rock that I was  
 talking about - possibly upwards of 50 percent  
 plagioclase rather than 30 like the mare - but an  
 intermediate gabbro of some kind. And one big block  
 there had very sharply defined - parallel parting  
 planes. I think there is a foliation of minerals  
 that parallel that parting, but I'll have to check  
 it out.

04 21 46+ LMP Those parting planes go through the whole boulder on (ALSEP)  
 the order of at least 3 meters long in outcrop.

-- --

04 21 50+ CDR The first core was awful loose. I think I could (ALSEP)(SAMP CORE 70001-09)  
 have pulled it back out with my hands.

-- --

04 21 56+ CDR Darn it. You know, Bob, one of the problems is I'm (ALSEP)(SAMP CORE 70001-09)  
 working in a small crater; and it's just a little  
 difficult to work on these slopes. Okay. It's on.  
 I'm ready to put the drill in.

-- --

04 22 03 14 CDR Hey, Bob, would you settle for about 8 inches out of (ALSEP)(SAMP CORE 70001-09)  
 the ground? It's about as low as I can get.

04 22 03+ CC Okay -- (ALSEP)(SAMP CORE 70001-09)

04 22 03+ CDR I'm within an inch of the white stripes. (ALSEP)(SAMP CORE 70001-09)

04 22 03+ CDR An inch of the white stripes, Bob. (ALSEP)(SAMP CORE 70001-09)

-- --

04 22 03+ CDR I was able to pull the core out with the drill, (ALSEP)(SAMP CORE 70001-09)  
 about 3 inches. And it's all jacking material from  
 there out.

-- --

04 22 03+ CC Why don't we just take two stereo pans for the ALSEP (ALSEP) photos. First stereo pan will be in the vicinity of (PHO 147 22565-88) the original stereo pan; and the second one, they suggested, will be to the northwest of that original one. (PHO 14, 22589-606; 136 20683-710)

04 22 03+ LMP Northwest. Okay. (ALSEP)

04 22 03+ CC Yes, and I suggest that you go far enough so that you can see the LEAM past the Central Station. (ALSEP)(PHO 147 22589-606; 136 20683-710)  
(PHO 147 22589-606; 136 20683-710)

--

04 22 03+ CDR I just put a plug in the top of that core; and it disappeared from sight down the center of the core. I'll put a cap on it, too; but I want to plug it first. I want to get the rammer to plug it down. (ALSEP)(SAMP CORE 70001-09)

04 22 07 43 LMP Where do you want the focus on the pan to be? (ALSEP)(PHO 147 22565-88)

04 22 07+ LMP About 15 feet? (ALSEP)(PHO 147 22565-88)

--

04 22 07+ CDR That's strange, that plug was too small for the core. (ALSEP)(SAMP CORE 70001-09)

04 22 07+ CC You got a focus that's just a little short of 74 feet? (ALSEP)(PHO 147 22565-88)

04 22 07+ LMP I've already taken it at 15. (ALSEP)(PHO 147 22565-88)

--

04 22 07+ LMP It's not a calibrated defent, but I don't think you need it here. (ALSEP)(PHO 147 22565-88)

04 22 07+ LMP How fer northwest? (ALSEP)(PHO 147 22589-606)

04 22 07+ LMP About the same position as the heat flow down-sun - or up-sun? (ALSEP)

--

04 22 07+ CC Yes. That sounds pretty good to me, Jack. (ALSEP)

04 22 07+ CDR I ran that plug - two-thirds of the way down the  
 reamer, and it hit solid paydirt. (ALSEP)(SAMP CORE 70001-09)

04 22 07+ CDR And I'll put a cap on it for you, too. (ALSEP)(SAMP CORE 70001-09)

--

04 22 11+ CDR That's cap Alpha that's on the core. (ALSEP)(SAMP CORE 70001-09)

04 22 11+ CC Jack, you're taking your second pan, right? (ALSEP)(PHO 147 22589-606)

04 22 11+ LMP Yes, but the camera just stopped. (ALSEP)(PHO 147 22589-606)

--

04 22 11+ LMP Would you believe I'm out of film, Bob? (ALSEP)(PHO 147 22589-606)

04 22 11+ CC You want to give me a frame count, Jack? (ALSEP)(PHO 147 22589-606)

04 22 11+ LMP Mag Alpha is empty. (ALSEP)(PHO 147 22589-606)

04 22 11+ LMP It's 158. (ALSEP)(PHO 147 22589-606)

04 22 11+ CC Jack, we're recommending magazine Hotel, and we also  
 suggest you take the second pan, when you retake it,  
 at 74 feet.

04 22 11+ CDR Man, it didn't feel like this stuff was that hard. (ALSEP)(SAMP CORE 70001-09)

--

04 22 11+ CDR See if I can get it out. I may be jacking the  
 treadle down into the surface. (ALSEP)(SAMP CORE 70001-09)

04 22 11+ CC Jack, if you haven't put magazine Hotel on, we want  
 to recall that and make it magazine Golf - Cali. (ALSEP)

04 22 11+ LMP Well, Bob, I've already got it on. Is that okay? (ALSEP)

--

04 22 11+ CC Leave Hotel on. (ALSEP)

--

04 22 11+ LMP Let me finish the pan and come and help you. (ALSEP)(PHO 136 20683-710)

-- --

04 22 15+ CDR Come on baby. I'm going to get this thing out, now (ALSEP)(SAMP CORE 70001-09)  
that I got it.

-- --

04 22 15+ CDR I hope - this core is appreciated. (ALSEP)(SAMP CORE 70001-09)

-- --

04 22 15+ CDR Man, I don't know what it's in. (ALSEP)(SAMP CORE 70001-09)

04 22 15+ LMP I was afraid that would happen - with all those (ALSEP)(SAMP CORE 70001-09)  
rocks.

04 22 15+ CDR Yes, but it didn't go in that hard. (ALSEP)(SAMP CORE 70001-09)

-- --

04 22 18 19 LMP I got your pans and a couple pictures of the heat (ALSEP)(PHO 147 22565-88; 136 20683-713)  
flow probe.

-- --

04 22 21+ CDR You don't suppose this is why we didn't have much (ALSEP)(SAMP CORE 70001-09)  
dust from the LM, do you?

04 22 21+ LMP I think it is. (ALSEP)(SAMP CORE 70001-09)

04 22 21+ CDR I saw all the way to the ground during landing. (ALSEP)

-- --

04 22 24+ LMP Bag 10 Echo is a sample of a very large boulder (ALSEP)(SAMP 70130-57)(PHO 147 22535-36)  
that's just beyond geophone 3. Just west - just  
south.

04 22 24+ LMP South of geophone 3 - southwest. And I got a few (ALSEP)(SAMP 70130-57)(PHO 147 22535-36)  
photos to document the boulder. I'm not sure I  
documented the sample, though.

04 22 24+ LMP It's the same kind of rock I saw near the LM - and (ALSEP)(SAMP 70130-57)  
the gabbro - I'm beginning to lean towards 50  
percent plagioclase, though.

-- --

04 22 27+ CDR I've got a delicate core in one hand, and I'm trying (ALSEP)(SAMP CORE 7C J1-09) to get some core caps in the other. You'd be glad to know it's full, Bob. And while I'm the only one to see the bottom end right now, I'm going to tell you, it looks like what I'm walking on, but it's obviously not powdery. It's obviously very cohesive. The bottom of the core is not smooth, it's very jaggedy, and fragmental-like.

--

04 22 27+ CC And Jack, in your travels there, while you're doing (ALSEP) some sampling, if you happen to wander by in the approximate vicinity of the deep core, you might get us a Rover sample of the soil there.

04 22 27+ LMP Okay. (ALSEP)

04 22 27+ CDR The core is filled to within an eighth or certainly (ALSEP)(SAMP CORE 70001-09) less than a quarter of an inch from the bit.

--

04 22 27+ CDR It's got Bravo on and the plug has been discarded (ALSEP)(SAMP CORE 70001-09)

--

04 22 31+ LMP I see no clear alignment of plagioclase or pyroxene (ALSEP)(SAMP 70130-57) in this rock. That's the one with the parting in it. It looks as if - integrating what I've seen here and over at the big rock - the geophone rock - that the layering or the foliation or the parting, whichever it is, is the result of variations in vesicle concentrations. The sample 10 Echo is a sample of the more coarsely vesicular rock. I could not get one of the finer - more finely or nonvesicular fragments. But I got pictures of it. (PHO 147 22535-36)

--

04 22 31+ CC Can you see any evidence of soil on top of some of (ALSEP)(SAMP 70130-57) these medium-sized boulders?

04 22 31+ LMP There's soil. A little bit of dust in some of the (ALSEP)(SAMP 70130-57) holes. But there's not enough to sample at this point. I may find some later.



04 22 31+ LMP Vesicle walls do not seem to be as shiny. Most of them seem to have dust in them. (ALSEP)(SAMP 70130-57)

04 22 31+ LMP The vesicles are not cleanly spherical - they're spherical but they have fairly rough outlines. They look as if there's been some recrystallization. (ALSEP)(SAMP 70130-57)

-- --

04 22 31+ LMP I picked the wrong rock to sample with a scoop, I'll tell you that. (ALSEP)(SAMP 70130-57)

-- --

04 22 35+ LMP Bag 174 - 474, 474, soil from next to this big rock, it's the fillet. I can't get a chunk of the rock. (ALSEP)(SAMP 70160)(PHO 136 20718-19)

04 22 35+ CC -- and, Jack, while you're coming back here to the Rover, why don't you get one more Rover sample in the vicinity of the deep drill, while you and Gene get ready to take on the core stems. And because of being a little bit behind here, what we're doing is, we're getting prepared to drop Station 1 in favor of doing Steno. (ALSEP)(SAMP 70180-85)(PHO 136 20720-22)

-- --

04 22 35+ LMP Okay, you want me to get a - you want to break that and I'll go get this sample, Gene. (ALSEP)(SAMP 70180-85)

-- --

04 22 35+ LMP Gene has pretty well chewed up the ground. I helped him. Do you want me to get a little ways away from it? (ALSEP)(SAMP 70180-85)

-- --

04 22 35+ CC Anything there in the dirt, Jack. It doesn't have to be a skim sample of any sort. (ALSEP)(SAMP 70180-85)

-- --

04 22 35+ CDR Okay, first piece of three sections - Bob, it's full. (ALSEP)(SAMP CORE 70001-09)

-- --

04 22 35+ LMP There's a mixture of soil and a rock in 475. (ALSEP)(SAMP 70180-85)

04 22 35+ LMP The soil came from about 0 to 5 centimeters. (ALSEP)(SAMP 70180-85)

04 22 35+ LMP And it's about 3 meters from the hole. (ALSEP)(SAMP 70180-85)

04 22 35+ CDR Cap Charlie is opposite Alpha, that was the first three section. (ALSEP)(SAMP CORE 70001-09)

04 22 35+ LMP It's about 3 meters from the hole. I got stereo before at 11 feet and one after at 11 feet. (ALSEP)(SAMP 70180-85)(P-10 136 20720-22)

-- --

04 22 35+ CC When you took those two pens off the ALSEP, was one at 15 feet and one at 20 feet? (ALSEP)(PHO 147 22565-88; 136 20683-713)

04 22 35+ LMP One was at focus for 15 and 74. (ALSEP)(PHO 147 22565-88; 136 20683-713)

04 22 35+ LMP There's a partial pen on mag A, which was taken at 15. (ALSEP)(PHO 147 22589-606)

04 22 35+ CDR I can't see what it is - I guess Delta and Echo is the two section core. Delta being adjacent to the first section of 3. (ALSEP)(SAMP CORE 70001-09)

-- --

04 22 43+ CDR The last one is Foxtrot, and it's on tight. (ALSEP)(SAMP CORE 70001-09)

-- --

04 22 43+ CDR It's 670, 002, 601. That's 670, 002, 601. (ALSEP)

-- --

04 22 46 44 LMP Right now, 10 Echo is in my suit pocket, I hope. (ALSEP)(SAMP 70130-57)

-- --

04 22 51+ CDR Did you get the heat flow pictures, by the way? (ALSEP)(PHO 136 20711-13)

04 22 51+ LMP I got most of them. Not all of them. (ALSEP)(PHO 136 20711-13)

-- --

04 22 57 24 CDR I'm on mag Bravo and frame count 19. (ALSEP)

04 22 59+ CDR Station 6 is pretty obvious up on the hill. It's fairly high up. I don't know if we'll get to drive up there or not. (ALSEP)

04 22 59+ CC I think you can see the boulder and that's how you can tell, right? (ALSEP)

04 22 59+ CDR Yes. And the crater. (ALSEP)

- - -

04 23 02+ LMP I'm at the SEP site, and I found a place I think we can lay out a pretty good grid. (SEP)

- - -

04 23 03 39 CDR Okay, Jack, here I come. Just about all you can see in that direction is the LM. Boy, that's tough driving into the Sun! (ALSEP-LM)

04 23 03+ LMP Go right to the LM, and then a little bit to your left, to the left of the LM. (ALSEP-LM)

04 23 03+ CDR Yes, I've got to go to the LM and give them a reading here. (ALSEP-LM)

- - -

04 23 03+ LMP Everything I've seen so far indicates that the so-called subfloor boulders, if we have gotten that deep, are this gabbro. I'm out here at the SEP site, and the large blocks are still the plagioclase pyroxene - - (SEP)

- - -

04 23 05 45 CDR Bearing 292, 0.2, and 0.2. I'm standing right in front of the MESA. (LM)

04 23 06 00 CDR Okay. I'm coming Jack. (LM-SEP)

04 23 06+ LMP The zap pits are nice white halos, although, for the (SEP) most part, the rock's too coarse to show them very well, some of the larger ones have white halos. We may not be down to the subfloor, but - it's hard to say.

- - -

04 23 06+ LMP I did see a dense gray rock that's different than (SEP) the others on my traverse out here. We'll try to find some of that, too.

04 23 07 12 CDR I'm reading 278, 003, and 003 at the SEP site. (SEP)

- - -

04 23 08+ OC Let me fill you in on the plan, guys. We're going (SEP) to go to the west side of Steno, which is where you would have driven by anyway, and the stop will be at the 340/1.2, which is where you've got the little Delta for EP 6, in your checklist. And we will plan on spending about 30 minutes there sampling primarily boulders.

- - -

04 23 08+ LMP You got a good feeling on how to head out of here? (SEP)

04 23 08+ CDR Yes. I want to get around on the back side of (SEP) Trident, and make sure that that's what I'm looking at, is Trident over there.

- - -

04 23 08+ CDR Let's see if we can't get around Trident east over (SEP) here.

- - -

04 23 11 02 CDR We're on the move, Bob. (SEP-1)

04 23 11+ LMP Okay, this is Trident, isn't it? (SEP-1)

04 23 11+ CDR Yes. It's got to be. (SEP-1)

- - -

04 23 11+ CDR This has got to be Trident east, right here, Jack. (SEP-1)  
 See that? That's got to be Trident east. That's  
 the big one.

04 23 11+ LMP On the right or the left? (SEP-1)

04 23 11+ CDR On the right. (SEP-1)

--

04 23 13+ LMP What are you headed now, south pretty much? (SEP-1)

04 23 13+ CDR Yes. (SEP-1)

04 23 13+ LMP That must be Emory over there. See with all the (SEP-1)  
 blocks in the wall?

04 23 13+ CDR Where you looking? Which way? (SEP-1)

04 23 13+ LMP Southeast. Way over there. (SEP-1)

04 23 13+ CDR Yes. (SEP-1)

04 23 13+ LMP This is very easily Steno right over here. We're (SEP-1)  
 between the two big ones.

04 23 13+ CDR That would be Powell. (SEP-1)

04 23 13+ LMP That would be Powell on the right. (SEP-1)

--

04 23 13+ CDR 330, 0.3. (SEP-1)

04 23 13+ CC Okay, i sounds like you're probably just driving by (SEP-1)  
 the east Trident or Trident 3.

04 23 14 45 LMP You think all that right there is Trident? (SEP-1)

04 23 14+ CDR My gosh, if it is, that's incredible. That's hard (SEP-1)  
 to believe.

--

04 23 14+ CC Jack, could you give me a frame count some time? (SEP-1)

--

04 23 14+ LMP Looks like 45. (SEP-1)

- - -

04 23 14+ CDR Hey, don't you suppose that's Trident? (SEP-1)

04 23 14+ LMP Well, it sure looks like it, doesn't it? (SEP-1)

04 23 14+ CDR Yes. We were quite a ways from Trident. (SEP-1)

04 23 14+ LMP I bet you it is. (SEP-1)

04 23 14+ CDR If that's true, we're at 342.4. That's about right; boy, what I was looking at Trident isn't anywhere near that big. (SEP-1)

04 23 14+ LMP Okay, if that's true, then we want to go (SEP-1)

- - -

04 23 14+ CDR We're all right now. That's got to be Trident. (SEP-1)

- - -

04 23 16 12 LMP Well, it's a triplet all right, with some septa between. Well, wish I could take pictures. (SEP-1)

- - -

04 23 16+ LMP Take a few, but it's not continuous. My hands are giving out. Okay, we're at 0.5 and 346. And the surface has not really changed except slightly more hummocky and rolling, because of a larger number of irregular depressions, or craters. The rocks at first glance from the Rover look very much like what we had around the LM. That's the big ones. (SEP-1)(PHO 136 20723-38)

- - -

04 23 18+ LMP Okay, how far have you come? (SEP-1)

04 23 18+ CDR I've got to go about another 0.7 kilometers. I may be coming up on the edge of it. Boy, this is a heck of a way to start out our navigation because it's into the Sun here. Now, that's got to be Powell, wouldn't you say? (SEP-1)

04 23 18+ LMP Yes. Must be. (SEP-1)

04 23 18+ CDR Then that's Steno with all the blocks in it. (SEP-1)

04 23 18+ CDR Boy, am I glad we didn't land out here! Whew! (SEP-1)

04 23 18+ LMP See this high point up here coming ahead? (SEP-1)

04 23 18+ CDR Yes. (SEP-1)

04 23 18+ LMP That should give us our bearings, I hope. (SEP-1)

- - -

04 23 18+ CDR Okay, that's Powell, huh? (SEP-1)

04 23 18+ LMP Yes. (SEP-1)

04 23 19 53 LMP Okay, if that's Powell. Quite a ways over there, but I think the thing to do is get up on that little ridge there. (SEP-1)

04 23 20 03 CDR I think we may end up looking right into Steno when we get up there. Bob, we're 342.9. (SEP-1)

- - -

04 23 20+ LMP Houston, there are certainly a lot of big boulders. Let me take a look into the Sun here. That doesn't look what I thought Steno looked like. There's no dimple there. I.2 he said. All right. (SEP-1)

04 23 20+ CDR This is it over here, though, I guess. (SEP-1)

- - -

04 23 20+ LMP I think they can locate us if we work that block field right there. (SEP-1)

- - -

04 23 20+ CDR It doesn't look like what I expected Steno to look like -- (SEP-1)

04 23 20+ LMP No, me either. (SEP-1)

- - -

04 23 23 03 CDR 346; l.l. I think it would almost be worth - I bet (SEP-1)  
that's emory up on that hill. It's got to be.

04 23 23+ LMP We better park in this boulder field here. (SEP-1)

- - -

04 23 24 02 CDR Okay, I'm parked !80. (1)

- - -

04 23 24 27 CDR I'm heading 182, 346, l.2, l.l. (1)

- - -

04 23 24+ LMP You want this charge deployed here? (1)

04 23 24+ CC That's affirmative, Jack. (1)

04 23 24+ LMP I'll deploy it now. (1)

- - -

04 23 25+ CDR Pin 1, \*\*\* two - (1)

04 23 25 44 CDR Mark, safe. (1)

04 23 25+ CDR Pin 3 - (1)

04 23 25 47 CDR Mark, safe. (1)

- - -

04 23 25+ LMP We're about 15 meters from a 20-meter blocky-rimmed (1)  
crater. It's about 3 to 4 meters deep. All the  
blocks on the rim look like the pyroxene,  
plagioclase gabbro - the vesicular rocks seen at the  
LM. At least all that I've seen so far.

04 23 25+ CC Is this crater to the east or west? (1)

04 23 27 01 LMP It's to the northwest of the Rover. (1)



04 23 27+ LMP The vesicle population varies from about a millimeter to 1 centimeter. It forms about 15 percent of the rock - 10 to 15. And I've given you grain size for the rocks near the LM and that goes well for this one. (1)

04 23 27+ LMF There is - the parting that I mentioned, still of somewhat unknown origin, and we'll try and cut a sample along a parting plane. It's clearly evident in one of the bigger blocks. (1)

- - -

04 23 27+ LMP Bob, you're going to want a core at this site? (1)

04 23 27+ CC Roger. We'd like to get - number 1 priority will be some block samples, including any dirt that was on the blocks, if there is such. And then the second priority is a rake soil sample; the third priority is a double core. Then, also in there, the pans, of course, and other documented samples. But the double core is there although it is third priority. (1)

- - -

04 23 29+ CDR Okay, you got one picked out? (1)(SAMP 71030-37)(PHO 136 20394-96; 136 20739-40)

04 23 29+ LMP Yes, let's hit this - see if we can work on that one, it's at the edge, but we can chip at the parting plane. And that's one of the things that's come up that I think is of interest that we've got to figure out why they have that foliation in them. (1)(SAMP 71030-37)

04 23 29+ CDR Boy, that rock is one of the more vesicular ones I've seen around. (1)(SAMP 71030-37)

04 23 29+ LMP Well, they're all about that, Gene. They're either that or mixed with that variety. In the same boulder, you'll see a nonvesicular - a relatively nonvesicular. Okay, that's the - that's the down-sun. Okay, right into the Sun. (PHO 136 20739)  
(PHO 136 20740)

04 23 29+ LMP Right at that overlapping fracture, huh? (1)(SAMP 71030-37)

04 23 29+ CDR Yes. (1)(SAMP 71030-37)

04 23 29+ LMP Let me get where I can maybe save the rock. If you (1)(SAMP 71030-37)  
can hook your -

04 23 29+ CDR I'm going to try and get it right up on top is where (1)(SAMP 71030-37)  
I'd like to -

04 23 29+ LMP If you hit it on the right side, it'll go this way, (1)(SAMP 71030-37)  
maybe. There you go.

04 23 29+ LMP Piece right there. (1)(SAMP 71030-37)

04 23 29+ LMP I can get another one, too. Try another one; don't (1)(SAMP 71030-37)  
lose that one.

04 23 29+ CDR Let me get that one for you. (1)(SAMP 71030-37)

04 23 29+ LMP I can get it. (1)(SAMP 71030-37)

04 23 29+ CDR Got it? Whoops. Can you keep it in sight here for (1)(SAMP 71030-37)  
a minute? Is that it?

04 23 29+ LMP Yes. Go ahead. Try hitting - there you go. Can (1)(SAMP 71030-37)  
you use the other end against the right side of the  
rock?

- - -

04 23 29+ CDR It's coming. (1)(SAMP 71030-37)

04 23 29+ LMP That's all right. (1)(SAMP 71030-37)

04 23 29+ CDR I'll get that one, wait a minute. (1)(SAMP 71030-37)

04 23 29+ LMP Be careful down in there. (1)(SAMP 71030-37)

04 23 29+ CDR The whole thing is going to fracture off here, in a (1)(SAMP 71030-37)  
minute.

- - -

04 23 29+ LMP It's trying to fall. Don't wear your hand out. (1)(SAMP 71030-37)  
That's good Gene.

04 23 29+ CDR Wait a minute. Let me give one more whack. The (1)(SAMP 71030-37)  
whole thing is - no, that's too tight. Let me get  
that other piece -

04 23 32 21 LMP Bag 476 is the rock sample with a little bit of the soil near it - with a chip off the rock, watch it, Gene. (1)(SAMP 71030-37)

04 23 32+ CDR Here's your other chip. If I go down there, that thing is about 15 feet deep. (1)(SAMP 71030-37)

04 23 32+ LMP Right. Got it. (1)(SAMP 71030-37)

04 23 32+ LMP Now, do you think you can chip off the other side of that plane, up on the edge? (1)(SAMP 71030-37)

04 23 32+ CDR Yes. (1)(SAMP 71030-37)

04 23 32+ LMP Then we'll get the soil, and maybe just a small rock, one nonchipped. (1)(SAMP 71030-37)

--

04 23 32+ LMP 476. (1)(SAMP 71030-37)

--

04 23 32+ LMP It's from the southeast side of the parting plane. (1)(SAMP 71030-37)

04 23 32+ CDR There it is - a whole big slab, right there. (1)(SAMP 71050,55)(PHO 134 20394-9C; 136 20739-40)

04 23 32+ CDR Oh, look at those dark minerals in there. Are those dark black? (1)(SAMP 71050,55)

04 23 32+ LMP Yes, they may be ilmenite or fresh pyroxene. We'll look at it. Gives the impression of pyroxene. (1)(SAMP 71050,55)

04 23 32+ CDR Okay, you want my bag? I tell you, if you work on any kind of slope, like this little crater - okay, I'm going to leave it open for a minute. (1)(SAMP 71050,55)

04 23 32+ CDR While we get that one. (1)(SAMP 71050,55)

04 23 32+ LMP You're going to have to use your tongs on that one, I think. (1)(SAMP 71050,55)

04 23 32+ LMP I got it. (1)(SAMP 71050,55)

--

04 23 32+ CDR Here's a big one. Get him the bag number, too. (1)(SAMP 71050,55)

04 23 34 27 LMP Bag 454. Okay, and the flashes are from inside of vugs and recrystallized vesicles. They look like pyroxene flashes; they could be ilmenite. (1)(SAMP 71050,55)

04 23 34+ CDR I'll get my after picture. (1)(SAMP 71050,55)(PHC 134 20396)

04 23 34+ LMP And let me get in there and get some soil. (1)(SAMP 71040-49,75)(PHO 134 20394-96; 136 20739-40)

04 23 34+ CDR Okay, let's get it first. (1)(SAMP 71040-49,75)

04 23 34+ LMP From the north side. The bag tore around that; it's pretty jagged rock, but I think it'll hold. (1)(SAMP 71040-49,75)

04 23 34+ LMP It's in Gene's sample collection bag. And a scoop sample. You got a bag handy, Gene? Okay, bag 455, Bob. It's from the west side of the rock. It's under a slight overhang of the rock - in a shadow, anyway. Okay, that's from about 1 centimeter down - deep, 1 to 2 centimeters. And the next one is down to about 5 or 6. And it's got some chips in it. (SAMP 71060-69,85-97)(PHO 134 20394-96; 136 20739-40)

04 23 35 53 CDR That's bag 456, Bob. (1)(SAMP 71060-69,85-97)

- - -

04 23 35+ CDR Turn around and let me help you get these in your bag. (1)

- - -

04 23 35+ LMP Yes, let's - get your after - (1)(PHO 134 20396)

04 23 35+ LMP And if we can, we might get just a block instead of breaking on it, and then we'll go to the rake. (1)

04 23 35+ CDR Bob wanted a core here, too, huh? (1)

04 23 35+ LMP Yes, but the rake's next, as you might imagine. This stuff here looks a little less vesicular. Why don't we try that one? (1)

04 23 35+ CDR Hey, look at this rock, where the vesicularity changes from a hummocky vesicularity to a very fine vesicular. Look at this. Let me try and crack - see that? The change? (1)(SAMP 71130,35-36)(PHO 134 20397-400; 136 20741)

04 23 35+ LMP Yes, that's what I'm after; that's it. (1)(SAMP 71130,35-36)

04 23 35+ CDR Let's see if I can't crack - - (1)(SAMP 71130,35-36)

04 23 35+ LMP That's it. That's what I saw in that other boulder. (1)(SAMP 71130,35-36)

04 23 35+ CDR Let's see if I can't crack the corner and get that (1) contact.

04 23 35+ LMP Yes. And get a piece of both - I think you can get (1)(SAMP 71130,35-36) - if you can reach down there.

04 23 35+ LMP That's a contact in a rock. (1)(SAMP 71130,35-36)

04 23 35+ CC Do you guys see any 2-meter boulders around there? (1)(SAMP 71130,35-36)

04 23 35+ LMP We just sampled one. \*\*\* - - (1)(SAMP 71030-37,40-49,50,55,60-69,75,85-97)

- - -

04 23 35+ LMP We're not where you think we are. We're not sure (1)(SAMP 71130,35-36) where we are. Gene, can you get down into that? Need some help?

04 23 35+ CDR Yes, just - give me the shovel to hold myself with. (1)(SAMP 71130,35-36) Give me a shovel.

04 23 35+ LMP How about that one? (1)(SAMP 71130,35-36)

04 23 35+ CDR Yes. (1)(SAMP 71130,35-36)

04 23 35+ LMP Get that little piece. (1)(SAMP 71130,35-36)

04 23 35+ CDR Okay, I see it. It's pretty hard. See if I can't - (1)(SAMP 71130,35-36) it's low and hard to hit.

04 23 35+ LMP How about coming around from this side? (1)(SAMP 71130,35-36)

04 23 38 59 CDR Well, I got the gnomon in the wrong place really. (1)(SAMP 71130,35-36)

04 23 39+ CDR Can you reach it? (1)(SAMP 71130,35-36)

04 23 39+ LMP Well, I'm going to lean on the rock maybe. I got (1)(SAMP 71130,35-36) that other little piece in sight.

04 23 39+ CDR Okay, I got that piece in sight, too. Let me - (1)(SAMP 71130,35-36)

04 23 39+ LMP Get them both with your - (1)(SAMP 71130,35-36)

04 23 39+ CDR Let me get them both right now. (1)(SAMP 71130,35-36)

04 23 39+ CDR Okay, this is a sample of the more coarsely vesicular rock. (1)(SAMP 71130,35-36)

04 23 39+ LMP You got it in your hand? (1)(SAMP 71130,35-36)

04 23 39+ CDR I got them both. I think, actually, we got a sample of both sides; but I wouldn't bet on it. (1)(SAMP 71130,35-36)

04 23 39+ LMP Okay, I just got a chunk of that side. (1)(SAMP 71130,35-36)

04 23 39+ CDR Okay, I got both of these. (1)(SAMP 71130,35-36)

04 23 39+ LMP See that rock right over there on the little mound, just projecting out of the edge of it? (1)(SAMP 71130,35-36)

- - -

04 23 39+ LMP There you go; you just about touched it. Right there, that piece. (1)(SAMP 71130,35-36)

04 23 39+ CDR Okay, let me get these in a bag here. (1)(SAMP 71130,35-36)

04 23 39+ LMP Well, I'll get that piece; and that's the samples from either side of the contact anyway. Can you get a bag - - (1)(SAMP 71130,35-36)

04 23 39+ CDR They're pretty small. (1)(SAMP 71130,35-36)

04 23 39+ CDR Give me a hammer, and get a bag and I'll - - (1)(SAMP 71130,35-36)

04 23 39+ CDR I got these in my hand I want to put there. (1)(SAMP 71130,35-36)

04 23 39+ LMP Bag 477 is the - coarsely vesicular rock. (1)(SAMP 71130,35-36)

04 23 39+ CDR Are two of them there? I hope two of them fell in. (1)(SAMP 71130,35-36)

04 23 39+ LMP No, I only got one. (1)(SAMP 71130,35-36)

04 23 39+ CDR Okay, here's that other one. It had to fall right here. (1)(SAMP 71130,35-36)

04 23 39+ LMP I don't think it ever - is that - there it is; get it. (1)(SAMP 71130,35-36)

04 23 39+ CDR Right here? (1)(SAMP 71130,35-36)

04 23 39+ LMP Now you're full of dirt in the scoop; you just covered it up. (1)(SAMP 71130,35-36)

04 23 39+ CDR Got it; I got it. (1)(SAMP 71130,35-36)

04 23 39+ LMP Here, put it in here with the dirt. That's good. (1)(SAMP 71130,35-36)

04 23 39+ CDR A little dirt never hurt anybody. (1)(SAMP 71130,35-36)

04 23 39+ LMP Got it. (1)(SAMP 71130,35-36)

04 23 39+ LMP 477 are two chips - they're small, but I think they'll give you the - if there's any compositional difference. (1)(SAMP 71130,35-36)

04 23 39+ CDR But these two are the ones you saw - that right there? That's what you pointed at. (1)(SAMP 71130,35-36)

04 23 39+ LMP Yes, I think you got it. (1)(SAMP 71130,35-36)

04 23 39+ CDR Okay, I'm going to take a closeup stereo on that contact. (1)(SAMP 71130,35-36)(PHO 134 20401-04)

04 23 39+ LMP Yes, definitely. (1)(SAMP 71130,35-36)(PHO 134 20401-04)

- - -

04 23 39+ LMP In bag 478 is the chip from the more finely vesicular rock. Both of them are coarse, it's a small chip; but it'll tell the story, I think. (1)(SAMP 71150,55-57)

04 23 39+ CDR I'll go ahead and get a closeup stereo - - (1)(SAMP 71150,55-57)(PHO 134 20401-04)

04 23 39+ LMP Get a closeup, and I'll get the rake. I'll get started on the rake. (1)(PHO 134 20401-04)

04 23 39+ LMP Gene, if you can pick up one more rock in that picture, with your fongs, let's bag it. (1)(SAMP 71150,55-57)

04 23 39+ CDR I'll get it. (1)(SAMP 71150,55-57)

04 23 39+ LMP As you come back. (1)(SAMP 71150,55-57)

- - -

04 23 39+ LMP I can bag it for you, Geno. (1)(SAMP 71150,55-57)

04 23 39+ CDR That's all right. I want to get this closeup here. (1)(SAMP 71150,55-57)(PHO 134 20401-04)

04 23 39+ LMP Okay, I've moved about 5 to 8 meters northeast of the Rover. And - as soon as Gene gets here with the gnomon - (1)(SAMP 71170,75)(PHO 134 20397-404; 136 20741)

04 23 43 50 LMP I've got a sample that was laying next to that boulder. I did not get an after picture of it, as I was taking my closeup pictures, it - is on my side of the boulder just 4 or 5 inches, covered with the dark mantle. (1)(SAMP 71170,75)

04 23 43+ CDR I think we probably disturbed that one. It'll probably show up in the before's. (1)(SAMP 71170,75)

- - -

04 23 43+ LMP That's in bag 479. (1)(SAMP 71170,75)

- - -

04 23 43+ LMP Let's rake right out there. (1)(SAMP RAKE 71520-97)(PHO 134 20405-07; 136 20742-43)

04 23 43+ CDR Look, let's go ahead and bag that one; and I'll get (1)

04 23 43+ LMP Bob, as you might have seen from the camera, up towards where we think Emory is you get a pretty high concentration of boulders up there. (1)

04 23 43+ CDR Well, we thought about going on up there; although - (1) we're in a pretty good area here, too, from the standpoint of boulders.

- - -

04 23 43+ CDR I think for the most part, large and small, all the (1) fragments seem to be filleted or even mantled by the dark material.

- - -

04 23 43+ CDR What area are you going to rake? (1)(SAMP RAKE 71520-97)

- - -



04 23 43+ LMP Ahead of the gnomon and to your left, there. (1)(SAMP RAKE 71520-97)

--

04 23 43+ CC I also gathered that most of the rocks look pretty much the same. (1)

04 23 43+ LMP That's what I said. (1)

04 23 43+ CDR Yes, except a change in vesicularity -- in terms of the size of vesicles, where I described one as being a more hummocky vesicular-type rock. The first time I've noticed any of the dark minerals was when we took that one big flat chip off that boulder.

04 23 43+ CDR I didn't look at it that close to see what it was. (1)

04 23 43+ CDR I'm going to get a pan, Jack, while you're doing that. (1)(PHO 134 20408-31)

--

04 23 46+ LMP I'm only penetrating about, at the most, 3 centimeters into this area with the rake. I've picked up a very good sample of boulders but most of them were in that distance of the surface and projecting out of it.

--

04 23 46+ CDR A couple of more Jack. Okay, coming at you. Bob, the pan is complete. (1)(PHO 134 20408-31)

--

04 23 46+ CDR There's two bags, I think. (1)(SAMP RAKE 71520-97)

04 23 46+ LMP Two bags full. First bag is 457 -- (1)(SAMP RAKE 71520-97)

04 23 46+ CDR Don't let me lose them. That's enough. Give me a couple of small ones. (1)(SAMP RAKE 71520-97)

04 23 46+ CDR Okay, that's good. That's good. Okay. (1)(SAMP RAKE 71520-97)

04 23 46+ LMP Here, \*\*\* they are. (1)(SAMP RAKE 71520-97)

04 23 46+ CDR Okay, in bag 458 is the rest of the rake sample. They're all fragments. (1)(SAMP RAKE 71520-97)

04 23 46+ CC Now we need the kilogram of the soil. (1)(SAMP 71500-09,15)(PHO 136 20405-07,23-27,32; 136 20742-43)

04 23 46+ CDR All the fragments, of course are completely covered with - the mantle; and they are slightly - oh, maybe 20 percent vesicular. I just took a glance at them. But, for the most part, they appear to be rounded and subrounded fragments. (1)(SAMP 71500-09,15)

04 23 46+ CDR Let's get the kilogram. (1)(SAMP 71500-09,15)

04 23 46+ LMP Ch, well, shoot. Start all over. (1)(SAMP 71500-09,15)

04 23 46+ CDR Try it again. 459 will get the kilogram, Bob. (1)(SAMP 71500-09,15)

04 23 46+ LMP Get some more. (1)

04 23 46+ CDR Okay, fill it up. (1)(SAMP 71500-09,15)

04 23 46+ LMP Can you close it? (1)(SAMP 71500-09,15)

04 23 46+ CDR Yes, yes, I can close it. (1)(SAMP 71500-09,15)

04 23 46+ LMP That's a good kilogram. (1)(SAMP 71500-09,15)

- - -

04 23 46+ LMP I think it's going to be hard to get a double core here. We could try a single right there. Bob, we got time to get the core? (1)

04 23 46+ CC Negative. The core has been deleted. We'd like for you to get your second pan, Jack, and then we'll press on. (1)(PHO 136 20744-76)

04 23 46+ LMP I'll get over here where our two sample sites are in view. (1)(PHO 136 20744-76)

04 23 46+ CDR Well, now I know why I felt that we were much too close to Trident than what I thought. We weren't really too close to Trident because Trident is way out here. That makes me feel better. A guy would know if he landed 100 meters from a big set of craters like that. You know, on a landing site like this, you ought to know exactly where you are. Anyway I landed where I wanted to. (1)

04 23 51 34 CDR 670, 012, 901; 670, 012, 901. (1)  
 - - -  
 04 23 51+ CC We will deploy charge number 7 on the way back. (1)  
 - - -  
 04 23 51+ LMP I'm taking your camera. (1)  
 04 23 51+ CC Jack, you got the pan or getting it? (1)(PHO 136 20744-76)  
 04 23 51+ LMP Yes, sir. (1)(PHO 136 20744-76)  
 04 23 51+ CDR CDR is on frame count 60. (1)  
 04 23 51+ LMP And the LMP is on 95. (1)  
 - - -  
 04 23 51+ LMP Bob, my impression right now is that the dark mantle (1)  
 may just be a - well, at least in here, it's  
 indistinguishable from a regolith that might be  
 derived from these other rocks. It seems to be a  
 little dark for that, but that might be the answer.  
 - - -  
 04 23 55+ CDR We are rolling. (1-SEP)  
 - - -  
 04 23 56+ CC Remember you'll be taking photos coming back here, (1-SEP)(PHO 134 20433-34; 136 20777-862)  
 Jack - - if you get a chance.  
 04 23 56+ LMP Yes, sir. I got a few going out, Bob, but they (1-SEP)  
 weren't too well spaced.  
 - - -  
 04 23 56+ CDR That's got to be Trident, Jack, because that's too (1-SEP)  
 big for anything else.

04 23 58 52 LMP There's - the classic raindrop pattern over this (1-SEP)  
fins debris. I'd say that the surface definitely is  
sorted, the fine regolithic material forming one  
fraction and then the blocks another. Those blocks  
are greater than 2 centimeters in diameter. In  
general, make up less than 10 percent of the  
surface. But there are some big ones. And it -  
fairly uniformly distributed. There are blocks a  
meter in diameter.

04 23 58+ CDR Hey, Jack, that big crater out there at 2 o'clock (1-SEP)  
has probably got to be Sherlock. That's got to be  
Sherlock over there.

04 23 58+ LMP Yes, probably. I think the only place I've really (1-SEP)  
identified that we can go to is to Station 6.

- - -

04 23 58+ LMP Okay, Bob, here's another crater about the same size (1-SEP)  
we sampled - the last station. And it doesn't have  
as many blocks, but it does have blocks. And from  
this distance, their vesicular texture and their  
light color shows up very well. I suspect they're  
the same general kind. There's a glass-bottom  
crater.

04 23 58+ CC Okay. You got a range and - - bearing, there, guys, (1-SEP)  
please?

04 23 58+ CDR 341, 0.8. (1-SEP)

04 23 58+ CDR Did you take a picture, Jack? (1-SEP)(PHO?)

04 23 58+ LMP Yes. (1-SEP)(PHO?)

04 23 58+ LMP You're pointed right at Station 6, I think, Gene. (1-SEP)

04 23 58+ CDR I think you may be right. There's that boulder. (1-SEP)

04 23 58+ LMP Not the one with the track but the one over there to (1-SEP)  
the right of that.

04 23 58+ LMP Unless the one with the track - I've got mixed (1-SEP)  
emotions which is 6.

04 23 58+ CDR Look over there to the left. You see that. (1-SEP)

04 23 58+ LMP Yes. (1-SEP)

04 23 58+ CDR That's Trident. Man, I'll tell you. (1-SEP)

04 23 58+ LMP Look at this thing. That looks like the same kind of rock except it doesn't have any vesicles. (1-SEP)

04 23 58+ CDR There's some white stuff in that rock. Just let me take a quick pic ### (1-SEP)(PH0?)

04 23 58+ CDR See that one right in front of it? Take a picture of it. (1-SEP)(PH0?)

04 23 58+ LMP Oh, you mean this one, here. (1-SEP)(PH0?)

04 23 58+ CDR That's a big zap pit, isn't it? Take a picture of that? (1-SEP)(PH0?)

04 23 58+ LMP Yes, they're big zap pits. Same rock with big zap pits. I think those are zap pits. It's a little hard to say. (1-SEP)(PH0?)

04 23 58+ CDR Looks like a big chip out of the rock. (1-SEP)

04 23 58+ LMP They're white halos; it just has more of them. (1-SEP)

04 23 58+ CDR But it's a big one; it's about an inch and a half or 2 inches across. (1-SEP)

- - -

04 23 58+ CC Okay, 17, how about - - range and bearing? (1-SEP)

04 23 58+ CDR 341, 0.7. (1-SEP)

04 23 58+ CDR Over there's the white mantle. Jack, look over there. Can you look to your left? (1-SEP)

04 23 58+ CDR That's the white mantle. (1-SEP)

04 23 58+ LMP Swing around that way. (1-SEP)

04 23 58+ CDR Call it a slide or not, but that's the white mantle. Whoa! That's my first real good picture of it. That is something. (1-SEP)

04 23 58+ LMP I got some of that. Okay, how are we doing? (1-SEP)(PHO?)

04 23 58+ CDR I don't want to go in that crater. We're at 0.6; how about 339 \*\*\* (1-SEP)

04 23 58+ LMP I got a couple of shots right in there. (1-SEP)(PHO?)

04 23 58+ CDR Coming right around to you. (1-SEP)

04 23 58+ LMP Hold that heading. Whoa. That'll be good. (1-SEP)

04 23 58+ CDR Right here? (1-SEP)

04 23 58+ LMP Yes, whoa. (1-SEP)

04 23 58+ CDR I got my locator. (EP 7) (1-SEP)

04 23 58+ LMP Okay, now this one we want me to get a partial pan until something's identified. (1-SEP)(PHO 136 20812-28)

04 23 58+ CDR Okay. We'll do that. We've got to turn that way anyway. (1-SEP)

05 00 02 32 LMP Okay, pin 1 pull, safe. Pin 2, pull, safe. (1-SEP)

05 00 02 41 LMP Mark it, null safe. (1-SEP)

05 00 02+ CC I copy that as charge number 1. (1-SEP)

05 00 02+ LMP That's affirm. (1-SEP)

-- --

05 00 02+ CDR Okay. Bearing is 339, 0.6. (1-SEP)

05 00 02+ LMP Start a pan around it, Gene -- (1-SEP)(PHO 134 20433-34)

-- --

05 00 02+ CDR Okay. We're on our way. (1-SEP)

05 00 02+ CDR Okay. We're heading on back to SEP. (1-SEP)

-- --

05 00 02+ LMP The pan was more or less complete at 146. (1-SEP)(PHO 136 20812-28)

05 00 02+ CC Copy, 146 on Hotel. (1-SEP)

05 00 02+ LMP The more I look at this dark dust, if you will, the more it doesn't seem like the kind of thing you'd expect to have been derived from the underlying bedrock. (1-SEP)

- - -

05 00 02+ LMP It just seems dark and much too fine-grained. It - don't have the impression that you're getting the size distribution you'd expect to get by having all these blocks around. (1-SEP)

00 02+ LMP Definitely, I think at least in my mind, two populations - size populations. (1-SEP)

05 00 02+ CDR Jack, that almost looks like bedrock over exposed in there. See that? (1-SEP)

05 00 02+ LMP Yes, why don't you take a pass over that way. Get through there? (1-SEP)

05 00 02+ CDR Yes, I can get through there. (1-SEP)

05 00 02+ LMP Do you know where you are? (1-SEP)

05 00 02+ CDR Yes. (1-SEP)

05 00 02+ LMP In Trident? (1-SEP)

05 00 02+ CDR No we're not in Trident. That's awful - that's pretty steep down in there. I'd walk down there. I'm not sure I want to drive down there yet. (1-SEP)

05 00 02+ LMP No, I didn't mean down in there. I meant right over there. (1-SEP)

05 00 02+ CDR Well, here's some right here. (1-SEP)

05 00 02+ CDR Take a picture of that? (1-SEP)(PHOT)

05 00 02+ LMP Yes. (1-SEP)(PHOT)

05 00 02+ CC And how about a range and bearing when you stop, to take the picture. (1-SEP)(PHOT)

(1-SEP)(PHO?)

05 00 02+ CDR 336, 0.4.

- - -

05 00 05 59 CDR Jack says it's going to be hard to tell whether this (1-SEP) is regolith composed from the rock field we see around, but - I get a distinct impression - you can see that dark mantle on top of almost all the rocks. Except we have fresh glazes, possibly, in the bottom of some of these small craters.

05 00 05+ CDR Everywhere else there is actually mantle, I believe, (1-SEP) in and around some of the crevices and in the vesicles and what have you.

05 00 05+ LMP It's all material though, that could be - knocked in (1-SEP) there by the local impact.

05 00 05+ CC Okay; but I gather you find a lot of material on top (1-SEP) of the rocks.

05 00 05+ CDR Not a lot. It's there, though. (1-SEP)

05 00 05+ CDR They're not nearly as covered with dust as they get (1-SEP) when you drop one. It's just really a salting or a cattering of debris in the depressions - - on the rock. The projections of the rock are perfectly clean.

05 00 05+ CDR Yes, but most of all - the craters are - have (1-SEP) re actively \*\*\*, except where the rocks are showing the boulders on the side, or - within the craters are evident - are suddenly covered over with this mantle. You don't see any good sharp ridges or walls on some of these craters. Even the small ones.

- - -

05 00 05+ LMP I'm going to state what Gene said slightly (1-SEP) differently. There just aren't a lot of very sharp, bright craters, but there are some. All the craters seem to be pretty well formed. It isn't an extensive mantle. Matter of fact for example, hasn't filled the - - bottom of the craters.



--  
05 00 05+ LMP We're back at the SEP, Bob. I'm starting to lay out (SEP)  
my first track.

--  
05 00 11 02 LMP Let me leave my camera. (SEP)

05 00 11+ CDR 252, 2.5, and 0. I'm resetting. (SEP)

05 00 11+ LMP And the LMP frame count is 197, and it was still (SEP)  
turning.

--  
05 00 11+ LMP We're deploying it. No, you take the pictures. (SEP)(PHO 134 20435-36)

--  
05 00 11+ LMP The location is in about the least-cratered area I (SEP)  
could find, between a large crater or a large  
depression that - ranges from maybe 50 to 150 meters  
behind the LM. That's maybe - south - or  
east-southeast; and it's between that depression and  
another large depression that is really a doublet  
with a blocky septum between them. That's to the  
northeast of the LM about 200 meters; that's the  
start of that second depression. I think we can get  
a nice layout, although there'll be a general slope.  
I believe, toward the LM - of about 1 degree.

--  
05 00 11+ LMP That depression to the northeast is at least a (SEP)  
couple hundred meters in diameter, and it's joined  
with one that's probably of comparable size just to  
the northwest of the first depression.

--  
05 00 14 03 CDR Okay, Bob, I've stopped - back at the SEP. (SEP)

--

05 00 14+ LMP This fine-grained dust that we're in could be ground (SEP)  
up pyroclastic. It might grind more easily than  
other things, and the blocks are just those blocks  
that have been excavated from below that pyroclastic  
by the larger craters and some of the smaller ones  
in the area.

-- --

05 00 17+ LMP You'd think glassy pyroclastic might turn into (SEP)  
regolith a little bit faster than some of these  
other things. But we'll check that one out.

-- --

05 00 17+ CDR Stay there, and I'll take a picture. (SEP)(PHO 134 20435-36)

-- --

05 00 22+ CDR I found a brown rock that I'm going to bring back. (SEP)

05 00 22+ CDR I think it's the back side of a piece of glass, but (SEP)  
it's brown.

-- --

05 00 22+ CDR Okay, Jack wait a minute. That looks orthogonal to (SEP)(PHO 134 20435-36)  
me, got your picture?

05 00 22+ LMP Will have in a sec. (SEP)(PHO 134 20435-36)

-- --

05 00 22+ CDR Okay, I got it. I straightened the line out a (SEP)(SAMP7)(PHO 134 20435-36)  
little bit better after I took the picture - a few  
links in it. Now where's my brown rock? I saw it  
when I was driving with the Rover. I knew I'd be  
able to come back here because of the tracks. Looks  
like an old piece of bread.

05 00 22+ CDR It's a piece of glass, all right - part of it (SEP)(SAMP?)  
crumbled but - I got to get that in a bag. Oh, man,  
is that a nice piece of glass. Just laying out  
there all by itself. Jack, you got a bag handy  
while I take my pan. I can't reach a bag; I got  
this sample in the wrong hand. (PHO 134 20437-46)

05 00 22+ LMP I don't have a bag. (SEP)(SAMP?)

05 00 22+ CDR You don't have - well, take one off of mine and give (SEP)(SAMP?)  
it to me. I'll take it back to the Rover.

05 00 22+ LMP Bag number 460. (SEP)(SAMP?)

--

05 00 22+ CDR I'm halfway out on the north course of the SEP. (SEP)

05 00 22+ LMP it's brown vesicular glass. Sort of a yellow-brown, (SEP)(SAMP?)  
as a matter of fact.

05 00 26 01 CDR Okay, it says - take locator photo to LM. I thought (SEP)(PHO 134 20437-46)  
I took a pan here. The LM wasn't - okay.

--

05 00 26+ CDR Yes, I'm here. I'm going to get a partial pan, Bob. (SEP)(PHO 134 20437-46)

05 00 26+ CDR Okay, take locator to photo LM; I got it. I'm on (SEP)(PHO 134 20437-46)  
about 71 on my frame count.

--

05 00 26+ CDR Okay, 670, 010, 101; that's 670, 010, 101. (SEP)

--

05 00 29+ LMP I'll walk back. (SEP)

--

05 00 29+ LMP Boy, here's a big boulder. (SEP-LM)

05 00 33 39 LMP Hey, I got a football-size rock of this coarsely  
vesicular gabbro. It's off a large 3- to 4-meter  
buried boulder northeast of the LM about 30 meters.

--

05 00 33+ LMP It'll be in the big bag. (SEP-LM)(SAMP 70035)

05 00 33+ LMP Undocumented, it's roughly tabular - 15 by 25 centimeters and about 5 to 7 centimeters thick. One face is very flat; looks like it was off of a parting plane, which were in that rock. (SEP-LM)(SAMP 70035)

05 00 33+ CC Okay, and if it fits in the SRC with all the other samples, you might put it there because the SRC's going to be kind of empty. (SEP-LM)(SAMP 70035)

-- --

05 00 33+ LMP Well, it was pretty big. It's in the big bag now. We can do that. (SEP-LM)(SAMP 70035)

-- --

05 00 36 15 CDR Okay, Bob, 086, 0.5, 0.1, (LRV at LM). (LM)

-- --

05 00 36+ CC Let's put all the stuff in that bag, Jack - both the stuff that's in yours and the stuff that's in Gene's. (LM)

05 00 36+ LMP Okay \*\*\* samples - two samples from under the LMP's seat. (LM)

-- --

05 00 36+ LMP I've got to put your - those samples in the SRC, in your bag; and we'll save this one, I guess. (LM)

05 00 36+ CDR Okay, you're filling which bag, the - (LM)

05 00 36+ LMP Putting them in the bag that goes into the SRC - (LM)

05 00 36+ CDR That's SCB 1. (LM)

05 00 36+ CDR Okay; let's see, offload LM - PLSS - core cap dispenser tools. Okay, as soon as you get that, I'll take that SCB 1 from you, and I'll close the SRC 1. (LM)

05 00 36+ CC I gather you didn't have any Rover samples today, did you, Jack? (LM)

-- --

05 00 36+ LMP No, I have one sample bag in my pocket that has a rock in it. (LM)(SAMP?)

--

05 00 36+ LMP Okay. Gene, where's that - you want to put that little rock? (LM)(SAMP 70018)

05 00 36+ CDR Yes, is it there? (LM)(SAMP 70018)

05 00 36+ LMP Well, what did you do with it? (LM)(SAMP 70018)

05 00 36+ CDR It was on the floor on my side. (LM)(SAMP 70018)

05 00 36+ LMP Your side? (LM)(SAMP 70018)

05 00 36+ CDR There it is; let me get it. (LM)(SAMP 70018)

05 00 36+ LMP We can put that in one of the core tube slots here. (LM)(SAMP 70018)

--

05 00 43+ LMP The rock that Gene picked up - early - right at the start, is in a core tube slot in the SRC 1. (LM)(SAMP 70018)

05 00 43+ LMP That's almost full of samples, and I think that big rock probably wouldn't fit in there. (LM)(SAMP 70035)

05 00 43+ CC Okay, then we'll put that in the big bag. (LM)(SAMP 70035)

05 00 43+ LMP It's in the big bag. (LM)(SAMP 70035)

--

05 00 43+ CDR Okay, the seal is clear, like I promised I'd make it, coming over the top. Bob, the seal is clear. (LM)

--

05 00 43+ LMP Containment bags and two cameras are stowed in the ETB. (LM)

--

05 00 43+ CC Give me your consideration - on that question of (LM)  
bringing back the big bag into the cabin.

- - -

05 00 47+ LMP I'd like to do that - look at that rock with a hand (LM)(SAMP 70035)  
lens on it

- - -

05 00 47+ CC Do you think I'll go in the SCB number 2? (LM)(SAMP 70035)

05 00 47+ LMP What would - the rock? (LM)(SAMP 70035)

05 00 47+ CC Yes, that's right. (LM)(SAMP 70035)

05 00 47+ LMP Well, I'll go in there. It's not that big. (LM)(SAMP 70035)

05 00 47+ CC Why don't you put it in SCB 2 and bring that in, (LM)(SAMP 70035)  
instead. Leave SRC out, and then we'll just leave  
SCB 2 in forever.

05 00 47+ LMP Okay. (LM)

- - -

05 00 48+ LMP While you were talking, I got all the mags - Romeo, (LM)  
Alpha, Bravo, (Gc'f?), Charlie.

05 00 48+ CC Hotel. Hotel. (LM)

05 00 48+ LMP That's on our camera. (LM)

- - -

05 00 48+ LMP Put it down here. Okay, I've got the mags, the 500 (LM)  
mag, yes - and the three - two cameras.

- - -

05 00 56+ CC SCB 2 for the big rock there, Jack. (LM)(SAMP 70035)

- - -

(LM)(SAMP 70035)

05 00 56+ LMP I got it. That's a big rock.

--

05 01 16 55 CDR Okay. The reading is 000, 133, 201, and I can only (LM)  
assume that one of us hit it. I think I've got time  
to give you another one.

--

05 01 21 11 CDR 670, 021, 501 - 670, 021, 501. (LM)

--

05 01 31 08 CDR Forward hatch is closed. (LM)

\*\*\* EVA 1 DEBRIEFING \*\*\*

05 02 35 24 LMP Joe, bag - collection bag 2 is 16. (BETWEEN EVAS)

05 02 55 01 LMP And the SRC is 32 pounds. (BETWEEN EVAS)

--

05 03 43+ CC Was there any spillage of the material in the drill core while you were breaking it down? (BETWEEN EVAS)(SAMP CORE 70001-09)

05 03 43+ CDR No, sir; I didn't lose any. (BETWEEN EVAS)(SAMP CORE 70001-09)

04 03 43+ CC When you were drilling the deep core where the neutron probe was, could you see the RTG over the rock?

04 03 43+ CDR Yes.

04 03 43+ CC You have any feel for how high the rock is or how low - how deep the thing was with respect to the - with respect to the RTG? Were you down in a level that was below, even without the rocks being there?

05 03 48 10 CDR Yes, I think I - yes. I was in a slump. There was a ridge between us and the RTG, and I had the rock in a line of sight between it and where I put that core. And I'd say the rock was certainly near the ridge and it was - what, Jack? - I don't know was it meter high for the most part. And it sloped off, and I'd say at least a half a meter high in the line of sight from where the neutron probe is to the RTG. Plus, there's a lot of undulations - I think it'll be below the line of sight, anyway. (BETWEEN EVAS)

05 03 48+ CC And a somewhat more general question, here. It says - and I'll read it. We're still puzzled as to whether there is a dark mantle. Could you say something more about the dark regolith surface? There's a lot of discussion, today, about whether or not it could have been a regolith derived from the intermediate gabbro which you were sampling as boulders. (BETWEEN EVAS)



- 05 03 48+ LMP Bob, I think I don't have too much to add to what I said, near the end of the EVA, is that I do not have an intuitive feeling that the regolith has been derived from most of the boulders that we're seeing. But - because those boulders are fairly light-colored, they look like they're probably 50 percent plagioclase. It could be that the regolith is derived from some other material that has blanketed the area. I don't think we have that answer, yet. (BETWEEN EVAS)
- 05 03 48+ CDR Bob, the boulders we are sampling - I think Jack and I both feel that it's probably - we feel we sampled the subfloor because we saw on the sides of the craters where some of these boulders were exposed almost as if they were bedrock down there. In driving back from what we called Station 1, we could definitely see the light mantle out in the area where the potentials of a slide are. (BETWEEN EVAS)
- 05 03 48+ LMP It is sort of strange that we don't see a good population of finer-grained rocks. These rocks look very much like igneous rocks, but they're considerably coarser than comparable - well, they're about the grain size of some of the coarse-grained mare basalts that tend to differentiate the cristobalite and tridymite - but we didn't see any of the finer-grain versions. If it's an intermediate crystalline rock, we have not seen any fine-grain equivalents yet. At least not in abundance. (BETWEEN EVAS)
- 05 03 48+ CC We gather that there's no color change in the dark mantle material at depth. In other words, the footprints, wheel tracks, and the rake sample, et cetera, were sort of uniform in color. (BETWEEN EVAS)
- 05 03 48+ LMP No, there's no major change, but looking out the window and I think I commented on it, the disturbed regolith is darker. Oh, I don't know, maybe by 10 percent albedo, something like that, than the undisturbed surface. (BETWEEN EVAS)
- 05 03 48+ CC I remember your commenting that when you were walking to the ALSEP, I think, Jack in fact. (BETWEEN EVAS)

05 03 48+ CC Okay, during drilling of the heat flow holes, (BETWEEN EVAS)  
Gene - -

05 03 48+ LMP That's right. (BETWEEN EVAS)

05 03 48+ CC - - was there change in color of the cuttings as they piled up - as you went down in depth? Do you remember any of that? (BETWEEN EVAS)

05 03 48+ CDR Yes, Bob, both in the core and the heat flow holes, it really didn't seem to pile it up like you're accustomed to it at the Cape, and I guess maybe that's because I was kicking so much dust around there. But I looked specifically when I cleared flutes, and what have you, and I didn't see any difference in terms of color, texture, or anything else coming up. (BETWEEN EVAS)

05 03 53 04 CC The outcrops you think you see in the North and South Massifs, do they appear to be linear, horizontal, or subhorizontal? Can you see layers and do you have any feel for the thickness or the attitude or the continuity of them? Can you discuss these outcrops? (BETWEEN EVAS)

05 03 53+ CDR Bob, going over yesterday, I thought I could see a structure dipping off to the southeast, apparent dip anyway, on the eastern side of the South Massif. Or northeastern side. We haven't examined them in detail because we were in a rush to get out. We'll put the binoculars on them and try to examine that question. There's nothing very obvious, any more than you can see on the photos, that the ridges were concentrated in the upper portion of the massif's units. (BETWEEN EVAS)

- - -

05 03 53+ CC Okay, the next question which calls for a little bit of discussion is: The layers of lineaments that you remarked on in the Sculptured Hills, can you say anything about them? (BETWEEN EVAS)

05 03 53+ CDR Yes, Bob, I did. I think I said - and I commented, I'm not sure whether it was the sun angle or not, but see, I was not looking at the Sculptured Hills. I was looking back at Bear mountain, I believe. (BETWEEN EVAS)

And, to me it looked like there was some organization that was dipping back to the east, somewhere between, oh, 20 and 25 degrees maybe. And it was very obvious to me but I'm a little hesitant because of some of this sun-angle stuff.

- 05 03 53+ OC I gather we didn't get any 500 millimeters of these (BETWEEN EVAS) lineations, that right?
- 05 03 55+ CDR No, but I think we will. They were on the western side of Bear Mountain back there, and I think I commented that I thought that Bear Mountain is probably what the Sculptured Hills look like.
- 05 03 53+ OC Is there a scar above the light mantle material? In other words the slide, is there a scar above that on the South Massif? Can you see anything up there to indicate that it might have come off of there?
- 05 03 53+ CDR Nothing obvious yet, Bob.
- 05 03 53+ OC On the way back to Station 1, you described a small crater with light material on the bottom. Can you say anything more about that crater?
- 05 03 53+ LMP Bob I don't remember saying that, or Gene doesn't either.
- 05 03 53+ OC You talked about something that was light I don't remember - I thought it was a boulder, but the question's about a crater.
- 05 03 53+ LMP You're right, there was a large zap pit in a boulder that was very white. It must have been - the crater for the zap must have been 2 centimeters diameter anyway. And it had about that, or maybe 3 centimeters worth of crushed minerals around it, that gave it a white, very bright white appearance.
- - -
- 05 03 57+ OC When you went to Station 1A, we're calling the new Station 1 - Station 1A, were the blocks there as well-filleted as those near the LM and the ALSEP? Do they all look the same? (BETWEEN EVAS)

05 03 57+ LMP All the boulders had filleting to a slight degree but not an extreme amount. I think it no more than that what is being caused by the redistribution of the darker, fine-grained regolith. (BETWEEN EVAS)

-- --

05 03 57+ CDR -- If I had to answer that question, I'd say yes. Yes that the fillet -- boulders are filleted over there about like they are over here. That would be my impression. (BETWEEN EVAS)

05 03 57+ CC Is there any indication that the fillets are directional, in other words, that the fillets are heavier on one side than the other? (BETWEEN EVAS)

05 03 57+ LMP Bob, haven't noticed that. (BETWEEN EVAS)

05 04 01 49 CC Okay, I copy that. Do you have the feeling that some boulders are more rounded -- (BETWEEN EVAS)

-- --

05 04 01+ CDR That's a good reminder, Bob. (BETWEEN EVAS)

05 04 01+ CC Do you have any feeling that some boulders are more rounded than others? Apparently this looked this way in some of the TV pictures. (BETWEEN EVAS)

05 04 01+ CDR Some of the big ones that are just barely exposed above the regolith looked quite well-rounded. Most of those around the craters are subangular. I got the impression that it's just purely a function of how long the same material has been exposed; but some of the big boulders like the one out near the geophones is quite angular in part and quite rounded on other parts. It's quite variable. (BETWEEN EVAS)

05 04 01+ CC Do you want to say any more about that boulder? Did it seem to have more or less the same lithology, in addition to the variation in vesicle size that the other rocks in the vicinity of the ALSEP, and the other rocks out at Station 1 had? (BETWEEN EVAS)

05 04 01+ LMP It's very comparable to the ones that we saw at Station 1, as a matter of fact. (BETWEEN EVAS)

05 04 01+ LMP Both types of rocks were there, both variations. (BETWEEN EVAS)

05 04 01+ CC Do you have a feeling for where the big blocks in the LM-ALSEP area came from? Do you think they were from Camelot, like I've been saying? (BETWEEN EVAS)

05 04 01+ LMP Don't have any idea yet, I'm really not sure. (BETWEEN EVAS)

05 04 01+ CC As you drove along on the traverse from the SEP to Station 1, did the size of the small craters with blocky rims vary? In other words, what we are looking for here is the variation in the thickness of the dark mantle. (BETWEEN EVAS)

05 04 01+ LMP I can't answer that one yet, Bob. (BETWEEN EVAS)

05 04 01+ CC Let me sum up by saying that I guess, as I indicated before, our best guess is that the the vesicular crystalline rock, probably gabbro, or I think you've been calling it intermediate basalt or gabbro, forms at least the upper part of the subfloor. I don't think we've been close enough to a large crater rim to say that it's what the deep sections of the subfloor form, but we think that this intermediate gabbro vesicular rock, at least medium-grained, perhaps coarse-grained rock, forms at least the upper layer of the subfloor. (BETWEEN EVAS)

05 04 01+ LMP Yes, Bob, I think that's pretty safe, right now. Once again, I'm surprised that it's as coarse as it is, that being the upper portion of a plains unit. (BETWEEN EVAS)

05 04 01+ CDR Driving back from Station 1, where we did some of our circling and what have you. We didn't have time to get off, but we did see down in - I don't remember whether it was in the slopes of some craters, or down on the slope itself, but I'd say several meters down below the mantle where there was what we almost agreed to, might be bedrock at least, a deeper portion of the subfloor. (BETWEEN EVAS)

05 04 07: CC (BETWEEN EVAS)

Okay. After the line: "Empty ETB as follows," change the first line which reads: "B&W mag Golf in forward RHSSC," to read: "B&W mag Hotel in LCG compartment." And then go into the next column which begins: "Stow in ETB." Change the second line, which reads: "LMP's camera with B&W mag Hotel" to "LMP's camera with B&W mag Golf." in mag 6, ETB. Over.

05 04 07+ CDR (BETWEEN EVAS)

Got you. Hotel, stow it; and go on with Golf.

- - -

05 04 17 45 LMP (BETWEEN EVAS)

Just to bring you up to date on magazines. Mag Bravo has 77 frames.

05 04 17+ LMP (BETWEEN EVAS)

Mag Hotel has 83 frames.

05 04 17+ CC (BETWEEN EVAS)

Jack, on your mag Hotel, we'd showed you all the way up to 183 at one time, on that. Did you miss the 1, this time?

05 04 17+ LMP (BETWEEN EVAS)

I may have clipped it out, Joe. 183, yes.

- - -

05 04 17+ LMP (BETWEEN EVAS)

Mag Romeo has 21 frames. And I took a few, random, and probably not very good 500 millimeter of the North and South Massifs.

- - -

05 04 22+ LMP (BETWEEN EVAS)

And Joe, verify that you want mag Charlie substituted for mag Bravo on CDR's camera.

- - -

05 04 22+ CC (BETWEEN EVAS)

Jack, I think the answer to that is yes. Per the checklist, by the way. That's the way we show it in our checklist here.

05 04 22+ LMP (BETWEEN EVAS)

Poger. We probably have about 100 frames left on Bravo, so we'll just keep track of that.

- - -

(BETWEEN EVAS) (SAMP 70035)

05 05 24+ LMP Joe, I just took a - quick look with the hand lens at that large rock I brought in, and I don't think there's much more than 30 percent plagioclase. I'll go back - could be more of a standard basalt or gabbro. It has a fair proportion of ilmenite in it, I believe. There's bright platelets - in the vugs or vesicles - of ilmenite. Now it could be that the glass - if the soil is very glassy, that it's developed the darker color from the contribution of the basic minerals through the glass, particularly the iron and the titanium.

05 05 24+ LMP All it means is that we don't yet know the origin of the dark mantle. (BETWEEN EVAS)

05 05 24+ LMP That rock - looks I may have, by accident, sampled the front side of one of the parting planes that I mentioned. Very, very sharply bounded on one side of a planar surface. (BETWEEN EVAS) (SAMP 70035)

- - -

05 05 24+ LMP I mentioned when I sampled it, it had one very planar surface, and looking at it more closely, it looks like one of those parting planes that I talked about earlier in the EVA. (BETWEEN EVAS) (SAMP 70035)

- - -

05 14 48+ CDR After thinking and looking at the map last night and recalling what I saw during landing and where I was planning on putting it down and everything, I still think, to the best of my knowledge, that we are about 1 or 2 o'clock, and I'll increase up to about 200 meters or so west and slightly north of Poppy. (BETWEEN EVAS)

05 14 50 56 CDR The thing that fooled me yesterday is this depression out at 9 o'clock here, which is greatly undersized for Trident, really isn't Trident, and I said yesterday, I didn't think how we could be that close. Well, we really aren't. Trident is way out there, and I'll still hold to my 200 meters at 1 to 2 o'clock of Poppy. (BETWEEN EVAS)

05 14 50+ CC We're thinking you might have, on the way to the geology stops, driven between a couple of the Trident craters then. (BETWEEN EVAS)

05 14 50+ CDR Yes, we may have coming back. I think went all the way around to the east of the last one going out, though. (BETWEEN EVAS)

05 15 04+ LMP Family mountain, the northeast facing slopes, although lower has boulders and outcrops. I mean below the outcrop. It has boulders from local block concentrations. Looks very much like the South Massif does. (BETWEEN EVAS)

05 15 09 50 LMP Let me give you a few observations. That outcrop I talked about that was way at the top of the South Massif at the break in slope - at the very top of the break in slope - almost looks - it's hard to tell that it's in place outcrop up there. It's hard to convince myself that it is. Looks like there's some very large and many, many small fragments of large-like 3- and 4-meter rocks up there and a lot of smaller fragments. I've seen that type of thing in a number of places over the South Massif. However, they all seem to be sitting on top of the South Massif surface, but I do see one other area that it looks like there is a - it is protruding from within some sort of mantle on the South Massif. So conceivably some of that could be in place. An additional impression I got is that at least with the monocular, that those fragments - those boulders look much more angular than what we've seen here. And, for the most part they appear to be - if covered at all - very little by any mantle except the one I just mentioned. (BETWEEN EVAS)

05 15 09+ LMP Through the monocular, in contrast to the tan-gray of the South Massif, those large blocks up there look blue - very distinctly blue-gray. Not unlike Gene mentioned yesterday, anorthosite - anorthosites look in certain terrestrial environments. (BETWEEN EVAS)



(BETWEEN EVAS)

05 15 09+ CDR I can look up on the scarp - out to 9 and 10 o'clock. It's practically the same color as the South Massif. It just looks to be very undulating. I see no outcrop evidenced from here in the scarp. I think I can just about see where Hole-in-the-wall is, but it's so subtle that I can't really tell you much about it. And the local terrain, which I think is the southern rim of Camelot, just about blanks out where Hole-in-the wall should be - just about covers it up. But what I can see in a small little saddle to our local horizon here in front of us - I can see out there just about - oh, I'd say a 100 meters or so to the south of Hole-in-the-wall and it just looks like a subtle undulating slope. We can't really tell too much the steepness from here.

(BETWEEN EVAS)

05 15 46 25 Lt. Bob, I think, based on what I saw yesterday, that the chances are pretty good that all the big blocks out here in the dark mantle area will be pretty much the gabbros. By the way, I looked at that with a hand lens last night, and I don't know that you got the report, and I'm back to saying that it's probably closer to 30 - 40 percent plagioclase. It's a good gabbro, a fine pyroxene gabbro, and it apparently has a fair amount of ilmenite in it. There's some bright shiny flakes within the vugs and some dark minerals in the matrix that are probably ilmenite. And one other additional possibility then, is that the mantling we're seeing here, is just dark fine glass - darker than usual, because of the iron and the titanium in the rock itself. Also, the probability, I think, still has to be considered that you're dealing with a true mantle that has been gardened enough that at least where we're seeing it now, in the first few tenths of a centimeter that it is unrecognizable as a mantling unit yet. The relationship to the large boulders is, I think, one right now, of just fileting and a small amount of covering because of the local gardening process. We haven't seen any clearly mantling relationships between the dark mantle or the surface materials here and the large boulders.

(SAMP 70035)

\* \* \* \* \* EVA 2 \* \* \* \* \*

05 17 54+ CDR Okay. We can start our watch. (LM)

- - -

05 18 02+ CDR Okay. I'm going down the ladder. (LM)

- - -

05 18 03+ CDR The reading is 222, 262, 207; that's 222, 262, 207. (LM)

- - -

05 18 05 16 LMP Okay. I'm on the ladder. Door is closed. (LM)

- - -

05 18 10 48 LMP Mag Romeo is going to go on the old 500 in a minute. (LM)  
Mag Delta is in there. Mag Kilo, mag Juliet, mag  
Bravo, mag Delta.

05 18 12 05 CDR The SRC organic sample has been sealed. And the SRC (LM)  
lid is staying almost closed, about 2 or 3 inches  
open; if that's fine, I'd like to leave that.

- - -

05 18 21 22 LMP Okay. The pan's complete. (LM)(PHO 137 20866-93)

05 18 21+ LMP And, Bob, those pans around here have more pictures (LM)(PHO 137 20866-93)  
because I'm having to be sure I get the massifs -  
I'm having to take extra pictures.

- - -

05 18 24+ CDR Okay; SCB 7 goes under your seat. (LM)

- - -

05 18 24+ CDR We got SCB 6, goes to you, and SCB 6 goes on the (LM)  
gate.

- - -

05 18 27 19 LMP SCB 7's in my seat. (LM)

--

05 18 33+ CDR Now, I want 4. (LM)

05 18 33+ LMP I took 8 off. (LM)

05 18 33+ CDR No, sir. I want 4 and 6. Why don't you just substitute -- (LM)

05 18 33+ LMP Hey, I just took 8 off. Can we use 8 instead of 6. (LM)

05 18 33+ CC Yes. (LM)

--

05 18 33+ CDR We'll use 8 instead of 4. (LM)

--

05 18 33+ CC -- 8 will be on the LMP. (LM)

--

05 18 33+ CDR We need 6 off of there, Jack. (LM)

05 18 33+ LMP Oh, your 5 stays back here, huh? (LM)

05 18 33+ CDR We need 6 to the gate. (LM)

05 18 33+ LMP It's probably behind 4, isn't it. (LM)

05 18 33+ CC Well, put 4 on the gate -- then put 5 on the Commander. (LM)

05 18 33+ LMP Yes. Okay; 4 is going on the gate and 5 on the Commander. (LM)

--

05 18 36+ CDR You've got -- we I guess SCB 8, if I'm not mistaken. (LM)

05 18 36+ LMP Yes. (LM)

05 18 36+ LMP Okay. You can give me SCB 5. (LM)

--

05 18 39+ CDR 670, 017, 701; 670, 017, 701. (LM)

--

05 18 41+ CDR This here's frame 27, mag Charlie. (LM)

05 18 41+ LMP I had to relearn how to document samples, Bob. I just have. The first part of my roll will have a lot of random exposures and focuses. (SEP)

05 18 41+ LMP And while I'm waiting for Gene, getting a rock - it looks a little finer-grained than the others we've seen in the LRV sampler, along with some soil. And that's in bag 22E. It has the stereo documentation and a locator to the LM, and it's about 2 meters from the SEP. (SEP)(SAMP 70250,55)(PHO 135 20533-38)

--

05 18 44+ CDR I'm on the way. (LRV leaving LM) (LM-SEP)

--

05 18 44+ CDR Hey, Bob, I'm 3 meters to the west of the transmitter and about 2-1/2 meters south of the line going west -- (SEP)

--

05 18 47+ CDR Okay. 265, 0.2, and 0.1. (SEP)

--

05 18 48 24 LMP Twenty-three Echo, if that followed in sequence, is another rock near the SEP documented in the same way. (SEP)(SAMP 70270,75)(PHO 135 20539-41)

05 18 48+ CDR Okay, Bob. 265 - 265, 0.3, 0.1; roll is 1 right, pitch is 0, and the sun-shadow device is 0. I'm heading 281 degrees. (SEP)

--

05 18 48+ CC Okay. We're ready for you guys to go. We presume (SEP)(PHO 135 20542-49)  
you have the SEP photos, Jack.

05 18 48+ LMP Yes, I do. (SEP)(PHO 135 20542-49)

05 18 48+ CC Remember to pick up EP 4 when you get in the Rover. (SEP)

05 18 48+ LMP Okay. We got it, and the frame count is 17. (SEP)

-- --

05 18 51 04 CDR Okay. We are moving right now. (SEP-2)

-- --

05 18 51 43 CDR Mark it. (end of SEP antenna) (SEP-2)

-- --

05 18 51+ LMP We want to get at 080 and 0.4 and get rid of this (SEP-2)  
charge.

-- --

05 18 51+ CC Because we think we're 200 meters east of where we (SEP-2)  
were, you should probably increase all those numbers  
except for the explosive package numbers by about  
two-tenths to get the distance at which you will  
come across these areas. Again it's about 0.4, 0.5,  
and we expect to deploy EP 4. The more important  
number though is that it's 0.2 west of the ALSEP.  
As you pass the ALSEP, you might know what the range  
and distance are reading at that point.

-- --

05 18 51+ CDR Let me get around your flag. There's your flag way (SEP-2)  
out there, isn't it?

05 18 51+ LMP Yes. (SEP-2)

05 18 51+ CDR Let me get around that. Man - that's really giving (SEP-2)  
the ALSEP some room.

05 18 51+ LMP Yes. Okay, Bob. We're still seeing - the light - (SEP-2)  
 colored gabbroic rocks. I think the reason I said  
 50 percent was because in this light they look  
 light-colored, and that's probably largely because  
 of the zap pit halos.

05 18 51+ LMP But, in the hand lens, it looked like the standard (SEP-2)  
 gabbro.

- - -

05 18 51+ LMP We're almost due south of the ALSEP now. (SEP-2)

- - -

05 18 51+ LMP It's a little rocky out here. (SEP-2)

- - -

05 18 51+ CDR We just clicked to 4. I want to move over this way (SEP-2)  
 just a skosh.

05 18 51+ LMP I'm just south of my geophone 2 flag now. (SEP-2)

05 18 51+ CC Okay. If you just clicked to 4, let's go to 6 (SEP-2)  
 then, just past the click on 6.

05 18 51+ LMP Okay. And you want about 080? (SEP-2)

- - -

05 18 51+ LMP Okay. Hole-in-the-wall should be just to the left (SEP-2)  
 of the notch.

05 18 51+ CDR Yes. That's exactly where I'm heading. (SEP-2)

05 18 51+ LMP And I think we're coming up closer to the rim of (SEP-2)  
 Camelot. It's starting to look like a crater now.

05 18 55 00 LMP Looking down-sun, I see no major albedo changes (SEP-2)  
 except for the very fresh craters which are  
 brighter. By maybe 20 percent.

- - -

05 18 55+ LMP Can you move forward, and I'll get it (EP) in that (SEP-2)(EP 4)  
 little depression.

05 18 55+ LMP You see on the other side of the rock. (SEP-2)(EP 4)

05 18 55+ CDR Okay, Bob; 083, 0.6, and 0.5. (EP). (SEP-2)(EP 4)

05 18 55 57 LMP Okay. Pin 1, pulled and safe; pin 2 is pulled and safe; pin 3, pulled and safe. (SEP-2)(EP 4)

-- --

05 18 56+ CDR I'll do a partial for you. (SEP-2)(EP 4)(PHO 135 20563-69)

05 18 56+ LMP Yes. We got to do a partial. (SEP-2)(EP 4)(PHO 135 20563-69)

-- --

05 18 56+ CDR Get your pan? (SEP-2)(EP 4)(PHO 135 20563-69)

05 18 56+ LMP Yes. (SEP-2)(EP 4)(PHO 135 20563-69)

-- --

05 18 56+ CDR Okay. I'll just come on around, and I'll pick up my tracks. (SEP-2)(EP 4)

-- --

05 18 58+ LMP And we're rolling. (from EP site) (SEP-2)

05 18 59 22 CC Okay, copy. You're moving. (SEP-2)

05 18 59+ LMP Let's go to Hole-in-the-wall. (SEP-2)

-- --

05 18 59+ LMP The surface is not changing in terms of the detail. (SEP-2)  
The surface texture of the fine-grained regolith still has a raindrop pattern. The blocks still look very much like what we sampled yesterday around the LM. They're light-colored, apparently gabbros, with zap pits - zap halos. Occasional craters show lighter-colored ejecta all the way down to - say half a meter in size. Other craters that are just as blocky as those with bright halos have no brightness associated with them. Most of the brightest craters have a little central pit in the bottom which is glass-lined. The pit is maybe - a

fifth of the diameter of the crater itself. It's a fairly standard thing for most of these fresher craters, is that little central pit.

05 19 01 20 CDR Okay, we're just south of the rim of Camelot. There is a light mantle on the other side. Look at that crater. (SEP-2)

- - -

05 19 02+ CDR Take a couple of pictures looking at that. (SEP-2)(PHO?)

05 19 02+ LMP Okay. Can you swing a little? (SEP-2)(PHO?)

05 19 02+ CDR Yes. (SEP-2)(PHO?)

05 19 02 36 LMP Okay, I got them. (SEP-2)(PHO?)

05 19 02+ CDR That is a 600-meter crater. (SEP-2)

05 19 02+ CDR And it is very likely we won't have any problem finding blocks on the rim of Camelot. (SEP-2)

- - -

05 19 02+ CC How about bearing and range to help us pick out the LM location. (SEP-2)

05 19 02 50 CDR 083, 1.2, and 1.0. (SEP-2)

- - -

05 19 02+ CDR Man, are there blocks there. (SEP-2)

05 19 02+ LMP Now that - little crater in the ejecta of Camelot, at least the rim of Camelot, did not bring up blocks on the rim. It may have been an old depression. Bob, there is extremely blocky area. I think Station 5 was over there where that block area is. The light-colored areas on the photos are essentially - blocky. They're probably 30 percent blocks. Many of them are in the 2- to 3- to 4-meter size range. All of them look light-colored, look like the gabbro we sampled from a distance. They have light-halo zap pits on them. I see only occasional gray varieties, which I believe are the nonvesicular ones like we also sampled. (SEP-2)



05 19 02+ LMP But the light-colored gabbros are dominant. (SEP-2)

05 19 02+ LMP Station 5 would have been - rather than in a light-colored area would have been in a very blocky area. Station 5 is probably still very good for blocks. (SEP-2)

05 19 02+ LMP There is probably as big blocks there as anywhere on the rim that we've seen. (SEP-2)

05 19 02+ LMP We ought to be going - really between Horatio and Camelot now. (SEP-2)

05 19 02+ CDR No. I'm going to give them a call when we're due south of Camelot and see if they can't get a position on us. (SEP-2)

- - -

05 19 02+ LMP Watch that block there; it's probably more than 14 inches. And got a fairly close look at the rock, and it is the vesicular - looks very much like the vesicular clinopyroxene gabbro. (SEP-2)

05 19 02+ LMP Now, the surface of Camelot is mantled - or the rim - is mantled with the same dark-gray material, and it has the same surface texture - a very fine raindrop pattern. The saturation crater size does not look bigger than a half a meter, if that. (SEP-2)

05 19 05 30 CDR 081, 1.6, and 1.4. We're south of the center of Camelot. (SEP-2)

- - -

05 19 05 52 CDR We can definitely see the light mantle as it comes out over the valley here, and we're looking at Hole-in-the-wall, although it's still too subtle. We're looking right at Lara, as a matter of fact. (SEP-2)

05 19 05+ LMP Yes. Here's Lara, very clear; and Hole-in-the-wall, you can see it. (SEP-2)

05 19 06 09 CDR There's Horatio way over there where those blocks are. See it? (SEP-2)

- 05 19 06+ LMP Yes, that's Horatio. We're right on course, sir. Here's a little depression we didn't talk about, though, between Horatio and Camelot. But it's a depression and not a blocky crater at all. As a matter of fact, the total block population has changed - once we get away from the rim of Camelot the block frequency is quite a bit smaller. It's down - maybe to only - less than 1 percent of the surface. (SEP-2)
- 05 19 06+ CDR Much easier driving with the rover. Because of the blocks and because of the smaller \*\*\* craters, and very subtle-type craters are in this area. (SEP-2)
- 05 19 06+ LMP There are up to 2-meter, bright-halo, blocky craters - and that's blocky-wall craters that may be instant rock rather than - I think it is rather than bedrock - in the rim area of Camelot. (SEP-2)
- 05 19 07 27 CDR Horatio has got to be - that's Horatio, right there. (SEP-2)
- 05 19 07+ LMP Yes. That's Horatio. (SEP-2)
- 05 19 07+ CDR Let me give another mark on the southern rim of Horatio. (SEP-2)
- 05 19 07+ LMP The scarp looks very smooth from here - no obvious outcrops at this time. Don't seem to be penetrating to any bedrock in the area we're traversing now, just to the southeast of Horatio. Horatio has a blocky wall; however, the upper section of meters, probably, of rim looks as if it's a mantle or composed of - with material we've been driving on. This material does not come to the rim of Horatio. (SEP-2)
- - -
- 05 19 07+ LMP Horatio has quite a different appearance than Camelot. It is - and that's the main one - the rims - the blocks do not get to the rim. (SEP-2)
- - -
- 05 19 07+ LMP It looks like - If Horatio is any more, the rim -ness of maybe, and this is a wild guess, but - an average of 20- or 30-meters - that's the

thickness lies above the exposures of the subfloor; exposures being blocks in the wall. And some of those blocks, again, are several meters, if not 5 to 10 meters in diameter. And they're concentrated on the west rim that I can see. There are very few blocks on the east - excuse me, the west wall - there are very few blocks on the east, north, and south walls of Horatio.

05 19 09 41 CDR We're on the southern rim; 07B, 2.3, and 2.0. (SEP-2)

05 19 09+ LMP Yes. We're maybe 100 meters south of the rim. Actually, we're on the rim crest. We're 100 meters south of the break in slope into the crater. (SEP-2)

05 19 09+ CDR It's an undulating, hummocky traverse terrain in here, Jack. (SEP-2)

05 19 09+ CDR These little craters make it bumpy; but, other than that, it's really smooth sailing. (SEP-2)

05 19 09+ LMP This is what I sort of expected dark mantle to look like, rather than what we landed on. Not more than 1 percent of the surface, and that percentage continues right over the rim crest of Horatio down onto the wall until you hit the big blocks. (SEP-2)

05 19 10 24 CDR What's this depression? We're not to Bronte yet. (SEP-2)

05 19 10+ LMP No, we're not at Bronte - (SEP-2)

05 19 11 13 CDR I'm sitting on 080 right now and 2.6. I think we've got to add a little bit to that \*\*\* (SEP-2)

05 19 11+ LMP The surface is not changing. We see no craters that seem to penetrate into bedrock cut in here - that is with blocky rims, and that's quite a contrast to the area we sampled at Station 1A yesterday. I cannot see in my field of view any blocky-rim craters. There are light craters with fragmental walls and rims, but it looks like instant rock rather than the subfloor material. (SEP-2)

05 19 11+ CDR Jack, can you see over there to the left? I'll turn (SEP-2)  
a little bit - on the dark area of the South Massif  
where you get those impressed lineations. See them  
going from left upward to the right?

05 19 11+ LMP Yes. I see what you mean; right. (SEP-2)

05 19 11+ CDR That's what I saw out my window. (SFP-2)

05 19 11+ LMP Yes - better left - they go obliquely up the slope. (SEP-2)

05 19 11+ CDR They're more like wrinkles, they're - linear (SEP-2)  
wrinkles.

05 19 11+ LMP Yes, crenulations, you might say, in the slope that (SEP-2)  
look something like those I saw from orbit - looking  
in the shadowed area - at the edge of the shadows.  
Bob, we've seen craters as much as - 20 meters,  
maybe 30 meters in diameter without blocky rims.

05 19 12+ LMP The rim block population is not much different than (SEP-2)  
the average for the terrain in here.

05 19 12+ CDR If we can't recognize a change in that albedo when (SEP-2)  
we get onto that white mantle, I'm going to be  
surprised.

05 19 12+ LMP The light mantle is just what Gene has said. There (SEP-2)  
are some very bright craters in it - they stand out.  
bright-haloed craters scattered over it, that - seem  
to be quite a bit brighter than anything we have  
out here on the dark mantle. See those blocks over  
there? That's the first different colored blocks  
I've seen; they're sort of gray-looking.

05 19 12+ CDR Where are you looking? (SEP-2)

05 19 12+ LMP Over to the right a little bit. (SEP-2)

05 19 12+ CDR Darker-gray, a little bit. (SEP-2)

05 19 13 41 LMP There's a crater with a big mass of block in the (SEP-2)  
bottom. It looks like it might be a secondary  
fragment from somewhere.

05 19 13+ CDR Do you want to get a photo as we go by? (SEP-2)(PHO 135 20623-27; 137 20895,

05 19 13+ LMP Yes, can you swing a little bit to the right? (SEP-2)(PHO 135 20623-27; 137 20895)

05 19 13+ CDR Yes. (SEP-2)(PHO 135 20623-27; 137 20895)

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05 19 13+ LMP Do we have time for an LRV sample? (SEP-2)(LRV 1)(SAMP 72130-35)(PHO 135 20623-27; 137 20895)

-- --

05 19 14 03 CC If you can do it quickly. (SEP-2)(LRV 1)(SAMP 72130-35)

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05 19 14+ LMP Swing a little bit to the right now. (SEP-2)(LRV 1)(SAMP 72130-35)

05 19 14+ LMP Right up across that little ray. (SEP-2)(LRV 1)(SAMP 72130-35)

-- --

05 19 14 34 CDR 082, 3.0, and 2.6. (SEP-2)(LRV 1)(SAMP 72130-35)

-- --

05 19 14+ LMP Okay, Gene. That's a pretty big rock in there. (SEP-2)(LRV 1)(SAMP 72130-35)

-- --

05 19 14+ CDR It's got quite a bit of dirt in it. (SEP-2)(LRV 1)(SAMP 72130-35)

05 19 14+ LMP This is a block from a linear-strewn field of very irregular and jagged rocks that are southwest of a crater that's 10 to 15 meters in diameter. It looks like the material that may have formed the crater, and you can look at some of the pictures and make up your own decision. (SEP-2)(LRV 1)(SAMP 72130-35)

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05 19 16 02 CDR Twenty-six Echo, Bob. We're on our way. (SEP-2)(SAMP 72130-35)

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05 19 16+ CDR And I did get my locator here. (SEP-2)(PHO 135 20623-27; 137 20895)

05 19 16+ LMP I got mine. (SEP-2)(PHO 135 20623-27; 137 20895)

05 19 16 17 LMP The frame count is 95. (SEP-2)

--

05 19 16+ LMP We're in a little area where the fragment population (SEP-2) may be up to 3 percent. It's getting a little more like what we saw around the LM. In fact, I would say it was comparable now.

05 19 16+ CDR I'm going down this slope and up the other side. (SEP-2)

05 19 16+ LMP But nothing like Station 1. (SEP-2)

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05 19 16+ LMP The blocks I see still seem to be the gabbro, except (SEP-2) for that one sample we took, which I hope was what I thought it was -

05 19 16+ CDR Gee, it's blocky here. (SEP-2)

05 19 16+ CDR Oh, that's a big crater. We got to get around here. (SEP-2)

05 19 17 50 LMP That must be Bronte. (SEP-2)

05 19 17+ CDR My gosh, is that big. (SEP-2)

05 19 17+ LMP That's bigger than I expected. (SEP-2)

05 19 17+ CDR I got to go around this thing. (SEP-2)

05 19 17+ LMP Yes, yes. There are some very - - (SEP-2)

05 19 17+ LMP \*\*\* blocks, greater than the normal gabbro we've (SEP-2) seen, that have very large, egg-sized vesicles in them.

--

05 19 17+ LMP I wonder if I took a picture of that block deal? I (SEP-2) hope I did.

05 19 17+ CDR I'm going to go through this niche between - on a (SEP-2) high point in the saddle here.

--

05 19 19 03 CDR 0.8, 3.5, and 2.9; and we're on the north side of Bronte. (SEP-2)

05 19 19+ LMP And it looks like Bronte has penetrated the dark mantle in here. It got the subfloor, but there's not an awful lot of blocks around the rim - there are just some small ones - compared to what we saw around - watch it. (SEP-2)

05 19 19+ LMP What we saw around Horatio or in the walls of Horatio and around Camelot. Nothing, also, like we saw yesterday at Station i. Bob, that characteristic little dimple in the bottom of the craters is still with us, and it's invariably glass-lined in the fresh ones. (SEP-2)

05 19 19+ LMP Now, that's not a complete lining. There seems to be glass agglutinates, if you will - that's holding the fragments in the bottom of the crater together. There's one on the side of an older crater. We're back into about a 1-percent coverage. I suspect that the reason our block population went up there was because of Bronte. (SEP-2)

05 19 19+ CDR An awful lot of these small glass-lined little craters around. (SEP-2)

05 19 19+ LMP Yes, and you notice, Gene, what I was saying about the little dimple in the bottom? (SEP-2)

05 19 19+ LMP Watch the fresh ones, and they all have that little dimple as if that - you see, there's one right there. (SEP-2)

- - -

05 19 19+ CDR I think the white mantle is starting right over there. See on your right? (SEP-2)

05 19 19+ LMP Yes, that's the first - (SEP-2)

05 19 19+ CDR The place you can really see it is where it's reflected off the slopes of the cliffs out there. I hate to say it, but Charlie may be right. (SEP-2)

05 19 19+ LMP Wall, but you know, one thing that may distinguish it is the bright-halo craters are brighter. (SEP-2)

05 19 19+ CDR But I can see it from here - - on the floor of the valley here. (SEP-2)

05 19 19+ CDR On the scarp it really shows up. (SEP-2)

05 19 19+ LMP Block population is unchanged; when I can see large enough blocks - appears to be the gabbro, although there's not as much to look at now in terms of blocks. The surface characteristics have not changed. There are no craters that we see that are bringing up clear, blocky rims. Most of the fresh craters have instant rock around them. The craters are the same size. They are older and more subdued. That instant rock is apparently broken down. I suspect a small zapping breaks that down fairly quickly. (SEP-2)

05 19 22+ CDR \*\*\* up-and-down, hummocky terrain. (SEP-2)

- - -

05 19 22+ CDR The terrain gets a lot more locally hummocky with some well-rounded rims but very large-aspect-ratio craters, which you got to get around in here - in the 4- or 5-meter size. (SEP-2)

05 19 23 27 CDR That's the white mantle we're coming up on right up here. (SEP-2)

05 19 23+ CDR See that on your right? (SEP-2)

05 19 23+ LMP Yes. (SEP-2)

05 19 23+ CDR That's it, there's not going to be that much difference. (SEP-2)

- - -

05 19 23+ CDR See, now you can look where we're going to come up on the white mantle. It's dusted with that light - look at it. (SEP-2)

05 19 23+ LMP Yes. (SEP-2)



05 19 23+ CDR We're only 100 meters from the light mantle. (SEP-2)  
 - - -

05 19 23+ CDR Look at this crater in here. We're coming right up (SEP-2)  
 on it now.

05 19 23+ LMP Yes. There certainly is a change in the general (SEP-2)  
 albedo, particularly in the craters. The craters  
 are much brighter in their walls than we've seen  
 before.

05 19 23+ LMP Although there still is a brown - a light-gray (SEP-2)  
 dusting over the top of it in here, but it's clearly  
 different - no question about that.

05 19 23+ CDR You can't see the contact as you cross it but we (SEP-2)  
 know we're coming into something lighter - you can -  
 obviously see it.

05 19 23+ LMP Yes. We ought to sample the rim of one of these (SEP-2)  
 craters when we get our LRV sample, because that's  
 what's distinctly lighter.

- - -

05 19 24 44 CDR We're at 3.8 here, and we can sample that rim - - (SEP-2)

05 19 24 48 CDR 083, 4.4, 3.8. (SEP-2)

05 + LMP Can you get on the rim of that crater? - - right to (SEP-2)(LRV 2)(SAMP 72140)(PHO 135 20641-43; 137 20896)  
 the right there. Right here - that light stuff.  
 See the big crater here - - and the light material  
 right on the rim?

05 19 24+ CDR Yes. I can get there. But I'm going to have to not (SEP-2)(LRV 2)(SAMP 72140)  
 give you much of a turn because it's - -

05 19 24+ LMP That's all right. I got the pictures. Now, if you (SEP-2)(LRV 2)(SAMP 72140)(PHO 135 20641-43)  
 can swing to the left a little bit and then back -  
 whoa. Now, back right.

- - -

05 19 25 17 CDR Okay, Bob. We're 083, 4.4, and 3.8. (SEP-2)(LRV 2)(SAMP 72140)

05 19 25+ CDR We are in the light mantle. It's not a contrasting light like you might expect, or like we're looking at on the scarp as the Sun shines on it, but I don't think there's any question. (SEP-2)(LRV 2)(SAMP 72140)

05 19 25+ LMP Yes. The craters that penetrate into it are definitely different. However, the surface texture is unchanged. There may be fewer blocks. (SEP-2)(LRV 2)(SAMP 72140)

05 19 26 02 CDR Bag 27 Echo. (SEP-2)(LRV 2)(SAMP 72140)

- - -

05 19 26+ LMP Okay; my locator. (SEP-2)(LRV 2)(SAMP 72140)(PHO 135 20643)

05 19 26+ CDR And my locator. (SEP-2)(LRV 2)(SAMP 72140)(PHO 137 20896)

05 19 26 31 LMP 110. (SEP-2)

- - -

05 19 26 50 CDR One of the remarkable things is the sun-angle difference on that light mantle when you're looking at the slopes of the scarp versus what we're on. I hate to use a familiar term, but my impression right here is there is more of a raindrop influence than back at the LM, or in the darker mantle. (SEP-2)

- - -

05 19 27+ LMP I think the big thing is, though, that each one of these little craters is much more lightly-colored. There's no crater in view that has a blocky rim. There's fragmental rims based on, almost certainly, instant rock, but no blocky rims. (SEP-2)

05 19 27+ CDR You know, one of the reasons those craters look lighter is because of their sun angle. Walls of some of these little craters - it's the same material we're driving on, I'll bet. Yes, there is instant rock right there, Jack, you're right. (SEP-2)

05 19 27+ LMP The fragment population is certainly less than 1 percent in here. (SEP-2)

05 19 27+ LMP When I say fragments, I'm talking about rocks that are greater than a centimeter in grain size. (SEP-2)

05 19 27+ CDR You know, it may be me, Rob; but it also seems to be a little bit more difficult to drive down-sun in this area. (SEP-2)

05 19 27+ LMP Yes, I think it is brighter, Geno. I was thinking that a minute ago, I think your normal albedo is greater. Here's some rocks now starting \*\*\* - - (SEP-2)

05 19 27+ CDR And the little craters still have the central pits. (SEP-2)

- - -

05 19 28+ LMP Yes. There're a few blocks. They still look like the gabbro, though. Hard to tell. (SEP-2)

05 19 28+ CDR Well, a couple of them looked to me like they had some very light \*\*\* crystals in them. See that? (SEP-2)

05 19 28+ LMP I'm afraid those are zap pits. (SEP-2)

05 19 28+ CDR They could be. (SEP-2)

05 19 28+ LMP I got - I think I've been fooled by that, too, and that's why I estimated the plagioclase high. (SEP-2)

- - -

05 19 29 14 CDR We're getting a little more blocks in here. Of course, we're approaching the dark mantle again. Now, you can see the difference. You got to look hard for it. But, you see those craters out in there are not white anymore. (SEP-2)

05 19 29 50 LMP Looking up on the South Massif, we've got real good views of the block-strewn fields. There seems to be two dominant colorations of the rock. The light-colored ones, very light-tan and to white, and then there are the blue-gray rocks. There's one major outcrop of blue-gray about a sixth of the way down the slope, the center of the field of view we have; and it looks very much like similar blue-gray

rocks right at the crest, the highest point from our vantage point.

--

- 05 19 30+ CDR Bob, you want another sample of the dark mantle here? Could you use that? (SEP-2)(LRV 3)
- 05 19 30+ CC Yes, we want - as soon as you get into the dark mantle - we're estimating it's something like 4.3, 4.4, 4.5, somewhere in that vicinity. (SEP-2)(LRV 3)
- 05 19 30+ LMP We're there. See that batch of rocks there? (SEP-2)(LRV 3)
- 
- 05 19 30+ CDR 082, 5.0, and 4.3. (SEP-2)(LRV 3)
- 05 19 30+ LMP I got the rock, and there's some dirt in there. Maybe I'd better get a little bit more dirt. (SEP-2)(LRV 3)(SAMP 72150,55)(PHO 135 20649; 137 20897)
- 
- 05 19 30+ LMP Much soil? (SEP-2)(LRV 3)(SAMP 72150,55)
- 
- 05 19 30+ CDR Couple teaspoonsfull. Twenty-eight Echo, Bob. (SEP-2)(LRV 3)(SAMP 72150,55)
- 
- 05 19 32+ CDR And that's primarily a rock fragment. Jack's getting a soil fragment - soil sample with it. (SEP-2)(LRV 3)(SAMP 72150,55)  
(SAMP 72160-64)(PHO 135 20649; 137 20897)
- 05 19 32+ CDR Jack, look at the wrinkles over there on the North Massif. (SEP-2)(LRV 3)
- 05 19 32+ LMP Yes, there's no question that there is apparent lineations all over these massifs, in a variety of directions. Hey, look at how that scarp goes up beside there. There's a distinct change in texture. (SEP-2)(LRV 3)
- 05 19 32+ LMP As a matter of fact, lineations are not present on the scarp, that we can see, where it crosses the North Massif. There is no sign of those lineations on there. (SEP-2)(LRV 3)

--

05 19 32+ LMP Look over by Hanover. (SEP-2)(LRV 3)

05 19 32+ CDR It looks like the scarp overlays the North Massif, doesn't it? (SEP-2)(LRV 3)

05 19 32+ LMP Yes. (SEP-2)(LRV 3)

05 19 32+ CDR This last one was 29 Echo. (SEP-2)(LRV 3)(SAMP 72160-64)

05 19 32+ CC And that's the soil. (SEP-2)(LRV 3)(SAMP 72160-64)

--

05 19 33 28 CDR We are rolling. (SEP-2)

--

05 19 33+ LMP Hanover is quite a ways up the slope. I don't think we'd have gotten to it, as we planned that time. But the appearance you have of the scarp - North Massif contact is one of the scarp being smoother-textured, less cratered, and certainly less lineated. And I wouldn't be a bit suprised if it's, as Gene says, younger. (SEP-2)

05 19 33+ CDR But it's not just this slope, it's the materials on the other side of the scarp, on the west side. (SEP-2)

05 19 33+ LMP Okay, I'm going to have to really ease up on picture. (SEP-2)

05 19 33+ LMP That frame at the LRV sample was about 115. (SEP-2)

--

05 19 33+ LMP Okay, we're back down in our old friend, the dark mantle. And I think the zero phase point is not as bright as it was. Passing a small crater, but the block population is still way down there in about 1 percent. (SEP-2)

--

(SEP-2)

05 19 36 12 LMP Okay here's another small crater - instant rock, with the same little pits and a spattering of glass holding the pit materials together. None of the glass linings look very coherent. They mainly just seem to be a sprinkling of glass that's - some - helping or coating the instant rock.

(SEP-2)

05 19 36+ LMP The craters at about 10 to 15 meters in diameter seem to have somewhat more blocky material in their rims. But they're not clear cut blocky-rim craters. And here's one that's probably 50 meters across that has a fair number of blocks in the bottom. Looks like it might have just about gotten down to where the gabbro starts to be abundant again.

- - -

(SEP-2)

05 19 36+ CDR Got Hole-in-the-wall, Bob. It's a very long, very subtle, very gentle slope. We'll just have to get some more words when we get there.

- - -

(SEP-2)

05 19 37 05 CDR Okay, 082, 5.6, and 4.9.

(SEP-2)

05 19 37+ CC Copy 4.9 on the range.

- - -

(SEP-2)

05 19 37+ LMP We're not in light mantle, I don't think. Maybe we are.

(SEP-2)

05 19 37+ CDR I think we are, Jack.

(SEP-2)

05 19 37+ LMP Yes, I guess we are.

(SEP-2)

05 19 37+ CDR I think we are. According to my geology map \*\*\*

(SEP-2)

05 19 37+ LMP I guess we are. Gosh, I was going to say the craters are whiter than they have been. So, we're back in it. And - - even the phase point's brighter too.

(SEP-2)

05 19 37+ CDR I think that place where we had those small, blocky craters was in the dark mantle. They're not evident here in the lighter stuff.

(SEP-2)

The rock fragments still look like gabbro. The craters tend to have white walls and white rims, which they don't have in the dark mantle area. The block population is way down, 1 percent or less. However, the bigger craters do have more blocks; but nowhere does that population seem to get above about 5 percent. And that's on the walls and the rims of the craters, say bigger than 15 meters. There's one probably 20 meters in diameter that has some blocks on it.

(SEP-2)

We're looking at Lara. I can see blocks in the northwest rim of Lara. At least, it's rugged terrain; and it looks like blocky terrain. One spot - is all I see. It looks like it may be a couple hundred meters in average diameter. It starts about - maybe three-quarters of the way up the wall and goes right up on the rim.

(SEP-2)

Look at that crater! That pit - that central pit goes down about half the depth of the crater, and the crater is a fresh 3-meter crater. It almost was a cylindrical pit. Hole-in-the-wall is just a step - headed down to the south or southeast on the scarp. Scarp is just about what I think we all expected it to be. It's very rolling and relatively smooth. I don't really see any outcrops exposed anywhere out here to the south.

(SEP-2)

You see, now there's Station 3 area right up there.

(SEP-2)

See that bright bigger crater over there to the right of Lara? That's probably a good place for Station 3.

(SEP-2)

Yes, way over there. Okay, we're going to find out something very shortly.

(SEP-2)

It doesn't look very rocky, Gene.

(SEP-2)

How about bearing and range, guys?

05 19 41+ CDR Bob, I'll give it to you just as soon as I make (at SEP-2)  
Hole-in-the-wall?) my turn. It's not too far - 100  
meters -

05 19 41+ CDR I'm going right up straight ahead and then go on to (SEP-2)  
the inside of that place.

05 19 41+ LMP That's more than 100 meters. (SEP-2)

05 19 43 08 CDR 081 and 5.6. (SEP-2)

05 19 43+ LMP Now the craters are getting very, very light-colored (SEP-2)  
- in the rims and walls.

05 19 43+ CDR You notice when we're in the light mantle looking at (SEP-2)  
the scarp, at this angle, it loses some of its high  
albedo?

05 19 43+ LMP Yes. Yes. I think we're getting - - (SEP-2)

05 19 43+ CDR We've got a long depression to go around. (SEP-2)

05 19 43+ LMP Your eyes get used to it. (SEP-2)

05 19 43+ CDR Okay, Jack, we got to watch it because I got to go (SEP-2)  
around a long depression. That's a crater over  
there.

05 19 43+ LMP On the right, yes. (SEP-2)

- - -

05 19 43+ CDR I may have to go up over there. I can't go down (SEP-2)  
that hole. That one's not going to make it.

- - -

05 19 43+ CDR We'll go up this gentle slope. See what's on top. (SEP-2)

05 19 44 17 LMP We made a turn to the south a little bit at 081 and (SEP-2)  
5.7.

- - -

05 19 44 47 CDR I'm starting up the scarp at 081, 6.6, and 5.7. (SEP-2)

05 19 44+ LMP This is the first tongue of the scarp. (SEP-2)



(SEP-2)

05 19 45+ LMP Whatever makes up the light mantle is - at least, the instant rock that it forms is much lighter than anything we see. Those fragments probably - are 30 percent lighter than any fragments we see on the dark mantle. And that's around the fresh craters. But it is not blocky.

(SEP-2)

05 19 46 25 CDR We're doing a little zig-zag navigation. Literally came up a slope at about a heading of 240. We couldn't get through the actual turn to the south because there is a big crater right at the foot of it. So we're just making our way through some relatively local undulating slopes that get pretty steep, but it seems to be no problem.

(SEP-2)

05 19 46+ LMP There are not any blocks big enough to really make a statement about what the rock is. But it really doesn't look like gabbro anymore.

(SEP-2)

05 19 46+ LMP We're not on top of that scarp, yet. We're still in the Hole-in-the-wall rim.

(SEP-2)

05 19 46+ LMP As far as lineations in the soil or on the surface that are observable at this range, I don't see any. I think there may be a finer raindrop pattern on the light mantle than maybe there was out on the dark. But that's an awfully hard judgment to make.

(SEP-2)

05 19 48 49 LMP Bob, it looks like maybe the large fragments in here are still crystalline. They have white zap pits on them. But they do not yet really resemble the gabbro.

(SEP-2)

05 19 48+ CDR I've got to go cross-slope some of the time because the Rover is really working to go uphill now.

05 19 48+ LMP As I look up the scarp to the west, there are some (SEP-2)  
big blocks scattered around on our horizon; but,  
again, I would guess that we're not dealing with  
more than - 2 or 3 percent total coverage of blocks  
in here, at that.

- - -

05 19 48+ LMP We're on top. (SEP-2)

05 19 49 53 CDR Bob, we're at 078, 7.2, and 6.2. (SEP-2)

05 19 49+ CDR Jack, where was Nansen with respect to those tracks (SEP-2)  
up there?

05 19 49+ LMP Well, they never really had any good tracks pinned (SEP-2)  
down. You'll be able to see Nansen, I think soon as  
you get over this hill.

- - -

05 19 49+ LMP Head towards that track area there. There are a lot (SEP-2)  
of boulder tracks coming down from the blue-gray  
rocks. We'll see whether or not we're going to get  
to those tracks at Nansen, or we might want to move  
over to the track and see if we can find the boulder  
that made them.

- - -

05 19 49+ LMP But there's no question where those tracks come (SEP-2)  
from.

- - -

05 19 49+ LMP I have the impression that there is a dipping zone (SEP-2)  
of blue-gray outcrops or block concentrations up  
there on the massif that trends from the high point  
just beneath the earth - cross-slope - and the  
apparent dip is - oh, I don't know, 10 or 15 degrees  
to the east. It looks like those outcrops may match  
up along that trend.

05 19 49+ CDR Jack, I'm going to head right along this ridge (SEP-2)  
because I think that's the depression we were  
talking about.

05 19 49+ LMP Yes, that's Nansen down there. (SEP-2)

- - -

05 19 49+ LMP We're a little more west, I think, than we intended to be. (SEP-2)

05 19 49+ CDR Yes, I think you're right. (SEP-2)

05 19 52 18 LMP 7.8 and 6.5. (SEP-2)

05 19 52+ LMP I've had an impression, and I can't prove it yet, that we're dealing with more heterogeneous rock. Possibly there are breccias in here. But it's awfully hard to tell right now. They're very light-colored rocks - I think even lighter-colored than the gabbros. (SEP-2)

- - -

05 19 52+ LMP I think the ones (tracks) from the big outcrop of blue-gray rock, though, are the ones going into Nansen. (SEP-2)

05 19 53 29 CDR My best guess - 077, 7.7, 6.6 - is that we're coming up on the northern side of Nansen. (SEP-2)

- - -

05 19 53+ CDR Okay, there's Nansen over there, huh? (SEP-2)

05 19 53+ LMP Well, I think so. (SEP-2)

05 19 53+ CDR Yes. (SEP-2)

05 19 53+ LMP I think you're right. It's got to be it. I think we're into a breccia population now. I think the blocks in the light mantle are largely breccias. They're mottled in their characteristics. Their white caps do not seem to be nearly as apparent. They tend to be chalky when they get hit. At least, in the large craters, the walls are chalky looking. Oh, yes. We've got boulders in Station? (SEP-2)

- - -

05 19 53+ LMP We're very clearly going downhill now, into the (SEP-2)

trough area that surrounds the massif - or between the mantle and the massif. But the trough is much greater in extent than just Nansen scale. It's probably a kilometer wide. I never realized that it was so much of a depression in here.

- - -

05 19 56 35 CDR 074, 8.2, 6.9. (SEP-2)

05 19 56+ CDR We won't be able to see the LM from down here. (SEP-2)

We'll be too low to see it.

05 19 56+ LMP The surface patterns are still the same, Bob. The (SEP-2)

main difference being that we're getting probably a gradual increase in block population and the blocks seem to be of a different character. They may be breccias.

05 19 56+ LMP And around the crater here that's maybe 75 meters in (SEP-2)

diameter, there's probably 5 percent blocks - fragments, I should say - greater than a centimeter.

- - -

05 19 56+ LMP There's a good-sized block, sort of blue-gray. (SEP-2)

- - -

05 19 56+ CDR Some of that stuff is mantled - or buried in the (SEP-2)

massif material. Some of it just seems to be laying on it, of course.

05 19 56+ LMP Yes. Well, I think it has to do with how long it's (SEP-2)

been there. You'll tend to get the downslope movements forming uphill fillets, and that's what a lot of it looks like.

05 19 56+ CDR Most of it is uphill fillets. Most of it is pretty (SEP-2)

sharp. But my guess, from back at the LM, that those blocks on the massif were much more angular - I think is a good guess because that's what they look like to me here.

05 19 56+ LMP And looking up into our blue-gray outcrop area, I still have even more the impression that there's a planar orientation that dips off to the southeast - maybe just fracturing, but pretty clear up there, I think. It may be shadows. (SEP-2)

--

05 19 58+ LMP As we get closer, we're out of the very - the block area. And that blocky region of 5 percent may have been just associated with that crater. I still see no lineations although --

05 19 58+ CDR Look at these wrinkles, though, Jack -- (SEP-2)

05 19 58+ LMP Yes. I was talking about the mantle. (SEP-2)

05 19 58+ LMP But you're right about on the massif. (SEP-2)

05 19 58+ CDR The same wrinkled lineations we saw sloping uphill to the west on the eastern half of the massif are still very evident at this sun angle.

--

05 19 58+ LMP The boulder tracks are really just chains of small craters, for the most part. (SEP-2)

--

05 20 01 08 CDR We're 071, 8.9, and 7.4. (SEP-2)

05 20 01+ LMP There's Nansen off to my right now. (SEP-2)

05 20 01+ CDR Yes, I just want to make sure that I'm not driving down a hole here, which I am, but - I don't want to drive down Nansen. (SEP-2)

05 20 01+ LMP No, you won't. The saddle - the end of Nansen is over there near those blocks. Right over there. (SEP-2)

05 20 01+ LMP Look at those blocks. Unfortunately, the good boulder tracks are over into Nansen. (SEP-2)

05 20 01+ LMP I think just about anywhere near the big blocks -- (SEP-2) would be a good Station 2.

05 20 01+ CDR - - that's where I'm going to put it. (SEP-2)  
 - - -

05 20 01+ CDR Boy, you're looking right into Nansen. (SEP-2)

05 20 01+ LMP Yes. We're right where we wanted to be for Station (SEP-2)  
 2. It looks like a great place. Big blocks. It  
 looks like quite a bit of variety from here.  
 Different colors, anyway. Grays and lighter-colored  
 tans.

05 20 01+ CDR Hey, Jack, I'm going to do a 180 and park the Rover (SEP-2)  
 at 045.

05 20 01+ LMP Those are two good - there's a blue-gray rock and a (SEP-2)  
 lighter-colored tan rock.

- - -

05 20 01+ CDR Right on the other side of this little crater. \*\*\* (SEP-2)  
 heading \*\*\* 045.

05 20 01+ CDR 045 \*\*\* 9.1, 7.6. (2)

- - -

05 20 01+ CC And you want to give me the bearing one more time (2)  
 there, Gens.

- - -

05 20 05+ CDR 071, 071 is the bearing. (2)

05 20 05+ LMP 142 on the LMP's camera. (2)

- - -

05 20 06+ CC Jack, we'd like to go to India on the magazine for (2)  
 you.

- - -

05 20 09+ LMP The number of blocks plotted on the map are not (2)  
 nearly enough. In the greater than 1-meter range,  
 there are many hundred blocks on the massif flank of  
 Nansen and up around Station 2, where we are. There

are only one or two blocks on the light mantle side of Nansen. It looks as if the material in the bottom of Nansen is overriding the light mantle materials of the north wall. That's just an impression. They're slightly lighter albedo than the north wall of Nansen.

--

05 20 09+ LMP I suggest that we do our raking - fairly close to (2)  
the Rover to get the front of the general population  
of talus material coming off the massif.

--

05 20 12+ LMP The blue-gray rocks are breccias. They're (2)  
multilithic, gray matrix - matrix breccias, I guess.  
There are fragments in them, but it doesn't look  
like more than about 10 or 15 percent fragments.  
Some of the light-colored fragments seem to have  
very fine-grained dark halos around them. The zap  
pits do not have white halos, so I suspect they are  
not crystalline. They might be glass - they might  
be the vitric or glassy breccias. At least, the one  
big rock we have here.

05 20 12+ LMP There's a rough, very rough, foliation in them - (2)  
it's shown by the elongate knobs on the surface. It  
looks like a fracture foliation of some kind.

05 20 12+ CDR Jack, that rock has almost got to have come down, (2)  
don't you think?

05 20 12+ LMP Oh, no question about it. I'll bet you it's the (2)  
same as the blue-gray rocks we see up higher.  
Here's some more blue-gray ones over here.

05 20 12+ CDR Look at the size of some of these light fragments in (2)  
here.

05 20 12+ LMP It looks like they're dominantly matrix breccias. (2)  
There are light-colored fragments, and they may be  
crystalline.

05 20 12+ LMP They are. They're very light-colored; they look (2)  
like the shattered anorthosites. They have white  
halos - I think that's what those fragments are.

05 20 12+ CDR Jack, let's get a piece of this one right here. (2)(SAMP 72210,15)(PHO 137 20900-09; 138 21029-37)

05 20 12+ CDR Biggest one here. (2)(SAMP 72210,15)

05 20 12+ LMP Get her up. This is the blue-gray variety. (2)(SAMP 72210,15)

05 20 12+ CDR I'm going to take that little knob off up there. (2)(SAMP 72210,15)

05 20 12+ LMP Okay; well, you can sample - you can work that block (2)(SAMP 72210,15)  
over - - we can get several examples. We ought to  
sample across that layering, actually - that  
foliation.

05 20 15 21 CDR When you look down into the bottom of Nansen, it (2)  
looks like, I guess - which sounds obvious - that  
some of the debris that has rolled off of the South  
Massif covers up the original material there that  
covers the north wall of Nansen. There is a  
distinct difference. You've got that very wrinkled  
texture in the north slopes of Nansen, and you've  
got the South Massif - debris in the south slopes of  
Nansen. And the debris, of course, overlays - the  
north slope. And all the rock fragments, all the  
boulders that have come down are all on the south side  
of the slope of Nansen.

05 20 15+ LMP I take back what I said about no halos. There are (2)  
light - not very sharply light - but light halos  
around zap pits in the matrix. The matrix glass is  
dark, and it seems to have a greenish cast; but it's  
very dark.

05 20 15+ CDR Oh, look at that blue. (2)

05 20 15+ CDR Look at the white fragments in there. (?)

05 20 15+ CDR Man, there's some boulder rolling rocks here, Jack. (2)

05 20 15+ LMP Okay, don't wreck the fillet. There's an overhang (2)  
we've got to get into.

05 20 16 53 LMP 514 is the - okay, I'll take it back. On the fresh (2)(SAMP 72210,15)  
surface, these look like fragment breccias although  
the fragment size is fairly small. There are  
dark-gray fragments and the light fragments we  
talked about. The gray ones are very fine-grained



and dense, although I see flashes that indicated they may be crystalline. The light-colored fragments are as I described them earlier, I think.

--

05 20 16+ LMP Gene's got a rock to go. That's from up higher? (2)(SAMP 72230,35)(PHO 137 20900-09; 138 21029-37)

05 20 16+ CDR That's a little higher. See that shelf up there? (2)(SAMP 72230,35)

05 20 16+ LMP The first rock was from about a - 514 was from a meter above the base of the rocks; 515 is from about a meter and a half. (2)(SAMP 72210,15)(SAMP 72230,35)

05 20 18 05 LMP Can you get some on either side of those two now? (2)

05 20 18+ CDR Yes. (2)

--

05 20 18+ LMP That's a north/south overhang. (2)

05 20 18+ CDR Yes. That one? (2)

05 20 18+ LMP Yes, you're facing right into the east. (2)

05 20 18+ CDR Yes. I don't know if I can get a piece back here or not. (2)

05 20 18+ LMP How about right where you \*\*\* yes. (2)(SAMP 72250,55)(PHO 137 20900-09; 138 21029-37)

05 20 18+ CDR Right here? I can get that. (2)(SAMP 72250,55)

05 20 18+ LMP Yes, that's good. (2)(SAMP 72250,55)

05 20 18+ LMP Oh, beautiful. Hit the gnomon. (2)(SAMP 72250,55)

05 20 18+ CDR It didn't move. It just tilted it. (2)(SAMP 72250,55)

05 20 18+ LMP This it? (2)(SAMP 72250,55)

05 20 18+ CDR Yes, that's it right there. (2)(SAMP 72250,55)

--

05 20 18+ LMP 494 is from a half a meter above the base of the rock. (2)(SAMP 72250,55)

05 20 18+ LMP And these are samples from across the layering - or the foliation. (2)(SAMP 72210,15,30,35,50,55)

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05 20 18+ CDR How about this one? Here's a whole big piece. (2)(SAMP 72270,75)(PHO 137 20900-09; 138 21029-37)

05 10 18+ LMP Okay. That's a good representative fragment. Can you get it? (2)(SAMP 72270,75)

05 20 18+ LMP That's a football-size fragment. Okay, this next sample - can you get a bag out, and we'll try to put it around it. Around the end. It's highly variable. This is a light-matrix breccia; whereas the other three fragments were dark-fragment matrix or dark-fragment breccias. The big rock is a light-matrix breccia with dark fragments, and it's the one that has the halos around the light fragments. And that's in 495, barely. It's not even in it. 495 is wrapped around it. (2)(SAMP 72270,75)

05 20 20 50 CDR It's not going to stay. (2)(SAMP 72270,75)

--

05 20 20+ CDR It's a football-size fragmental rock. (2)(SAMP 72270,75)

05 20 20+ LMP Why don't you just stuff it. See if you can stuff it in there with the bag down - - (2)(SAMP 72270,75)

05 20 20+ CDR We'll be able to identify it when we get - 495 when we get back. Okay, it'll stay. (2)(SAMP 72270,75)

05 20 20+ LMP Is the bag on it now? (2)(SAMP 72270,75)

05 20 20+ CDR Well, yes. (2)(SAMP 72270,75)

--

05 20 20+ CC Do you guys see any tracks coming down to these boulders? Do have any feeling that you can place these that way? (2)

05 20 20+ LMP Unfortunately, no. The main tracks are out into Nansen, and I don't think we can get over there. (2)

--

05 20 20+ LMP Coming up I was looking; and there are no obvious tracks coming down here. (2)

- - -

05 20 20+ LMP The gnomon was moved a little between the samples. (2)

05 20 20+ CDR Do you need to take a vertical pan? (2)

05 20 20+ LMP Yes, I've gotten it all. I'm getting it all. (2)

05 20 20+ CDR You getting the flight line? I'll get a flight line (2)(PHO 137 20902-09) this way. Postsample, flight line.

05 20 20+ CDR I'm on frame count 42. (2)

05 20 22 19 CDR Did you get a locator from here, Jack? (2)(PHO?)

05 20 22+ LMP Yes. (2)(PHO?)

05 20 22+ LMP I got flight line on the north/south trend; Gene got (2)(PHO 138 21029-35) east/west. (PHO 137 20902-09)

05 20 22+ CDR You going to get that sample under there? (2)(SAMP 72220-24)(PHO 137 20900-09; 138 21029-37)

05 20 22+ LMP Yes, we got to get the soil. (2)(SAMP 72220-24)

05 20 22+ CDR There must be an overhang. And look at that frag - (2) that rock is - fragmented; let's see it's southeast/northwest. - there's a split.

- - -

05 20 22+ LMP This is a fillet from underneath the rock. (2)(SAMP 72220-24)

05 20 22+ LMP This fillet is up underneath an overhang. I got it from about - - oh, a third of a meter under an overhang. And it's the upper 3 centimeters of soil. (2)(SAMP 72220-24)

05 20 22+ CDR And it's bag 496.

05 20 22+ LMP Now let me get one out away from the overhang a little bit. (2)(SAMP 72240-44)(PHO 137 20900-09; 138 21029-37)

05 20 22+ CC You think that's permanent shadow? (2)(SAMP 72240-44)

05 20 22+ CDR No. It's facing east. (2)(SAMP 72240-44)

05 20 22+ LMP And a sample down to a depth of about 5 centimeters, (2)(SAMP 72240-44)  
about two-thirds of a meter from the - boulder - the  
south side - is in 497.

05 20 22+ LMP Now let me get a skim sample, Geno. (2)(SAMP 72260-64)(PHO 137 20900-09; 138 21029-37)

05 20 22+ CDR Okay. I got to take a set of pictures after that, (2)(SAMP 72260-64)(PHO?)  
by the way. Show where they are.

05 20 22+ LMP I can piece them into my flight line stereo. (2)(SAMP 72260-64)(PHO 138 21029-37)

05 20 22+ CDR They were in both of the before pictures on those (2)(SAMP 72260-64)(PHO 137 20900-01)  
rocks.

05 20 22+ LMP Okay; about a centimeter deep - skim. (2)(SAMP 72260-64)

05 20 22+ CDR Careful. You're in a hole. You better come out. (2)(SAMP 72260-64)

- - -

05 20 22+ CC Give sample bag number, please. (2)(SAMP 72260-64)

05 20 22+ LMP Okay, Bob. I missed that. I didn't give it to you; (2)(SAMP 72260-64)  
but I think - well the next bag I take out, you can  
check the num - well, wait a minute, I'll do it for  
you.

05 20 22+ CC No. That's okay. I suspect it's 498. (2)(SAMP 72260-64)

05 20 22+ LMP I'm almost positive it was 498. (2)(SAMP 72260-64)

- - -

05 20 26 13 LMP Looking at the blocks directly down-sun, the (2)  
light-gray, or the gray-matrix breccias seem to be  
fragments, or schlieren anyway, within the  
white-matrix breccias.

05 20 26+ LMP And I got a couple pictures down-sun to show that (2)(PHO 138 21036-37)  
texture.

- - -

05 20 26+ LMP We're going after a gray - I mean a lighter-colored block, now. Are you going up there? (2)

05 20 26+ CDR Yes. (2)

05 20 26+ LMP You're still on the talus. The rims of the small craters in the talus are softer than the - normal terrain. My foot goes in maybe 10 centimeters where normally it only goes in a centimeter.

- - -

05 20 28 20 LMP Okay, 670, 155, 201; 670, 155, 201. (2)

05 20 28+ CDR I'm at another boulder up the slope here. It's looks quite similar to the one we just sampled, except there is a lot of flake fractures on it. Nonuniform nondirectional - but quite different at least from that other rock, in terms of the fracture pattern. The texture looks to be quite similar.

05 20 28+ LMP On these rake samples, there is just no point in carrying a rake all the way up here - - because all we needed was a break in the slope. (2)

05 20 28+ CC As long as you're above the break in the slope; that's right. (2)

05 20 28+ LMP It's being done. (2)

- - -

05 20 28+ LMP We want to get away from that big rock because it's probably shedding. Hey, that's a different rock, Gene. ?

05 20 28+ CDR Yes. Well, it looks like the same texture, but it's got that flaky fracture pattern all over it. I'm going to get a stereo while I'm at it. (2)(PHO 137 20912-16)

05 20 28+ CDR This ought to cover any samples I take off of that thing. (2)(PHO 137 20912-16)

- - -

05 20 28+ LMP This is a crystalline rock, Houston. It's got nice white halos around the zap pits. The zaps are not - dense black glass, but a very dark greenish-gray. (2)

05 20 28+ CDR Are those halos or fragments? (2)

05 20 28+ LMP No, they're halos. Well, they are fragments, I think, also. It's fairly crystalline, but it is heterogeneous. Matter of fact there's a big fragment of a porphyry caught up in this thing, I think. (2)

-- --

05 20 31+ LMP And there's a chunk there we can get. That's a big fragment within this crystalline rock - - inclusion. (2)(SAMP 72310,15)(PHO 137 20912-16; 138 21038-42)

05 20 31+ CDR Take a picture of that and then your locator, I'll get it. (2)(SAMP 72310,15)(PHO 138 21038-39)

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05 20 31+ LMP Looks like a porphyry is what it looks like. (2)(SAMP 72310,15)

05 20 31+ CDR It does look like a crystalline rock. (2)(SAMP 72310,15)

05 20 31+ LMP Looks like an andesite porphyry. (2)(SAMP 72310,15)

05 20 31+ CDR The \*\*\* has got the very large crystals in there. They're very reflective, elongated crystals. (2)(SAMP 72310,15)

05 20 31+ LMP It's a relatively angular inclusion about a half a meter in size, and it's a square cross section. Well, it's irregular; but generally square cross section. It's in bag 516, and it looks like a - well it's a high feldspar rock. It may be an anorthositic gabbro, but it does look like a porphyry. (2)(SAMP 72310,15)

05 20 31+ CDR There's a big chunk where I've got - I can't get it out, though; it's buried in a rock - half of an inch elongated - I can't see whether they are colorless or not, but they are certainly reflective crystals. See that up here? See right there? (2)

05 20 13+ LMP Yes. (2)

05 20 31+ CDR And then in the big rock, you've got massive things (2)  
like this big fragment here - that's 5 inches  
across.

05 20 31+ LMP That may be a spall point, Gene, that's a  
lighter-color, in general, because of a zap or  
something.

05 20 31+ CDR Let me get some more samples of it. (2)(SAMP 72330,35)(PHO 137 20912-16; 138 21038-42)

05 20 31+ LMP Yes, we need to get some of the host rock here. (2)(SAMP 72330,35)

05 20 31+ CDR We'll get a piece here. (2)(SAMP 72330,35)

05 20 31+ LMP You're still sampling the one we just got. So we'll (2)(SAMP 72330,35)  
get another one.

05 20 33 42 LMP The same kind - or the contact of that rock looks  
like it might be finer-grained - but it's about the  
same - in 517. That's the contact in the inclusion  
side of the contact. Keep going after the other  
one, Gene, I'll get this in your bag. (2)(SAMP 72330,35)  
(SAMP 72350,55)(PHO 137 20912-16; 138 21038-42)

- - -

05 20 33+ LMP The host rock for the inclusion, which appears to be  
also crystalline but may be a recrystallized rock of  
some kind - ~ metamorphic - also looks like it's  
high plagioclase - high feldspar, anyway. That's in  
bag 518 - and that was a loose frag - fairly loose  
but in piece fragment along the fracture zone. (2)(SAMP 72350,55)

05 20 33+ CDR I'm going to try to get the rest of it up there. (2)(SAMP 72370,75)(PHO 137 20912-16; 138 21038-42)

- - -

05 20 33+ LMP This is a medium-grained anorthositic gabbro, and it (2)(SAMP 72370,75)  
looks like it has some pastel-green olivine crystals  
in it. Did you get it?

05 20 33+ CDR I can't get any more of it, Jack, up there. I can't (2)(SAMP 72370,75)  
reach any more.

05 20 33+ LMP Okay, and that small chip of that is in 519. It's (2)(SAMP 72370,75)  
the same host - rock, much like the previous sample.

05 20 33+ CDR There's a good sample for you. (2)(SAMP 72390,95)(PHO 137 20912-16; 138 21038-42)

05 20 33+ LMP Another chunk of the host - (2)(SAMP 72390,95)

- - -

05 20 33+ LMP It's in there. I haven't closed your bag yet. And (2)  
 we've got to - get one soil sample up the hill here.  
 Oh, we didn't get the rake -

05 20 33+ LMP We'll get the rake sample right over here on this (2)(SAMP RAKE 72530-59)(PHO 138 21043-46; 137 20962)  
 slope.

- - -

05 20 33+ CC Was that last sample in 518, as well? (2)(SAMP 72390,95)

05 20 33+ CDR There it is. That's it right there. (2)(SAMP 72390,95)

05 20 36 31 LMP No. We haven't put it in yet. (2)(SAMP 72390,95)

05 20 36+ CDR That will go in 499. (2)(SAMP 72390,95)

05 20 36+ LMP This is a fairly uniform-looking rock. It does have (2)(SAMP 72390,95)  
 some widely spaced fractures across it. It's  
 clearly crystalline and has crystalline inclusions  
 in it.

05 20 36+ CDR Might get the soil from around that thing. (2)(SAMP SOIL 72320-24)(PHO 138 21043-46; 137 20962)

05 20 36+ LMP Both rocks look like they might be in the (2)  
 anorthositic class - of rocks. It's just that -  
 one has the appearance of being a finer-grained  
 matrix. Looks like a porphyry in the boulder.

- - -

05 20 37 59 CDR I've got a stereo - I'll just continue my stereo (2)(SAMP SOIL 72320-24)(PHO 137 20912-16)  
 around here. Hey, Jack, you can get way under  
 there, and I know you could get soil. I don't know  
 how long it's been shadowed, but it's been shadowed  
 as long as this rock's been here.

05 20 37+ LMP I'll do that. (2)(SAMP SOIL 72320-24)

05 20 37+ CDR I've got a stereo of this one. (2)(SAMP SOIL 72320-24)(PHO 137 20912-16)

05 20 37+ CDR I've already got it. (2)(SAMP SOIL 72320-24)(PHO 137 20912-16)



05 20 37+ LMP Well, I'm getting it from this way, and they like that. Did we kick any dirt in under there? (2)(SAMP SOIL 72320-24)(PHO 138 21038-42)

05 20 37+ CDI I don't think so. Go way down in there. Let me get a couple of after pictures. Yes, we want to get two sides of these rocks, and you can see their structure. (2)(SAMP SOIL 72320-24)(PHO?)

05 20 37+ LMP I took that stereo. (2)(SAMP SOIL 72320-24)(PHO?)

05 20 37+ LMP I got under an east-west overhang about - 20 centimeters - ways back - quite a ways back; it goes even farther, but that's about as far as I can reach back there now. (2)(SAMP SOIL 72320-24)

05 20 37+ LMP That's in bag 500. (2)(SAMP SOIL 72320-24)

05 20 40+ CDR And, Bob, I took an after picture of where Jack just got that soil sample under the rock from; and I'm on 60. (2)(SAMP SOIL 72320-24)(PHO 137 20925)

05 20 40+ CDR I'll go up there and get a pan, Jack. (2)(PHO 137 20926-56)

05 20 40+ LMP We're on a pretty good slope, Geno. (2)(PHO 137 20926-56)

05 20 40+ CDR This pan may be looking right smack in the sides of the mess!fs. Only way you can get it is to lean back - and I can't lean downhill. (2)(PHO 137 20926-56)

05 20 40+ CC Hey. Watch out for that crater behind you there, Geno. (2)(PHO 137 20926-56)

05 20 40+ CDR I'm standing in the crater so I can get level. (2)(PHO 137 20926-56)

05 20 40+ CDR Well, I have some good pictures of Nansen, anyway. (2)(PHO 137 20926-56)

05 20 40+ LMP Bob, my down-sun pictures on the rake were taken at 138 21043-46; 137 20962 f:8. I'm sorry.

05 20 40+ CDR I'll be right down there to bag that rake for you. (2)(SAMP RAKE 72530-59)

05 20 42+ LMP Not many small walnut-sized fragments in here, Bob. Gotten about seven or eight. (2)(SAMP RAKE 72530-59)

05 20 42+ CDR Bag 501. (2)(SAMP RAKE 72530-59)

05 20 42+ CDR No, there aren't a lot; but that'll fill up a bag. (2)(SAMP RAKE 72530-59)

05 20 42+ CC And this is the one that we would like to get the kilogram of soil from, Jack. (2)(SAMP SOIL 72500-05)(PHO 138 21043-46; 137 20962)

05 20 42+ LMP Okay. I'll use my scoop for that. (2)(SAMP SOIL 72500-05)

05 20 45 27 CDR Bag 501. (2)(SAMP SOIL 72500-05)

05 20 45+ CDR Okay, my pan, by the way - I got extensive vertical coverage down into Nansen, Bob. (2)(PHO 137 20926-56)

05 20 45+ CDR 502, Bob, will be the kilogram. (2)(SAMP SOIL 72500-05)

05 20 45+ LMP And that's sample down to about 4 centimeters. (2)(SAMP SOIL 72500-05)

05 20 45+ CDR Oh, that's a big bag full. (2)(SAMP SOIL 72500-05)

05 20 46+ CC Okay. And guys - do you see any more different blocks up there that are worth sampling before you go on down on to the flats and sample the light mantle? (2)

05 20 46+ LMP We haven't had a chance to look around any more than (2) you've heard.

--

05 20 46+ LMP Get an after, Gene. (2)(SAMP SOIL 72500-05)(PHO 137 20962)

05 20 46+ CDR Yes. Got it. (2)(SAMP SOIL 72500-05)(PHO 137 20962)

--

05 20 46+ CDR Jack got the before on the rake and I got the after. (2)(PHO 138 21043-46; 137 20962)

05 20 46+ CDR Here are two rocks side by side, a meter or two in diameter. And one is the anorthositic gabbro, if I can use the term; and the other is that two-cycle breccia. (2)(SAMP 72410,15-18)(PHO 138 21047-49; 137 20963-65)

--

05 20 46+ LMP Set up right there. Let's get that big clast. (2)(SAMP 72410,15-18)

05 20 46+ LMP There's a fracture right in there I want to get near. (2)(SAMP 72410,15-18)

05 20 46+ CDR Oh, the clast. (2)(SAMP 72410,15-18)

05 20 46+ LMP Yes. (2)(SAMP 72410,15-18)

05 20 46+ LMP Big white clast in the gray-matrix breccia. (2)(SAMP 72410,15-18)

--

05 20 46+ LMP Pretty hard, isn't it? That boulder's going to roll. (2)(SAMP 72410,15-18)

05 20 46+ CDR Man, that is hard. There's the same clast over there. (2)(SAMP 72410,15-18)

05 20 46+ CDR That clast is sort. (2)(SAMP 72410,15-18)

05 20 46+ LMP Can you use your - your blade end? (2)(SAMP 72410,15-18)

05 20 46+ CDR Yes, let me get that little piece, anyway, to start with. Got it. There's two more pieces. (2)(SAMP 72410, 15-18)

05 20 46+ LMP Before we cover them up, let's get them. (2)(SAMP 72410, 15-18)

05 20 46+ CDR I got to get a sample of that mother (host) rock. (2)(SAMP 72410, 15-18)

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05 20 46+ LMP Want to try to hit that one more time. I think we've got another one coming there. There's another little one. (2)(SAMP 72410, 15-18)

05 20 46+ LMP That looks almost like a rhyolite from here. I don't believe it, though. (2)(SAMP 72410, 15-18)

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05 20 50 16 LMP This is a fine-grained - but crystalline white clast - in the gray breccia; and it's mixed with soil. We had to pick up a little soil. 503. (2)(SAMP 72410, 15-18)

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05 20 50+ LMP There are three clasts, anyway - or three fragments that we got off. (2)(SAMP 72410, 15-18)

05 20 50+ CDR Chips. Let me get a piece of the rock it's in. And I'm going to take a closeup stereo of that. (2)(SAMP 72430-35)(PHO 138 21047-49; 137 20963-65) (PHO 137 20966-73?)

-- --

05 20 50+ LMP The host rock for that inclusion of white material will be in bag 504. Two chips with soil. (2)(SAMP 72430-35)

05 20 50+ CDR We're getting some samples this time. I want to get an after, and I want to get a closeup stereo of that. And I'm going to get some pictures around this block, too. (2)(SAMP 72430-35)(PHO 137 20965) (PHO 137 20966-73)

05 20 50+ CDR There's an after and now I'm going to get - sort of a closeup stereo around it. (2)(PHO 137 20965) (PHO 137 20966-73)

05 20 52 18 LMP There's a real good example of pit-bottom crater up here even on this talus slope. I'll try to take a stereo of it. (2)(PHO 138 21050-52)

--

05 20 52+ LMP There isn't any glass in this crater - you can see it with your TV. (2)(PHO 138 21050-52)

05 20 52+ LMP It's just bigger than the average crater. And it still has that pit, the pit being about a third of the inner diameter of the crater - make it a fourth of the rim diameter, that's easier. (2)(PHO 138 21050-52)

--

05 20 52+ CDR Look out, Jack. (2)

05 20 52+ CC It's the old boulder-rolling trick. (2)

05 20 52+ CDR How about getting a soil sample under there? (2)(SAMP SOIL 72440-44)(PHO 138 21047-49; 137 20963-65)

05 20 52+ CDR Get that sample under there, Jack. Under that rock. (2)(SAMP SOIL 72440-44)

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05 20 54 12 LMP The soil from right underneath the rock - down to about 4 centimeters - in 505. And I'll try to skim it here a little, too. Get the upper centimeter. (2)(SAMP SOIL 72440-44)

05 20 54+ CDR Bob, this big white clast - I'm not sure there aren't some smaller ones in some of those other big boulders. That's just an intuitive guess. (2)

05 20 54+ LMP Oh, there are. (2)

05 20 54+ CDR But we never saw any as obviously big, as gross as this one. Such as this particular boulder I photographed, I had three of them other than the one we sampled. And that's 505 - and 506, in that order. (SAMP SOIL 72440-44, 60-64)

--

05 20 54+ LMP That white clast - I looked at it, and it has a light pastel-green - fairly rounded crystals in a fine-grained white to light pinkish-tan matrix. And you can figure that one out. Looks like olivine and something. (2)(SAMP 72415-18)

--

05 20 54+ CDR Hey, Bob, have you panned - down into Nansen and (2)  
seen this rock that's - oh, 30 or 40 meters from us?  
To give you an idea of the kind of upslope filleting  
you have on some of those boulders.

-- --

05 20 57 22 LMP Gene. You getting your pan? (2)

05 20 57+ CDR Yes. I said where do you want it? (2)

05 20 57+ LMP Well, right over there where there's some fragments. (2)

05 20 57+ CDR I'll get the before and the locator. (2)(PHO 137 20974-77)

05 20 57+ LMP Okay, and then I'll get the down. (2)(PHO 138 21074)

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05 20 57+ LMP Okay, pan's complete. (2)(PHO '38 21053-73)

05 20 57+ CDR Let's get the rake sample so we can move on. (2)(SAMP RAKE 72730, 35-38) (PHO 137 20974-78; 138 21074)

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05 20 58+ LMP There just aren't any rocks. (2)(SAMP RAKE 72730, 35-38)

-- --

05 20 58+ CDR There's a couple, keep going. (2)(SAMP RAKE 72730, 35-38)

-- --

05 20 58+ CDR There's one unclear the gnomon you can get. (2)(SAMP RAKE 72730, 35-38)

05 20 58+ LMP Several I thought were rocks turned out to be clods. (2)(SAMP RAKE 72730, 35-38)

05 20 58+ CDR Yes, that's what most of them are is clods. How do  
you get clods if it's never been wet? You're not  
getting any. You've had three in there ever since  
the last four scoops.

05 20 58+ LMP There just aren't many. (2)(SAMP RAKE 72730, 35-38)

05 20 58+ CDR 507. (2)(SAMP RAKE 72730, 35-38)

05 20 58+ CDR Three rocks. Yes, you got about four rocks - about 2 inches and smaller. (2)(SAMP RAKE 72730,35-38)

05 20 58+ LMP And let me get the down-sun. (2)(SAMP RAKE 72730,35-38)(PHO 138 21074)

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05 20 58+ CC Get the soil. (2)(SAMP SOIL 72700-05)(PHO 137 20974-78; 138 21074)

-- --

05 20 58+ LMP One-scoop-Schmitt, they call me. (2)(SAMP SOIL 72700-05)

05 20 58+ CDR That's good. That's bag 508. (2)(SAMP SOIL 72700-05)

-- --

05 21 00+ CDR Let me get one after of the area that we messed up. (2)(SAMP SOIL 72700-05)(PHO 137 20978)

-- --

05 21 00+ CDR Look where we kicked up this stuff. There's some light - well, I can't see it now. (2)(SAMP SOIL 72700-05)

05 21 00+ LMP Occasionally there's a light-colored fragment I think we break into. (2)

05 21 00+ CDR Yes, we kick it up. (2)

05 21 00+ LMP They are light-colored clods. (2)

05 21 00+ CDR And when I was walking uphill, I really wasn't sinking in probably more than an inch or two. (2)

-- --

05 21 00+ CDR Bag 8 is on the gate, and Jack's getting bag 4. (2)

-- --

05 21 06 16 LMP Okay. LMP is at 46. (2)

05 21 06+ CDR And CDR is at 113. (2)

-- --

05 21 07 25 CDR We're rolling. (2-2A)

05 21 07+ LMP (2-2A)  
 Those two major kinds of blocks that we sampled there - it was about the two varieties we saw in the area, it's a long extrapolation I realize, but they do resemble in color, and I believe in texture, the blue-gray rocks and the light tan rocks up on the massif. So I feel fairly confident that we sampled at least the two major units visible from a distance in the South Massif.

05 21 07+ LMP (2-2A)  
 I think that there is a lot of postmission work to be done on correlating the angularity and possibly even the albedos of the rocks we sampled with those on the massif. We should have good pictures of both from a distance and up close.

05 21 09+ CC (2-2A)  
 Rover sample - used to be at 073 and 6.3 - - halfway to Hole-in-the-wall. We're now going to have that near sample stop at 078 and 7.0. That should be along your tracks - - we're going - - to get a gravimeter reading at that location.

05 21 09+ CDR (2-2A)  
 We're on the top, coming off the highest lobe of the scarp looking back into the valley.

05 21 09+ LMP (2-2A)(PHO 138 21077-92)  
 Hey, turn a partial pan, I know it's into the Sun.

05 21 09+ CDR (2-2A)(PHO 138 21077-92)  
 Okay. Let's take one from right here. I want the whole thing.

05 21 09+ CDR (2-2A)(PHO 138 21077-92)  
 You ready to start?

05 21 10 18 LMP (2-2A)(PHO 138 21077-92)  
 Yes, I got it.

05 21 10+ CDR (2-2A)(PHO 138 21077-92)  
 Take the whole thing.

05 21 10+ LMP (2-2A)(PHO 138 21077-92)  
 I got a pan down in the valley.



---  
 05 21 10+ LMP Keep turning around over there, and I'll get that  
 scarp. (2-2A)(PHO 138 21077-92)  
 ---  
 05 21 11 10 LMP Okay, looking at the light mantle. No more comments (2-2A)  
 except that by that rake sample and just looking, there certainly are fewer fragments than we saw at  
 Station 2. The main thing that we can tell about the light mantle and when we're on it, of course, is  
 the light-colored craters. The fresher craters all appear to be light-colored. As they get older, the  
 albedo goes down and potentially have been dusted with material from the dark mantle or from other  
 sites. Either that or it's just the lunar patination that we're all familiar with. (SAMP RAKE 72730, 35-38)  
 ---  
 05 21 11+ LMP None of the craters out here in the light mantle (2-2A)  
 appear to show - they've got new bedrock. Almost all of them are instant rock craters.  
 ---  
 05 21 12 32 CDR How about 071 and 7.0? Will that do? (2-2A)  
 05 21 12+ CC Yes. (2-2A)  
 ---  
 05 21 12+ CDR I'm stopping here. (2A)  
 05 21 12+ CDR 071 \*\*\* 9.8 and 7.0. (2A)  
 05 21 12+ CC And the Rover \*\*\* should be fairly flat for the (2A)  
 gravimeter.  
 05 21 12+ CDR Well - that means we have to change here. (2A)  
 05 21 12+ LMP Hey, right over here to my right - - (2A)  
 05 21 12+ LMP Maybe it's the best we can do, but it's still going (2A)  
 to be on a slope.

05 21 12+ CDR Well, I'll level it off on a local - - (2A)  
 - - -

05 21 12+ CDR On the rim of that crater that's built up a little (2A)  
 bit? Right up here.  
 - - -

05 21 14+ LMP 071, 9.8, and 7.0. (2A)  
 - - -

05 21 15+ LMP Bag 30 Easy. (2A)(SAMP SOIL 73120-24)

05 21 15+ CC Are you guys finding much in the way of rocks here? (2A)(SAMP 73130-34)(PHO 138 21096- [7])

05 21 15+ LMP I'm looking. I can get you some instant rock out of (2A)  
 a small pit bottom crater.

05 21 17 25 CDR Up to frame count 57 is the outcrop or boulders at (2A)(PHO 144 22003-15)  
 the top of the South Massif.

05 21 17+ LMP Bag 31 Easy. Instant rock out of a 3-meter pit (2A)(SAMP 73130-34)  
 -bottom crater - off the inner wall.

05 21 17+ LMP Well, let's make it 30 centimeters down from the (2A)(SAMP 73130-34)  
 rim.  
 - - -

05 21 17+ CDR And through frame count 57 are the North Massif from (2A)(PHO 144 22016-32)  
 part of the western portions to part of the eastern  
 portions.  
 - - -

05 21 17+ LMP A chunk of yellow-brown rock that apparently has (2A)(SAMP 73150-56)(PHO 138 21098-99)  
 several spots behind it, probably indicating  
 direction from which it came - oh, no - what is  
 that? That's a reflection. That really fooled me.  
 A reflection off the mylar. Crazy. Well, what the  
 heck, I'll sample it anyway.  
 - - -

05 21 17+ CDR I've got Family mountain and some of the hills way (2A)(PHO 144 22033-45)  
up to the right of Family mountain. I'm at 67 on  
the 500.  
- - -

05 21 17+ LMP Thirty-two Easy is another small fragment. (2A)(SAMP 73150-56)

05 21 20 56 CDR 670, 123, 501 - 670, 123, 501. (2A)

- - -

05 21 21+ CDR About 2 inches below the surface here, you ran into (2A)  
that blue-gray material down there and it's in  
little clods, and it breaks apart in your hands.

05 21 21+ LMP Yes, that's right. (2A)

05 21 21+ CDR Did you get some of that in your Rover sample? (2A)

05 21 21+ LMP No, but I got it out of that instant rock crater. (2A)(SAMP 73130-34)

05 21 21+ CDR Let's grab a quick Rover sample and we'll take off. (2A)(SAMP SOIL 73140-46)(PHO 138 21098-99)

- - -

05 21 21+ LMP But, really those trenches - those craters are (2A)  
giving us the same information. That there's a  
light-colored material underneath.

- - -

05 21 23+ LMP Forty Yankee. (2A)(SAMP SOIL 73140-46)

05 21 23+ LMP That's light-colored soil from a depth of about - (2A)(SAMP SOIL 73140-46)  
it's mixed with a little of the upper surface, but  
mostly light-colored soil from a depth of about 15  
centimeters.

05 21 23+ LMP It looks like the light mantle in here is covered (2A)  
with dark to a depth of about 5 to 10 centimeters.

- - -

05 21 23+ CDR Did you take any pictures at all while you were (2A)  
there.

05 21 23+ LMP Oh, yes. I didn't take a pan. Why don't you turn (2A)  
right to a \*\*\*? (2A-3)

05 21 23+ CDR We're rolling. (2A-3)

05 21 25 08 CC Okay. Mark that. (2A-3)

05 21 25+ CDR Making a right-hand turn for a pan. (2A-3)(PHO 138 21100-08)

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05 21 25+ LMP Left. (2A-3)(PHO 138 21100-08)

05 21 25+ LMP Not a complete pan but it will show the location. (2A-3)(PHO 138 21100-08)

05 21 25+ LMP LMP frame count 80. (2A-3)(PHO 138 21100-08)

--

05 21 26 25 LMP I think we have a good sample of only partially  
contaminated light mantle in that last Rover sample  
that Gene accidentally discovered was right under  
our feet. It's almost certainly the light-colored  
material that we've been talking about in the walls  
of the crater. And, as a matter of fact, that  
instant rock sample I took was light-colored and  
probably represents the same stuff, indurated  
slightly. (2A-3)(SAMP SOIL 73140)

05 21 26+ CDR Light-colored mantle has that bluish tint that y  
saw in those rocks. (2A-3)

--

05 21 26+ CDR 073, 10.3, 6.6. (2A-3)

05 21 26+ LMP I have a feeling that whatever darkens the - ooh,  
there's a beautiful little glass-lined crater,  
pit-bottom crater - whatever darkens the light  
mantle is not a one-time only mantling of darker  
material. It's something that happens over a period  
of time, continually, because craters of all sizes  
and apparent degradation are darkened and there are  
lighter craters that are light to varying degrees,  
there seem to be a continuum of albedo change. (2A-3)

05 21 29 08 CDR That little crater on the side of the North Massif (2A-3)  
that we're thinking about going to doesn't look  
nearly as light-colored or haloed as it does in  
pictures, does it?

05 21 29+ LMP No. (2A-3)

--

05 21 29+ LMP I think you're almost to the rim. (2A-3)

05 21 29+ CDR Yes, I want to go down here if I can. My tracks are (2A-3)  
over there to the left, I haven't crossed them yet.

05 21 29 45 LMP 073, 6.3. (2A-3)

05 21 29+ LMP LMP frame count is 86. (2A-3)

--

05 21 29+ LMP See the lobes coming out - looks like lobes out from (2A-3)  
the scarp. The scarp rather being a line in there  
on the plain, appears to be lobes. I got a couple  
of shots of that. Whereas when it gets up on the  
massif, it's a fairly continuous curve; although it  
does appear to be younger, at least there's less  
relief on it for the first few kilometers of that  
bend there.

05 21 29+ CDR We're going to have to go down like the way we came (2A-3)  
because there's that big crater down at the bottom.

05 21 29+ LMP Bob, the scarp, so-called scarp, impresses me as (2A-3)  
less of a scarp than a series of lobes which roughly  
have a north-south trend. And we've been driving  
over various hummocks within those lobes.

--

05 21 29+ LMP I think you've got something right ahead of you. (2A-3)  
Here --

05 21 29+ LMP See the instant rock. (2A-3)

--

05 21 33 08 LMP Okay, there's Lara, and I think we can see Station - (2A-3)  
- - -

05 21 33+ LMP The light mantle is a uniform surface and I think (2A-3)  
'you've heard just about everything we've had to say  
so far.

- - -

05 21 33+ LMP The fragment population hasn't changed, nor has the (2A-3)  
crater population, as near as I can tell.

- - -

05 21 33+ CDR Yes, I got to get over to this next knoll and I'm (2A-3)  
going to be off the scarp. We're about three  
-quarters of the way down.

- - -

05 21 33+ LMP Oh, there's Nemo over there to my right. (2A-3)

- - -

05 21 35 45 CC You guys cut each other out but I take it that (2A-3)  
you're at the edge of the scarp.

05 21 35+ CDR We're off, we came down. (2A-3)

- - -

05 21 35+ LMP It's that bright - see that bright crater? You can (2A-3)  
just start to see Station 3 over there now.

- - -

05 21 35+ CDR We're at 079, 11.5, and 5.7. (2A-3)

- - -

05 21 35+ CDR And I'm headed northwest. (2A-3)

- - -

05 21 35+ LMP Right over there is Station 3, I think. (2A-3)

05 21 35+ CDR I can just start to see two craters - - and they're closer to Lara. (2A-3)

- - -

05 21 35+ CDR Here's a nice sharp little hole; look at that. (2A-3)

05 21 35+ LMP The texture of the light mantle - surface texture - is really no different on the scarp, on its flank, or out here to the east of the scarp. Fragment population, crater population, everything looking about the same. If there is such a thing as a light mantle, it seems to be uniform across the scarp.

05 21 37+ LMP Here are your tracks - hey! We crossed somebody's tracks. (2A-3)

05 21 37+ CDR We sure did \*\*\* we made a loop. (2A-3)

05 21 38 14 CDR That was at 081, 5.7. (2A-3)

- - -

05 21 38+ CDR This is where we went to the big crater and I came southeast in order to get around it. (2A-3)

- - -

05 21 38+ CDR We're still headed northwest, Bob. (2A-3)

05 21 38+ LMP Bob, I guess one thing we don't have a handle on yet is what are the - I think we sampled them - once in a Rover sample, but what are the fragments out here mixed with the light mantle? (2A-3)

05 21 38+ LMP I think I got one at our last gravimeter stop, a small one, and I guess there's one other Rover sample, but - Station 3, we probably ought to make sure we get a representative suite of those fragments. (2A-3)

- - -

05 21 38+ LMP We're at 083, 5.7. (2A-3)  
- - -  
05 21 38+ CDR That must be Lara right there, huh? (2A-3)  
05 21 38+ LMP Yes. (2A-3)  
05 21 38+ CDR On the left. You can see the blocks on the other side of her. (2A-3)  
05 21 38+ LMP That's right. I told them about those earlier. I think, Gene, you want to bear a little bit to the left. See those two craters, two bright craters, that are just this side of Lara? (2A-3)  
05 21 38+ LMP You're pointed almost right at them, now. (2A-3)  
- - -  
05 21 40 25 LMP Those are the two I think they wanted us to be at, and I think that's a good choice if we can get up there. (2A-3)  
05 21 40+ CDR Bob, I want to get some 500's the way that scarp flows up on top - well, it looks like it flows up on top of the North Massif. Now it may look like the North Massif may drabe material down upon it. Look at that. (2A-3)  
05 21 40+ CDR Not really. The texture is so different. It just doesn't look like as old a surface, but definitely different. (2A-3)  
- - -  
05 21 40+ LMP There's another big crater with a pit in it. (2A-3)  
- - -  
05 21 41+ LMP You know, that big block up there might be worth going to. (2A-3)  
05 21 41+ CDR 087 at 5.9. I think that's the best station we've got right here. (2A-3)



05 21 41+ CDR Let's see what's over on your right. Let's see if (2A-3)  
we can get at that scarp over there.  
-- --

05 21 41+ CDR Well, there's that first crater, there, Jack. (2A-3)

05 21 42+ CDR We're at 087, 6.0. I think that's probably about (2A-3)  
right. Why don't we stop here?  
-- --

05 21 43+ CDR We've got some boulders over here that are in the (2A-3)  
light mantle.  
05 21 43+ CDR We can see a little bit down into Lara, too. (2A-3)

-- --

05 21 43+ CDR We'll park right out here and we can work those (2A-3)  
blocks right up behind us.  
-- --

05 21 43+ CDR I'm looking for a level spot, but my gosh, there (2A-3)  
sure aren't very many.  
-- --

05 21 46 CDR 087 and 12.6, 6.0. (2A-3)

-- --

05 21 46+ LMP Looks like a pretty good location to sample the rim (2A-3)  
materials of this crater.

05 21 46+ LMP Bob, I'm at the south, let's say the east-south-east (3)  
rim of a - oh, 30-meter crater in the light mantle,  
of course; up on the scarp and maybe 300 - 200  
meters from the rim of Lara in a northeast  
direction.

05 21 46+ CDR It probably shows up as a bright crater on your map. (3)  
There's only about a half a centimeter of gray cover  
over very white material that forms the rim.

-- --

05 21 48 45 CDR 087, 12.7, 6.0. (3)

-- --

05 21 48+ CDR Heading is 043. (3)

-- --

05 21 50+ CDR If there is a scarp, and if it is a fault, I'm right -- (3)

05 21 50+ LMP You're right on it because the projection of it would be uphill a little bit. (3)

-- --

05 21 50+ CC Jack, what's your frame count? (3)

05 21 51 35 LMP 122. (3)

-- --

05 21 51+ LMP I dug a trench in the side of this crater. I've got down-sun pictures of it. There is quite a marbling of light and dark soil or fine-grained material. It looks as if there's a uniform, about 3-centimeter layer of light material over that marbled light and dark. On the very top surface, there's a half centimeter of light-gray, and when I say dark, I mean a medium-gray. (3)(SAMP TRENCH 73220-25)(PHO 138 21143-48, 78)

05 21 51+ LMP I'm going to start sampling the soils, and then I'll get you the fragments. (3)(SAMP TRENCH 73220-25)

05 21 51+ CC Okay, I presume that we'll at least have the single upper core which we can use to sample of that stuff in the soil, and we - (3)(SAMP TRENCH 73220-25)

05 21 51+ LMP Oh, there's no guarantee. This is a crater rim. (3)(SAMP TRENCH 73220-25)

-- --

LMP Can't see a skip down in soil. Don't know where I'm going to put these things, I've got to come down and get a bag.

- 05 21 56 36 LMP The upper 5 centimeter - 3 centimeters mixed with that upper half centimeter, is in the next sample.  
---
- 05 21 57+ LMP And 521 is the sample bag.  
(3)(SAMP TRENCH 73240-45)
- 05 21 57+ CDR Well, the first core has gone down pretty good.  
(3)(SAMP CORE 73001-02)(PHO 137 20981-82)
- 05 21 57+ LMP Oh, you won't have any problem in here coring.  
(3)(SAMP CORE 73001-02)
- 05 21 57+ CDR Oh, man, I tell you, I wish I was putting a drill hole in here. Looks pretty nice.  
(3)(SAMP CORE 73001-02)
- 05 21 58 29 LMP The next sample is mostly the medium-gray fraction of the marbling. It's mixed, though.  
(3)(SAMP TRENCH 73260-64)(PHO 138 21143-48,78)
- 05 21 59 19 LMP That's in bag 522.  
(3)(SAMP TRENCH 73260-64)
- 
- 05 22 00 15 CDR 670, 049, 701; 670, 049, 701.  
(3)
- 
- 05 22 00+ LMP The white fraction in the marble zone in 523.  
(3)(SAMP TRENCH 73280-85)(PHO 138 21143-48,78)
- 
- 05 22 00+ LMP 524 is what I think is a blue-gray rock probably breccia. It's got a little dust cover.  
(3)(SAMP 73230,35)(PHO 138 21143-48,78)
- 05 22 00+ LMP From just off the rim of this little crater.  
(3)(SAMP 73230,35)
- 05 22 00+ CC It's a blue-gray rock, it's not part of the trench, right? You finish with the trench?  
(3)(SAMP 73230,35)
- 05 22 00+ LMP Yes.  
(3)
-

05 22 05 38 LMP What I know is a blue-gray breccia is in bag 525. (3)(SAMP 73250,55)(PHO 138 21143-48,78)

05 22 05+ CC And, Jack, you just scooping up little rocks along here - in your little xenolith mode? (3)(SAMP 73250,55)

05 22 05+ LMP Yes, \*\*\* you read my mind. I do want to get one of these light-colored rocks, though. (3)(SAMP 73250,55)

05 22 05+ CDR When I broke the cores apart, there's just a lot of dried clods and the bottom core's full; but about an inch and a half of the (top) core just zero g to 1/6 g'd itself right out. (3)(SAMP CORE 73001-02)

-- --

05 22 07 23 LMP Bag 526. (3)(SAMP 73270,75)(PHO 138 21143-48,78)

05 22 07+ LMP That may have been a piece of gabbro. But again, I can't be completely sure. (3)(SAMP 73270,75)

05 22 07+ LMP It's either that or anorthositic gabbro we saw up on the front. Up on the massif. (3)(SAMP 73270,75)

-- --

05 22 07 56 CDR Forty-six, Bob, is going into the long can. (3)(SAMP CORE 73001-02)

-- --

05 22 08+ CDR Okay, Bob, the long can is sealed. (3)(SAMP CORE 73001-02)

-- --

05 22 08+ CDR None of the material in this core, in either the top section or the bottom section, look unlike that stuff just beneath the surface that we sampled at that special stop back there. It's a bluish-gray, and it tends to clod and break up in your hands. And that's core 31 - upper is 31. (3)(SAMP CORE 73001-02)

-- --

05 22 09+ CDR You've got two-thirds of a core after I packed it down a little bit. (3)(SAMP CORE 73001-02)

05 22 09+ LMP That little set of 4 samples is in 527, barely. (3)(SAMP 73210-19)(PHO 138 21143-49,78-80)  
 - - -

05 22 09+ CC Jack, have you ever started your pan? (3)(PHO 138 21150-77)  
 05 22 13+ CC We're watching you, Jack. (60mm pan) (3)(PHO 138 21150-77)  
 - - -

05 22 13+ LMP \*\*\* the samples from that - wait I gotta go up there. Take an after - cross-sun, from over to the north of the gnomon. (3)(SAMP 73210-19) (PHO 138 21178-80)

05 22 13+ CDR You didn't get an after, huh? (3)(SAMP 73210-19)(PHO 137 20981-82)  
 05 22 13+ LMP No. (3)(SAMP 73210-19)(PHO 137 20981-82)  
 - - -

05 22 16 03 CC Don't forget the gnomon. (3)(PHO 137 20981-82)

05 22 16+ CDR We're going back to get that after - and we won't forget it. (3)(SAMP 73210-19)(PHO 137 20981-82)  
 - - -

05 22 17+ CC Okay, how about frame counts on both you guys before (3) you start? (3)

05 22 19 43 LMP 152 on the LMP - (3)

05 22 19+ CC We suggest magazine Juliett, please. (3)

05 22 19+ CDR The CDR's on 118. (3)  
 - - -

05 22 19+ LMP Fire fire, two frames. You know, I'd enjoy this if (3)(PHO 138 21178-80) it weren't so much fun.  
 - - -

05 22 19+ CDR Shoot a 500 while you're doing that. (3)  
 - - -

05 22 19+ CDR Take a portion of the scarp over there you can see. (3)

- - -

05 22 19+ CDR Okay, I'm picking up with frame 66 (500mm) and I'm going to try to get a little bit of where the scarp overlaps the North Massif. I can't see much of it. All I could get was three frames of that. Now I'm picking up the South Massif. (3)(PHO 144 22047-50)  
(PHO 144 22051-71)

- - -

05 22 22 51 CDR When I finished with South Massif, I was on 94 and I took - now I'm on 99 - I took five more pictures back over to the northeast. (3)(PHO 144 22051-71)  
(PHO 144 22072-77)

- - -

05 22 25 29 CDR \*\*\* (Mark) Bob. (3-4)

- - -

05 22 26 24 CDR We've been rolling for about 30 seconds. (about 55) (3-4)

05 22 26+ CDR We're at 087 and 5.9 on the range. (3-4)

- - -

05 22 27+ CDR Just drive by this big rock. Want to look at it. (3-4)

- - -

05 22 27+ LMP Looks like one of the gray breccias. (3-4)

05 22 27+ LMP Big 3- to 4-meter block out here all by itself on the light mantle - I got some pictures. It was at 088, 5.6. (3-4)  
(PHO7)

05 22 27+ LMP And it looked like a gray breccia, I'm not sure though, all I could see was the surface texture, and it had the nodular or elongate nodular texture that those breccias had up on the South Massif. (3-4)

- - -

05 22 29+ LMP As far as any of the things we talked about trying to see at the surface, dynamics or a variation of the light mantle, I think you've heard it all, there isn't much to say about the dynamics right now. I have a feeling that the surfaces are old enough that all those kind of detailed relationships have been obscured. Filletting is just about the same all over here, it varies, but there are no systematics that I've seen. (3-4)

- - -

05 22 29+ CDR Good lord! Was that a - what was the aspect ratio of that little thing? (3-4)(LRV 5)

05 22 29+ LMP Yes, that's what they call a pit crater. Can you swing a little bit and let me get that fragment crater - see that one on your left there? (3-4)(LRV 5)(SAMP 74110-19)(PHO 137 20983; 133 20208)

05 22 29+ LMP \*\*\* craters we've seen here. (3-4)(LRV 5)

05 22 29+ CDR Got your pictures? (3-4)(LRV 5)(SAMP 74110-19)

05 22 31 04 LMP Yes, I got them. (3-4)(LRV 5)(SAMP 74110-19)(PHO 137 20983; 133 20208)

05 22 31+ CDR We're at 090, 5.3 for a quick Rover sample of a very very fragmental crater. The ejecta is about 50 percent small angular fragments, much different than we have seen before in terms of the type of patterns. (SAMP 74110-19)

05 22 31 35 LMP Okay, and that's in bag - 41 Yankee. (3-4)(LRV 5)(SAMP 74110-19)

05 22 31 40 CDR And we're on our way. (3-4)

05 22 31+ CDR Get your picture, Jack? (3-4)(PHO 137 20983; 133 20208)

05 22 31 51 LMP Yes. LMP frame count is 15. (3-4)(PHO 137 20983; 133 20208)

- - -

05 22 31 58 CDR I'm 090, 5.3 now Bob. We're heading toward your stop. (3-4)

- - -

05 22 32 17 LMP I couldn't tell whether that was just - it looked like that might have been a crater that had got to bedrock. There may have been a high point, or let's say a thin point in the light mantle, and it got down to bedrock. But I can't - it's the most blocky-rimmed crater we've seen for a long time. (3-4) (SAMP 74110-19)

05 22 32+ CDR Yes. All these others are nowhere near that - (3-4)

05 22 32+ LMP It was about 15 meters in diameter. (3-4)(SAMP 74110-19)

05 22 32+ LMP There are no obvious lineations, at the scale we can observe, on the light mantle. I think the pan photography and the metric stuff may be what you'll have to use for any directional trends out in here. Depending on what we decide the origin is. (3-4)

- - -

05 22 33 54 CDR We're 093 and 5.2. (3-4)

05 22 33+ LMP Going to be right on the rim of that crater. (3-4)

05 22 34 08 CC Okay. And, 17, the word from the backroom is - with that last Rover sample you got, we'd like to go straight to Station 4 - and we won't get the one here at 094 and 5.3 - 5.1. (3-4)(LRV 6)

05 22 34+ LMP I thought the purpose was to sample the light mantle? (3-4)(LRV 6)

05 22 34+ CC I - we talked to them about that, but they - - (3-4)(LRV 6)

05 22 34+ LMP We didn't sample light mantle at that last one. (3-4)(LRV 6)

05 22 34+ CC - - I agree. I talked to them about that. But they are so anxious to get to Station 4, I guess they don't want to do it. (3-4)(LRV 6)

05 22 34+ LMP Well, how about it, Gene? A little real time - (3-4)(LRV 6)

05 22 34+ CDR I think we got to, right here. (3-4)(LRV 6)(SAMP 74120-24)

05 22 34 48 CDR 94, 5.1. You got your picture? (3-4)(LRV 6)(SAMP 74120-24)

05 22 34+ LMP Yes. Okay; that's good enough. (3-4)(LRV 6)(SAMP 74120-24)



05 22 34+ LMP We'll get the sample - anyway. (3-4)(LRV 6)(SAMP 74120-24)

05 22 34 58 CDR Okay. 094, 5.1. (3-4)(LRV 6)(SAMP 74120-24)

- - -

05 22 35 02 CDR Sample is in 42 Yankee. (3-4)(LRV 6)(SAMP 74120-24)

05 22 35 13 CDR And we are rolling. (3-4)

- - -

05 22 35 29 CDR We're now at 094 and 5.0. (3-4)

05 22 35 33 LMP LMP frame count is 25. (3-4)

- - -

05 22 35+ LMP There aren't very many rocks that just sit on the surface. All of them seem to be slightly buried or moderately buried. That one looked like it might be vesicular. There's a trench - linear set of craters. (3-4)

- - -

05 22 35+ CDR I'll just get down this slope. I don't see Shorty though do you? (3-4)

05 22 35+ LMP Is that it out there straight ahead? (3-4)

05 22 35+ CDR Well, let me get down this slope. (3-4)

05 22 35+ LMP Something's dark out there. I think that's it. (3-4)

- - -

05 22 35+ LMP I forgot to take pictures again. That scarp certainly is spectacular going up there by Hanover, isn't it? (3-4)

05 22 35+ CDR It just rolls over the side, doesn't it? (3-4)

05 22 38 00 LMP I don't know what else we can say about it, though. Okay, we're getting a good view of the North Massif, and the cross-hatched lineaments that Gene has (3-4)

talked about are over there, also. They seem to be a set that plunge about, 30 degrees to the east and another set that plunge about the same to the west. Plus the boulder tracks, which we see occasionally over there. And there are areas - boulder fields up on the massif itself, such as we saw on the South Massif. As a matter of fact, it looks like there's one just above where Station 6 may be. Straight ahead of us there, Geno.

05 22 39 02 LMP About bearing 060 from our present position, which is 098 and 4.8. (3-4)

- - -

05 22 39+ LMP I don't see anything like layering up there. Although the upper boundary of those boulder fields on the North Massif, and as a matter of fact, on the South Massif - - (3-4)

05 22 39+ CDR That's Shorty straight ahead of us, I think. (3-4)

05 22 39+ LMP Yes. (3-4)

05 22 39+ CDR Yes, that's got to be it. (3-4)

05 22 39+ LMP - - all tend to have a linear boundary. That's the upper portion of the field; the lower portion is strung out downslope. That looks like it might be Shorty. Yes. (3-4)

05 22 40 07 CDR We're at 099, 4.7. (3-4)

- - -

05 22 40+ CDR I think we got it in front of us. (3-4)

05 22 40+ LMP Looking at the Sculptured Hills, I think Gene's comments the other day about Bear mountain would apply. There's a small relief - or small amplitude hummockiness to the surface. It's formed by a crosshatch of - let's say the slope I'm looking at is sort of west-facing slope. So on the other side of Messex cleft, it's formed by lineaments plunging about 10 degrees to the north and about 10 degrees to the south. And the combination gives some hummocks that are quite distinct. (3-4)

05 22 40+ CDR Well, you know it's hard to see a blanket here, but that's got to be Shorty right there. (3-4)

05 22 40+ CDR It's the only large - real large - (3-4)

05 22 40+ LMP We want to park. I don't think we'll see a blanket. (3-4)

05 22 40+ CDR I don't either. (3-4)

05 22 40+ LMP At least we're going to see where the break in slope is for the rim. My goodness. (3-4)

05 22 40+ CDR Oh, look at the boulders sitting on that rim. (3-4)

05 22 40+ LMP It's different. (3-4)

05 22 40+ CDR It is darker. (3-4)

05 22 40+ LMP Let's go over there. (3-4)

05 22 41 42 CDR No question. We're at 10i, 4.5. (3-4)

- - -

05 22 41+ LMP I think we ought to park over here near that big boulder. (3-4)

05 22 41+ CDR Yes - yes, if I can get up there. I think I can. (3-4)

- - -

05 22 41+ CDR Let me get up there slowly. I'll put them on this low saddle here. 045 will give them a good heading. (3-4)

05 22 41+ LMP Shorty is a crater, the size of which you know. It's obviously darker-rimmed, although the fragment population for most of the blanket does not seem too different than the light mantle. But inside - whoo, whoo, whoo! (3-4)

05 22 41+ CDR Man, are you going to get a picture now. (3-4)

- - -

05 22 42 57 CDR We're heading 041; bearing is 102; distance, 5.1; (4)  
and 4.4 on the range.

- - -

05 22 42+ CC And did I understand 4.2 on the range, Gene? (4)

05 22 42+ CDR Yes sir! (4)

- - -

05 22 42+ LMP Shorty is clearly a darker-rimmed crater. The inner (4)  
wall is quite blocky - except for the western  
portion of it, which is less blocky than the others.  
The floor is hummocky, as we thought it was in the  
photograph. The central peak, if you will, or  
central mound, is very blocky and jagged. And the  
impression I have of the other mounds in the bottom  
is that they look like slump masses that may have  
come off the side.

05 22 42+ LMP That's just what they look like. They have a bench (4)  
appearance.

- - -

05 22 42+ LMP We've got a large boulder of very intensely (4)  
fractured rock, right on the rim, right near the  
Rover. It looks like a finely vesicular version of  
our clinopyroxene gabbro. It's obviously  
crystalline and has generally that same appearance.  
There is, in one spot here, some inclusions of a  
darker-gray rock also intensely fractured. The  
fracture systems, I think, will show up well in the  
flight-line stereo.

- - -

05 22 45+ LMP Okay, I'm going to take a pan while I'm waiting for (4)(PHO 133 20229-56)  
you.

05 22 46 22 LMP Oh, hey! Wait a minute - - (4)

05 22 46+ CDR What? (4)

05 22 46+ LMP - - where are the reflections? I've been fooled (4)  
once. There is orange soil!

05 22 46+ CDR Well, don't move till I see it! (4)  
05 22 46+ LMP It's all over! Orange! (4)  
05 22 46+ CDR Don't move it until I see 't. (4)  
05 22 46+ LMP I stirred it up with my feet. (4)  
05 22 46+ CDR Hey, it is! I can see it from here! (4)  
05 22 46+ LMP It's orange! (4)  
05 22 46+ CDR Wait a minute, let me put my visor up. It's still (4)  
orange!  
05 22 46+ LMP Sure it is! Crazy! Orange! I've got to dig a (4)  
trench, Houston.  
05 22 46+ CDR Hey, he's not - he's not going out of his wits. It (4)  
really is.  
- - -  
05 22 47+ LMP It's almost the same color as the LMP decal on my (4)  
camera.  
05 22 47+ CDR That is orange, Jack! (4)  
- - -  
05 22 47+ LMP It's trench time. You can see this in your color (4)  
television, I'll bet you.  
05 22 47+ CDR How can there be orange soil on the Moon? (4)  
05 22 47+ CDR Jack, that is really orange. It's been oxidized. (4)  
- - -  
05 22 47+ LMP It looks just like - an oxidized desert soil, that's (4)  
exactly right.  
- - -  
05 22 47+ LMP That orange is along a line along the rim crest - (4)

05 22 47+ CDR Circumferential? (4)

05 22 47+ LMP Yes, man if there ever was something that looked like a fumarole alteration, this is it. (4)

-- --

05 22 51+ LMP I've trenched across the trend of the yellow - or the orange. There is light-gray material on either side. (4)

-- --

05 22 51+ LMP You need to get a down-sun color - - (4)

05 22 51+ LMP I'll get my black-and white. (4)

-- --

05 22 51+ CDR Let's start sampling that trench. (4)(SAMP 74220)(PHO 137 20984-90)

05 22 51+ CDR Look at where the contact between the gray and the - (4)(SAMP 74220)

05 22 51+ LMP Yes. Right, and it's on both sides - - (4)(SAMP 74220)

05 22 51+ CDR Before you disturb it, let me just get a couple of closeups of that. (4)(SAMP 74220)(PHO 137 20984-90)

05 22 51+ LMP Hey, can you get a down-sun? I think your color will be best down-sun. (4)(SAMP 74220)(PHO 137 20990)

05 22 51+ CDR Okay. (4)(SAMP 74220)(PHO 137 20990)

05 22 51+ LMP Go to fill. Get a little closer, Geno, if you think you're minimum. (4)(SAMP 74220)(PHO 137 20990)

05 22 51+ CDR Let me get one more. (4)(SAMP 74220)(PHO 137 20995)

05 22 51+ LMP Hey, you want any of this bagged in the can, Bob? (4)(SAMP 74220)

-- --

05 22 51+ CC Roger. Let's get the short can for some of that and -- (4)(SAMP 74220)

-- --

05 22 51+ CDR It's quite - it's indurated. (4)(SAMP 74220)

--

05 22 51+ CDR See if you can get a sample right across that contact too. (4)(SAMP 74240-49,85-87)(PHO 137 20984-90)

05 22 51+ LMP I will. Okay, bag that one. (4)(SAMP 74220)

05 22 53 49 CDR Bag 509 has got the - the orange material from, oh, about 2 to 3 inches down. (4)(SAMP 74220)

--

05 22 54+ LMP Okay, the light-gray, which is on either side. Want me to get some more? (4)(SAMP 74240-49,85-87)

05 22 54+ CDR Yes, a little more. (4)(SAMP 74240-49,85-87)

05 22 54+ LMP All of this is getting mixed a little bit with - about a half-centimeter thick light-gray or a medium-gray covering over the whole area. (4)(SAMP 74240-49,85-87)

05 22 54 57 CDR The gray material that is adjacent to the red material is in 510. (4)(SAMP 74240-49,85-87)

--

05 22 54+ CDR And that orange band is about a meter wide, I think. (4)(SAMP 74220)

05 22 54+ LMP About a meter. (4)(SAMP 74220)

05 22 54+ CDR You can't get to the end of it - bottom of it though, can you? (4)(SAMP 74220)

05 22 54+ LMP I haven't been able to yet. (4)(SAMP 74220)

05 22 54+ LMP Just to be sure, why don't we sample this side of it, too? (4)(SAMP 74260)(PHO 137 20984-90)

--

05 22 55 40 LMP 511 has the gray from the other side of the orange band. (4)(SAMP 74260)

05 22 55+ CDR And the other side happens to be the crater side. (4)(SAMP 74260)

05 22 55+ LMP That's right. North side. (4)(SAMP 74260)

- - -

05 22 55+ LMP Okay. I'm going to see if this goes on down here as (4) a zone.

05 22 55+ CDR It looks like it's ellipsoidal area if my footprints (4) are any indication.

05 22 55+ CC We'd like to get the double core here instead of the (4)(SAMP CORE 74001-02) small can.

05 22 55+ LMP Did you want it in the orange? (4)(SAMP CORE 74001-02)

05 22 55+ CC Roger, that's affirm. We can put cores in the gray (4)(SAMP CORE 74001-02) soil all the time.

05 22 55 LMP Well, it's a vertical stratigraphy. Do you want to go sideways a little with it? Or you just want to get it as deep as you can, huh? (4)(SAMP CORE 74001-02)

05 22 56 52 CC Let's go as deep as we can in the orange. (4)(SAMP CORE 74001-02)

- - -

05 22 57 15 CDR The bottom will be 44, and the top will be 35. (4)(SAMP CORE 74001-02)

- - -

05 22 57+ CC And I'm not sure whether your pan will look down into the crater or not, Jack. But if it didn't, we'd like to get another one from there. Hey there's the crater. (4)(PHO 133 20229-56)

05 22 57+ CDR It did. Yes - look into it yourself - and then I'll (4) also get you a stereo pan before we leave. I can do (PHO 137 20991-21027) that.

05 22 57+ CDR Yes. I've practiced too long on taking stereo pans (4)(PHO 137 20991-21027) of craters, without getting one here.

05 22 57+ LMP I got mine from right - right down there, Gene. (4)(PHO 133 20229-56)

05 22 57+ CDR What is that right there? (4)(SAMP 74230, 35)



05 22 57+ LMP Oh, it's a piece of glass, probably. (4)(SAMP 74230,35)

05 22 57+ CDR Boy, it sure is. (4)(SAMP 74230,35)

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05 22 57+ LMP You know that we just about got to the upper edge of this little ellipsoid zone. I think we've messed up most of it. Let's try right over here. (4)(SAMP CORE 74001-02)

05 22 57+ CDR I've got a little piece of glass in my pocket. (4)(SAMP 74230,35)

05 22 57+ LMP The upper portion of the core is going to be a little bit disturbed, because we've walked around the area so much. (4)(SAMP CORE 74001-02)

05 22 57+ CDR There was a little piece of black glass - - solid black glass. (4)(SAMP 74230,35)

--

05 22 57+ LMP I'll get a shot. (4)(SAMP CORE 74001-02)(PHO 133 20257-68 BLANK)

05 22 59 26 CDR Take your picture. That's about as far as I could shove it in. (4)(SAMP CORE 74001-02)(PHO 133 20257-68 BLANK)

05 22 59+ CC Was the gray martile over the top of this, or was this showing all the way through to the surface?

05 22 59+ LMP No, it was over the top. It was about a half a centimeter over the top. (4)(SAMP CORE 74001-02)

05 22 59+ LMP He's getting about 3 centimeters a whack. (4)(SAMP CORE 74001-02)

05 22 59+ CC Very good. (4)(SAMP CORE 74001-02)

05 22 59+ CDR I'll tell you, it's a lot harder going in than that double core was back there. It's pretty hard. (4)(SAMP CORE 74001-02)

05 22 59+ LMP It acts like it's inherently cohesive. It breaks up in angular fragments. (4)(SAMP CORE 74001-02)

05 22 59+ LMP An essential portion of the zone actually has a crimson hue, or red hue. Outside of that it's orange. And outside of that, it's gray. (4)(SAMP CORE 74001-02)

--

05 22 59+ CDR I'm going up to max here for just a minute or two. (4)

05 22 59+ CDR Okay, let me hit some more. Ready? (4)(SAMP CORE 74001-02)

--

05 22 59+ LMP Have at it. He's still getting a centimeter a whack, poor guy. I better get a locator. (4)(SAMP CORE 74001-02)  
(PHO 133 20257-68 BLANK)

05 23 01 05 CDR The only thing I question is our ability to get it out. Man, that's really hit bottom. (4)(SAMP CORE 74001-02)

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05 23 01 57 CDR Pull slowly. Slowly so I can cap it all right. Let me get a cap. (4)(SAMP CORE 74001-02)

--

05 23 01 57 CDR Okay, very slow. Even the core tube is red! (4)(SAMP CORE 74001-02)

05 23 01+ CDR Even the core is red! The bottom one's black - black and orange, and the top one's gray and orange! (4)(SAMP CORE 74001-02)

05 23 01+ LMP The fact is, the bottom of the core is very black compared to anything we've seen. (4)(SAMP CORE 74001-02)

05 23 01+ CDR Hey, we must have gone through the red soil because it's filled, but it's filled with a black material. (4)(SAMP CORE 74001-02)

05 23 01+ CDR Dark gray, almost a very fine-grained - - (4)(SAMP CORE 74001-02)

05 23 01+ LMP That might be magnetite. (4)(SAMP CORE 74001-02)

--

05 23 01+ LMP God, it is black isn't it? (4)(SAMP CORE 74001-02)

05 23 01+ CDR Yes. Boy, it is black and is it contrasted to that orange stuff. Very black. Well, not very black. It's a good dark-gray. Very dark bluish-gray. (4)(SAMP CORE 74001-02)

--

05 23 03+ CDR Why don't you take a picture of the hole, while you've got a camera there? (4)(SAMP CORE 74001-02) (PHO 133 20257-68 BLANK)

--

05 23 03+ CC The caps are in SCB 7. They're under the LMP seat. (4)(SAMP CORE 74001-02)

05 23 03+ LMP Well, the hole's most - the hole's mostly in shadow. (4)(SAMP CORE 74001-02)

--

05 23 03 42 CC We'd like to get a quick sample of the basalt up there on the rim, and Gene's stereo pan, and then press on. (4)(SAMP 74250,55)  
(PHO 137 20991-21027)

--

05 23 03+ LMP Okay, Bob, I'll get a sample. I'll sample it by hand. But it'll be documented. And I'll get it in a bag in a minute since I don't have any. (4)(SAMP 74250,55)

--

05 23 03+ CDR The bottom of the upper core is also dark. (4)(SAMP CORE 74001-02)

05 23 03+ CDR And, like you might expect, the top of the bottom core is dark, too. (4)(SAMP CORE 74001-02)

05 23 03+ LMP If I ever saw a classic alteration halo around a volcanic crater, this is it. It's ellipsoidal. It appears to be zoned. There's one sample we didn't get. We didn't get the more yellow stuff, we got the center portion. (4)

--

05 23 06 10 LMP Basalt is in bag 512. (4)(SAMP 74250,55)

--

05 27 07 00 CDR I'm going to go get my pan. (4)(PHO 137 20991-21027)

--

05 23 07 31 CDR I'm going several meters around to the east and towards the south to get this pan. (4)(PHO 137 20991-21027)

05 23 07+ CDR I'm going upslope. I'm circum - oh, you know, on the rim. And I'm up. (4)(PHO 137 20991-21027)

--

05 23 07 57 LMP The lower core is chunky-jam full. I don't think I've budged that thing. (4)(SAMP CORE 74001-02)

--

05 23 08 37 CDR From where I am, about 100 meters around the west side of the rim of this crater, the mantle on the inside of the rim runs from this gray material we've been sampling in here - to a very dark-gray material. And there's a lot of (orange?) stuff that goes down - radially down into the pit of the crater. (4)(PHO 137 20991-21027)

05 23 08+ LMP Hey, Bob, those cores didn't feel like the follower went down at all. (4)(SAMP CORE 74001-02)

05 23 08+ LMP Shouldn't it have gone a little bit? (4)(SAMP CORE 74001-02)

05 23 08+ CC Not necessarily, if it's pretty compact stuff. You were having a hard time getting it in. (4)(SAMP CORE 74001-02)

05 23 08+ LMP Well, I thought there was a little space up there, but maybe I just didn't feel it. (4)(SAMP CORE 74001-02)

05 23 08+ CC Not very much - - (4)(SAMP CORE 74001-02)

--

05 23 08+ CDR I got to take a couple of more pictures at that contact slope over there. I know you can't see it from where you are, Jack, but I guess we got to leave. Otherwise it would be nice to sample that dark stuff up on top. (4)(PHO 137 20991-21027)

--

05 23 08+ CDR I bet I'm out of film! Well, I got them all anyway. I'm at 1b2. I'm out of film. That stuff - and you're looking at me with the camera - that stuff is up toward that boulder, around that - about as far away from that boulder on the other side as we are on this side. And we want a hack at that boulder, too. Jack, let's see if we can't get that boulder, anyway. (4)(PHO 137 20991-21027)

05 23 08+ CDR There's a lot of little pieces - not a lot - but enough that I've seen five or six of them. Little pieces of obsidian-like glass. I got one in my pocket. Unbagged. Undocumented. This boulder that you were looking at with the TV. I'm going to take a sample. Undocumented. (4)(SAMP 74230,35)

05 23 11 00 LMP I got it! I got it! (4)(SAMP 74270,75)

05 23 11+ CDR I'm sorry, I didn't know you got that. (4)(SAMP 74270,75)

05 23 11+ LMP Bag 461 has another sample of basalt that I picked up right near where we dug the trench. (4)(SAMP 74270,75)

05 23 11+ CDR I'm going to give you something with the TV. I want to show you where that dark material starts. (4)

05 23 11+ CDR As you look at the inner rim - as it goes down to the right - you see a lot of boulders - a lot of rocks that are protruding out. Where that rock pattern thins out, just beyond that is an orange - a visible orange radial pattern, and then beyond that is a definite change in albedo where you get the gray material, and a definite change in the number of rocks on the slope. (4)

05 23 12+ CDR That particular rim material there continues around to the due north, and then there's a drastic change again where you see the inner rim completely terraced with this boulder fill. (4)

05 23 14+ LMP LMP is at 75. (4)

05 23 16 24 LMP Okay. We're moving, Houston. (4-5)  
- - -  
05 23 16+ LMP So you saw a radial orange, huh? (4-5)  
05 23 16+ CDR Yes, it was radial, Jack. You could see it very - (4-5)  
it'll be in the pictures. (PHO 137 20531-21027)  
- - -  
05 23 16+ LMP That was on the inside of the crater? (4-5)  
05 23 16+ CDR On the inside rim of the crater. (4-5)  
05 23 16+ LMP Yes, that's where the surface \*\*\* keeps slumping off (4-5)  
so it's exposed, probably.  
- - -  
05 23 16+ LMP I didn't have time to really think at that station (4-5)  
but - if I hadn't seen that alteration, and all I'd  
seen - is the fractured block on the rim, - which  
looked like the stuff in the bottom - I might have  
said it was just another impact. But having all the  
color changes and everything, I think we might have  
to consider that it could be a volcanic vent.  
- - -  
05 23 20+ CDR We moved out into the Tortilla Flat area, I guess. (4-5)  
Not very flat.  
- - -  
05 23 20+ CDR 102, 3.8. (4-5)  
- - -  
05 23 20+ CDR Boy, Victory is going to be subtle. (4-5)  
- - -  
05 23 20+ LMP There's Victory over there, I bet. See that's the (4-5)  
long edge.  
- - -

05 23 20+ CDR That's got to be Victory over there, Jack. (4-5)

05 23 20+ LMP Yes. (4-5)

05 23 23 03 CDR We're at 103, 3.4 (4-5)

05 23 23 03 CDR That is Victory. (4-5)

05 23 23+ LMP We're still seeing - the glass-lined, pit-bottomed craters. How's that? (4-5)

- - -

05 23 23+ CDR There's a square boulder - look at that one! (4-5)

05 23 23+ LMP Yes, it's square all right - or at least one side of it is. (4-5)

05 23 23+ CDR No, three sides of it are square. It just fractured that way - that's by accident, looking at it. So how do we get over here? (4-5)

05 23 23+ LMP Go left, probably. And along the rim. (4-5)

05 23 23+ CDR Yes, that's where I'm going to go. Hold on. (4-5)

- - -

05 23 23+ CDR 106, 3.2. We're approaching the rim of Victory. (4-5)

05 23 23+ LMP And the LMP frame count is somewhere around 85, maybe. (4-5)(PHO 133 20269-79)

05 23 23+ CDR That's Victory; look at it go to the left and look at it go to the right. That's Victory; we're right on the ridge. (4-5)(LRV 7)

- - -

05 23 23+ CDR 106, 3.2 (4-5)(LRV 7)

05 23 23+ CDR Tell me where you want that thing (EP 1) and we'll get a pan around it. (4-5)(LRV 7)(PHO 133 20281-300)

- - -

05 23 23+ CDR I'm going, right here; you could put it in that hole. (4-5)(LRV 7)

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05 23 23+ CDR Just pick a spot and take your photos. (4-5)(LRV 7)(PHO 133 20281-300)

05 23 23+ LMP Okay, I've got them. Now, go just beyond there. Little bit more. That's good. (4-5)(LRV 7)

05 23 25+ CDR We're at 106, 3.2. (4-5)(LRV 7)

05 23 26 04 LMP Pin 1 is pulled and safe. Pin 2 is pulled and safe. (4-5)(LRV 7)

--

05 23 27 00 LMP Pin 3 is out and safe. (4-5)(LRV 7)

05 23 27+ LMP And look at the orange flag. (4-5)(LRV 7)

05 23 27+ OC That's what you guys were sampling at Station 4, I bet. (4-5)(LRV 7)

05 23 27+ CDR Yes - it's about that orange, only - not quite as bright. Same shade. (4-5)(LRV 7)

--

05 23 27+ CDR There's no question but what that we're at Victory. (4-5)(LRV 7)

--

05 23 27+ CDR Okay, let's get a nice Rover pan here. (4-5)(LRV 7)(PHO 133 20281-300)

--

05 23 27+ LMP Look at the light mantle over there. (4-5)(LRV 7)

05 23 27+ CDR You can sure see it now, can't you now? (4-5)(LRV 7)

05 23 27+ LMP Yes. (4-5)(LRV 7)

05 23 27+ CDR Getting your setting changed fast enough? (4-5)(LRV 7)(PHO 133 20281-300)

05 23 27+ LMP I got it; yes. (4-5)(LRV 7)(PHO 133 20281-300)



05 23 27+ CDR Let's get our Rover sample. (4-5)(LRV 7)(SAMP SOIL 75110-15)(PHO 133 20280)

05 23 29 01 CDR And the Rover sample will be from the same locality. (4-5)(LRV 7)(SAMP SOIL 75110-15)  
It's just a couple of meters from the charge.

05 23 29+ LMP Yes. I hope I didn't put too much soil in there for (4-5)(LRV 7)(SAMP SOIL 75110-15)  
you.

05 23 29+ CDR Bag 43 Yankee. (4-5)(LRV 7)(SAMP SOIL 75110-15)

05 23 29+ CC And how about a frame count right now, Jack. (4-5)(LRV 7)

05 23 29+ LMP 106. (4-5)(LRV 7)

- - -

05 23 29+ LMP Gene, can you swing out there and give me one look (4-5)(LRV 7)  
down north into Victory?

- - -

05 23 29+ LMP North. Just swing it - point north so I can look in (4-5)(LRV 7)  
there.

05 23 29+ CDR Yes. (4-5)(LRV 7)

05 23 29+ CDR I never got a good look at it. It's a series of (4-5)(LRV 7)  
three craters. There's some boulders on the talus  
slope of the eastern slope of the southernmost  
crater, the one we're closest to.

05 23 29+ CDR Now how does that look to you? (4-5)(LRV 7)

- - -

05 23 29+ LMP I don't know what it looks like. The northwest end (4-5)(LRV 7)  
of the V has a white block - white blocks on it -  
boulders - on the inner wall and right at the rim.  
And the northeast end of the V looks like it has  
somewhat darker rocks.

05 23 29+ LMP Part of that is shadowed, but I think they are (4-5)(LRV 7)  
darker. And they look like about the same as down  
here near the tip of the V.

05 23 29+ CDR Got to be careful on that one, because there's one (4-5)(LRV 7)  
sloping away and one sloping towards us.

-- --

05 23 31 28 CDR Okay; we are rolling, by the way. And we're at 106 (4-5)  
and - well, we're still 3.1.

05 23 31+ LMP In the rim itself though, Victory is not blocky. (4-5)  
There is some increase in fragment size, but that  
seems to be the result of some craters in the rim  
that have gotten below the debris that's covering  
it. I'd say that Victory's somewhat like Horatio in  
that it has blocky inner walls but essentially a  
normal block population on the rim.

-- --

05 23 31+ CDR That one I could have gone through. (4-5)

-- --

05 23 31+ CDR Look at the size of that one. That's another one of (4-5)  
those -

05 23 31+ LMP Yes. (4-5)

05 23 31+ CDR \*\*\* - there's another one on the right. Lookit. (4-5)

05 23 31+ LMP Some of them have - (4-5)

05 23 31+ CDR Well, that one doesn't have any fragments in the (4-5)  
bottom of it.

05 23 31+ LMP No. (4-5)

05 23 31+ CDR Looks like someone walked across it. (4-5)

-- --

05 23 31+ LMP I think that there's quite a variability in the (4-5)  
thickness of the dark mantle in here. I didn't  
notice us crossing that one tongue of light mantle.

05 23 31+ CDR No, I didn't either. (4-5)

-- --

05 23 31+ CDR Looking into the Sun, you can't tell any difference (4-5)  
anyway. However, I tell you, I certainly get the  
impression there is a mantle. I would say that -

05 23 31+ LMP Oh, I think so. I don't know what it is, but the (4-5)  
dark mantle exists. These craters are just too big  
not to have thrown up blocks. And they're either  
subdued by the mantle or they haven't penetrated it.

05 23 31+ LMP And I think you probably have both. (4-5)

05 23 31+ CDR I'd say they've been subdued by the mantle. That (4-5)  
really imposes an impression on me.

05 23 31+ LMP Yes. There are those that appear that way, like (4-5)  
Horatio, for example, or the big ones. But others,  
I think, are too young. They just don't penetrate.  
Particularly those that are big and have bright  
halos.

05 23 31+ CDR Yes, but the only ones that look fresh and not (4-5)  
enough to penetrate are these little ones with the  
glass in them.

05 23 31+ LMP Well, there's been some big fresh ones. We'll look (4-5)  
for one.

05 23 31+ CDR Now there's one with glass in it, probably. (4-5)

05 23 31+ LMP Yes. I think that's one - - (4-5)

05 23 31+ CDR And without any blocks on it. That may not have (4-5)  
penetrated.

05 23 31+ LMP Yes, that just has mostly the shock-indurated rock. (4-5)

05 23 35 13 CDR We're coming up to 103 at 2.6 now, so we need a (4-5)  
sample up here.

05 23 35+ CDR 103, 2.5, anywhere. (4-5)

- - -

05 23 35+ LMP Okay. Right out in that little inter-crater area, (4-5)(LRV 8)(SAMP SOIL 75120-24)(PHO 133 20316-17)  
right out in there is good. If you let me guide you  
a little, I might get a rock sample.

--

05 23 35+ CDR Okay. Pick a point. (4-5)(LRV 8)(SAMP SOIL 75120-24)

--

05 23 35+ LMP Whoo! Now we'll give it a try. (4-5)(LRV 8)(SAMP SOIL 75120-24)

05 23 35+ CDR 103, 2.5. (4-5)(LRV 8)(SAMP SOIL 75120-24)

--

05 23 36 27 LMP The soil is in 44 Yankee. (4-5)(LRV 8)(SAMP SOIL 75120-24)

05 23 36+ LMP That block's too big. I can't get it. (4-5)(LRV 8)(SAMP SOIL 75'20-24)

05 23 36+ CDR Get your picture? (4-5)(LRV 8)(SAMP SOIL 75120-24)(PHO 133 20316-17)

05 23 36+ LMP No. Okay, got mine. (4-5)(LRV 8)(SAMP SOIL 75120-24)(PHO 133 20316-17)

--

05 23 37 04 LMP 125's the LMP frame. (4-5)(LRV 8)

--

05 23 37+ LMP I think Station 5 is a pretty good spot. (4-5)

--

05 23 37+ LMP It's probably the most concentrated boulder field on Camelot. (4-5)

--

05 23 37+ LMP Wonder where Horatio is? (4-5)

--

05 23 37+ CDR It's probably right over that the right, Jack. Right off your right hand at 2 o'clock. (4-5)

05 23 37+ LMP Right. I guess so. (4-5)

05 23 37+ CDR You know, it doesn't have boulders on it. It should be over there. That should be it right over that rim. (4-5)

--

05 23 37+ CDR I'm sure glad I went up to take that second pan to see that stuff go radially down into the center of the crater at that contact.

--

05 23 37+ CD< Look at - up the cleft over there. You can see definite change in albedo now between the North Massif and the Sculptured Hills. Look right up the valley. (4-5)

--

05 23 37+ LMP Yes. But, again, that may be your photometric effect. (4-5)

05 23 37+ CDR Yes, one's an upslope and one's a downslope. (4-5)

05 23 37+ LMP Yes. Yes. Just about right, but it's supposed to be darker in the cleft you know. (4-5)

--

05 23 40 LMP Bob, the fragment population - we're at 099, 2.0 - is still about the 1 percent category of - and it's hard to tell, going into the Sun, what kind of blocks you're dealing with. But my guess is - well, more than a guess - most of them look like they're slightly vesicular. And, in that regard, resemble the gabbros. (4-5)

05 23 40+ LMP Now there is something - there's a class of boulders that is flat-topped and fairly well rounded that is just about completely buried. Not more than 5 centimeters of it projects above the surface. We've seen those off and on, both days. (4-5)

05 23 40+ LMP And they seem to be quite distinct. At least you notice them. Now, whether it's just a continuation of the mantling, I don't know. But most other boulders - the big ones seem to be - project above the surface more than just that 5 or 10 centimeters. (4-5)

05 23 40+ CDR I tell you, the Sculptured Hills just have that wrinkled old-face feeling. (4-5)

05 23 40+ LMP Yes. There are blocks over there though, aren't there? (4-5)

05 23 40+ CDR There's blocks, but I don't see any concentrated outcrops - or concentrated masses of blocks up on the slope anywhere - like you did on the massif. (4-5)

05 23 40+ CDR Do you think that's Camelot or not? (4-5)

05 23 40+ LMP I think that might be Camelot. (4-5)

- - -

05 23 40+ CDR - - southwestern rim. (4-5)

05 23 40+ LMP Yes. (4-5)

05 23 40+ CDR Yes, because Horatio's got to be on our right. (4-5)

05 23 40+ LMP It's not Horatio, is it? (4-5)

05 23 42 43 CDR Well, we're at 094, 1.7. (4-5)

05 23 42+ LMP No, I think that's Camelot. Horatio didn't have blocks that far up the rim. (4-5)

05 23 42+ CDR Let me look at the bottom. I'll tell you. I remember. (4-5)

- - -

05 23 42+ LMP Yes. (4-5)

05 23 42+ CC That kind of sounds like Camelot to us. (4-5)

05 23 42+ CDR Yes, I remember. Yes, that's it, Bob. We're coming right up at Station 5. Right at it. (4-5)

05 23 42+ LMP You want to park up on the rim so they can have a good panorama? (4-5)

05 23 42+ CDR I'd like to get a little on the other side of those blocks, if I can. (4-5)

05 23 42+ LMP Yes, you better. Then they can look with the Sun on them. (4-5)

05 23 42+ CDR Because, otherwise, they can't see that other rim (4-5)  
over there.

- - -

05 23 42+ CDR I'll get to the other side. Then they can look at (4-5)  
these blocks and those across the way. I got to go  
around this block field, though.

05 23 42+ LMP I should hope so. \*\*\* (4-5)

05 23 42+ LMP There's Horatio back there. I can see Horatio now. (4-5)

05 23 42+ LMP Looks just like it did before. (4-5)

05 23 42+ CDR So, we came right where we were supposed to. (4-5)

05 23 42+ LMP All the blocks look very much the same in the wall (4-5)  
of Horatio.

- - -

05 23 42+ CDR Talk about a block field! (4-5)

05 23 42+ LMP I think my guess of 30 percent was reasonably good (4-5)  
before.

05 23 42+ CDR I'll park right over here, so that they can look in (4-5)  
it.

05 23 42+ CDR I got to head 045, so I head right into those (4-5)  
blocks.

- - -

05 23 45 15 CDR We're stopped. 086 and 1.4. (5)

05 23 45+ LMP Not very level for the gravimeter. What's their (5)  
limit?

05 23 45+ CDR I don't know, but it's taken a couple better than (5)  
this.

05 23 45+ CDR Hey, I got to change film. (5)

05 23 45+ LMP I think I can get by this station without it. (5)  
 -- --

05 23 47+ LMP Bob, I have 135 frames. (5)  
 -- --

05 23 48+ LMP This looks just like our old friend, the pyroxene gabbro with the shiny ilmenite platelets in the vugs and partially recrystallized vesicles. The textural variations are planar, and they're primarily - subplanar in the concentrations of vesicles. (5)  
 -- --

05 23 48+ CDR Bob, what magazine? (5)

05 23 48+ CC Magazine Delta. (5)  
 -- --

05 23 48+ CDR Delta - Bravo. There's Delta. (5)

05 23 48+ LMP Boy, this is certainly a subfloor, as we mapped it. It's certainly a uniform rock type. I'll tell you. The only variation - are those gray zones which just seem to be either finer or the absence of vesicles. Boy, I'm nose to nose with a piece of it right now. (5)  
 -- --

05 23 50 37 LMP Here I am in the middle of a boulder field. The texture - mineral texture appears to be subophitic to - sort of like a good diabase, although a little coarser. But it's unquestionably organized and - with that variation in vesicle concentration. (5)

05 23 50+ CDR Starting on frame 4, Bob. (5)  
 -- --



- 05 23 50+ LMP I have the impression that these blocks are buried (5)  
up here. That the mantle does exist, even on  
Camelot. There are a few blocks that - looks like  
they're lying more or less on the surface, you can  
attribute those to craters that have disrupted the  
block field.
- 05 23 50+ LMP The big ones seem to be projecting out of the (5)  
mantle.
- 05 23 50+ CC Do you see any such mantle - - on top of them? (5)
- 05 23 50+ LMP No, I don't. What's there seems to be what could (5)  
have been knocked up there.
- 05 23 50+ LMP I see a place where I think we can skim some off the (5)  
top of a rock, which I think we probably ought to  
do.
- 05 23 50+ LMP But I don't have the impression of draping, so much (5)  
as I have just of burial. And I have a feeling that  
the zap-pitting process just has cleaned these  
boulders off - of anything that may have been on top  
of them, in excess of what's around them, right now.
- 05 23 50+ CC You're talking about mantle - blocks - then mantle - (5)  
and then cleaned off by zap pits, in other words.
- 05 23 53 38 LMP That's right. That seems to be what has happened (5)  
all over the Moon that we've looked at. But the  
rocks are always cleaner than the surface, of  
course. The far rim of Camelot - you can see - fact  
is everywhere but where we are and on the rim near  
the LM - the rim seems to be completely covered or,  
at least, the blocks don't show through. They show  
up in the wall but not at the rim. That's much like  
Horatio, but not to the extreme that we saw at  
Horatio. I'd say, at Camelot, the mantle is - oh,  
maybe - at the most - the rim thickness, if that's  
mantle, is on the order of a half of what we saw at  
Horatio.
- 05 23 53+ LMP The pan should let you measure that - well, we (5)  
didn't get a pan at Horatio, but we got some Rover  
shots of it. But you may be able to - quantify that  
a little bit.

--

05 23 55+ LMP Here's a nicely structured rock that we probably ought to work on here. Structured again in the vesicle concentration. And then I think we ought to try to get - right over there, we can get mantle. (5)

05 23 55+ CDR Hey, I'll tell you what impresses me about some of these rocks. There's a lot of - they may be zap pits - I guess you looked at them closer than I did, but there sure is a lot of lineation in some of that white material, Jack. (5)

05 23 55+ LMP But at what scale? (5)

05 23 55+ CDR On a visual-obvious scale. (5)

--

05 23 55+ LMP The crystal grains seem to be linear, but they are more or less random. Is that what you mean? (5)

05 23 55+ CDR No, they're linear, though. - - can't be really linear and random. There's some rocks here - - that are highly vesicular and there's others that are not. (5)

05 23 55+ LMP That's right. (5)

--

05 23 55+ CDR Let me get these two first and then we'll go get that one, because there's two different kinds here - at least apparent kinds. One's a relatively new fracture. (5)

--

05 23 55+ LMP We need to sample the structures, though, in this thing. We haven't really done that. (5)(SAMP 75010,15)(PHO 133 20328-29; 145 22136-40)

05 23 55+ CDR We'll try and get an around-the-corner - - picture. (5)(SAMP 75010,15)

05 23 55+ LMP We need to get that stuff on the mantle, too. I mean on the blocks. (5)(SAMP 75010,15)

05 23 55+ CDR We want to get an around-the-corner picture of one of those big ones, too. See if we can get the structure of it. Okay, you get your picture? (5)(SAMP 75010,15)  
(PHO 133 20328-29)

05 23 55+ LMP Yes. (5)(SAMP 75010,15)(PHO 133 20328-29)

05 23 57 19 CDR Here's a piece right here. (5)(SAMP 75010,15)

- - -

05 23 57+ LMP Okay, I got it. That looks like our old friend, the gabbro, all right. (5)(SAMP 75010,15)

05 23 57+ LMP 462 is Gene's fairly freshly fractured rock. (5)(SAMP 75010,15)

- - -

05 23 57+ CDR Here's another one right here. (5)(SAMP 75030,35)(PHO 133 20328-29; 145 22136-40)

- - -

05 23 58 53 LMP 463. Is another of the same variety. Wish we'd started on that structured rock because we're going to run out of time. Let's go over there and get at least one off of it. (5)(SAMP 75030,35)

05 23 58+ CDR Yes, we'll get it. (5)(SAMP 75030,35)

05 23 58+ LMP Get the after. (5)(SAMP 75030,35)(PHO 145 22139-40)

05 23 58+ CDR Got it. (5)(SAMP 75030,35)(PHO 145 22139-40)

05 23 58+ CDR What did you have picked out? (5)(SAMP 75050,55)(PHO 133 20330-36; 145 22141-53)

05 23 58+ LMP This in here with the layering in it. (5)(SAMP 75050,55)

05 23 58+ LMP I'll get a - - a flight line photo. (5)(SAMP 75050,55)(PHO 133 20330-34)

05 23 58+ LMP Why don't you get a flight line - (5)(SAMP 75050,55)(PHO 145 22141-53)

05 23 58+ CDR I'm going to get that from here. (5)(SAMP 75050,55)(PHO 145 22141-53)

05 23 58+ LMP Sort of northeast. How you going to go? (5)(SAMP 75050,55)(PHO 145 22141-53)

05 23 58+ CDR I'll come around from this end and go around to that side. (5)(SAMP 75050,55)(PHO 145 22141-53)  
(PHO 133 20330-34)

05 23 58+ LMP Okay, I'll go perpendicular to you more or less. (5)(SAMP 75050,55)

05 23 58+ CDR Boy, that one right behind you is just vesicular, by comparison, to a high degree - like three times as much. (5)(SAMP 75050,55)

05 23 58+ CDR I hope those bags weren't in the way of every one of those pictures. There ought to be a lot of permanent shaded samples in here, Jack. (5)(SAMP 75050,55)

06 00 01 17 LMP Okay, I got the down-sun. (5)(SAMP 75050,55)(PHO 133 20335)

06 00 01+ CDR Man! That's a hard Moon. (5)(SAMP 75050,55)

06 00 01+ LMP How about this chunk down there, Gene? (5)(SAMP 75050,55)

- - -

06 00 01+ CDR I don't think that'll come off very easy. (5)(SAMP 75050,55)

- - -

06 00 02 18 CDR By golly, your geology training did come in handy. You learned where to hit rocks. (5)(SAMP 75050,55)

06 00 02 36 CDR 464. Won't all go in there but - - (5)(SAMP 75050,55)

06 00 02+ LMP That's all right, you can wrap it around it. (5)(SAMP 75050,55)

06 00 02+ CDR No, I'll get it, babe. It's in there. (5)(SAMP 75050,55)

- - -

06 00 02+ CDR These rocks here have a much greater density of the white minerals in them, or crystals, than I've ever seen before, Jack. Where did we see these kind before? (5)(SAMP 75050,55)

06 00 02+ LMP Well, when I looked at them right at first, that's what I thought - but I think that the zap pits are making the white stand out more. They're fooling you a little bit. (5)(SAMP 75050,55)

06 00 02+ LMP Because when I looked at it with the hand lens, it  
looked like a fairly normal gabbro - like some of  
those that have crystallized with the mare basalt. (5)

06 00 02+ CDR Where are you? (5)

06 00 02+ LMP I'm back over here. What I want is a sample of this (5)(SAMP SOIL 75060-66)(PHO 133 20337-38; 145 22154-58)  
soil off one of these rocks.

06 00 02+ CDR Okay, let's get that now and then let's get the rake (5)(SAMP SOIL 75060-66)  
sample.

06 00 02+ LMP But it looks to me like it's soil that's been thrown (5)(SAMP SOIL 75060-66)  
up there rather than - this rock is about 3 meters  
in diameter - but it's one of the flat-surfaced  
rocks. It only stands about - at the most -  
one-third of a meter high.

06 00 02+ LMP But we can get up about a meter from the soil/rock (5)(SAMP SOIL 75060-66)  
interface and get soil off the rock, I think.

--

06 00 02+ LMP I got some soil. (5)(SAMP SOIL 75060-66)

--

06 00 04 56 CDR 465 is that bag number. (5)(SAMP SOIL 75060-66)

06 00 04+ LMP Okay, this is soil from a half a meter in. It's  
about a centimeter deep and a-half-a-meter in. (5)(SAMP SOIL 75060-66)

06 00 04+ CDR Let's take that chip there that's lying on top with (5)(SAMP 75070,75)(PHO 133 20337-38; 145 22154-58)  
the next scoop.

06 00 04+ CDR Let's take the soil on that. Okay, take that one (5)  
then. Well, that's another bag. Before you pick  
that one up, pick that little chip up -

06 00 04+ LMP I don't want to get the chips. I want the soil. (5)  
Either that or a coherent rock.

--

06 00 05 43 CDR Okay, 465. Pick that other one up and I'll bag it (5)(SAMP SOIL 75060-66)  
real quick.

06 00 05+ CDR That's the soil from on top the rock. And we're taking a piece of the rock itself, which looks pretty much like the other one. It might be a little bit more vesicular. (5)(SAMP SOIL 75060-66) (SAMP 75070,75)

06 00 05+ CC That'll be in 466, right? (5)(SAMP 75070,75)

06 00 06 06 CDR You're right again. (5)(SAMP 75070,75)

--

06 00 06+ LMP Okay, the soil came from a half a meter in the soil boundary. Let me get over here and get one bag of soil that's away from the boulder. (5)(SAMP SOIL 75060-66) (PHO 133 20337-38; 145 22154-58)

06 00 06+ CDR I'm going to get my after while I'm here. (5)(SAMP SOIL 75080-89)(PHO 145 22156-57)

--

06 00 06+ CC We'd just like to get the kilogram of soil somewhere between the boulders - as open as you can. (5)(SAMP SOIL 75080-89)

--

06 00 06+ LMP Let's do it right here. (5)(SAMP SOIL 75080-89)

--

06 00 06+ CDR This will be a matched pair with our soil sample, too. (5)(SAMP SOIL 75080-89)

06 00 07 32 CDR Bag 467 is where your kilogram is coming from. (5)(SAMP SOIL 75080-89)

06 00 07+ CDR Another scoopful. (5)(SAMP SOIL 75080-89)

06 00 07+ LMP I'm sampling down to about 5 centimeters. (5)(SAMP SOIL 75080-89)

--

05 00 08 15 CDR That's full. That's 467. (5)(SAMP SOIL 75080-89)

--

06 00 08+ CDR Jack, you got a shot of where my scoop was, didn't you? (5)(SAMP SOIL 75080-89)

06 00 08+ LMP Yes. (5)(SAMP SOIL 75080 39)

06 00 08+ CDR Let me get an offer of it, though. (5)(SAMP SOIL 75080-89)(PHO 145 22158)

06 00 08+ IP We sampled about 3 meters southwest of the gnomon that was set up for the top-of-boulder soil sample. So it's a matched pair, really, in that regard. (5)(SAMP SOIL 75080-37)

--

06 00 08+ LMP Now I need to get a pan - are you in a pan? (5)(PHO 133 20339-61)

06 00 08+ CDR I've already started it. (5)(PHO 145 22159-83)

06 00 08+ LMP I'll go over near the Rover and get one. (5)(PHO 133 20339-61)

--

06 00 11 23 CDR 670, 031, and 401. 670, 031, and 401. (5)

--

06 00 11+ CDR CDR's at 50. (5)

06 00 11+ LMP 170. (5)

--

06 00 11+ LMP I'll use it until it runs out. (5)

06 00 11+ CDR I got a lot of film anyway. (5)

--

06 00 11+ LMP Let's go. (5)

06 00 15 16 CDR Okay, the switch is coming on. (5)

--

06 00 15 59 CDR i'm reading 085/1.4. (5)

--

06 00 15+ LMP I guess my impression and it's purely pure interpretation right at this stage - that Camelot is mantled by whatever has formed the dark mantle. (5-ALSEP)

06 00 15+ LMP It does not seem to be mantled to the degree that (5-ALSEP)  
Horatio is.  
- - -

06 00 16 58 LMP And we've been going about - a minute. (5-ALSEP)  
- - -

06 00 16+ LMP The inner wall of Camelot to the east is certainly (5-ALSEP)  
blocky.  
- - -

06 00 18 08 CDR Okay, we're at 083 and 1.1. We're just about abeam (5-ALSEP)  
the eastern rim of Camelot. And there's Challenger.  
- - -

06 00 18+ LMP You can even see the ALSEP. (5-ALSEP)  
- - -

06 00 18+ LMP Looking over there, though, we're about 50 meters (5-ALSEP)  
from boulders in Camelot. And their appearance from  
this distance is the same as what we sampled at 5.  
I think we've pretty well identified the subfloor.

06 00 18+ CC Sounds like from the very deepest - even from the (5-ALSEP)  
bottom of Camelot - it looks like it's about the  
same.

06 00 18+ LMP It sure does. I can't say I understand it. But (5-ALSEP)  
that's the way it appears right now.  
- - -

06 00 18+ LMP Whatever filled this valley - it certainly was (5-ALSEP)  
different than the massifs. I think we've proved  
that. And it, presumably, at least everything I see  
indicates that it was an igneous extrusion of some  
kind. Either that, or the whole valley's been  
tilted and we're looking at some strange cross  
section, planar more or less - relative to the other  
mountains, of a crystalline body that was formed at  
depth. But I don't think that's likely.



--

06 00 20+ LMP Look at the Italian flag. (5-ALSEP)

06 00 20+ CDR Hey, there is one there. I saw the box before I saw the flag. No I didn't, I saw the flag first. (5-ALSEP)

--

06 00 20+ CDR I'm 082 and I'm 0.5. I'll just head right in towards the LM. Man, I want to stay away from ALSEP, I see that big boulder. (5-ALSEP)

--

06 00 20+ CDR Did we ever get any glass out of the bottom of those craters? (5-ALSEP)(SAMP 70019)

06 00 20+ LMP No, we haven't, we've got to try to do that before we leave. (5-ALSEP)(SAMP 70019)

--

06 00 22 47 CDR 081, 0.4. (5-ALSEP)

06 00 22+ LMP Okay, let's put it in that little depression there. See right ahead of us to the right. (5-ALSEP)

06 00 22+ CDR Got your pictures? (5-ALSEP)

06 00 22+ LMP I'm getting them. (5-ALSEP)(PHO 133 20369-73)

06 00 22+ LMP Now just swing into that depression and I'll put it there. (5-ALSEP)

--

06 00 23 12 LMP Okay, charge number 8. (5-ALSEP)

06 00 23+ CDR You didn't get a picture to the LM then, did you? (5-ALSEP)

06 00 23+ LMP I got several of them. (5-ALSEP)(PHO 133 20369-73)

--

06 00 25 21 LMP Okay, antenna is deployed. Pin 1 is pulled and safe. And. Let me check that. It's dusty. Yes, it's safe. Pin 2 is pulled and safe. Pin 3, pulled and safe. (5-ALSEP)

--

06 00 23+ LMP Okay, the LM was in the approach shot, I believe, let me - Go ahead and turn around -- (5-ALSEP)

06 00 23+ CDR Yes, I got to go around anyway. (5-ALSEP)

06 00 23+ CDR This way I can get a running shot of \*\*\* - right in the middle of it - let me get them both in it. (5-ALSEP)(PHO 145 22184)

06 00 23+ LMP Okay, I ran out of film, too. (5-ALSEP)

06 00 23+ LMP When you come around, take a picture of the LM on your camera. (5-ALSEP)

06 00 23+ CDR I'll. I'll take it right out the front looking right at the thing. (5-ALSEP)(PHO 145 22184)

06 00 23+ LMP Yes, and give them a frame count. (5-ALSEP)(PHO 145 22184)

06 00 23+ CDR Five-six. (5-ALSEP)(PHO 145 22184)

06 00 23+ CDR Bob, I've got the locator of the charge and the LM all in the same order here, and I'm one more than what I just gave you. I can't look at it now. (5-ALSEP)(PHO 145 22184)

--

06 00 25+ CC Jack, if you'll get out at the ALSEP, we'll have you take a look at the surface gravimeter and Gene can press on home to the LM. (5-ALSEP)

06 00 25+ CDR Jack, I'm going to drive you in this way, and then I'll drive all the way back around that one geophone. (5-ALSEP)

06 00 25+ CC While you're to the north, you could drive in toward the heat flow, towards that big rock, if you can see that. (5-ALSEP)

06 00 25+ CDR Yes, that's as good as anything. (5-ALSEP)

-- --

06 00 26+ CDR Do you have any film at all? (ALSEP)

06 00 26+ LMP No, I want your camera. (ALSEP)

-- --

06 00 26+ CX Okay, Jack. We aren't planning on taking the ALSEP photos right now. (ALSEP)

-- --

06 00 27 42 CDR Okay, Jack's got my camera and tongs, and I'm on my way. (ALSEP-LM)

-- --

06 00 32 24 CDR I'm reading 089, 20.1, 002. (ALSEP-LM)

-- --

06 00 32+ CC Gene, are you at the Rover? (LM)

06 00 32+ CDR Yes, sir. I'm parked. (LM)

-- --

06 00 39+ LMP I just sampled the glass in the bottom of a crater. I documented it by shooting the LM across the crater at infinity and then shooting the crater with stereo at 11 feet and in that cross-sun pair at 7; and then I sampled it. (ALSEP)(SAMP 70019)(PHO 145 22185-91)  
(PHO 145 22185)  
(PHO 145 22186-87)  
(PHO 145 22188-89)

06 00 39+ LMP Then I took a cross-sun pair at 7 after. (ALSEP)(SAMP 70019)(PHO 145 22190-91)

-- --

06 00 39+ LMP It's very fragile, and I double bagged it. I don't know whether we can keep it or not. (ALSEP-LM)(SAMP 70019)

06 00 39+ CDR You may think about how to preserve it. (ALSEP-LM)(SAMP 70019)

06 00 39+ LMP While you're thinking, I'll put it on my floor pan. (LM)(SAMP 70019)

-- --

06 00 41 50 CDR As you look at those little sparkles in the soil (LM)  
 we're walking on and they change colors on you - -  
 greens and purples, iridescent. Iridescent  
 sparkles.

- - -

06 00 42+ CC Okay, guys. We're going to put stuff in loose, (LM)  
 because they'd like to segregate stuff in the  
 following way. Like to put the long can and four  
 core tubes in the SRC. They'd like to get the long  
 can and three core tubes in the SRC number 1. And  
 then, we'd like to get all the SCB 4 samples in the  
 same SRC.

- - -

06 00 42+ CDR Three plus the long can; that's four cores all (LM)  
 together.

06 00 42+ CC Right. Put those in the SRC - - (LM)

06 00 42+ CDR All samples from 4. (LM)

06 00 42+ CC All the samples from SCB 4. (LM)

06 00 42+ LMP These are 4. You want to get the core tubes in (LM)  
 first, though.

06 00 44 40 CDR Yes. I want to put these in. (LM)

- - -

06 00 44+ CC Do you remember where the three trench soil samples (LM) (SAMP 74220-24, 40-49, 60, 85-87)  
 - which bag those were put in - from Station 4?

06 00 44+ CDR I'm the only one who had bags, so I bagged them and (LM) (SAMP 74220-24, 40-49, 60, 85-87)  
 put them in whatever bag Jack had.

06 00 44+ CC Okay, then that'll be SCB 4, so we'd like those in (LM) (SAMP 74220-24, 40-49, 60, 85-87)  
 SCB 4. And those are the ones that will go in the  
 rock box.

06 00 44+ CDR Give me these other two cores, if you've got them, (LM)  
 Jack.

06 00 44+ CDR Long can. (LM)

06 00 44+ LMP The long can. (LM)

06 00 44+ CDR Yes, and we need one more core. (LM)

06 00 44+ LMP One more core. (LM)

06 00 44+ CDR That right now? Three core tubes and a long can? (LM)

06 00 44+ CDR Yes, got them all. (LM)

06 00 44+ CC And then all the samples in SCB 4. Then beyond that (LM)  
we'll fill them up with samples from SCB 5.

-- --

06 00 47 27 CC Jack, it probably would protect the glass a bit  
better if you put it in the SRC gently with the  
other rocks there.

-- --

06 00 47+ LMP Leave a space for a sample, I guess, Gene. (LM)(SAMP 70019)

-- --

06 00 47+ LMP Just set it in there. (LM)(SAMP 70019)

06 00 47+ CDR Yes, I'll tell you, I'll be delicate with it. (LM)(SAMP 70019)

06 00 47+ LMP Okay. It's in the right-hand back corner of the  
SRC. (LM)(SAMP 70019)

-- --

06 00 48+ LMP There's samples in (SCB) 6. (LM)

06 00 48+ CC Okay. You should also have SCB 8 under your seat  
with samples in it. (LM)

06 00 48+ LMP This is what I sampled at -- (LM)

06 00 48+ CC At Station 3, maybe. (LM)

06 00 48+ LMP Six has the samples rom - from - yes. (LM)

06 00 48+ CC Okay. Let's take up SCB 8 - - (LM)

- - -

06 00 48+ CC And let's take up SCB 6 and why don't you dump out (LM)  
the Rover samples into SCB 6?

06 00 48+ LMP Well, one reason not to take 6 is I don't know if I (LM)  
can get it off.

06 00 48+ CC And let's save SCB 4 because I think you may need (LM)  
that tomorrow.

06 00 48+ CDR Four is on the rack, empty. (LM)

06 00 48+ CC How about SCB 5? Is that only partially emptied, or (LM)  
is it totally emptied?

06 00 48+ CDR Oh, it's about half full, Bob. (LM)

06 00 48+ CC Okay. We'll take that up with us. (LM)

- - -

06 00 50 08 LMP I've got SCB 8 full. (LM)

06 00 50+ LMP Let's take it up. (LM)

06 00 50+ LMP It's got Rover samples in it. (LM)

06 00 50+ LMP But I can't get them all. They won't all be in (LM)  
there.

06 00 50+ CDR The seal was clean. It was clean and I got your (LM)  
four cores - three cores, plus a long can. I got  
Jack's glass. I got SCB 4 and a couple of samples (SAMP 70019)  
out of SCB 5.

- - -

06 00 50+ CDR Now, Jack, we've got SCB 5 that's half full. What (LM)  
have you got over there?

06 00 50+ LMP Bring it over here, and I'll put it into 6. Six is (LM)  
a little more than half full.

06 00 50+ CDR Well, this is a little less than half full. (LM)

06 00 50+ CDR That ought to make one full bag. These are big (LM)  
 rocks so they'll come out easy. Where's that big,  
 big rock we got? That's in one of those bags, too.  
 Picked up a big rock - here let me see if I can't  
 dump it.

- - -

06 00 52 15 LMP Okay, Bob. SCB 8 and 6 are going up. (LM)

06 00 52+ CC Okay, and I understand 5 will be - - on the gate. (LM)

06 00 52+ CDR Yes, sir, Bob. It'll be there. (LM)

06 00 52+ LMP And 7 under the LMP's seat. (LM)

06 00 52+ CDR Four and five will be on the gate. (LM)

- - -

06 00 55+ LMP Nothing's in the big bag. (LM)

06 00 55+ LMP Unless there's one rock that disappeared yesterday. (LM)  
 I don't know what happened to it.

- - -

06 00 55+ CC Jack, while you're unloading there - - on the 500 (LM)(PHO 144 22080-132)  
 millimeter, you might squeeze off a few shots of the  
 North and South Massif there, if there's any  
 lineations visible.

06 00 55+ LMP I'll give it a try. (LM)(PHO 144 22080-132)

- - -

06 00 55+ CDR Why don't you give it to me while you're packing the (LM)(PHO 144 22080-132)  
 ETB, Jack; I'll do it.

- - -

06 00 57 52 LMP Oh, I should call - mag Charlie. (LM)

06 00 57+ LMP Mag Kilo. Mag Bravo. Mag Golf. Mag India. (LM)

06 00 57+ CC Tell Gene that we can confirm that his lense cover's (LM)(PHO 144 22080-132) off.  
 - - -

06 00 57+ LMP Try f:5.6 directly down-sun or up-sun at that Sculptured Hills there in the distance.  
 (LM)(PHO 144 22080-132)

06 00 57+ CDR Yes, I'll get it.  
 (LM)/PHO 144 22080-132)

- - -

06 00 57+ CDR Some of these won't overlap, Bob, because I'm hurrying.  
 (LM)(PHO 144 22080-132)

- - -

06 00 57+ CDR They're not smeared, but I just didn't overlap some of them.  
 (LM)(PHO 144 22080-132)

- - -

06 00 57+ CDR Frame count is 152 on the 500.  
 (LM)(PHO 144 22080-132)

- - -

06 01 00+ LMP Meg Romeo.  
 (LM)

- - -

06 01 14 22 LMP What is this rock, right here, by the pad?  
 (LM)

- - -

06 01 14+ LMP Yes. I've just been intending to mention that several times. Anybody that lands on a rock ought to have their head examined.  
 (LM)

- - -

06 01 14+ CDR Gosh dang that rock! If I was strong enough, I'd move it. Hey, I am strong enough. That's one we ought to bring home.  
 (LM)

- - -



06 01 14+ CDR That's about the size of the SRC. (LM)  
--  
06 01 19 24 CDR The reading is 670, 023, 501; that's 670, 023, 501. (LM)  
--  
06 01 19+ C/JR SRC 2 is in my hand. The big bag is not required. (LM)  
--  
06 01 22+ CC Are the three SCBs inside the hatch, already? (LM)  
--  
06 01 22+ CDR -- I've got 8 here and 6 here and we emptied the contents of 4 into the -- SRC, and we emptied the contents of 5 into one of these other two bags. So we've only got two of them here, plus the SRC. (LM)  
06 01 22+ CDR Five went into 6. (LM)  
06 01 27+ CDR And we've got two of them hanging on the tail of the Rover. And I don't know what it is under Jack's seat right now. (LM)  
06 01 22+ LMP Seven is under my seat. (LM)  
--  
06 01 29 44 CDR Okay. Hatch is closed and locked. (LM)

\*\*\* EVA 2 DEBRIEFING \*\*\*

06 02 32+ CDR I just dug a rock out of my pocket. When we were at (BETWEEN EVAS) (SAMP 74230,35)  
Shorty, fumbling around, trying to get everything done, I said there was a piece of very shiny black glass-like-looking material that reminded me of obsidian. Well, it's not. It looks like a very fine-grained gray rock. But, it's a fractured piece and I've picked up fractures of about three or four vesicle faces on it. The vesicle faces are very shiny and that's what reflected and caught my eye. I picked it up at Shorty. Undocumented, halfway between the Rover and where we were sampling that orange stuff. And it will be in bag 12 Echo.

-- --  
06 02 32+ CDR We'll put in it in SCB 8. (BETWEEN EVAS) (SAMP 74230,35)

-- --  
06 02 33+ LMP This rock looks very much like 12009. It's a fine-grained, very coarsely vesicular gray rock - probably basaltic. (BETWEEN EVAS) (SAMP 74230,35)

-- --  
06 02 33+ LMP The vesicles, if I may project the size of them, probably were up to 4 or 5 centimeters in diameter. They're irregular in shape, but they're clearly vesicles and it looks like they are lined with either glass or very fine-grained crystals. They're very shiny. (BETWEEN EVAS) (SAMP 74230,35)

-- --  
06 02 36+ LMP You might make a note that the area samples (BETWEEN EVAS)  
went into bag 8 also

-- --  
06 02 36+ CDR SRC is 41.5. Bag 6 is 35. (lbs.) (BETWEEN EVAS)

(BETWEEN EVAS)

06 03 52+ CC Now two real quick geology questions that will help us do the planning for your EVA tomorrow. The first one has to do with Station 4. You called out some material on the rim there - the crater at Station 4 - which looked like bedded spatter. And we're wondering if that resembled anything that you'd seen in Hawaii?

(BETWEEN EVAS)

06 03 57 03 LMP I think they misheard. I think I may have said shattered and you might of thought spattered. Neither one of us intended to leave that impression. The big rock we sampled looked like intensely shattered gabbro, such as we've had around the Li. The rocks, probably more significantly, that Gene - one of which Gene picked up with the fine-grained vesicular basalt - coarsely vesicular basalt. And we didn't have any time to really examine the interrelationships of those rock types there, but those were the two fragment types we saw.

(SAMP 74230,35)

(BETWEEN EVAS)

06 03 58 04 LMP The bottom of that crater, now, had material that was extremely disorganized in its aspect and, really, we didn't have time to examine it in detail in order to decide why it was disorganized. It did not necessarily look like the boulder that we sampled at the rim.

(BETWEEN EVAS)

06 03 58+ CC A question about the boulder you sampled at the rim. Would you compare the basalt in this boulder which you may have called a gabbro, I'm not sure - in any case the basalt - to samples which you collected at Camelot and at ALSEP?

(BETWEEN EVAS)

06 03 58+ LMP Well, my impression was that they were the same rock types.

06 04 23+ CDR The small craters - of course, are the ones that can (BETWEEN EVAS)  
really jolt you. But the trouble is, you can never  
see what's just over the next ridge, and the next  
ridge may be 20 meters away, and you just can't see  
it until you're there, and you don't know whether  
it's a dish crater or pit crater.

- - -  
06 04 23+ LMP That description fits the geology up in there, (BETWEEN EVAS)  
because we weren't seeing blocky-rimmed craters and  
otherwise you would have been able to tell more  
easily about the old versus new craters, which would  
be the ones you could either go through or not go  
through, respectively.

- - -  
06 04 43+ CC Your mag Bravo is about 77 frames, and we'd like for (BETWEEN EVAS)  
you to leave it in the ETB and take it out with you  
tomorrow.

\* \* \* \* EVA 3 BRIEFING \* \* \* \*

06 14 41+ LMP I think in terms of sampling, Gene and I will try to (BETWEEN EVAS)  
shift the emphasis in the mantle area to fragments  
that are different from the gabbros that we've  
sampled fairly well, I think, up to now, that  
presumably are subfloor materials. You might pass  
that word on and see if they agree with us.

- - -

06 14 41+ CC Let me read up the planning for EVA 3 and the (BETWEEN EVAS)  
summary of what we think we have so far.

06 14 41+ LMP GC ahead. (BETWEEN EVAS)

06 14 45 26 CC Okay. I'll read here from this thing just verbatim. (BETWEEN EVAS)  
It says, "EVA 3 continues to follow essentially the  
minimal pre-mission plan. Main objectives continue  
to be the North Massif; Station 6, 7; Sculpture  
Hills; and Van Serg crater. In view of the  
extensive observations of the dark mantle and plains  
subfloor unit on EVA 1 and 2, particularly there  
before Station 5, the relative priority of Station  
10 is reduced, so that Station 10 becomes a flexible  
station as time allotment is a reserve, possibly  
providing more time at the earlier station, if  
desired. However, mantle and block sampling at  
Station 10 are still important objectives. Back  
-pack constraints are not nearly as tight as they  
were yesterday, guys, and so we can be more flexible  
in reshuffling station times if we need. We  
probably won't be coming up against option walkbacks  
like we did at Station 4. Closeout time at the LM  
has been increased by 20 minutes to make the  
closeout less rushed and to allow for potential  
ALSEP troubleshooting. It is currently planned to  
take this time from Station 6, 7."

06 14 46 27 CC But if 6/7 requires more time when we get there, we (BETWEEN EVAS)  
can borrow it from one of the other stations; I  
guess, in particular, Station 10, probably. As the  
initial activity then, we are going to have to take  
explosive package 5 with us, and we'll stick it  
under the LMP seat, and I'll remind you in real time

when we get down on the ground on that one. And number 5, 3 pound, will be deployed at Station 10, and again I'll remind you about that in real time, so you don't have to bother to write it in on your checklist. Planned traverse proceeds as normal. We're expecting to spend about an hour and 20 minutes at Stations 6 and 7, and the suggestion is that we may end up wanting to spend that totally at the split boulder at Station 6, but, of course, the option still exists to visit more than one place and sample other boulders if it seems feasible and attractive and desirable. They are suggesting additional 500-millimeter photographs, especially if it seems that we can use those to document tracks and sources - of the sampled boulders; for instance, at Stations 6 and 7. We are continuing to hold the nominal 47 minutes at Station 8 - that is, 8A, and we still think that's as good a place as any to sample the Sculptured Hills. Station 9 is still nominal 30 minutes, but in view of the similarities - to Station 4, we're anticipating a possible desirability to remove time from Station 10 to enlarge Station 9, but that will have to be a real-time decision, based upon what we find at Station 9. Station 10 continues nominal. We're still interested in sampling the blocks and also interested in trenching to try and see - if we can say something about the dark mantle - light area relationship and, perhaps, the nominal coring. We're going to deploy EP 5 there; and, other than that, they're basically the same. If we have the time during that closeout, somewhat, of the LM, based on our experience the last two nights, particularly for dusting; but also, if time permits, in that time we might try and use up the extra double core, if there is one, in the dark mantle near the LM or do some trenching near the LM. But that's only if time permits at the very end, depending upon how the consumables run out. They want to call attention to two particular things here. One, since you guys really haven't gotten any very big rocks so far, they're recommending, they say here, and I quote: "The value of large individual samples has been demonstrated. We recommend that several football-sized samples of a uniform igneous rock be collected at Station 9 or 10." I'll pass that on as that.

06 14 46+ CC (BETWEEN EVAS)

Another point of interest is the 1- to 20-millimeter size section of the regolith, the dark mantle, the lithology. Then, any observations or collections you can make pertinent to that would be of interest in trying to determine the relationship of the dark mantle to the subfloor units of gabbro underneath. Two short questions which I'll ask, which I hope - hope you can answer in just a few words. One of them is a yes and no answer. One, they can't find the geophone photos specifically called out in the transcript. There is probably a little bit of garble at that point, and thru people in the back room will be very happy if you could say once and for all, Jack, that, yes, you did get the geophone photos. Over.

06 14 50 03 LMP Yes. (BETWEEN EVAS)(PHO 147 22528-32)

06 14 50+ CC (BETWEEN EVAS)

And the second one concerns the one-fourth-pound charge which we deployed on the way in last night. Two questions on that. It appears to us from your voice transcript that we weren't fast enough on it at the time that that may be deployed closer to the ALSEP than the one you deployed on the way out. And we'd like an impression on that. And, number 2, you mentioned that you placed it in a depression. We'd like some feeling for that depression in terms of how much of a danger that bomb - charge might play to the ALSEP when it goes off. If it's in a depression of any sort, they're probably pretty well protecting the ALSEP. Any comment on those two questions? Over.

06 14 50 47 CDR (BETWEEN EVAS)

Well, the second one. It's not in a major depression. It's a little ditch, maybe a third of a meter deep. I imagine it will help a little bit. That's why we picked it.

- - -

06 14 50+ CC Remember, you drove back by and you said you saw the (BETWEEN EVAS)

flag, and then you said you actually saw the charge itself first. And it was some time after that you said you deployed the charge. And we have the opinion from both that and the mileage that you probably deployed the second charge closer to the ALSEP than the first one. Do you have any sort of a feel for that?

06 14 51 43 CDR Oh, yes. I remember saying that, but that's when I (BETWEEN EVAS)  
did a big 360, and Jack was out of film. And I just lined up to take that picture with LM up in the (PHO 145 22184)  
background. And when I said, hey, I saw the charge first.

- - -

06 14 51+ CDR Hey, Bob. How far should that last charge be from (BETWEEN EVAS)  
the ALSEP?

06 14 51+ CC They want it about 300 to 400 meters. (BETWEEN EVAS)

06 14 51+ CC And, Gene, 0.2 for range when - - you got back to (BETWEEN EVAS)  
the LM. And I guess the question would be, did you ever go through zero on the way back to the LM? If you were at 0.2, and we think 092 was the bearing, then the LM is right where we thought it was, and we were just a little confused by our distances.

06 14 51+ CDR No, I don't think I ever went through zero, because (BETWEEN EVAS)  
I initiated at the SEP.

- - -

06 14 51+ CDR I'm positive. (BETWEEN EVAS)

- - -

06 14 51+ LMP Bob, I can - hey, Bob; this is Jack. I can see the (BETWEEN EVAS)  
charge with the binocular. It's out almost behind a rock that's between it and the LM. I can't give you any idea, though, how far it is.

06 14 51+ CC Okay. (BETWEEN EVAS)



06 14 54 LMP No, it's the one off to the left. Hey, Bob. Let me (BETWEEN EVAS)

say again, I think we ought to emphasize the exotic-looking fragments on the dark mantle. And we ought to try to make sure that we look at a variety of rocks from the North Massif. I think we saw the major rock types on the South Massif yesterday, but we really didn't spend a lot of time ranging along the front there to verify that completely. The other comment on the 1- to 20-millimeter-size fraction. There isn't an awful lot of that in the dark mantle. That's one of the striking things about it.

06 14 57+ CDR I've got them both. And the last one we deployed, (BETWEEN EVAS)

which I think is the easternmost one, is definitely farther out than the first one we deployed. At this distance, it's awful hard by looking at Jack's geophones. I got to give you at least 300 meters, Bob.

- - -

06 14 57+ CDR Yes, I've got both of them with the monocular now. (BETWEEN EVAS)

And the second one, the last one we deployed is quite a bit farther out than the first one.

06 14 57+ CC Okay. I think that's what they want to hear. (BETWEEN EVAS)

06 14 57+ CDR Gordo, I guess it's half again or maybe even twice (BETWEEN EVAS)

as far away as - as the first we deployed. So we're going to forget it.

06 1 + CC Okay, Geno. That sounds good. (BETWEEN EVAS)

\* \* \* \* EVA 3 \* \* \* \*

06 16 52 33 CDR Okay, Bob, I'm starting my watch. (LM)  
-- --

06 17 01+ CDR Okay, Bob, I'm on the pad. The first thing I'll do (LM)  
is I'll turn the TGE on and I'll give you a reading.  
-- --

06 17 02 40 CDR It's on, it reads 222, 262, 207; 222, 262, 207. (LM)  
-- --

06 17 02+ CDR Beautiful out here today, Bob. We can look to the (LM)  
east for a change - a little bit, anyway.  
06 17 02+ CDR A higher sun angle. (LM)  
-- --

06 17 04 49 LMP Okay. I'm on the porch and the hatch is closed. (LM)  
-- --

06 17 04+ CC And, 17, if you guys are interested, your shadows (LM)  
will be 8 feet long tonight.  
-- --

06 17 10+ CDR Okay, we'll take the big bag. I hope we can keep it (LM)  
on.  
-- --

06 17 10+ LMP Okay, mag Killo goes on the 500; is that correct? (LM)  
06 17 10+ CC That's affirm. (LM)

06 17 10+ LMP Okay, I've got Mary and Franny and Nancy and Donna - (LM)  
and Bobby - - and Karen.  
-- --

06 17 14+ CDR Okay, Bob, the big bag is on the inside of the (LM)  
pallet.  
-- --

06 17 14+ CDR Big bag. SCB 7 to gate. (LM)  
-- --

06 17 14+ CC Okay. And, Jack are you going out to take the pan (LM)(PHO 140 21359-80)  
now?

06 17 16 15 LMP Well, as soon as I finish up here. (LM)(PHO 140 21359-80)

06 17 16+ CC Okay. And after you take the pan, we'd like you to (LM)(PHO 140 21359-80)  
retrieve the Cosmic Ray Experiment. They're  
expecting a little solar storm, and before the rain  
gets on the Cosmic Ray Experiment, they'd like to  
retrieve it. We'll leave it in the ETB during the  
traverse.

06 17 16+ LMP Okay, after the pan. All right. (LM)(PHO 140 21359-80)  
-- --

06 17 16+ CDR Okay, SCB 7 - 20-bag dispenser goes on my camera (LM)  
when it gets back. Short can under the LMP's seat.  
Okay. Jack, I'll just go ahead and mount some of  
these bags on your camera while I'm here.  
-- --

06 17 16+ CC Okay. And did you get Jack's camera fixed last (LM)  
night? I didn't hear.

06 17 16+ CDR Yes, we did. Twenty-bag dispenser on Commander's (LM)  
camera, we'll do it when I get back - 20 bags on the  
LMP's cameras, core cap dispenser to gate - there's  
one there, there's one under the seat - short can's  
under the LMP's seat. Okay, I got to put that cap  
dispenser on him, I got to get my rammer, hammer -  
hey, Bob, what bag do you want on the LMP? Do we  
have 8 here?  
-- --

06 17 19 45 CDP Okay. 670, 027, 021; that's 670, 027, 001. (LM)

- - -

06 17 20 17 LMP Mark it. The Cosmic Ray is terminated. (LM)

06 17 20+ LMP I took two 5-foot stereopairs of the configuration. (LM)(PHO 140 21381-84)

06 17 20+ CC Copy. And we'll stick it in the TB and just hang (LM)  
it there.

06 17 20+ LMP Yes. And in case you're wondering, and so you don't (LM)  
confuse it with a rock, it's in bag 106.

- - -

06 17 22+ CC The one under LMP's seat will go on the CDR, the one (LM)  
with all the stuff in it. (SCB 7)

- - -

06 17 22+ LMP Sure is strange not to see some fine-grained rocks (LM)  
out here. Seen a couple but certainly not very  
many.

06 17 22+ LMP That rock that you picked up at - what are you doing (LM)  
up there? Okay.

- - -

06 17 22+ LMP Gene, your bag's going to have two lowers and one (LM)  
upper. (SCB 7)

- - -

06 17 26+ CDR Okay, Bob, I'm going to put SCB 4 on Jack. (LM)

- - -

06 17 26+ CDR What charge you got there, Jack? (LM)

06 17 26+ LMP Five is under my seat. (LM)

06 17 26+ CDR Five, okay. You got 5 there, we got 2 and 3 on the (LM)  
Rover.

- - -

06 17 30+ CDR Just come over here by the left front wheel. I know (LM)(PHO 140 21385-87)  
you got a second. Just a little bit closer to the  
left front wheel, towards me. Oh, that's good,  
anywhere in there. Wait a minute.

06 17 30+ CDR Can you do that likewise? Or can you hold it with (LM)  
that other camera? It's already set at 30.

06 17 30+ LMP Okay. (LM)

06 17 30+ CDR And you might want to take a couple \*\*\* (LM)(PHO 140 21388-91)

- - -

06 17 35+ CC Okay, and Gene, we'd like to torque to 287, 287. (LM-SEP)

- - -

06 17 36 31 LMP Forty-five Yankee is a sample from near the SEP. (SEP)(SAMP 70290,95)

- - -

06 17 36+ CC We copied 45 Yankee near the Str'. That's all we (SEP)(SAMP 70290,95)  
have. If you give us a frame count when you get  
done, and give us an approximate location for the  
Rover, at least crosswise from the Y, we'd  
appreciate it. And we also need SEP receiver power  
and DSEA both on.

- - -

06 17 36+ LMP Bob, that 45 Yankee was a fine-grained basalt, I (SEP)(SAMP 70290,95)  
think. One of the few around here. That's why I  
picked it up.

- - -

06 17 36+ CDR I'm stopped and I'm ready to go. I'm 2 meters to (SEP)  
the west of the north line.

06 17 36+ CDR And I guess I'm certainly within 5 meters of the (SEP)  
transmitter.

06 17 36+ CC We'll get that in the photos.

06 17 39 07 CDR It's oriented 355 and my heading is 352. (SEP)(PHO 141 21510-17)  
(SEP)

06 17 39+ CC Roger. Both the receiver and the recorder on - (SEP)

- - -

06 17 39+ CC And we're ready for you guys to roll. (SEP)

- - -

06 17 40+ CDR I'm going to head on at about 012. We ought to go (SEP)  
right through Jones.

06 17 40+ CC Okay, and, Gene, remember the driving fairly slow - (SEP)  
or fairly well controlled the first 300 meters, and  
a mark at the end of the antenna.

- - -

06 17 40+ CC Okay. Give us another mark when you start up on (SEP)  
that side.

- - -

06 17 40+ CDR Yes, I'm right on the track. Same tracks exactly. (SEP)

- - -

06 17 40+ CDR We're starting Bob - (SEP-6)

06 17 42 36 CDR Mark it. (SEP-6)

06 17 42+ CDR We can't go too far in this heading. We've got a (SEP-6)  
big hole up here.

06 17 42+ CDR Like a big one. (SEP-6)

06 17 42+ LMP Wonder if that's Rudolph? (SEP-6)

06 17 42+ LMP Well, let's see, this is east, it's a double crater (SEP-6)  
but it's much bigger than I thought Rudolph would  
be.

06 17 42+ CC No, if you're where we think you are, you're beyond (SEP-6)  
- you're east of Rudolph quite a ways.

06 17 42+ CDR Hey, I think you ought to know where we are by now, (SEP-6)  
Bob.

06 17 42+ LMP Maybe that's Lewis and Clark. (SEP-6)

06 17 42+ CC After you give me a mark there, I'll talk to you (SEP-6)  
about it.

06 17 42+ CDR I'm sorry Bob. I guess you didn't hear it. We're (SEP-6)  
passed the end of the antenna and we're headed  
northeast.

- - -

06 17 42+ CDR I gave you a mark when I started and it took about (SEP-6)  
20 seconds to get to the end.

- - -

06 17 42+ CC No. Press on. And, Jack, if you look at your (SEP-6)  
contour map there, we think you are located right  
now at approximately where the P in SEP is, just  
below the P in Poppy. In which case you're probably  
driving through that little crater that's just to  
the northeast there.

06 17 42+ CDR Not very little though. (SEP-6)

- - -

06 17 44 59 LMP The major boulders still look like the pyroxene (SEP-6)  
gabbro. Surface texture has not changed. There is  
a granule population, now that I look at it more  
closely, with the shadows. But I have a feeling  
that most of those are - they look like they're just  
very small clods. That should show up in some of  
the bulk samples we've taken. It is remarkable to  
me - only a small number of fine-grain rocks.  
There's one at about halfway between the SEP and the (SAMP 70215)  
LM that I'd like to pick up, it's a fairly good  
sized one. Maybe we can get it when we get back.  
It looks like a fine-grained basalt. I may have  
sampled one in 45 Yankee there.

06 17 44+ CDR Well, I tell you, it's not exactly the greatest (SEP-6)  
place to navigate through.

06 17 44+ LMP : think you ought to bear left, don't you? (SEP-6)

06 17 44+ CDR Yes. That's where I'm going now. I just want to get across, this - around these boulders. (SEP-6)

06 17 44+ LMP There's a crater we're just passing at 2077.4 about 20 meters in diameter, with the pyroxene gabbro blocks on the rim, few of them. It's not an exceptionally blocky rim crater, but we are in an area where the block population is up to about 5 percent in contrast to most of the area we traversed yesterday. (SEP-6)

06 17 46+ CDR I tell you, going is a little bit rough; there's a population of blocks as Jack said - an awful lot of small craters. (SEP-6)

06 17 46+ LMP Yes, I was just going to add that the frequency of craters in the 10-meter-size range is quite a bit higher than we were used to yesterday. Oops, there's one. (SEP-6)

06 17 46+ CDR Yes. (SEP-6)

06 17 46+ LMP Snuck up on you. And they all - although not exceptionally blocky rim - they all have a slightly, maybe 2 or 3 or 5 percent more blocks in their walls and on their rim than does the normal terrain. (SEP-6)

06 17 46+ LMP Still no obvious structure within the dark mantling material itself. (SEP-6)

06 17 46+ CDR Bob, you said 185/1.5? (SEP-6)

06 17 46+ CC That's affirm. (SEP-6)

06 17 46+ LMP What do you want? For the Rover? (SEP-6)

06 17 46+ CDR Yes, for a sample (SEP-6)

06 17 46+ LMP Oh, they changed it on us. Okay - there's - still seeing the little pit-bottom craters with the glass in them. And you asked me for an LMP frame count awhile back and I believe it was 5. That was at the SEP. (SEP-6)

06 17 46+ CC That was after the SLP photos, right? (SEP-6) (PHO 14) (1510-17)



(SEP-6)(PHO 141 21510-17)

06 17 46+ LMP Negative; that was before the SEP photos.

(SEP-6)

06 17 48 39 LMP Looking up at the North Massif, we see the scattered, strewn field of boulders, that generally seem to start, more or less, from a line of large boulders, which might indicate some structure. And those lines are roughly horizontal across the face that we're looking at. The boulder tracks are irregular in shape, obviously downhill, but you'll see in the pictures that they are curved in places but they're all - that I see - tend to be aggregates of little craters - where the boulder was obviously tumbling and bouncing a little bit. We're out in population of fragments now in the immediate area at 1 - is that 188?

(SEP-6)

06 17 49 52 CDR 188, 0.9.

(SEP-6)

06 17 49+ LMP It's generally about 1 percent between craters. But at the crater rim, it's up to about 5 percent.

(SEP-6)

06 17 49+ CC Okay. Copy that Jack. And how far down the North Massif is the line of boulders?

(SEP-6)

06 17 49+ LMP Oh, there are several of them, Bob. What I'm talking about is about 100-meter-long lines where the boulder trains initiate and they are - there's one about - looks like about halfway - maybe two-thirds of the way down in perspective. Another one that's probably about halfway - they're just sort of scattered around on the massif.

(SEP-6)

06 17 49+ LMP That must be Jones.

(SEP-6)

06 17 49+ CDR Where are you looking?

(SEP-6)

06 17 49+ LMP Off to the right.

(SEP-6)

06 17 49+ CDR Yes, our heading that they're sending us down here, it really should put us to west of Jones. So that's about right.

- - -

4

06 17 52 22 LMP And they look like there are boulders up on the side (SEP-6) of Sculptured Hills, except that they aren't nearly as big as those on the North Massif. The areas where the boulder source is, look like they're made up of boulders no bigger than a meter maybe; whereas, the North Massif boulders are up to several meters. Those boulder sources all seem to be up within a third of the height of the Sculptured Hills, just east of the Wessex cleft. Here is a boulder track that crossed the slope. See that Geno?

06 17 52+ CDR Yes. I sure do now. (SEP-6)

06 17 52+ LMP It looks like it goes, rather than perpendicular contours, it probably is crossing them in a fairly straight line on an angle of 60 degrees, maybe. (SEP-6)

06 17 52+ CDR Back to the east. (SEP-6)

06 17 52+ LMP Yes, to the east. That one may be fairly near - - (SEP-6)

06 17 52+ CDR Jack, see that big boulder with that big track - it looks like it's an elongated rolled-up boulder. (SEP-6)

06 17 52+ LMP Yes, it does. Look: like it may be broken now. (SEP-6)

06 17 52+ CDR Okay. Here we are 1.5 and 185. (SEP-6)(LRV 9)

06 17 52+ LMP Okay, is this a Rover sample? (SEP-6)(LRV 9)(SAMP 76120-24)(PHO 140 21392; i41 21547-44)

06 17 52+ CDR A Rover sample. (SEP-6)(LRV 9)(SAMP 76120-24)

06 17 52+ LMP - - see that little pit right over there about 30 feet ahead. (SEP-6)(LRV 9)(SAMP 76120-24)

06 17 52+ CDR Yes, I think so. (SEP-6)(LRV 9)(SAMP 76120-24)

06 17 52+ LMP Okay, I've got two pictures there. (SEP-6)(LRV 9)(SAMP 76120-24)(PHO 141 21542-43)

06 17 52+ CDR How's that? (SEP-6)(LRV 9)(SAMP 76120-24)

06 17 52+ LMP That's great. Okay, this is soil sample. (SEP-6)(LRV 9)(SAMP 76120-24)

06 17 52+ CDR Okay, and I just took a locator; and CDR is on frame 41. (SEP-6)(LRV 9)(SAMP 76120-24)(PHO 140 21392)

- - -

06 17 52+ CDR Bag 46 Yankee. (SEP-6)(LRV 9)(SAMP 76120-24)

06 17 52+ CDR Your bag open? (SEP-6)(LRV 9)(SAMP 76120-24)

06 17 52+ LMP Yes. (SEP-6)(LRV 9)(SAMP 76120-24)

06 17 54+ CDR Okay. It's in. (SEP-6)(LRV 9)(SAMP 76120-24)

- - -

06 17 54+ LMP Okay. And LMP's frame count is 35. (SEP-6)(LRV 9)(SAMP 76120-24)

- - -

06 17 54+ CC Bearing and range for the large block, just beyond the crater Henry, the large block there near the break in the slope, which is our next aiming point. The bearing and range there is 188 and 2.8. (SEP-6)

06 17 54+ CC Jack, what do you see in the way of boulders coming down to the base of the Sculptured Hills, in terms of sampling opportunities at Station 8 and in terms of any boulder tracks that might lead down to boulders that might just possibly be accessible at Station 8. (SEP-6)

06 17 54+ LMP Boulder tracks are not obvious on the Sculptured Hills at all. It looks like there are fragments over there that would have had their source higher up in the slope. I think we can get boulders there. (SEP-6)

06 17 54+ CDR We'll have to get a little closer, Bob. (SEP-6)  
 - - -

06 17 54+ CDR See that big boulder, Jack, with those tracks? (SEP-6)  
 06 17 54+ CDR That's a funny looking boulder. (SEP-6)  
 06 17 54+ LMP It looks like it may have stopped rolling because it (SEP-6)  
 broke up.  
 06 17 54+ LMP Looks broken to me now. (SEP-6)  
 - - -

06 17 54+ LMP Okay, you've got yourself in some holes here. Okay, (SEP-6)  
 there's a big crater. I haven't recognized Jones  
 yet. Looks like you're getting up on the rim of  
 Henry here.

06 17 54+ CDR Should be well west of Henry, I think. I wouldn't (SEP-6)  
 be surprised if Henry isn't right over that little  
 rise on the right.

06 17 54+ LMP The surface structure hasn't changed texture. We're (SEP-6)  
 on a little bit of a rise in here now and still  
 about 1 percent of the surface - -

06 17 57 48 CDR There's Henry right there, Jack. (SEP-6)  
 06 17 57+ LMP There's Henry. (SEP-6)  
 - - -

06 17 57+ CDR 188, 1.8. (SEP-6)  
 06 17 57+ LMP And we're just southwest of Henry. (SEP-6)  
 06 17 57+ LMP On the rim. (SEP-6)  
 - - -

06 17 57+ LMP Henry looks much like Horatio did. Has boulders on (SEP-6)  
 its inner wall - not as many. They look light  
 colored - a light albedo gabbroic appearance. There  
 may be some right down there, though, that are fine  
 grained; they look a little grayer.

06 17 57+ CDR Jack, there's our target - either one of - that's one right down there on \*\*\* (SEP-6)

06 17 57+ LMP Break in slope. (SEP-6)

06 17 57+ CDR See the one we've got over there has a boulder track. That's the one, that crossed slope. (SEP-6) (PHO 141 21549-50)

06 17 57+ LMP Yes, if we could get - - (SEP-6)

06 17 57+ CDR That's awful high. (SEP-6)

06 17 57+ LMP - - can we get up there? (SEP-6)

06 17 57+ CDR We'll see. (SEP-6)

06 17 57+ LMP That's the one - that's Station 6, and that was the turning boulder. (SEP-6)

06 17 57+ CDR Yes, that's it. (SEP-6)

06 17 57+ CDR Station 6 - we can probably get up there. (SEP-6)

06 17 57+ LMP I think we can; it doesn't look too bad. At the break in slope, right now, doesn't show anything obvious, except that's where the boulders start. (SEP-6)

- - -

06 17 59+ LMP But as I was saying, Henry just looks like somewhat more mantled Horatio. (SEP-6)

06 17 59+ CDR I'm headed northwest now - to get around the western rim of Henry. (SEP-6)

06 17 59+ LMP And on that west rim, we've got about 10 percent boulder cover. (SEP-6)

06 17 59+ CC Okay. And a reminder Jack, to keep taking your Rover photos. (SEP-6)

06 17 59+ LMP Yes, sir. By boulder, I generally mean fragment, (SEP-6)  
 Bob, in this case. When I say 10 percent, I'm  
 looking at stuff greater than about a centimeter in  
 diameter. I'll try to say fragment from now on and  
 be more precise. Okay. Here's a little area where  
 there's - this part of Henry - this is the one part  
 of the rim of Henry I see that has fairly large  
 fragments, or boulders, on them up to 2 or 3 meters.  
 But, again, they all appear to be buried. There are  
 very few, except small ones, sitting out on the  
 surface.

06 18 00 32 CDR And, you know, the fragment population out here only (SEP-6)  
 goes out to maybe 200 meters, I expect.

06 18 00+ LMP Okay. Now this concentration of boulders is because (SEP-6)  
 of a 50-meter crater in the rim of Henry.

06 18 00+ CC Okay that sounds like Locke up on the rim of Henry. (SEP-6)

06 18 00+ CDR Take a picture in here, Jack. (SEP-6)(PHO 140 21393)

06 18 00+ LMP No. Locke, I can see - (SEP-6)

06 18 00+ CDR I'm getting the picture. (SEP-6)(PHO 140 21393)

06 18 00+ CDR Yes, Locke's right ahead of us. (SEP-6)

06 18 00+ LMP This is one on the - about 50 meters right on the (SEP-6)  
 rim crest of Henry, almost due - the west rim - due  
 west rim. Now Locke is just ahead of us. It also  
 has boulders in its walls but has relatively few on  
 the rim.

06 18 00+ LMP Characteristic of both Henry, Locke, and Horatio is (SEP-6)  
 essentially no change in the average frequency of  
 boulders on the rim. The increase comes in the  
 wall.

06 18 00+ CDR We're at 184, 2.3. We're just about between Henry (SEP-6)  
 and -

06 18 00+ LMP Locke. (SEP-6)

06 18 00+ CDR Locke. Yes; right between them. (SEP-6)

06 18 00+ CC Okay. I copy that. And you guys are heading for (SEP-6)  
that big boulder, which must be just dead ahead of  
you there, about half a kilometer.

06 18 00+ LMP Well, Gene's sort of headed for Station 6 now. (SEP-6)

06 18 00+ CDR I'm going to take a tour around that boulder and and (SEP-6)  
get location on it.

06 18 00+ CC Yes. That would be a good mark to give us a range (SEP-6)  
and a bearing on, since that's a pretty good  
straight point.

06 18 02 09 LMP The boulder concentrations in the wall of Henry have (SEP-6)  
their upslope start at about - I would guess an  
average of 30 meters down from the rim crest. The  
rim crest of Henry is not very well defined, but  
it's there. And from that initiation of boulders,  
they stream down the slope to the break in slope  
down at the floor. Still no obvious change in the  
dark mantle, as we're just to the east of Locke now.  
There's a 30-meter crater, fairly subdued but still  
quite deep - subdued rim. Again it looks as if it  
were mantled; that has no significant increase in  
blocks on its rim. That crater, in any other place,  
would have been a very blocky-rim crater. It's  
maybe 30 meters by 5 meters deep. Man, that is a  
big rock up there. Turning Point rock is a split  
rock - looks like a northwest-southeast overhang,  
with another block just this side of it - just to  
the south of that overhang. It's a pyramid shape in  
cross section - triangular shape in cross section.  
And it looks like it is pretty well fractured,  
although not pervasively like the rock at Shorty  
was.

06 18 02+ CDR Okay, Jack, I know I can get up to Station 6. (SEP-6)

06 18 02+ LMP Yes. Now, Bob, Station 6 rock - one of them - is (SEP-6)  
from that boulder track that runs obliquely across  
the contour.

06 18 02+ LMP And the pictures ought to pin down at least the end (SEP-6)  
of the boulder track pretty well.

06 18 02+ CDR Bay, this is a big rock, Jack, when. (SEP-6)

06 18 02+ LMP As I recall - as I saw it, the boulder tracks stopped about halfway up the slope of the North Massif. That is a big rock. (SEP-6)

06 18 02+ CDR We're at Turning Point rock. I don't know if it's mantled on top, but it's certainly filleted. There's a lot of the dark mantle up and on some of the shallower slopes of the boulder. And it's on a little mound itself, as if much of it might be covered up. (SEP-6)

06 18 02+ LMP Yes. It looks like a breccia from here. (SEP-6)

06 18 02+ CDR Can you get a sample of it right here? You see these little chips? (SEP-6)(LRV 10)(SAMP 76130-37)(PHO 140 21396-98; 141 21566-68)

06 18 02+ LMP Yes, I probably can. (SEP-6)(LRV 10)(SAMP 76130-37)

06 18 02+ CDR I'm 3 meters from Turning Point rock. On the east side, and I'm reading 186 and 2.8. (SEP-6)(LRV 10)(SAMP 76130-37)

06 18 02+ LMP Can you drive up to the - right there, let's see - no, I can get them. The thing is, I don't know what it is. (SEP-6)(LRV 10)(SAMP 76130-37)

06 18 02+ CDR Well, but at least it's part of these fragments around here. I guess Turning Point rock is 1, 2, 3, 4, 5, 6, - 6 meters high anyway. I'd say it's a very rough subrounded type of rock - by the face - let me get this, Jack. Okay. There are two fragments in that sample. (SEP-6)(LRV 10)(SAMP 76130-37)

06 18 02+ CDR Forty-seven Yankee. (SEP-6)(LRV 10)(SAMP 76130-37)

06 18 02+ LMP Plus some dirt. And it's about 4 meters from the - Turning Point rock on the north side. (SEP-6)(LRV 10)(SAMP 76130-37)

06 18 02+ CC And presume you got some good photos of the rock. (SEP-6)(LRV 10)

06 18 06 21 LMP Yes, I got a couple, I hope they're good. (SEP-6)(LRV 10)(PHO 141 21567-68)

- - -

06 18 06+ LMP And my locator is - - 5, 6. (56) (SEP-6)(LRV 10)(SAMP 76130-37)(PHO 141 21567-68)

06 18 06+ CDR Jack, let me spin around this little crater here to the left. (SEP-6)(LRV 10)



(SEP-6)(LRV 10)

Bob, it looks - it's very coarsely vesicular; but, at first glance, it did not look like the pyroxene gabbro - although the rock - that rock does. It looks like it might be fragmental, although I'm suspicious that I'm looking at zap pits. - - I got them. Pick one. That's a nice view.

06 18 06+ LMP

And we're on a little rise looking at this boulder. That's incredible.

06 18 06+ CDR

(SEP-6)

Okay. We're on the roll, Bob.

06 18 07 15 CDR

Bob, my guess is, right now, is that Turning Point rock is a big piece of subfloor gabbro.

06 18 07+ LMP

(SEP-6)

Okay. I gather you changed your opinion.

06 18 07+ CC

What looked like fragments is just big spalls of where the zap pits have cleaned off the rock.

06 18 07+ LMP

(SEP-6)

Okay. I copy that. And guys, you might be happy to know that we think we've finally found the LM, because we were calling that for 188 and 2.8 and you got there at 186 and 2.8.

06 18 07+ CC

- - -

It's the split one up there, Jack. I've had my eye on it. There's some big boulders down here.

06 18 08 12 CDR

- - -

(SEP-6)

Now, I got it. I've had my eye on that boulder. You can't see the track from here. I'll bet you can. I can see it now. We'll see it - we'll be looking right up it - looking right up the old boulder track. Man, I tell you, this navigating through here is not - -

06 18 08+ CDR

(SEP-6)

Okay. We're in a region where the general fragment population is no different. We're up off the break in slope, although you wouldn't notice it - but we are quite a ways. But the fragment population is not much different than that on the plains. The big difference is that there are these scattered blocks that are from a meter to probably 10 meters - no 5 meters in diameter. Hard to say, maybe 8.

06 18 08+ LMP

06 18 08+ CDR See that track coming down? We'll be looking right (SEP-6)  
up that track.

06 18 08+ LMP ; didn't realize you were that far upslope. (SEP-6)

--

06 18 08+ LMP Oh, I feel fine. - until I looked down there and (SEP-6)  
saw the slope we're on.

06 18 08+ LMP And I can't see any obvious change in albedo, like (SEP-6)  
we could see with the light mantle yesterday. There  
you got a nice - place. Oh, oh, you don't want to  
go over that way.

06 18 09+ CDR I can make it. I want to park right - - (SEP-6)

06 18 08+ OC And 17, you want to park at a heading of 107 - (SEP-6)

--

06 18 08+ LMP That's going to be moderately level right there. (SEP-6)

06 18 08+ LMP Trouble is, they're looking into the shady side of (SEP-6)  
the block.

06 18 08+ CDR Well, if I park on the other side, they won't be (SEP-6)  
able to - I can go right upslope a little bit.

06 18 08+ LMP That's all right. We can work in there. No, that's (SEP-6)  
all right.

06 18 10 35 CDR Yes, I can't go up there. Let me just - this is (SEP-6)  
going to have to be good.

06 18 10+ LMP I think you're all right. (SEP-6)

06 18 10+ CDR That's not very level, but - - (SEP-6)

06 18 10+ LMP Not too hard. Watch that turn. (SEP-6)

06 18 10+ CDR That's not very level, but we're not going to get (SEP-6)  
much more level than that.

06 18 10+ CDR They wanted 107. That's the best I can do. That's (SEP-6)  
not very level for the gravimeter.

06 18 11 24 CDR Okay. We're parked on a heading of 107. (6)  
06 18 11+ LMP You parked on a slope, too. (6)  
06 18 11+ CDR There's no level spot to park, here, though. (6)  
06 18 11+ LMP You want some help getting off? (6)  
06 18 11+ CDR I've got to go uphill. (6)  
06 18 11+ LMP I just about ended up down at the bottom of the hill. (6)  
06 18 11+ CDR Okay; 192, 3.8, 3.1. (6)  
- - -  
06 18 11+ LMP You want me to block the wheels? You got the brake on, I hope. (6)  
06 18 11+ CDR You betcha. Boy, are we on a slope! (6)  
- - -  
06 18 11+ LMP Okay. I'm going to stay out from between the rocks. It's a beautiful east-west split rock. It's even got a north overhang that we can work with. And let me see what it is. We're right at Station 6. You wouldn't believe it. (6)  
06 18 11+ CDR I would. Oh mer., what a slope! (6)  
06 18 11+ LMP And this boulder's got its own little track, right up the hill, cross contours. It's a chain of craters track, and it looks like it starts \*\*\* where it started. It starts in, what looks to be, a lighter colored linear zone - trying to give you perspective; it's probably only about a third of the way up the North Massif. (6)  
06 18 11+ CC Read you loud and clear; and we got a picture. (6)  
- - -  
06 18 11+ CDR I don't know whether your TCE's going to hack it. (6)  
06 18 11+ CC Okay. It'll pick up to 15 degrees. (6)

06 18 11+ LMP It's a coarsely vesicular, crystalline rock - finely (6)  
 crystalline. Looks like - probably an anorthositic  
 gabbro - trying to see the zap pits, for glass  
 color, I don't have a good one yet.

06 18 11+ CDR Say, Bob, you want both the recorder - and the other (6)  
 switch off?

06 18 11+ CC Roger. Both of those off, and the - - (6)

- - -

06 18 11+ LMP Bob, it looks like the glass is fairly light (6)  
 colored. It's not white. Well no - it's black.  
 It's anorthositic gabbro, rather than gabbroic  
 anorthosite, I think. Yes, that's black glass in  
 the pits.

- - -

06 18 11+ LMP Bob, some of the vesicles are flattened. All of (6)  
 them are flattened. There's a strong foliation of  
 vesicles in the rock. Most of them are flattened,  
 and they are up to 15 or 20 centimeters in diameter  
 and about 5 to 6 centimeters thick - or wide.

06 18 15 56 LMP And there's some beautiful north overhangs all (6)  
 around the block. Well, on the north side of the  
 block.

- - -

06 18 15+ CC Okay. That's the best place - to have north (6)  
 overhang; and I guess that means one of you guys  
 might grab - the small can - before you leave the  
 Rover.

06 18 15+ LMP Bob, let's get it straight, you want the north (6)  
 overhang sample in the short can?

06 18 15+ CC Miracle of miracles. They don't want the short can. (6)  
 I'm not sure I understand that, Jack, but they don't  
 want the short can here, they say, I guess they're  
 looking for volcanics today.

06 18 15+ LMP Okay, we'll put them in bags. (6)

06 18 15+ CC They're looking for volcanics today, Jack. (6)

06 18 15+ LMP Oh, they are huh? We found those yesterday. (6)

06 18 15+ CC Well, they're hoping again at Station 9. (6)

06 18 15+ LMP Now, that dilution I mentioned does not go all the way through the rock. There are variations in texture. One zone was strongly foliated. There's another - it almost looks like a large - it is - a large inclusion of nonvesicular rock within the vesicular rock. There may be some autobrecciation involved in the formation of this thing. It really looks mineralogically like the light-colored samples from the South Massif. But I tell you, that's only because it's light colored, and I can't give you anymore than that right now, until we get a fresh surface.

-- --

06 18 18+ CC And Jack, how about a frame count, if convenient. (6)

06 18 18+ LMP It's now 68. (6)

-- --

06 18 18+ LMP I think I'll get over here and get a pan while we're awaiting a sample. (6)(PHO 141 21575-603)

-- --

06 18 18+ LMP Well, I found a place to stand where I can take a pan. (6)(PHO 141 21575-603)

-- --

06 18 18+ LMP I'm taking a pan. (6)(PHO 141 21575-603)

06 18 18+ CDR Very good. I'm coming right now. I bet you a dollar to doughnuts that you don't get a TGE reading. (6)

06 18 18+ CC Yes. Gene. If it's easy enough to take it off, why don't you take it off the Rover; and we'll try and level it in the stuff. (6)

06 18 18+ CDR Yes. That looks level to me. (6)

06 18 21+ LMP Hey, I'm standing on a boulder track. How does that (6)  
make you feel?

06 18 21+ CDR That makes me feel like I'm coming over to do some (6)  
sampling.

06 18 21+ LMP Let's get the boulder and then get in that east-west (6)  
split. I got an undocumented sample from the middle (SAMP 76220-24)  
of the boulder track.

06 18 21+ LMP Soil sample. Gene, if you hit them off in there, (6)(SAMP 76220-24)  
it's going to be awful hard to find them, that's the  
problem.

06 18 21+ CDR Did you pick a good spot while you were over here? (6)

06 18 21+ LMP No, I didn't. I just was looking at it. I think we (6)  
need to get in the light, though.

06 18 21+ LMP Let me put a sample in your bag. (6)(SAMP 76220-24)

06 18 21+ CDR Okay. Go ahead. (6)(SAMP 76220-24)

06 18 21+ LMP It's bag 534. (6)(SAMP 76220-24)

06 18 21+ CDR This boulder looks fairly uniform from top to (6)  
bottom.

06 18 21+ LMP We've got to get a reference sample out - this soil. (6)(SAMP 76280-86)(PHO 141 21004-06; 140 1401-09)

06 18 21+ CDR Let's get where we can get that 90-degree picture, (6)  
too; so we want to get on the - sun side. Let me  
get that slab right there, though, to start with. I  
can get that one off. Let's go over on the sun side  
because we can't really photograph it.

06 18 21+ LMP Okay. I got to get out of here first. (6)

06 18 21+ CDR Let's go through the split. (6)

06 18 21+ LMP Well, okay. Be careful, though. Why don't we sample the split first so we don't - - (6)(SAMP 76240-46) (PHO 141 21604-06; 140 21401-09)

06 18 21+ CDR Look at that overhang. Man, I tell you, if you can get your shovel down there, you'd have a ball. (6)(SAMP 76240-46)

06 18 21+ LMP Yes, let's sample in the split first so that we don't get it too messed up. And then we can sample some of this stuff. We want this overhang over here, Geno - the north facing one. (6)(SAMP 76240-46)

06 18 21+ CDR Right here? (6)(SAMP 76240-46)

06 18 21+ LMP Yes. I got to get - sneak by over there. Whoops! Don't shuffle too much dirt in there. (6)(SAMP 76240-46)

06 18 21+ CDR Okay. You by rs so I can set the gnomon down. (6)(SAMP 76240-46)

06 18 21+ LMP Not quite. Don't think I can make it - without hitting you. I can't. (6)(SAMP 76240-46)

- - -

06 18 21+ CDR Let me set the gnomon down - - (6)(SAMP 76240-46)

06 18 21+ LMP Set it down just outside the shadow there. Right there. That's good. There's still some good clean ground there. (6)(SAMP 76240-46)

06 18 21+ CDR I can get back far enough to take these pictures. I want to go get a stereo pan around the corner anyway. Let's see if I can't start here with about 5/6. I'm so close. (6)(SAMP 76240-46) (PHO 140 21414-40) (PHO 140 21401-09)

06 18 21+ CDR I must have a boulder \*\*\* (6)

- - -

06 18 21+ LMP Okay. You got a bag? (6)(SAMP 76240-46)

06 18 21+ LMP I'm going to get the shadowed material. (6)(SAMP 76240-46)

06 18 21+ CDR It's in bag 312, Bob. (6)(SAMP 76240-46)

06 18 21+ LMP It's from - I think you saw where I got it. It's about a half a meter back of the limit of the overhang. (6)(SAMP 76240-46)

06 18 21+ CDR Okay. Can you reach it. (6)(SAMP 76240-46)

06 18 21+ LMP I will in a minute. You can turn it a little bit towards me. Okay, 312. And the soil outside the overhang will be next. (6)(SAMP 76240-46)  
(SAMP 76260-65)(PHO 141 21604-06; 140 21401-09)

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06 18 26 57 LMP And the first one is from the upper 2 centimeters. (6)(SAMP 76260-65)

06 18 26+ CDR Bag 313. (6)(SAMP 76260-65)

06 18 26+ LMP And the second one is from 2 centimeters down to about 8. (6)(SAMP 76280-86)(PHO 141 21604-06; 140 21401-09)

06 18 26+ LMP It looks like - the boulder just to the south of us has some inclusions in it - light-colored inclusions. (6)

06 18 26+ CDR Bag 472 on that. (6)(SAMP 76280-86)

06 18 26+ CC Copy 472 on that. You mean the south half of the split boulder? (6)(SAMP 76280-86)

06 18 26+ LMP Yes. I haven't seen inclusions in the other half. (6)

06 18 26+ LMP Now we need boulder stuff. (6)(SAMP 76015)(PHO 141 21607; 140 21410-13)

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06 18 26+ LMP Got your hammer? (6)

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06 18 26+ LMP It's a little hard, huh? (6)

06 18 26+ CDR I've got to find a corner I can get at. (6)

06 18 26+ CDR Let me get an after picture down in this hole. (6)(PHO?)

06 18 26+ LMP Oh, that's right. You almost stepped on the - I forgot the after, too. (6)



06 18 26+ LMP hey, there are chips up here on top. Also, that's (6)  
 been spalled off.

06 18 26+ LMP We can get some of those, but - - (6)

06 18 26+ CDR Looks like somebody's been chipping up there. (6)

06 18 26+ LMP Looks like there's been a geologist here before us. (6)

06 18 26+ CDR Let me get the gnomon. I think I can get some of (6)  
 these pieces over here. I want to get that (PHO 140 21414-40)  
 90-degree angular flight line around this boulder,  
 too.

06 18 26+ LMP Here's the piece that fell off. Here's the piece (6)  
 that was knocked off up there.

06 18 26+ CDR We ought to bring a big piece of that home. That's (6)  
 obvious.

06 18 26+ LMP How about this one up here? Take your picture. I (6)(SAMP 76015)  
 think we can just lift that off. See that?

06 18 26+ CDR I'll get a locator from here. (6)(SAMP 76015)(PHO 140 21412)

06 18 26+ LMP Okay. I was going to get my down-sun, but I'm (6)(SAMP 76015)  
 afraid - - afraid -

06 18 26+ CDR You may be down-sun if you do. (6)(SAMP 76015)

06 18 26+ LMP Yes, we'll get some. Get it? (6)(SAMP 76015)

06 18 26+ CDR Yes, will it come off? (6)(SAMP 76015)

06 18 26 LMP Yes. (6)(SAMP 76015)

06 18 26+ CDR Just throw it in my bag. It's broken, but it's in (6)(SAMP 76015)  
 place. That's a nice, big piece, too.

06 18 26+ LMP Don't you put it in mine. I can't get a thing in (6)(SAMP 76015)  
 it.

- - -

06 18 26+ LMP There's a big spall lying on the ground here that  
has been knocked off up there, from right on top of  
the boulder. And, I tell you, the more I look at  
this - the south half of this boulder, the more  
heterogeneous in texture it looks. It looks as if  
it may be either a recrystallized breccia of some  
kind, or you had a gabbrioc anorthosite magma catch  
up an awful lot of inclusions. I guess I prefer the  
latter explanation because of the extreme  
vesicularity of the rock. (6)

06 18 26+ LMP A few of the inclusions are - well, they're all  
subrounded to rounded, and a few of them are very  
light colored. (6)

06 18 26+ CDR I'm coming around the corner \*\*\* (6)(PHO 140 21414-40)

06 18 26+ LMP Are you going to do it now? Okay. Well, you know,  
I ought to get one shot back here with a black and  
white. I'll get this half black and white. (6)(PHO 140 21414-40)  
(PHO 141 21608)

06 18 26+ LMP I think we ought to pick up a piece of that spall  
there by the gnomon - (6)(SAMP 76210,15)(PHO 140 21412,20-24; 141 21608)

06 18 26+ CDR I can break it off. (6)(SAMP 76210,15)

06 18 26+ LMP There's one right by the gnomon we can just pick up.  
It's a finer-grained vesicular rock than - (6)(SAMP 76210,15)

06 18 26+ LMP I thought I was going to get this half. (6)

- - -

06 18 26+ LMP Well, they like to have some of it in black and  
white, you know. (6)

06 18 26+ CDR I'll get that rock. (6)(SAMP 76210,15)

06 18 26+ LMP I forgot to look at the objectives for this station. (6)  
I hope we're meeting them.

06 18 26+ CDR We want to get 500's of that boulder track. (6)

06 18 26+ LMP Okay. A piece of that spalled rock that was sitting (6)(SAMP 76210,15)  
by the gnomon - watch out gnomon. How about that?  
- is in - bag 535.

06 18 26+ CDR You got one in there already? (6)(SAMP 76210,15)

06 18 26+ LMP Yes. (6)(SAMP 76210,15)

- - -

06 18 26+ CDR You won't be able to reach my bag. (6)(SAMP 76210,150)

06 18 26+ LMP No, but you can put it in mine. Can you reach it? (6)(SAMP 76210,15)

06 18 26+ LMP One of the light-colored inclusions looks like it may be anorthositic - gabbroic anorthosite - let me get my terms straight. The host rock has dark enough zap pits that it's probably gab - anorthositic gabbro, if I didn't say that. Some of the light-colored inclusions have slightly lighter-colored glass, and they may be the gabbroic anorthosite. (6)(SAMP 76210,15)

06 18 26+ LMP Inclusions like this one and that one. (6)

06 18 26+ CDR Some of those inclusions get to be bigger than the size of a baseball. There's one here and a couple up here. (6)

06 18 26+ LMP Let me borrow your hammer. (6)

06 18 26+ CDR Yes. Jack, try a little higher. See that one right on the - right there. (6)

06 18 26+ CDK Yes, that's a hard rock. (6)

06 18 26+ LMP Yes, that's a hard rock. You might be able to do it; I can't. (6)

06 18 26+ CDR I can't get down there. Okay, we need some of the soil outside the shadow here. (6)

06 18 26+ LMP Yes. How about over where your bag went? Let's move around here. Get on this slope over here. How about out over here? Are we supposed to get a - where are we here? (6)

- - -

06 18 26+ LMP We want to get a rake on the rim of that little crater down there, I guess. (6)

06 18 26+ CC Okay, 17. Roger. You were asking about objectives. (6)  
 The primary objective is documented samples of the blocks; and then also, we'd like to get some of the rake and soil sample out in the surface, namely, the rim crater there, if that's available. And one of the things, we're looking for is the variety of rocks here, if there's more than just the one boulder. You can sample the boulder for a while, but we would be interested in seeing if there is more than just the single type of rock. Probably, also, samples from both sides - both halves of the rock.

06 18 35 18 LMP Come on up here, Gene, if you can. (6)

06 18 35+ CDR Okay. (6)

06 18 35+ CC And so it's sort of your option as to how much time you spend here and how much you go on to Station 7 and spend. If you feel that it's worthwhile, we could spend essentially all that hour and 20 minutes at this station. But if we did that, we'd like to get a fair variety of blocks, if they're available.

06 18 35+ CDR Okay. (6)

06 18 35+ LMP Gene, we sampled some of the light-colored group - as a matter of fact, this block looks different. (6)

06 18 35+ CDR Well, so does that big one - - (6)

06 18 35+ LMP It's grayer. (6)

06 18 35+ CDR That's why I've been photographing it. (6) (PT 140 21414-40)

06 18 35+ LMP What it is, I think - it's a big blue-gray rock - itself is crystalline, I believe. The inclusions are much more sharply defined, and it's nonvesicular; and it's included, or at least it's in contact with the very vesicular anorthositic gabbro - right up there. See that? (6)

06 18 35+ CDR Yes, the whole big one. (6)

06 18 35+ LMP Did you get some pictures of it? (6)

06 18 35+ CDR As I bounced around there, I took pictures of it. (6)

06 18 35+ LMP Look, we can get some of that light-colored stuff in there, along with the blue-gray. (6)(SAMP 76230,35-39; 76305-07)(PHO 141 21608-12; 140 21441)

06 18 35+ CDR We ought to get as big a piece of that inclusion as we can. There's -- (6)(SAMP 76230,35-39; 76305-07)

06 18 35+ LMP See it up in there. (6)(SAMP 76230,35-39; 76305-07)

06 18 35+ CDR Yes. I think we're out of line of sight with them. We're behind a boulder. (6)(SAMP 76230,35-39; 76305-07)

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06 18 35+ CDR The boulder downslope is more of a light-gray vesicular boulder. The one Jack just talked about with some of these larger white inclusions is less vesicular, and it's more of blue-gray rock. (6)(SAMP 76230,35-39; 76305-07)

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06 18 35+ LMP The locator is of Henry. (6)(SAMP 76230,35-39; 76305-07)(PHO 141 21610)

06 18 35+ CDR Okay, let me try and get up there. Henry? We must be high enough to see something. I haven't even looked back. (6)(SAMP 76230,35-39; 76305-07)

06 18 35+ LMP Let me get a closeup before you start pounding. (6)(SAMP 76230,35-39; 76305-07)(PHO 141 21611-15)

06 18 35+ CDR No, I might go from this angle too. That will give them something. A little different up in there too, Jack. (6)(SAMP 76230,35-39; 76305-07)

06 18 35+ CDR We ought to try and sample that. (6)(SAMP 76230,35-39; 76305-07)

06 18 35+ LMP You want me to get my scoop under there? Probably won't fall out. (6)(SAMP 76230,35-39; 76305-07)

06 18 35+ CDR Okay. Get as many of these pieces as we can. I don't know how many are going to come out. (6)(SAMP 76230,35-39; 76305-07)

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06 18 38+ CDR This whole thing will come out here in a minute. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ LMP I'll watch it. I'll watch it. Got it? (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ CDR Move your arm up or down. Okay. I got it in case we don't get another one. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ CDR Hey, we're getting good at that. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ LMP Yes. Can't hold that much longer. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ CDR Let me get up on this - up here. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ LMP Why don't we get a bag out. Let me put these in a bag. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ CDR That's why I'm getting up here so I can just get my balance. Bob, 556 is one of the light-colored inclusions in the blue-gray rock. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ LMP It's chips. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ LMP I think we lost that other one. That's good enough. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ CDR I got it; I know where it is. (6)(SAMP 76230,35-39; 76305-07)

06 18 38+ LMP That's all right. It's not a lot of sample, but it's representative, I think. It looks a lot like that sugary rock I sampled yesterday, doesn't it? (6)(SAMP 76230,35-39; 76305-07)

06 18 39 43 CDR Yes, it's pretty easy to break up; it's really not very coherent at all. (6)(SAMP 76230,35-39; 76305-07)

06 18 39+ LMP You know, I thought last night, Bob, that I should use the word apilitic for a texture that we saw in that inclusion yesterday on the South Massif. (6)

- - -

06 18 39+ LMP Okay, you going to get some of that? (6)(SAMP 76250,55)(PHO 141 21609-10,15; 140 21441)

06 18 39+ CDR Yes, that's a different kind; that's a more beat up inclusion of some sort. Oh, there's a nice piece coming out. Oh, wait a minute - don't lose it. (6)(SAMP 76250,55)

06 18 39+ LMP I got it. I've got it. (6)(SAMP 76250,55)

06 18 39+ CDR Got it. (6)(SAMP 76250,55)

06 18 39+ CDR Okay. We have another inclusion that, on the surface, has a more reddish-brown texture. Interior looks pretty much the same; it's a very light gray. (6)(SAMP 76250,55)

06 18 39+ LMP This looks like a piece of breccia. Looks like a fragment breccia that got caught up in this thing. (6)(SAMP 76250,55)

06 18 39+ CDR Yes, well, the whole thing is obviously a breccia. I'd sure like to get that -- (6)(SAMP 76250,55)

06 18 39+ LMP Well, I'd say - I'm not sure; it's obviously a breccia. I think it may be an igneous rock with breccia inclusions. (6)(SAMP 76250,55)

06 18 39+ LMP Which is sort of in the same class. (6)

06 18 39+ CDR Sort of makes a breccia out of the big rock. (6)

06 18 39+ CDR Except you can -- (6)

06 18 39+ LMP I can't get in there, Geno, you'll have to. (6)

06 18 39+ LMP No way - (6)

06 18 39+ LMP Watch it. Hold still. I think it's easier for you. (6)

06 18 39+ CDR Did I give them a number on that? - no. (6)(SAMP 76250,55)

06 18 39+ CDR It's 536. (6)(SAMP 76250,55)

06 18 39+ LMP Squash it - cramp it a little bit, if you can; a little more. (6)

--

06 18 39+ CDR Okay. Let's go get the host rock here. (6)(SAMP 76270,75)(PHO 141 21609-10,15; 140 21441,56,58-59)

06 18 39+ LMP How about that piece? (6)(SAMP 76270,75)

06 18 39+ CDR How about this one, with the inclusion? Maybe I can get this one. (6)(SAMP 76270,75)

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06 18 39+ LMP That may have been a little optimistic. (6)(SAMP 76270,75)

06 18 39+ CC Do you guys have a feeling that the two halves of the big boulder are different rocks? Or is it the same rock split? (6)

06 18 42 13 LMP No, they're - they're two - they were all one boulder, I think. They are just two major rock types in the - whatever they came from. And I tried to describe that to you. We have the contact in the central boulder. They're really three big boulders. The central boulder has the contact between the light-gray rocks - or the blue-gray rocks and the vesicular anorthositic gabbro. (6)

06 18 42 13 CC Okay. And you guys have that pretty well photodocumented, right? (6)

06 18 42+ LMP Yes, it's in pretty good shape. We're working on it (6) still.

06 18 42+ LMP Try going on the side there, Geno. (6)(SAMP 76270,75)

06 18 42+ CDR Just went from the side, Jack. (6)(SAMP 76270,75)

06 18 42+ LMP That's enough. You got a piece of host rock. (6)(SAMP 76270,75)

06 18 42+ CDR I wanted that one cause it had that inclusion wrapped in it. Which one are you talking about? This one here? (6)(SAMP 76270,75)

06 18 42+ LMP Yes, I just - it's about to come. I've got it. (6)(SAMP 76270,75)

06 18 42+ CDR They're both host rocks; we can put them in the same bag. (6)(SAMP 76270,75)

06 18 42+ LMP No, let's don't. No, they're different places. 537, is a chip of the blue-gray rock; and the blue-gray host rock - and let me get that other one -

- - -

06 18 42+ CDR Pick the rock up while you're there. It's right at your hand. (6)(SAMP 76290,95)(PHO 141 21609-10; 140 21441,52,55,57)

06 18 42+ LMP I will. (6)(SAMP 76290,95)

06 18 42+ CDR \*\*\* hammer somewhere. (6)



06 18 42+ LMP And 538 is another sample of that material - a little dustier. (6)(SAMP 76290,95)

06 18 44 57 LMP That's the blue-gray, Bob, with the inclusions in it. Now the blue-gray, this more you looked at it, it looks like a - - (6)(SAMP 76290,95)

06 18 44+ CDR Give me your right hand. Turn it over. Turn it over. (6)

06 18 44+ LMP Well, I did. How do you want it over? (6)

06 18 44+ CDR You kept turning it over in the same direction. Like that, so I can fix that. Okay. Now give me your bag, and I'll get it in there. (6)

06 18 44+ LMP The blue-gray rock, on closer examination, looks like a partially recrystallized fragment breccia. It's very hard. (6)(SAMP 76290,95)

06 18 44+ LMP Are you going to get the afters in there? (6)(SAMP 76290,95)(PHO 140 21452,55,57)

06 18 44+ CDR Yes, I'll get them. I want to do a little bit better documentation on this thing. (6)(SAMP 76290,95)(PHO 140 21452,55,57)

06 18 44+ LMP I'm going to go over and look at that contact. (6)

06 18 44+ CDR I got a few closeup stereos of the inclusion that we tried to sample, and I'm going to see if I can't give you a little flight line stereo around this thing - if I can stay on my feet. (6)(PHO 140 21442-82)

- - -

06 18 46+ CDR You can see where we've been pounding on this rock. We didn't succeed in getting samples everywhere. And I'm giving you a 90-degree corner. (6)(PHO 140 21442-82)

06 18 46+ LMP Bob, it looks to me like there are inclusions of blue-gray in the gabbro - in the anorthositic gabbro. (6)

06 18 46+ CDR Are you saying you think - you think this whole big blue-gray thing is an inclusion? (6)

06 18 46+ LMP Yes, sir. And there's some little ones over here. (6)

06 18 46+ CDR But then within the blue-gray, we've got all these other fragments. (6)

06 18 46+ LMP Well, that's right. It's just several generations of activity; and it looks like the gabbro though, picked up the fragmental breccia as inclusions. Bob, it really looks that way right now. (6)

06 18 46+ CC Okay, Charlie is here mumbling something about it looking just like House Rock. (6)

06 18 46+ LMP It's very crystalline. I'll tell you, it's not a breccia - not like House Rock. Not to take anything away from House Rock though. (6)

06 18 46+ CDR Hey, Bob, there's a lot of mantling on a very shallow slope of a fracture here on one of the upslope rocks. I would assume it's just part of the talus picked up as it's rolled down. But if it's worth sampling, you might think about it. (6)(SAMP 76320-24)

06 18 46+ CC Okay, Gene, if you can get that fairly readily, why don't you - you can perhaps just scoop it up with the bag. (6)(SAMP 76320-24)

06 18 46+ CDR That's exactly what I can do. (6)

06 18 46+ CC If you can get up to the rock there. (6)

06 18 46+ CDR And it will be in my flight line stereo, and it's going to be bag 557. And I'll take an after and show you where it came from. (6)(SAMP 76320-24)

06 18 46+ CDR This is the easiest part of the rock in the world to work. Here's a big white clast. There's one on top about a foot and a half across, and here's one - must be 2 feet across - 3 feet. And that's in the blue-gray. (6)

- - -

06 18 46+ LMP Well, Bob, I think I've done the best I can. I would - I'd say that they're pretty clearly inclusions of blue-gray in the anorthositic gabbro here near the contact. (6)

06 18 46+ CC Okay. And Gene, your bag is hanging by one hook (6)  
there. Be careful, if you can - or LMP - -

- - -

06 18 50 07 LMP Okay, Bob, by accident - I didn't think I could do (6)(SAMP 76310,15)(PHO :40 21435-39,42-82; 141 21616-20)  
it but I got a sample of the inclusion. And it's in  
bag 539.

06 18 50+ CDR Hey, Jack, that's your bag that's hanging by one (6)  
hook. Let me go get it.

06 18 50+ LMP Oh, they're talking to me, huh? (6)

06 18 50+ CDR I didn't think they could see me. I'm way up on (6)  
top.

06 18 50+ LMP And it's blue-gray with light colored inclusions in (6)(SAMP 76310,15)  
it.

06 18 50+ CDR Put these in my bag. (6)

06 18 50+ LMP But the whole thing seems to be pretty well altered, (6)(SAMP 76310,15)  
or metamorphosed - compared to the major rock we  
sampled - to the other blue-gray rock.

- - -

06 18 50+ CDR Man, there's a dark hole in there. (6)

- - -

06 18 50+ CDR Here's another bag to put in there before you go. (6)(SAMP 76320?)

- - -

06 18 50+ CDR Now let me fix your bag. (6)

06 18 50+ LMP Okay, Bob, I think that inclusion will give you - an (6)(SAMP 76310,15)  
example of what this thing - what the orthositic  
gabbro did to the blue-gray breccia.

06 18 50+ CC Okay. We copy that. And we're ready for you guys (6)  
to leave this rock and press on and either get the  
rake rind cores near that crater down below the  
rock just a shade, or else go on to some other  
different variety rocks in the area.

06 18 50+ LMP Well, I tell you, going down to that crater is not a (6)  
 problem. Getting back up is.

06 18 50+ CC Okay, well, find a decent area to get the rake soil (6)  
 and a couple of cores.

05 18 50+ LMP Tell you what, Gene, I could go down there and start (6)(SAMP RAKE 76530, 35-77)(PHO 141 21621-27)  
 a rake, and you could come down there.

06 18 50+ CDR Okay. Yes, I don't think you ought to try and walk (6)(SAMP RAKE 76530, 35-77)  
 back up, Jack. Let me get a pan from right here  
 where I got this sample.

06 18 50+ LMP Okay. I'm going to come over and - I'll go get the (6)(SAMP RAKE 76530, 35-77)  
 rake and get the --

06 18 50+ CC Seventeen, it's not that vital to get o that (6)  
 crater. We just need a good place for a rake soil  
 and a single core.

06 18 50+ LMP Get uphill a little bit, if you can, for the pan, so (6)(PHO 140 21483-503)  
 that you don't - so you see my other pan station.  
 (PHO 141 21575-603)

06 18 50+ CDR Where was it? (6)(PHO 141 21575-603)

06 18 50+ LMP It was over there in that crater. Just uphill from (6)(PHO 141 21575-603)  
 the Rover.

06 18 50+ CDR I'm going up there. (6)(PHO 140 21483-509)

--

05 18 50+ CDR Bob, we'd. It want to move around from here too (6)  
 much. I tell you, these slopes are something else.

06 18 50+ CC Yes. We agree with that, from what we see on the (6)  
 television. So use your judgement, and get them  
 where it's the best place.

06 18 50+ CDR Well, you might take a look at me walking up. But I (6)  
 don't think I can get to the top. I just got to get (PHO 140 21483-509)  
 a place I can get a pan from, right here. Right in  
 this little hole. Okay, now I left the gnomon down  
 there.

06 18 50+ LMP I'll have to go get it. I think they're set up (6)  
 right here near the Rover.

06 18 50+ CDR Hope my lens is clean. Bob, from up here, the light (6)(PHO 140 21483-509)

mantle is not evident until you see the angular reflection up on the scarp. Very thin-like patches might be evident out on the valley, but not nearly as pronounced as I might have thought from this altitude.

06 18 50+ CDR And there's Challenger. You know, Jack, when we finish with Station 8, we will have covered this whole valley from corner to corner. (6)

06 18 50+ LMP That was the idea. (6)

06 18 55 20 CDR Yes, but I didn't think we'd ever really quite get to that far corner. Not 2, but this other one. And we're going to make it. (6)

06 18 55 20 LMP Bob, that blue-gray rock near the contact with the anorthositic gabbro does get some vesicles in it. I think they'll show up in Gene's pictures. (6)

06 18 55+ CDR I just ran out of film at 150. And I'm about two pictures short of the pan, and they're upslope. I think I can cover most of that with the 500. (6)(PHO 140 21483-509)

06 18 55+ CC Okay, Gene. You going to go to the Rover and change your mags now. (6)

06 18 55+ CDR Well, Jack's going to need some help from me. (6)

06 18 55+ LMP I'm starting to rake. (6)(SAMP RAKE 76530,35-77)

06 18 55+ CC Let me know when you get to the Rover to change the mags after you get done with that, and I'll tell you what mag to change. (6)

06 18 55+ CC But press on and help Jack with those first. (6)

06 18 55+ CDR Jack, if you got enough film, I'll just come and help you. (6)

06 18 55+ CDR Remind me to dust my camera, too, will you? (6)

06 18 55+ LMP Don't forget to dust your camera. (6)

06 18 55+ CC We'll keep track of that for you, Gene. (6)

06 18 55+ CDR Did you get any before pictures? (6) (SAMP RAKE 76530,35-77)(PHO 141 21621-24)

06 18 55+ LMP I'm getting them now. (6) (SAMP RAKE 76530,35-77)(PHO 141 21621-24)

06 18 55+ CDR Man, I tell you, these slopes are great. I wouldn't (6)  
mind being up on top coming down; but - hey, that  
boulder track is quite a trench.

06 18 57 26 CDR That thing must be a meter or 2 deep, huh? (6)

06 18 57+ LMP Ok; the big r.a.e. (6) (SAMP RAKE 76530,35-77)

06 18 57+ CDR Wouldn't it be easier to rake downhill. (6) (SAMP RAKE 76530,35-77)

06 18 57+ LMP It would, but the stuff wouldn't stay in. Right? (6) (SAMP RAKE 76530,35-77)

06 18 57+ CDR Well, I don't know. (6) (SAMP RAKE 76530,35-77)

06 18 57+ LMP It's a thought. (6) (SAMP RAKE 76530,35-77)

06 18 57+ CDR Make sure you get that one by the - - (6) (SAMP RAKE 76530,35-77)

06 18 57+ LMP Yes, I will. (6) (SAMP RAKE 76530,35-77)

06 18 57+ LMP We're not really supposed to be selective about (6) (SAMP RAKE 76530,35-77)  
raking.

06 18 57+ CDR Well, you're not; you're just covering the area. (6) (SAMP RAKE 76530,35-77)

06 18 57+ LMP That's why I set up there. (6) (SAMP RAKE 76530,35-77)

06 18 57+ CDR A selective sample is better than no sample at all. (6) (SAMP RAKE 76530,35-77)  
Let me put some in there.

06 18 57+ CDR Bag 558. (6) (SAMP RAKE 76530,35-77)

06 18 57+ LMP Let me go another couple of swipes. (6) (SAMP RAKE 76530,35-77)

06 18 57+ CDR Okay. There's one a couple of inches. Most of them (6) (SAMP RAKE 76530,35-77)  
are an inch or so smaller. They're angular to  
subrounded fragments. Some of them look like  
inclusions. As a matter of fact, the ones that are  
broken open look like some of the light-colored  
inclusions we saw in the big boulder. The others  
are too dust covered to say anything about.

06 18 57+ CDR A couple of them look fairly coarsely crystalline. (6)(SAMP RAKE 76530,35-77)

06 18 57+ LMP Okay. Put these in there. (6)(SAMP RAKE 76530,35-77)

06 18 57+ CDK Big deal. Now we ended up with three more. (6)(SAMP RAKE 76530,35-77)

06 18 57+ LMP Let me get an after, such as it is. Oh, we want the - - (6)(SAMP RAKE 76530,35-77)(PHO 141 21625-27)

06 18 57+ CDR They want the soil here. (6)(SAMP SOIL 76500-06)(PHO 141 21621-27)

06 18 57+ LMP Soil - that's right. (6)(SAMP SOIL 76500-06)

06 18 59 46 LMP Okay. You want to put that in? (6)(SAMP SOIL 76500-06)

06 18 59+ CDR Yes, I'd better put it in before I - okay. Let's try for the soil. 559's the soil. (6)(SAMP SOIL 76500-06)

06 18 59+ CC And 17, our present plans from the back room are that we'd like to get the single core, the 500-millimeter shots - and, I guess, maybe one could do one, and one could do the other - and then we'd like to press on and do a short Station 7 unless you think you have got a fair variety of rocks here. The feeling is to do that, you have to take a look at the variety of rocks. (6)(SAMP CORE 76001)(PHO 139 21186-211)

06 18 59+ CDR Little more, little more, little more. (6)(SAMP SOIL 76500-06)

06 18 59+ CDR Okay, Bob. I'll get the core and let Jack get the 500. 559 is the kilogram of soil. I think we've pretty much covered the general variety we've seen here. I think we've seen most of them in that boulder. (6)(SAMP CORE 76001)(SAMP SOIL 76500-06)

06 18 59+ CC Okay. And so we'd like to go on to Station 7, then, (6) when you get the 500 and the core, in hopes of finding a variation of boulders along the Front.

06 19 01 02 CDR Okay. Let me know when you get it. (6)

06 19 01+ LMP Okay. The after. (6)(SAMP SOIL 76500-06)(PHO 141 21625-27)

06 19 01+ CDR Okay, why don't you get the 500, and I'll get the core. (6)

06 19 01+ LMP And the LMP's on 120. (6)

06 19 01+ CC Copy 120 there. And, Gene, if you want to change, (6)  
we recommend magazine Foxtrot or Fran, as the case  
may be.

06 19 01+ CDR Okay. We'll try Foxtrot Franny. Don't forget to (6)  
get that boulder track.

- - -

06 19 01+ LMP Hey, Bob, I think we could use an upper here if you (6)(SAMP CORE 76001)(PHO 146 22291-95)  
want to save the lowers.

06 19 01+ CDR I think so, too. (6)(SAMP CORE 76001)

- - -

06 19 01+ LMP Well there's some in under my seat if you want to (6)(SAMP CORE 76001)  
use those.

06 19 01+ CDR I'll use those. (6)(SAMP CORE 76001)

06 19 01+ CC Stand by, Jack. We have three lowers and two (6)(SAMP CORE 76001)  
uppers, so we'd just as soon use the extra lower  
here in the single core. That'll give us two uppers  
and two lowers left - for doubles.

06 19 01+ LMP Okay. (6)(SAMP CORE 76001)

06 19 01+ LMP There should be a lower in there, Geno. (6)(SAMP CORE 76001)

06 19 01+ CDR Yes, Bob, any special place you want that? Just out (6)(SAMP CORE 76001)  
here on the slope?

06 19 01+ LMP Should have put the gnomon up. Well - (6)

06 19 01+ CC Just out there on the slope. I guess if you saw a (6)(SAMP CORE 76001)  
crater \*\*\* you might look at that, but primarily  
we're looking at the crater.

- - -

06 19 01+ CDR Did he say in a crater? (6)(SAMP CORE 76001)

06 19 01+ LMP I'm not sure what he said. Thinking - how do I get (6)(PHO 139 21186-211)  
this doggone -

- - -



06 19 01+ LMP How am I going to see up there to shoot this thing? (6)(PHO 139 21186-211)  
06 19 01+ CDR Well, why don't you lean against the rock? Go over there and lean against it. (6)(PHO 139 21186-211)

- - -

06 19 01+ CC Okay. And, Jack, and if you'll listen for a minute, I'll tell you some possible 500-millimeter targets the people have in mind. One, the LM if you can see it from there. Two, Nansen, if you can see it from there. Three, Lara; and four, Shorty. In other words, I guess they're talking about looking along your traverse from yesterday. It would be mostly the back shots, apparently. And then, also, the South Massif, and I don't know what you can get of boulder tracks leading up the North Massif. And most of those will be looking downhill towards the LM, Stations 2, 3, and 4. Over. Nansen Lara, and Shorty.

06 19 01+ LMP I got you, Bob. (6)(PHO 139 21186-211)

06 19 01+ CDR Yes, the LM is visible by the way. (6)(PHO 139 21186-211)

06 19 05 27 LMP Okay, I got a set of what looks like the outcrop from which the boulder came. (6)(PHO 139 21186-93)

06 19 05+ LMP I'm afraid they're moved a little bit. (6)(PHO 139 21186-93)

06 19 05+ LMP Oh, I can't. That's it. I got a few pictures looking up the boulder track and then off to the right - to the left a little bit - and the one off to the right. And I think - I'm not sure how well they overlap; that's just an awful hard shot. (6)(PHO 139 21186-93)

- - -

06 19 05+ CDR Okay. My camera is clean. Magazine Foxtrot - Is on about frame 2, and I cycled through it. And I've got the core all set, and I'm going to go get it. And I didn't hear where you said to put it, Bob. (6)(SAMP CORE 76001)

06 19 05+ CC Anywhere. (6)(SAMP CORE 76001)

06 19 05+ CDR Oh, man, you're easy. (6)(SAMP CORE 76001)

06 19 05+ CDR Anywhere. Not the bottom of a small crater, huh? (6)(SAMP CORE 76001)

06 19 05+ CC Any place. And didn't you get your camera dusted? (6)(SAMP CORE 76001)

06 19 05+ CDR Yes. I got it all dusted and the mag's changed. (6)

06 19 05+ CDR It's core 48. (6)(SAMP CORE 76001)

06 19 08 06 CDR I'll even get you a picture of it. (6)(SAMP CORE 76001)(PHO 146 22291-92)

06 19 08+ CDR Can you get the LM from there? (6)(PHO 139 21203-05)

06 19 08+ LMP Yes. (6)(PHO 139 21203-05)

06 19 08+ CDR That core went in very easy, Bob. I pushed it in about a quarter of the way. And about another five or six whacks, and it's in all the way. (6)(SAMP CORE 76001)

06 19 08+ CDR Okay. Come on out now, baby. (6)(SAMP CORE 76001)

06 19 08+ LMP Okay, Bob. Shorty, and Station 3, and Station 2, and what else? (6)(PHO 139 21186-211)

06 19 08+ CC And any sort of outcrops you see in the South Messif. (6)(PHO 139 21186-211)

06 19 08+ LMP I thought we shot those. (6)(PHO 139 21186-211)

06 19 08+ CC Okay. If you got those, fine. (6)(PHO 139 21186-211)

06 19 08+ LMP No, I mean the other day. (6)(PHO 139 21186-211)

06 19 08+ LMP I'll try again. (6)(PHO 139 21186-211)

06 19 08+ CC Stereo is stereo is stereo, I guess. (6)(PHO 139 21186-211)

06 19 08+ LMP Well, but it's not stereo; it's right along the same line. (6)(PHO 139 21186-211)

06 19 08+ CDR Okay, and I got you a little soil mechanics of the hole; which stayed intact; very nice and round.

- - -

06 19 08+ LMP You aren't going to get anything else out of me if I (6)(PHO 139 21186-211) keep taking pictures.

(6)(SAMP CORE 76001)(PHO 146 22291-95)

06 19 08+ CDR Frame 31, Bob.

06 19 08+ LMP Okay. LMP was what? 120? I guess we can get to (6)  
the next station with that.

06 19 08+ CDR Yes, I got a brand new mag on. (6)

06 19 08+ CC And we'd like to get you guys rolling as soon as (6)  
feasible there.

06 19 11+ CDR Okay. I'll need your rammer, so if you'll just turn (6)(SAMP CORE 76001)  
right.

06 19 11+ CDR Good timing. Pin's out; core tube is safe. In (6)(SAMP CORE 76001)  
full.

06 19 11+ CDR I knew it was. Okay. You take this and put this (6)(SAMP CORE 76001)  
under your seat, if you want, Jack. And I'll get  
the TGE. Oh, let me put your shovel back on for  
you. I'll get it.

06 19 11+ LMP Don't lose that. Boy, if you do - (6)

06 19 11+ LMP Okay. Did you give them the number? (6)(SAMP CORE 76001)

06 19 11+ CDR Yes, they got the number. (6)(SAMP CORE 76001)

06 19 11+ LMP Under the LMP's seat. (6)(SAMP CORE 76001)

06 19 11+ CC Roger. We got it. Copy that - under the LMP's (6)(SAMP CORE 76001)  
seat.

06 19 12 51 CDR 670, 109, 801; 670, 109, 801. (6)

06 19 12+ LMP I wish we - the one thing I didn't do. While you're (6)  
doing that -

06 19 12+ LMP Didn't get pictures of those foliated vesicles. I (6)  
don't think the ones you had were in that kind of  
rock.

06 19 12+ CDR I don't want to lose that thing, so I guess - - (6)

06 19 12+ CC Okay, 17 when you get back on here, we don't need any charges, and we'll leave the SEP turned off. (6)

- - -

05 19 12+ CDR Yes, I turned it off. Let me see. We want to move on to 7 here. Rake, talus, documented core, you got your stereos, we got two pans, TGE, camera. Okay, we're going to head east and look for Station 7 - block variation, contact change, and get a different sample of rocks. I like want to get one or two of those nice ones in the big bag while you're over there. (SAMP 76055)

06 19 12+ LMP Open the gate, and I'll bring one. (6)(SAMP 76055)

- - -

06 19 12+ CDR Guess what isn't opening again. Should, though. It's all set right. (6)(SAMP 76055)

06 19 12+ CC You could put them under Jack's seat if it's easier. (6)(SAMP 76055)

- - -

06 19 12+ LMP Big bag open? (6)(SAMP 76055)

06 19 12+ CDR Yes, it's all open. All set. (6)(SAMP 76055)

06 19 12+ LMP Get me a - I need a normal sample bag for one here. It's pretty fragile. (6)(SAMP 76330,35)

- - -

06 19 12+ LMP Here, let me get this big one. I'm about ready to drop it. It looks like a gabbro. (6)(SAMP 76055)

06 19 12+ CDR There's sample bag 560. (6)(SAMP 76330,35)

06 19 12+ LMP And 560 has an undocumented except by the pans - very white - looks like a crushed anorthosite. It looks like - some of the inclusions in the gray breccia - gray and recrystallized breccia. (6)(SAMP 76330,35)

- - -

06 19 16 30 CDR Wait a minute. Let me get this out of the way. (6) (SAMP 76330,35)  
 Okay. Close it. Yes. That's got it.

- - -

06 19 17 10 CDR Okay. We're moving. Sort of. (6)

- - -

06 19 17+ LMP Your camera lens looks all right, Geno. (6)

06 19 17+ CDR Yes, I dusted it already. (6)

- - -

06 19 17+ CDR I can drive, Jack. (6)

06 19 17+ LMP Why don't you drive down and get - so you're not \*\*\* (6)  
 you can get on -

06 19 17+ CDR You can go downhill very easy. (6)

06 19 17+ LMP Yes. (6)

- - -

06 19 17+ CDR Why don't you just go down there. (6)

06 19 17+ LMP I'll carry the Rover samples. Just in case. (6)

06 19 17+ LMP Got it? (6)

06 19 17+ CDR Okay. I'll get that out of your way, too. (6)

06 19 17+ LMP Okay. I'll head down to that side hill over to (6)  
 those boulders right over there and then see if  
 that's any change.

06 19 17+ CDR Okay. You might, if you get another sample - a (6)  
 large sample, you might grab it, and we'll throw it  
 in the footpan here and I'll see if I can't find a  
 level spot to - -

06 19 19 14 LMP I sort of ought to have my scoop, too. (6)

06 19 19+ CDR - - help you get on. No don't take too much; just (6)  
 take that. That's all you need.

06 19 19+ LMP How about letting me have your hammer, then? (6)

--

06 19 19+ CDR Gnomon is on the Rover. The TGE is on the Rover. (6)

06 19 19+ CDR The rake is on the Rover. The scoop's on the Rover. (6)  
You put the core under your pan, right? (SAMP CORE 76001)

06 19 19+ LMP Yes, that's right. (6)(SAMP CORE 76001)

06 19 19+ CDR Okay. I'm going to power up and see if I can't come (6)  
down and get you.

06 19 19+ CDR It's fun walking downhill. Boy that boulder track (6)  
is impressive.

06 19 19+ CC Ok; and, I7, when you get moving we want to get, and (6)  
I quote, a maximum variety of hand samples with a  
minimum amount of documentation, in a minimum amount  
of time at Station 7. It's just an attempt to see  
what kind of variety we can get along the face of  
the Front.

--

06 19 22 10 CDR Okay. I'm rolling. (6)

06 19 22+ CDR Man, this is still a slope. Jack, I'm going to pull (6)  
around and in front of the way you're facing.

06 19 22+ LMP I can go down - there's a crater over here. Don't (6)  
drive through it.

06 19 22+ CDR Oh, there you are. This is much better. How is (6)  
this?

06 19 22+ CDR We ought to be able to pick up lots of those (6)  
fragments out in that field out there.

06 19 22+ CDR Okay. Bob, I just came downslope reading 193/3.1 - (6)  
just about 100 meters to pick up Jack.

06 19 22+ LMP Okay. Bag 48 Yankee has a sample of about a half - (6)(SAMP 76030-37)  
one-third-meter boulder that was lying in - that's  
sitting right smack dab in a little crater of it's  
own.

06 19 22+ CDR Oh, Jack. (6)

06 19 22+ LMP What? (6)

06 19 22+ CDR Oh, you just kicked a snowstorm of dust across here. (6)

06 19 22+ LMP I'm sorry. I just fell, too. (6)

05 19 22+ CDR Did you? You all right? (5)

06 19 22+ LMP Yes. Got your hammer? (6)

06 19 22+ CDR I got to drop it in the pan here. Hold on to it, I think. (6)

- - -

06 19 25 36 CDR We're rolling, Bob. (6-7)

06 19 25+ LMP LMP frame is 130. (6-7)

- - -

06 19 25+ LMP Hey, you got a rock on your right. (6-7)

06 19 25+ CDR Yes. I got them. (6-7)

- - -

06 19 26 10 LMP Okay. How about that field, not this block but there's sort of a collection of them - - way out there, about 300 meters or so. (6-7)

06 19 26+ CDR Oh, at least. Yes. (6-7)

06 19 26+ LMP Oh; going into the sun, I can't see a thing to tell you about Wessex Cleft. (6-7)

- - -

06 19 26+ CDR You feel like you're on a downslope over there? (6-7)

06 19 26+ LMP Yes. I feel like you're about ready to spin out downhill any minute. (6-7)

06 19 26+ CDR I don't feel that at all up here. (6-7)

--  
06 19 26+ CDR We must be about 200 meters up the slope, looking at (6-7)  
that little valley down there, Jack. Am I right?

06 19 26+ LMP Yes. I think you're right. The pattern on the (6-7)  
slope really doesn't look much different than on the  
light mantle. Matter of fact, it looks very much  
like light mantle, except for these large blocks  
that are in it.

--  
06 19 27+ LMP That looks like a pretty good pile to work on. (6-7)

--  
06 19 27+ CDR I want to get in that flat area, Jack, so I can dust (6-7)  
the radiators.

06 19 27 57 LMP Yes. (6-7)

06 19 27+ CC This is going to be a very short station. Probably (6-7)  
not more than 10 or 15 minutes. But just to grab a  
maximum variety of hand samples with a minimum  
amount of documentation and a minimum amount of  
time.

06 19 27+ CDR We can do a pan, and pick up a lot of those small (6-7)  
ones, Jack.

--  
06 19 27+ CDR I'd like to see us a little more level. (6-7)

--  
06 19 27+ LMP I thought you were going to stop back there. (6-7)

06 19 27+ CDR I was going out here around this big one. (6-7)

--  
06 19 27+ CDR See, there's a lot of little ones up in here. (6-7)



06 19 27+ CDR Right here to give you as much of a level spot as I can. That's about as level a spot as I can find. I'm inside the slope of a crater. (6-7)

06 19 29 05 CDR I'm at 200/3.3. (7)

--

06 19 29+ CDR You take a pan before, and we'll start picking up some of those samples, and I'll take a pan afterward. (7)(PHO 141 21646-67) (PHO 146 22339-63)

--

06 19 29+ LMP There is another one of our blue-gray breccias, I think, over there; recrystallized breccias with some of that crushed anorthosite in it. I think right in here I'm going to take the pan. (PHO 141 21646-67)

06 19 29+ CC Jack, what's your frame count? (7)(PHO 141 21646-67)

06 19 29+ LMP 131. (7)(PHO 141 21646-67)

06 19 30 23 LMP I'm going to take the pan at 11 feet so you can see the fragments that we are going to pick up here. Then we can take another one at - for location work. (7)(PHO 141 21646-67)

--

06 19 31 09 CC We've got a TV. (7)

--

06 19 33 09 LMP 540 is the first bag of selected samples. (7)(SAMP 77510-19,25-26)(PHO 146 22298-300,336-38)

--

06 19 33+ CDR Here, put that one in there. (7)(SAMP 77017)

06 19 33+ LMP Let's get a bag on it. We're getting to many rocks, and we don't know where they came from. (7)(SAMP 77017)

06 19 33+ LMP I don't think it will fit. (7)(SAMP 77017)

06 19 33+ CDR Yes, we'll wrap it a little bit \*\*\* it will fit. (7)(SAMP 77017)

06 19 34+ LMP Sam 541 is partially around another big rock in  
Weng's collection bag. (7)(SAMP 7017)

06 19 34+ CDR Did you not picture of this thing here? (7)(PHO 146 22298-330)

06 19 34+ LMP Yes; well, not the big rock yet. Not in focus  
anyway. (7)(PHO 146 22298-330)

06 19 34+ CDR I got to do that. (7)(PHO 146 22298-330)

06 19 34+ LMP I was just collecting in this area. (7)

06 19 34+ CDR Why don't you keep grabbing a few, and I'm going  
to -- (7)(SAMP 77070,75-77)(PHO 146 22300,05,15,27-30)

06 19 34+ LMP That's what I'm doing. (7)(SAMP 77070,75-77)

06 19 34+ CDR That's one of the blue-gray rocks. And it's got a  
light-colored fragment that runs the full height of  
it, about a meter and a half thick. And then it's  
got the gray or blue-gray rock on the other side.  
As a matter of fact - let me look at it closely.  
It's a fragment in it all right.

--

06 19 34+ CDR I wouldn't be absolutely positive, but it sure looks (7)(SAMP 77070,75-77)  
like I see a dikelet in here that's in the  
ir fusion. And I'm going to get a closeup stereo of (PHO?)  
it. I'd call it a dikelet, if you pinned me down.

--

06 19 34+ CDR I wish I could break a sample of that off. Here's  
another one. It is a dikelet. There's three or  
four of them. (7)(SAMP 77070,75-77)

06 19 34+ CDR The material in the dike looks - yes, it's not  
covering it. It's between the lighter-colored rock,  
and it's the blue-gray rock. (7)(SAMP 77070,75-77)

06 19 37+ LMP 542 is another bag of goodies. (7)(SAMP 77530-45)

--

06 19 37+ CDR Well, maybe it isn't a dikelet. Maybe it's just a (7)  
screen covering, a flow covering.

05 19 37+ LMP No, they're dikes. (7)

06 19 37+ LMP They're little veinlets of - (7)

06 19 37+ CDR Let me get this whole thing in a bag. (7)

06 19 37+ CDR I got a rock, Bob. It's fractured, primarily around the dike. It's in several pieces, but we're going to put it all in one bag. (7)(SAMP 77210,15)(PHO?)

06 19 37 35 LMP 543. (7)(SAMP 77210,15)

--

06 19 37+ LMP We need to put one of those dikes in another bag. It looks like some fraction of the blue-gray material has obviously intruded. (7)(SAMP 77070,75-77)(PHO 146 22300,05-15,27-30)

06 19 37+ CDR Now, can you get that dike there? Piece of it? (7)(SAMP 77070,75-77)

06 19 37+ CDR I can get it right here. (7)(SAMP 77070,75-77)

--

06 19 37+ CDR Yes. It's this soft, white inclusion again. It breaks pretty easy. (7)(SAMP 77070,75-77)

06 19 37+ CDR Oh, it's got to be a dike. Look at that. (7)(SAMP 77070,75-77)

06 19 37+ LMP It is. (7)(SAMP 77070,75-77)

06 19 38 40 LMP Okay, 544. (7)(SAMP 77070,75-77)

06 19 38+ CDR Oh, yes, it is because I just broke into it. (7)(SAMP 77070,75-77)

--

06 19 38+ LMP Although the blue-gray up on the hill looked like a fragment breccia, if this is still related, then it's - been some partial melting at some time. (7)(SAMP 77070,75-77)

06 19 38+ CDR There's a preserved contact between the dike and the - - white material. (7)(SAMP 77070,75-77)

06 19 38+ LMP That's what I wanted. (7)(SAMP 77070,75-77)

06 19 38+ CDR Why don't we get this big piece of dike now? (7)(SAMP 77070,75-77)

06 19 38+ LMP See if you can get - whoa! Don't hit it again. (7)(SAMP 77070,75-77)  
There, you've still got some contact there.

06 19 38+ CDR Now, there's some good contact. That'll do it. (7)(SAMP 77070,75-77)

06 19 39 32 LMP Dike and intruded rock in 544. Now, these dikes are (7)(SAMP 77070,75-77)  
a dark bluish-gray. And it looks like they're very  
finely crystalline - maybe with some - -

06 19 39+ CDR I'm taking some closeups. (7)(SAMP 77070,75-77)(PHO 146 22327-30)

06 19 39+ LMP - - very fine phenocrysts. (7)(SAMP 77070,75-77)

- - -

06 19 39+ LMP We ought to get a piece of the normal gray that the (7)(SAMP 77110,15)(PHO 146 22298-99,336-38)  
dikes are coming from.

- - -

06 19 39+ CDR I want to get this. - - finish documenting this (7)(SAMP 77070,75-77)(PHO 146 22298-99,336-38)  
thing.

06 19 39+ LMP Hey, over here on this side, it looks like the (7)(SAMP 77130,35)(PHO 146 22298-300,331-38)  
vesicular anorthositic gabbro.

06 19 39+ CDR I got to get some regular pictures on this set. (7)(PHO 146 22331-38)

- - -

06 19 40 38 LMP Yes. 561. That's a sample of the gray, looks like (7)(SAMP 77110,15)  
recrystallized breccia that the dikes are continuous  
with.

- - -

06 19 40+ LMP And the vesicular rocks - (7)

06 19 40+ CDR Let me finish the stereo around the corner here. (7)(PHO 146 22331-38)

- - -

06 19 41+ CC And you might grab one FSR on the way out. (7)(SAMP 77035)

06 19 41+ CDR We'll do that. (7)

06 19 41 39 LMP Okay. There's that one. The vesicular anorthositic (7)(SAMP 77130,35) gabbro is in 5 - what is it? 62.  
 - - -

06 19 43 09 CDR Here's a football-size rock that was 50 percent (7)(SAMP 77035) buried.  
 - - -

06 19 43+ LMP That one looked like a piece of the gray rock, I (7)(SAMP 77035) think.  
 - - -

06 19 43+ CC Jack, we'd like you to change mags before you leave (7) this station.  
 06 19 43+ LMP Yes, sir. (7)  
 - - -

06 19 43+ LMP What magazine did you want, Bob? (7)  
 06 19 43+ CC Magazine Mike. (7)

06 19 45+ CC Gene, you might spend your time taking a standard (7)(PHO 146 22339-63) 74-foot pan while Jack is changing his mag.  
 06 19 45+ CDR That's exactly what I'll do. I don't mind going (7)(PHO 146 22339-63) uphill, because it's so much fun coming down.  
 - - -

06 19 47 26 LMP Mag's changed. (7)

06 19 47+ LMP Those two bags with the goodies in them will have (7) enough soil to be representative of the area we sampled, too, I think.  
 - - -

06 19 50 48 CDR CDR is about 73 on the frames. (7)(PHO 146 22339-63)  
 - - -

06 19 51 09 CDR Okay. We're rolling, and I'd like the range and bearing to the next - (7-8)

- - -

06 19 52 27 LMP We're still about 100 meters, I think, from where the break in slope is - with the flank. But we're away from the block population except for two great big blocks out ahead of us, this side of the SWP crater. But the average population is down to the 1 percent or less, again. (7-8)

06 19 52+ LMP That average population really never changed up in here. Just the big blocks we're around. I saw some little - - half-meter to one-third-meter, glass-lined, pit-bottom craters. (7-8)

06 19 52+ LMP Look at the size of those things! (7-8)

06 19 52+ CDR Boy, aren't they big mammoos. (7-8)

06 19 52+ LMP And it looks like they're probably the same thing that we sampled. They have the inclusions in them, white inclusions. They look like a mixture of the gray of the recrystallized breccia, and the tan-gray of the anorthositic gabbro. (7-8)

06 19 54 02 LMP There's Van Serg, blocky rim crater. That's the other side of Cochise there. See it? (7-8)

06 19 54+ CDR Yes. Way over there. (7-8)

06 19 54+ LMP Yes. Cochise is certainly a shallow crater, although we knew that. It only has one place I can see that has any blocks on the inner wall of Cochise. Otherwise, it has a surface much like what we're driving on for walls and for the floor. One place on the south-southeast wall is a concentration of blocks much like we saw in Henry or in Horatio. But the rest of the crater seems to be pretty well mantled. Van Serg is a very blocky rim crater, big blocks up on the rim. (7-8)

- - -

06 19 54+ CDR I'm looking at the Sculptured Hills, and I still (7-8)  
 have that old man wrinkled face appearance, even up  
 close at this sun ang.e. And those wrinkles go  
 from, generally, upslope at the west to downslope at  
 the east.

06 19 54+ LMP You're right at the edge of Cochise. Aren't you? (7-8)

06 19 54+ CDR No, we're not that close. Cochise is up at - see (7-8)  
 that rim where those blocks are?

06 19 54+ LMP No, that's a small crater. (7-8)

06 19 54+ CDR Oh, I'll bet you that's Cochise up there. We've got (7-8)  
 to go quite a ways yet to get to -

06 19 54+ CDR This sideslope driving is really a tough - - (7-8)

06 19 55 45 CC How about a range and bearing? (7-8)

06 19 55+ CDR Okay. It's 210/3.4. (7-8)

- - -

06 19 55+ CDR I guess that's some other - that's just a (7-8)  
 depression. I think Cochise is over that rim.

06 19 55+ LMP That's just a depression. (7-8)

- - -

06 19 55+ LMP That's just a big, shallow depression. (7-8)

- - -

06 19 55+ LMP There's another one of those deep craters that's not (7-8)  
 - that doesn't have a blocky rim.

06 19 56 57 CDR Okay. 214/3.4. (7-8)

06 19 56+ LMP That's one of the more striking characteristics of (7-8)  
 the mantle are these craters that look, as far as  
 the diameter-to-depth ratio is concerned, like they  
 ought to be fairly young. But there's no blocks on  
 the rim, and they seem to have this mantled  
 appearance, just like some of the large craters.

06 19 56+ CDR As I look up Wessex clear from just about abeam of (7-8)  
it. It still shows me an albedo change and a  
surface wrinkle-texture change.

06 19 56+ LMP Yes, I think so. I've got it at the same sun angle (7-8)  
more or less.

- - -

06 19 56+ CDR Is that SWP? (7-8)

06 19 56+ LMP I don't know. (7-8)

- - -

06 19 56+ LMP Bob, there's something I haven't mentioned, but if (7-8)  
one had time on the next program - -

06 19 58 31 CDR I think that's SWP right there, Jack. (7-8)

06 19 58+ LMP - - you can sample secondary craters, and they tend (7-8)  
to have blocks either in them or on one rim,  
suggesting that you could tell directions if you put  
your mind to it. Directions of where the  
secondaries came from. These are small ones.

06 19 58+ CDR Did we ever get a piece of glass in place? (7-8)(SAMP 70019)

06 19 58+ LMP Yes, I did yesterday. (7-8)(SAMP 70019)

06 19 58+ CDR Documented in place? (7-8)(SAMP 70019)

06 19 58+ LMP Yes. (7-8)(SAMP 70019)

06 19 58+ LMP That's what I was trying to protect in the SRC (7-8)(SAMP 70019)  
yesterday.

06 19 59 00 CDR Here's SWP, Jack. It's coming right up, and I'll go (7-8)  
along the southern rim.

06 19 59+ LMP I'm forgetting to take my pictures. (7-8)(PHO 142 21671-97)

- - -

06 19 59 25 LMP There's a crater, that double pit-bottom crater. (7-8)  
That's the first one of those I've seen.



06 19 59+ CDR Right here, Jack, you're going to be able to peek (7-8)  
right over the top of SWP.

06 19 59 36 CDR Right here. How's that grab you? (7-8)

06 19 59+ LMP That's SWP, all right. SWP's a bigger hole than i (7-8)  
thought it was.

06 19 59+ LMP SWP even has some blocks in the wall. (7-8)

06 19 59+ CDR Yes, but the eastern and southeastern rim of SWP are (7-8)  
just continuous with the slopes of the Sculptured  
Hills.

06 20 00 16 CDR How does 238/4.2 sound for the beginning of 8? (7-8)

06 20 00+ CC 238 and 4.0 we're expecting for Station 8. (7-8)

--

06 20 00+ CDR Let me tell you, this Rover is a machine. I don't (7-8)  
know if it saw that hill we're climbing, but I did.

--

06 20 00+ CDR Doing fine. I'm trying to get around SWP over here (7-8)  
and start hitting that -

06 20 00+ LMP East Massif has outcrops on it. I can see now on (7-8)  
the north side. And they also tend to have linear  
upper terminations. And some of those line up as if  
there's roughly horizontal structure within the  
upper one-half of the East Massif.

--

06 20 00+ LMP Go by that little dark crater over there. There's a (7-8)  
very blocky-rim small crater that's a dark-rimmed  
crater instead of a bright rim like we'd seen some  
around that looked fresh. It partly may be the  
angle at which we're approaching it.

06 20 02 35 CDR We're on the southeastern rim of SWP at 226 and 3.6. (7-8)(LRV 11)

06 20 02+ LMP Why don't we get some samples of that material in (7-8)(LRV 11)(SAMP 78120-24)(PHO 142 21692-96)  
there.

06 20 02+ LMP Okay. Keep driving toward the rim and then just - a (7-8)(LRV 11)(SAMP 78120-24) shallow curve.

- - -

06 20 03 03 CDR 226/3.6. There's a highly fragmental, small crater (7-8)(LRV 11)(SAMP 78120-24) about 30 or 40 meters across, right on the southeastern rim of SWP. And most of the fragments are football size and smaller, and they're very angular.

06 20 03+ LMP Turns out that they'll break. They're clods. (7-8)(LRV 11)(SAMP 78120-24)

06 20 03+ CDR I guess that's going to be about 70 percent covered (7-8)(LRV 11)(SAMP 78120-24) on the inside of the rim with these things.

06 20 03+ LMP It's all instant rock, but the crater rim looks dark (7-8)(LRV 11)(SAMP 78120-24) compared to other fresh craters like this that we've seen.

06 20 03 47 CDR Fifty Yankee. (7-8)(LRV 11)(SAMP 78120-24)

06 20 03 52 LMP LMP frame is 26. (7-8)(LRV 11)

- - -

06 20 04 02 LMP We're rolling. (7-8)

06 20 04+ LMP Your wheels are just chewing those things up. (7-8)

- - -

06 20 04+ LMP I think we ought to get below the highest peak up (7-8) there because that seems to have the rocks on it.

06 20 04+ LMP I only see one rock so far - - (7-8)

06 20 04+ CDR \*\*\* straight ahead, in there. See that one. Of (7-8) course, I don't know where that came down. Doesn't look like it may have come down from the top.

06 20 04+ LMP Certainly aren't many rocks. It's certainly not (7-8) like the old North and South Massifs. Yes. There's one big rock over there.

06 20 04+ CDR Well, let's head that way. That's about where the (7-8) station is, anyway.

06 20 04' LMP \*\*\* I think we're starting to see blocks. That one (7-8)  
is so unusual -

06 20 04+ CDR That's the northernmost station anyway. There's (7-8)  
another one there.

06 20 04+ LMP We can get the other smaller population around it. (7-8)  
I'm worried about that one being exotic to the  
Sculptured Hills.

06 20 04+ CDR Yes, it doesn't look like it rolled - (7-8)

06 20 04+ CDR But I don't see any others, do you? (7-8)

06 20 04+ LMP Well, there's some small ones up in there. Off to (7-8)  
about the 2 o'clock position. But I think that's  
all. We're going to have to be satisfied with small  
ones. Big ones don't get down. There's some big  
ones way up on the slope.

- - -

06 20 05 59 CDR We're at 227/3.9. (7-8)

06 20 05+ CDR There's smaller ones around here, too, Jack. (7-8)

06 20 05+ LMP Yes. That looks like subfloor from here. (7-8)

06 20 05+ CDR What's it look like? If it doesn't look worthwhile (7-8)  
stopping, I'll move on up over there.

06 20 05+ LMP Yes, it looks like subfloor. I would recommend that (7-8)  
we try to get up to some of those. I don't know  
whether we can or not.

- - -

06 20 05+ LMP Those two up there would be reasonably well up the (7-8)  
slope.

- - -

06 20 06+ CDR I have to park about 045 because I've got to be (7-8)  
pointing uphill so we can get out.

- - -

06 20 06+ LMP How about just that rim of that little crater there? (7-8)

06 20 06+ CDR Well, this is so level right here, Jack, I'm going (7-8)  
to just park it -

06 20 06+ LMP Well, I was just thinking on top of that crater is (7-8)  
closer to the ... that's level, too, on the rim.  
It'll give them a good view of the sampling area. I  
think if we work on those blocks there, we're in  
pretty good shape.

06 20 07+ LMP Bob, we're directly downhill, and that is from the (7-8)  
highest point that I could see up on this first  
sculptured hill.

06 20 07 40 CDR Bob, I'm parked at 026; bearing 226; distance, 6.6; (8)  
range, 4.0.

- - -

06 20 07+ CDR Yes. And I'm fairly level. (8)

06 20 07+ LMP Not really. (8)

06 20 07+ CDR I'm not, huh? (8)

06 20 07+ LMP I just about rolled downhill again. (8)

06 20 07+ CDR I am pointing uphill, aren't I? (8)

- - -

06 20 07+ LMP The first block I looked at here looks like subfloor (8)  
gabbro.

06 20 10 17 CC Okay. We've got a picture. (8)

- - -

06 20 12+ LMP All the blocks bigger than 20 centimeters that I've (8)  
looked at up here are subfloor gabbro in appearance.

06 20 12+ LMP I've looked at about five. (8)

- - -

06 20 12+ LMP Gere, I'm going to go up and look at this one rock. (8)  
Why don't you set up and sample any one of these (SAMP 78130, 35)(PHO 146 22365-68)  
other big ones. They're all the same. Like the one  
near the Rover. And I'll go up and try to get this  
big one down there.

06 20 12+ LMP It's the only one left to look at, but right now (8)  
we're dealing with subfloor material, I think.

06 20 12+ CDR What about some of these little fragments that seem (8)  
to be sitting more on the surface?

06 20 12+ LMP Yes, we're supposed to rake here. We'll get those (8)  
with the rake.

06 20 12+ CDR That one up there, by the way, is sitting on the (8)  
surface. These others are submerged.

06 20 12+ LMP Yes. That's why I want to look at it. (8)

- - -

06 20 13 56 CC A reminder, 17. We'd like to have you leaving here (8)  
in 30 minutes to make up some of the time we spent  
at Stations 6 and 7, a little extra. And we'd also  
remind you that we'd like a rake soil sample here,  
too. That may be the only way we try and pick up  
some stuff other than subfloor if that, indeed, has  
come down from the top of the Sculptured Hills.

06 20 14 20 LMP This rock is a big chunk of shattered, but still (8)  
visible, bluish-gray anorthosite. It's  
glass-coated, and it actually looks like it's  
vesicular. I'm going to roll it downhill so we can  
work on it. Well, I'll document it first.

- - -

06 20 14+ LMP But the point is, as Gene said, it's the only rock, (8)  
big one anyway, in the area that I see that's  
perched on the surface as if it might have rolled  
here.

06 20 14+ LMP But I don't see a track. (8)

06 20 14+ CDR Man, this one here is tough as a - (8)(SAMP 78130, 35)

06 20 14+ LMP Well, we can get some small ones. (8)(SAMP 78130,35)

06 20 14+ CDR Yes. That's what I'm going to do. (3)(SAMP 78130,35)

06 20 14+ LMP I thought you might be able to break it up. (8)(SAMP 78130,35)

06 20 14+ CDR There's no corners on it. (8)(SAMP 78130,35)

- - -

06 20 16 28 CDR Bob, 563 is the sample. (8)

- - -

06 20 16+ LMP Go, roll. Look, I would roll on this slope, why don't you? Hey, I'll bet you they would like, if I didn't step on it, sample out of the bottom of that thing. (8)

06 20 16+ CDR These others all look - you're right, Jack, they look like what we've been sampling. And they're all pretty well mantled except the one you got up there. There's one more piece I see on the side of that crater that may not be. (8)

06 20 17 14 LMP Bag 545 will be soil from under that anorthosite boulder. The only thing that bothers me about that boulder being subfloor - I mean Sculptured Hills is that it's glass-coated. (8)(SAMP SOIL 78220-24)(FO 142 21704-05)

06 20 17+ LMP It may have been thrown in here by an impact. Oh, you're here. (8)

06 20 17+ CDR Thought I'd sample it, and then roll it down. (8)

06 20 17+ LMP Well, okay. I never would have moved it if I thought you were coming up. (8)

- - -

06 20 17+ LMP I got it documented up in place. I think that's the side that was down. Let me roll it over. (8)(SAMP 78230-38)(PHO 142 21698-703; 146 22369-7)

06 20 17+ CDR Well, let me get a piece of that side since it was underneath. Then we'll roll it over and get a piece of the other side. (8)

06 20 17+ LMP Okay, yes. Let's do it again. Except I got dust all over it. (8) (SAMP 76230-38)

06 20 18 57 LMP The albedo - the down-sun picture's not going to mean much. Let me get this sample in your bag. I think we ought to change your bag because the stuff's going to start flying out. (8) (SAMP 78230-38)

06 20 18+ CDR Jack, after this one, there's one more in that crater. It may be from that crater, but I don't know. (8)

-- --

06 20 18+ CDR Two pieces for you. (8) (SAMP 78230-38)

06 20 18+ CDR Oh, that's a pretty one inside! (8) (SAMP 78230-38)

06 20 18+ LMP Well, it's stained by the glass coating. (8) (SAMP 78230-38)

-- --

06 20 18+ CDR While I'm at it, I'm going to chop another piece off right here. (8) (SAMP 78230-38)

06 20 18+ LMP Yes, get more than that. (8) (SAMP 78230-38)

06 20 18+ CDR Piece right there. You've got three pieces laying around. Let's get those before we lose them. (8) (SAMP 78230-38)

06 20 20 26 LMP Bag 564. (8) (SAMP 78230-38)

-- --

06 20 20 26 CC 564 from the bottom of the boulder. (8) (SAMP 78230-38)

06 20 20+ CDR Sure that's the bottom, huh? (8) (SAMP 78230-38)

06 20 20+ LMP Yes. (8) (SAMP 78230-38)

06 20 20+ CDR It's mixed with local soil. (8) (SAMP 78230-38)

06 20 20+ LMP Yes, I'm pretty sure. Let's turn it over. I think I'd recognize the top, although it's got dust all over it now. (8)

06 20 20+ CDR I think I'll get one more swap off there. I don't want to seal this. Let me get another swap off there. I can get it. (8)(SAMP 78230-38)

06 20 20+ CDR Well, that disappeared. Get it this way. (8)(SAMP 78230-38)

06 20 20+ CDR One time. That disappeared, too? That probably went into orbit. (8)(SAMP 78230-38)

06 20 20+ CDR Boy, is that pretty inside. Whooh! We haven't seen anything like this. I haven't. Unless you've been holding out on me. (8)(SAMP 78230-38)

06 20 20+ LMP No, this is a nice crystalline rock. (8)(SAMP 78230-38)

06 20 20+ CDR Okay, I see that one. (8)(SAMP 78230-38)

06 20 20+ CDR That's a good one. I'll go get it with my tongs. That one I worked too hard to get. Hey, I see how it makes boulder tracks. It just skipped along, made those little pothole craters as it went. (8)(SAMP 78230-38)

06 20 22 30 LMP This is about a 50-50 mixture of what looks like maskelynite or at least blue-gray plagioclase, and a very - let's say light yellow-tan mineral, probably orthopyroxene. It's fairly coarsely crystalline. (8)(SAMP 78230-38)

06 20 22+ CC When you guys get done with that rock, we'd like to get to the rake sample, please. And that's probably just as well done by the Rover as anywhere else. We don't seem to see anything worthwhile here doing besides that. (8)

06 20 23 29 CDR Okay. That went in the same bag, Bob, as the rest of the chips from the bottom (top?). All the chips from the bottom are in 464. (8)(SAMP 78230-38)

06 20 23+ LMP Here, let me roll it over. (8)(SAMP 78250,55)(PHO 146 22372-74,98)

06 20 23+ LMP By coarsely crystalline, probably, the average grain size will turn out to be about 3 or 4 millimeters, maybe half a centimeter. (8)

06 20 24+ CDR Well, I got to go get a couple of pictures. (8)(PHO 146 22372-74)

06 20 24+ LMP Yes, we really got that one messed up. (8)



06 20 24+ CDR If you'd hold your scoop where that one came off, it'd help. (8)(PHO 146 22372-74)

06 20 24+ LMP Yes: I was just going over there. (8)(PHO 146 22372-74)

06 20 24+ CDR On that other side. (8)(PHO 146 22372-74)

06 20 24+ LMP Just going over there. (8)(PHO 146 22372-74)

06 20 24+ CDR This side is clear. That last one I took off. (8)

06 20 24+ LMP Right there. (8)

05 20 24+ CDR Okay, that's good. Let's move the gnomon, and we won't roll it over on the gnomon. (8)(PHO 146 22372-74)

06 20 24+ LMP That other side is the one that was up. Well, I'm not sure now. It's got so much dust on it. (8)

06 20 24+ CDR It's not going to roll down that hill unless we got it on edge. (8)

06 20 24+ CDR Well, look at that glass on it. (8)

06 20 24+ CDR Which side was the glass on when you looked at it? (8)

06 20 24+ LMP It's on all sides. (8)

06 20 24+ OC There's probably not much point in spending a lot of time out here trying to decide which is the top. It's not big enough, anyway, really to worry about the top and bottom samples. They're radiologically significant. (8)

06 20 24+ LMP If you don't want another sample, then we can go ahead. (8)(SAMP 78250,55)

06 20 24+ CDR Let me get a piece of this glass. (8)(SAMP 78250,55)

06 20 24+ LMP There it is. Let me try to get them. Put them in here. (8)(SAMP 78250,55)

06 20 26 29 CDR A piece of the glass from it, Bob, is 546. (bottom). (8)(SAMP 78250,55)

06 20 26+ CDR With a little of the local soil. (8)(SAMP 78250,55)

06 20 26+ CDR We'll rake. (8)(SAMP RAKE 78525-28, 30, 35-99)(PHO 142 21706-16; 146 22399-403)

06 20 26+ CC They suggest the crater rim if possible. Probably over there near the Rover. (8)(SAMP RAKE 78525-28, 30, 35-99)

06 20 26+ LMP Okay. Now you got a sample of that big block down there, huh? (8)(SAMP 78130, 35)

06 20 26+ CDR Yes. (8)(SAMP 78130, 35)

06 20 26+ LMP Don't forget your gnomon. (8)

05 20 27 08 CDR Bob, I'm on frame count: 85. (8)

--

06 20 27+ CDR Jack, did you get a pan up here? (8)(PHO 146 22375-97)

06 20 27+ LMP No. (8)(PHO 146 22375-97)

06 20 27 25 CDR I'll get one. (8)(PHO 146 22375-97)

--

06 20 27+ CDR Let's see, I must be looking back at - well there's SWP. Golly, I don't know. I'm looking back at the complex: Cochise and Shakespeare, and I can see the LM. (8)

06 20 27+ CDR One interesting thing up here, you can see the erosional pattern of the talus, the mantle that - I call it a mantle, but the talus that's on the Sculptured Hills, there's little boulder tracks of all sizes from all these little clods. And they all, of course, point downhill or nearly downhill. (8)

06 20 27+ LMP In the interest of time, I'll document this without the gnomon. (8)(PHO 142 21706-11)

--

06 20 27+ CDR Oh. You documented already; I was just going to put this in the field of view anyway. (8)

06 20 27+ LMP Yes. Here on the after we can have it there. (8)

06 20 30 55 CDR There's not much in here worth - man, there's just nothing. This has been totally mantled with talus. Well, it is, because that downhill pattern goes right down the slope of this crater, and, actually, it goes upslope of the crater. This may be on a ray somewhere. Because it goes right downhill - this little bitty boulder-trail pattern goes right up the slope.

06 20 30+ LMP I think those are later than the crater by a long ways.

06 20 30+ CDR Did you sample anything over here?

06 20 30+ LMP No, I haven't done anything - -

06 20 30+ CDR I'm going to pick up the piece out of that little - - crater.

06 20 30+ LMP Want your gnomon over there?

06 20 30+ CDR No. I'll just take it to it. Let me know when you're ready for a bag.

06 20 30+ LMP Well, I'm about ready.

06 20 32 17 LMP I raked about a 2-meter-square area - and down to 4 or 5 centimeters for these. Pretty good population. They all going to go in?

06 20 32+ CDR They're all in; - - 565.

06 20 33 16 CDR The kilogram is in 566.

06 20 33+ CC And, remaining here, we'd have primarily a trench. If you fellows think it's feasible, we'd like to be moving in 11 minutes. And we could use a pan from this lower location also, probably.

06 20 33+ CDR Why don't you go back and dig a trench at the Rover? (8)

(8)(SAMP RAKE 78530,35-99)

(8)(SAMP RAKE 78530,35-99)

(8)(SAMP RAKE 78530,35-99)

(8)(SAMP RAKE 78530,35-99)

(8)

(8)

(8)(SAMP RAKE 78530,35-99)

(8)(SAMP RAKE 78530,35-99)

(8)(SAMP RAKE 78530,35-99)

(8)(SAMP RAKE 78530,35-99)

(8)(SAMP RAKE SOIL 78500-18)(PHO 142 21706-16; 146 22399-403)

(8)

(PHO 142 21726-45)

06 20 33+ CDR Once you get a trench at the Rover - - we just scoop (8)  
 this out. I'll get the sample here that I got (SAMP 78150,55)(PHO 142 21706-16; 146 22399-403)  
 documented now and - -

06 20 33+ LMP Is that all going to go in there? (8)(SAMP 78150,55)

06 20 33+ CDR Yes, it'll go. (8)(SAMP 78150,55)

- - -

06 20 33+ LMP That \*\*\* rock may have been too much. Take that (8)(SAMP 78150,55)  
 rock out, if it is.

06 20 33+ CDR No, it'll stay. We're going to have to put it in (8)(SAMP 78150,55)  
 mine, though. Well, let me try. Since we're going  
 to unload your bag, this may be the last one.  
 That's the last one for your bag.

06 20 33+ LMP Did you get anything out of that little crater? (8)(SAMP 78150,55)

06 20 33+ CDR No. But I'm going to right now. (8)(SAMP 78150,55)

06 20 33+ CDR Why don't you get your after picture over there and (8)(PHO 142 21712-16?)  
 go down and get that trench.

- - -

06 20 35 04 CDR Boy, almost pure white and very friable. Oh, boy, (8)(SAMP 78150,55)  
 is it! Pure white. Right out of a small little pit  
 crater on the side of this crater I just walked in,  
 Houston. And it's pure white, very friable. I got  
 one big piece and several small in 567.

06 20 35+ LMP Bob, the walls of these craters, the big craters (8)  
 around here, that is, the ones that are, say, 15  
 meters in diameter, tend to be a little bit lighter  
 albedo than ones down in the mantled area. I'm  
 afraid those pictures on that rake may be through a  
 dust-colored lens.

06 20 35+ CDR Yes, they were also in my dor. d sample here, (8)(SAMP 78150,55)(PHO 146 22399-403)  
 too.

06 20 35+ CDR Okay. Where do you want this trench? On the side (8)(SAMP TRENCH 78420-24)(PHO 142 1717-25)  
 of this crater?

06 20 35+ CDR I'll drop my gnomon. (8)(SAMP TRENCH 78420-24)(PHO 142 21717-25)

06 20 35+ LMP - - I don't know. I was just thinking about that. I think we ought to get out in the inter-crater area to see if there's any stratigraphy to whatever the talus is. (8)(SAMP TRENCH 78420-24)

06 20 35+ CDR Okay, Jack. I'm going to leave the gnomon right here. (8)

06 20 35+ LVP I'll get it. (8)

06 20 35+ CDK And, while you're digging that trench, we've got to pan to get, but I want to fix this fender. (8)

06 20 35+ LMP I guess. The pan's mine, isn't it, this one? (8)(PHO 142 21726-45)

06 20 35+ CDR Yes, it is. (8)(PHO 142 21726-45)

- - -

06 20 37 31 CDR The gravimeter's coming up. 670, 096, 001 - 670, 096, 001. (8)

06 20 37+ CDR You want it (gravimeter) dropped on the ground? (8)

06 20 37+ CC Gently. (8)

- - -

06 20 38+ LMP I have dug - have gotten a wall, now in one place that's standing about 25 centimeters high. And it shows no apparent change in the texture of the soil to that depth; except possibly at the lower 5 centimeters, there's some zones that might be slightly more granular. Particle size may be up a little bit. (8)(SAMP TRENCH 78420-24)

- - -

06 20 38+ LMP Okay - the bottom 10 centimeters - - (8)(SAMP TRENCH 78420-24)

06 20 38+ CDR Let me get your bags - I left my camera off. (8)(SAMP TRENCH 78420-24)

06 20 38+ LMP I didn't take a picture of the trench after I dug it. Let me take one - one shot. (8)(SAMP TRENCH 78420-24)(PHO 142 21720-25)

06 20 42 01 CDR The bottom is in 548. It's very cloddy. Looks very (8) (SAMP TRENCH 78420-24)  
much like the surface we're standing on except it  
clods up quite a bit more. Can you tell them  
anything from the trench itself?

06 20 42+ LMP I talked to them a little bit about it. (8)

06 20 42+ LMP It looked a little coarser-grained, but that's all. (8)

06 20 42+ CDR Okay. It sure holds a nice wall, though. (8)

- - -

06 20 42+ LMP Skim sample of the upper half centimeter. Maybe a (8) (SAMP TRENCH 78480-84) (PHO 142 21717-25)  
centimeter deep.

06 20 42+ CDR I'm going to put it in your bag. (8) (SAMP TRENCH 78480-84)

06 20 42+ CDR There's no choice, right now. Let me see if these (8) (SAMP TRENCH 78480-84)  
little ones will fit in there. Stand by. I want to  
put this one in there, too.

06 20 43 45 CDR That's in bag 545. (8) (SAMP TRENCH 78480-84)

- - -

06 20 43+ LMP Below that skim, the next 5 centimeters. (8) (SAMP TRENCH 78460-65) (PHO 142 21717-25)

06 20 44 33 CDR 550. (8) (SAMP TRENCH 78460-65)

06 20 44+ CDR And the next 10 centimeters down - (8) (SAMP TRENCH 78440-44) (PHO 142 21717-25)

- - -

06 20 44+ LMP Now, I go\* to - get your bag. (8) (SAMP TRENCH 78440-44)

06 20 44+ LMP That was the next 10 centimeters, and then the first (8) (SAMP TRENCH 78440-44)  
sample, of course, was the 10 centimeters below  
that.

06 20 45 05 CDR And that last bag was 551. (8) (SAMP TRENCH 78440-44)

- - -

06 20 45+ CDR You didn't get a pan here - while I clean up the  
 Rover, you can get your after of the trench in the  
 pan. (8)(PHO 142 21726-45)

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06 20 45+ LMP I'll get the pan. (8)(PHO 142 21726-45)

--

06 20 45+ LMP You took a pan up the hill there? (8)(PHO 146 22375-97)

06 20 45+ CDR Yes. It took it way up there, somewhere. (8)(PHO 146 22375-97)

06 20 45+ LMP Okay. I'll take it right here, then. Uh oh. (8)(PHO 142 21726-45)

06 20 45+ LMP Sample came out. (8)

06 20 45+ LMP I'll pick it up. (8)

06 20 45+ CDR Your top came open. It's awful full, Jack. If you  
 can't get it, I'll get it with the tongs. (8)

06 20 45+ LMP Go ahead and go to work, and I'll get the pan first. (8)(PHO 142 21726-45)  
 I lost two of them, I guess.

06 20 45+ CDR Yes, those are the last two I put in there. Your  
 bag is so full they won't stay. (8)

--

06 20 46 44 CDR 670, 117, 301 - that's 670, 117, 301. (8)

--

06 20 46+ CDR I'll get those things with my tongs. You can't get (8)  
 them - you'd have to bend over. Every time you jump  
 around, you come close to losing something. I'll  
 just take them back there. Put them under the seat.

--

06 20 46+ CC You got another one dropped there, Gene - Jack - got (8)  
 it.

06 20 46+ CDR Another one? (8)

06 20 46+ OC Jack's getting it. (8)  
--  
06 20 46+ LMP I have a sample. (8)  
06 20 46+ CDR Okay. Let me take your bag off first. (8)  
06 20 46+ LMP Okay. Well, you might as well fill it as full as  
you can. (8)  
--  
06 20 46+ CDR Okay. It's off. Let me fill it. (8)  
06 20 46+ LMP Your bag isn't in much better shape. (8)  
--  
06 20 46+ CDR Bag number 4 is absolutely full - and it's under  
Jack's seat. (8)  
--  
06 20 49+ LMP SCB 5 is on the LMP. (8)  
06 20 49+ LMP There is nothing on the gate. (8)  
--  
06 20 49+ CDR I've got one more loose sample I'm going to throw in (8)(SAMP NOT RETURNED)  
the big bag back there. \*\*\*  
06 20 49+ LMP A local one, you mean? (8)(SAMP NOT RETURNED)  
06 20 49+ CDR Yes. (8)(SAMP NOT RETURNED)  
06 20 49+ CDR Well, let me leave it under your seat. (8)(SAMP NOT RETURNED)  
06 20 49+ LMP Can I put a bag around it? (8)(SAMP NOT RETURNED)  
06 20 49+ CDR No, it's got a bag around it - it's all bagged. (8)(SAMP NOT RETURNED)  
--



06 20 55 33 CDR We're heading to Station 9 pointed about 267. The (8-9)  
switch is on. Okay, I'm going to make a turn to the  
right.

--

06 20 55+ LMP I think your rake sample here at the Sculptured  
Hills is going to have to tell a tale combined with  
the observation that most of the blocks we saw were,  
like Gene sampled, looked like subfloor gabbro.  
It's conceivable that the Sculptured Hills could be  
the same kind of material. I think it's fairly  
clear that the Boulder population does not resemble  
the massif population at all.

06 20 55+ CDR You been ridin' on this downslope all the time? (8-9)

06 20 55+ CDR And you hadn't said anything, huh? (8-9)

06 20 55+ LMP Scary, isn't it? (8-9)

06 20 56 58 CDR Men, I'm glad I'm driving. (8-9)

06 20 56+ CC You have a bearing of 234 - - and a range of 2.1. (8-9)

--

06 20 57 27 LMP We got to get around SMP here and then - - (8-9)

06 20 57+ LMP LMP frame is at 80. (8-9)(PHO 142 21746-90)

06 20 57+ LMP SMP or Bowen, - Bowen, I guess it is. (8-9)

06 20 57+ LMP That's SMP over there. Bowen is out here ahead of (8-9)  
us.

--

06 20 57+ LMP And all the big blocks still look like subfloor from (8-9)  
the Rover. But big blocks in here are only about a  
third of a meter in diameter. And they're  
subrounded to subangular. Okay. We're up on the  
plains again now, just off the back in slope.

06 20 59 48 CDR That sure looks like outcrop back there in the East (8-9)  
Massif on the lower slopes, where the high albedo  
is.

(8-9)(SAMP RAKE 78525-28, 30, 35-99)

06 20 59+ LMP Yes. Was one of my guidelines for the geophone deployment - (guide?) points. (8-9)

06 21 00 21 CDR There's some more of the blue-gray rock here in the east end of the South Massif down low. (8-9)

06 21 00+ LMP Yes. It looks like it might have been a slump block or something. (8-9)

06 21 00+ CDR Yes. You can see it's blue-gray because of it's contrast with the light mantle. (8-9)

06 21 00+ LMP Yes. It might be a slump block, or something like that. (8-9)

- - -

06 21 00+ LMP That's probably Bowen there, don't you think? (8-9)

- - -

06 21 00+ LMP ### aren't very far from SWP. (8-9)

06 21 00+ CDR It's 228/3.4. (8-9)

- - -

06 21 00+ LMP We're back into the mantled area - population of fragments is still 1 percent or so. The crater off to our left, which is at 227 and 3.3 - (8-9)

06 21 00+ LMP - is a fairly good-sized depression, but it's completely mantled. There's no blocks showing in the wall at all. (8-9)

06 21 02 38 LMP Now there's that crater in the wall of that depression or hollow near it. And it has one big block in the side as if it penetrated the mantle and exposed some of the wall of the depression. Just about a 30-meter crater. (8-9)

06 21 02+ CDR Valley of Taurus-Littrow is not planar. (8-9)

06 21 02+ LMP I'm glad we changed it to a subfloor instead of a plains unit. (8-9)

06 21 03 21 LMP We're in the inner wall of the depression here, and (8-9)  
the rocks still look like subfloor gabbro. Boy,  
there's certainly not much variety.

06 21 03+ LMP Generally, there are few exotics. (8 9)  
(8-9)

06 21 03+ CDR That's Cochise.

- - -

06 21 03+ CDR Get yourself a couple pictures while you're looking (8-9)(PHO?)  
right at it.

06 21 03+ LMP Could you swing right. Swing right! (8-9)

06 21 03+ CDR We are on the northeastern rim of Cochise. I'm (8-9)  
going to work my way around the other side.

06 21 03+ LMP And Bob - - looking at the western wall of Cochise, (8-9)  
I can see a contact within the subfloor between  
albedo units, one of which is a light tan-gray and  
the other is a light blue-gray. May reflect the two  
kinds of subfloor gabbro we've already sampled.  
Vesicular and nonvesicular. And that contact that  
looked like it was dipping - apparent dip in the  
wall - was to the north. And the west wall dipping  
to the north about 20 degrees.

06 21 03+ CC Which one's on top? Can you tell? (8-9)

06 21 03+ CDR The blue-gray's on top. (8-9)

06 21 03+ CDR I took a picture of it. We're at 228/3.0, and we're (8-9)(PHO?)  
headed south and not quite on the east rim.

06 21 03+ LMP I got a - a picture of that contact. (8-9)(PHO?)

06 21 03+ CDR I took some pictures right into Cochise, too, when (8-9)(PHO?)  
we were coming up.

06 21 03+ LMP Good. I'll show on yours, too, probably - I hope. (8-9)

06 21 03+ CDR Okay. We're sort of on the inner - (8-9)

06 21 03+ LMP Quick; give them a mark. (8-9)

06 21 05 39 CDR Mark. 230/2.9. We're on the east rim. (8-9)

06 21 05+ LMP Well, we're sort of inside the east rim a little bit. (8-9)

06 21 05+ LMP We're halfway between the rim and where the blocky wall starts. (8-9)

06 21 05+ LMP Cochise is much like Horatio and - actually, more like Camelot, although not as blocky in the walls, in general, in that it has blocky walls but a mantled rim. Again, all the blocks I see in here are big ones. And blocks down to about 20 centimeters are subangular, in general, and appear to have the appearance of the subfloor gabbro, although most of the smaller rocks do not appear to be highly vesicular. (8-9)

06 21 07 05 CDR We're at 232 and 2.7. (8-9)

06 21 07+ LMP I got another view of that contact, and let's put that on the northwest wall of Cochise and dipping to the southeast. (8-9)

06 21 07+ CDR Is that right? South and east is to our left. (8-9)

06 21 07+ LMP No, put it on the northwest wall dipping to the northeast. (8-9)

06 21 07+ LMP Yes, that's right. See that, Geno, can you see that over there? (8-9)

06 21 07+ CDR Oh, yes. I can see it now between the gray and blue-gray. (8-9)

- - -

06 21 07+ LMP Can you swing in there, and let me get another shot of it? (8-9)(PHO?)

06 21 07+ CDR You betcha. (8-9)

06 21 07+ LMP This is a good view right here. Now, I need to have you go left. (8-9)

06 21 07+ CDR I got two of them there, too. (8-9)(PHO?)

06 21 07+ CDR Look at that rock right in front of us. It looks like a contact between a blue and a gray. (8-9)

06 21 07+ CDR We can't get down to it, but take a picture. (8-9) (PHO?)

06 21 07+ LMP I think we've got that relationship. I think we got (8-9)  
it at Station 1. as a matter of fact.

06 21 07+ CDR But that's a big beautiful boulder on the - - inner (8-9)  
south rim of Cochise.

06 21 07+ CDR It's a single block. (8-9)

- - -

06 21 07+ LMP That might be glass-covered. That might be a glass (8-9)  
coating; the way it sort of hangs on the outside  
there. Hard to say.

06 21 09 20 CDR We're at 234/2.5. (8-9)

06 21 09+ LMP Starting to sling dust. I wonder if we've lost our (8-9)  
fender.

06 21 09+ CDR No, they're on there tight. \*\*\* - - (8-9)

06 21 09+ CDR You think that's Van Serg? Right over there. (8-9)

06 21 09+ LMP No. (8-9)

06 21 09+ LMP There it is. Bet you. (8-9)

06 21 09 37 CDR Yes. I think you're right, because that's just (8-9)  
about the right place. Let's see, 234 - and 2.1 is  
where we want to go, and I'm at 230/2.5.

06 21 09+ LMP Okay - - our block population in here now on the (8-9)  
south rim of Cochise and up ahead of us looks like  
it's up to 5 percent. And it all looks like  
subfloor - light- to tan-subfloor gabbro - or  
tan-gray. You don't see much blue-gray; not out on  
here.

06 21 09+ LMP There's a recent hit. (8-9)

- - -

06 21 09+ LMP There's a different looking rock here. (8-9)

- - -

06 21 09+ LMP We're still primarily in an extreme block field here (8-9) now. It's up to a 20 percent cover of fragments mostly the subfloor. Some of it looks quite highly shattered. I just saw one piece that looked like a white anorthositic rock.

06 21 09+ CDR How's this look to you? We can go farther up there, (8-9) I guess. Let me go farther up.

06 21 09+ LMP Okay, if you can get up. (8-9)

06 21 09+ CDR Get a little farther on the southeast. (8-9)

06 21 09+ LMP A little higher is apt to overdo it. (8-9)

06 21 09+ LMP There are some grayish rocks that are -- (8-9)

--

05 21 09+ CDR Right, coming up here. I turn to the right and park (8-9) right here.

06 21 09+ LMP -- that have somewhat of a swirl texture. (8-9)

06 21 13 10 CDR We're at 230/2.2. (8-9)

06 21 13+ CC Copy you parked. (9)

--

06 21 13+ CDR Yes. I'm parked on a heading of 320 which gives you (9) a better view.

06 21 13+ CC Copy 320 for the parking. (9)

06 21 13+ CDR Yes, 330. (9)

--

06 21 13+ LMP Van Sery looks like a blocky-rim fresh-impact crater (9) right now.

06 21 13+ CC How about scuffing you get and seeing if it looks (9) orange underneath?

06 21 13+ LMP Slight differences - don't worry. (9)

--

06 21 17+ CC And you might give me a frame count or check it to (9)  
make sure you're okay.

06 21 18 34 LMP I just did, and it's 123. (9)

--

06 21 18+ LMP This is starting to look like a Geological Survey (9)  
expedition. The vehicles are all covered with  
dust.

--

06 21 20+ LMP We're going to go up there and sample on the rim (9)  
look at the walls, and the floor, and miscellaneous.

06 21 20+ CDR Well, we are on the rim \*\*\* (9)

06 21 20+ LMP But the first thing we do is go up to the crater. I (9)  
think the mantle objective here really is immaterial  
because the blocky ejecta around the crater covers  
- - well, it looks like it extends several hundred  
meters out from the rim - say a couple of hundred  
meters.

06 21 20+ LMP We're pretty close to the rim. (9)

06 21 20+ LMP I'll go up on the rim, Gene, and see what we've got. (9)

06 21 22+ CC Let's get grabs before you guys leave. (9)

06 21 22+ LMP I'm getting it right now. (9)

--

06 21 22+ LMP Sure look like shocked rocks to me. (9)

06 21 22+ CDR Lot of girls splattered on some of these, Jack. (9)

06 21 22+ LMP Yes. (9)

06 21 22+ LMP We might even find some shatter cones. (9)

06 21 22+ LMP Well, I'll say one thing for old Van Serg, it's (9)  
blocky.

--

06 21 23+ LMP This is at least a large blocky-rim crater. But even it has the mantle dust material covering the rim, partially buried rocks. And it's down on the floor, as near as I can tell, and on the walls. The crater itself has a central mound of blocks that's probably 50 meters in diameter - that's a little high - 30 meters in diameter. Many of the blocks are - - intensely shattered in that area, as the ones that are on the walls. I don't see any sign of organization of the blocks in the walls right now. There's a possibility that on the west wall, there's an indication that there's a slightly darker gray rocks starting about halfway down the crater. And that level is coincident with what appears to be a bench on the northwest wall. And that bench - hints of that bench - it's not continuous, but hints of it are around on the north wall and, I think, right below us - yes, on the southeast wall. The rocks are pretty badly broken in many cases. And - well, I haven't seen any real glass yet. We'll start looking at them a little more carefully.

06 21 23+ LMF That looks like a breccia right there in front of us. (9)

06 21 23+ CDR Yes. There's some interesting patterns on the surface. (9)

-- --

06 21 23+ LMP Okay, there. Afraid I haven't been doing my duty on locators, occasionally. (9)(SAMP 79110,15)(PHO 146 22413-18; 142 21791-94)(PHO 142 21792-94)

06 21 23+ CDR Do that? (9)(SAMP 79110,15)

06 21 23+ LMP Yes. I got it. (9)(SAMP 79110,15)

06 21 23+ LMP Okay, Gene's tearing apart one of the - - very intensely fractured rocks. And it comes off in small flakes. Let's get this one, because this will be the best oriented one for documentation, plus why don't you get that one you've got inside there? (9)(SAMP 79110,15)

06 21 27 14 CDR Bag 566 is a fragment from the surface. (9)(SAMP 79110,15)



06 21 27+ LMP That's a corner, I think, off the block that Gene (9)(SAMP 79110,15)(PHO 146 22413-14)  
documented here.

06 21 27+ CDR Yes; it is. (9)(SAMP 79110,15)

06 21 27+ LMP We'll get another sample - that'll be from inside (9)(SAMP 79130,35)(PHO 146 22413-18; 142 21791-94)  
the block.

06 21 27+ CDR Get it with this real easy. Here's a whole big - we (9)(SAMP 79130,35)  
ought to take that just as is.

06 21 27+ CDR Put a bag around one end if we can. Here the other (9)(SAMP 79130,35)  
end is smaller.

- - -

06 21 27+ CDR That's a breccia, too. (9)(SAMP 79130,35)

06 21 27+ CDR See the white fragments in there? (9)(SAMP 79130,35)

06 21 27+ CDR It's got a lot of very small - - (9)(SAMP 79130,35)

06 21 27+ LMP It looks like this big one over here. You know, it (9)(SAMP 79130,35)  
might be that these might be pieces of the  
projectile. I don't know. Because it doesn't look  
like - it's not subfloor.

- - -

06 21 27+ LMP Well, that's wrapped in - if you put it end down, it (9)(SAMP 79130,35)  
may stay in the bag.

06 21 27+ CDR I doubt it. (9)(SAMP 79130,35)

06 21 28 45 CDR It's 480, and it's a relatively tabular shape, and (9)(SAMP 79130,35)  
it's about - - 10 inches long.

06 21 28+ LMP And it's highly friable. It breaks apart. (9)(SAMP 79130,35)

06 21 28+ CDR Oh, not so much. (9)(SAMP 79130,35)

06 21 28+ LMP In small chips. Well, you did it with your hands (9)(SAMP 79130,35)  
there. I call that being friable, compared to what  
we've seen anyway.

06 21 28+ CDR Okay, and let me get an after of that. (9)(SAMP 79130,35)(PHO 146 22415-18)

06 21 26+ LMP Let me get a soil right over here. Okay. The soil next to the boulder down about 3 centimeters, is in bag 569. (9)(SAMP SOIL 79120-25)(PHO 146 22413-18; 142 21791-54)

06 21 28+ LMP And the soil and chips - about two-thirds of a meter from the boulder - - are in bag 570. (9)(SAMP SOIL 79510-37)(PHO 146 22413-18; 142 21791-54)

- - -

06 21 28+ LMP There, very clearly, is a central mound. And now that we've looked at this one, the mound looks like it's composed of gray fragment breccias much like what we've just sampled - - dark gray. And again it might be related - - to the projectile. Now, we've got to see if there is subfloor up here, or whether we're dealing with another unit somewhere. (9)

06 21 28+ LMP Got your after. (9)(PHO 146 22416-18)

06 21 28+ LMP Well, the more coherent rocks - this looks like subfloor. (9)

06 21 28+ CDR I don't see any orange material either. (9)

06 21 28+ LMP Not yet. (9)

06 21 28+ CDR This particular rock we've sampled has tabular fractures, and in one-half of the rock, they are definitely oriented. (9)

06 21 28+ LMP There's more dust on these rocks - it's harder to see a fresh surface. They're not as clean. That's subfloor. (9)

06 21 28+ CDR Even the floor of the crater is mantled down there. (9)

- - -

06 21 28+ LMP What you got? A piece of glass? (9)(SAMP 79150,55)

06 21 31 51 CDR Yes, I think it is glass-covered. At least it's glass-covered - just glass-covered. I've got an undocumented sample. It's about 2 meters west of where we just sampled. It's a glass-covered baseball-size rock in 571. (9)(SAMP 79150,55)

06 21 32 14 LMP A lot of these blocks up here, particularly the more (9)  
fractured ones, but even some that aren't - are a  
gray matrix fragment breccia. And it looks like -  
really, the fragments are quite fine. There are no  
- on the rim anyway, we haven't seen any large  
fragments. The largest I've seen is about 2  
centimeters. But down in the mound you can see  
some fragments that are probably half a meter in  
diameter.

06 21 32+ CDR Jack, are you going around that rim of the crater up (9)  
there?

06 21 32+ LMP I was just looking at rocks. (9)

06 21 32+ CDR I want to get a pan before we leave back there. (9) (PHO 146 22423-50)

06 21 32+ LMP Yes. We need to see if we can get some of the (9)  
subfloor. I'm not sure I understand what's happened  
here, yet. This should have brought up subfloor  
according to the theory, and it hasn't.

06 21 32+ CDR That looks like some of the - look at some of the (9)  
breccias - the blue breccias with the white - big  
old slabby white - with the fracture face with the  
white inclusions.

06 21 32+ LMP Down there. (9)

06 21 32+ CDR Yes, down in the floor, Jack. (9)

06 21 32+ LMP Yes, it has that appearance all right. Hey, Gene - (9)

06 21 32+ CDR Do you see that - - that's fractured in sort of a (9)  
pyramid shape down there? Out here on the right -  
the right end of the floor down there - that big  
one?

06 21 32+ LMP Yes. (9)

05 21 32+ CDR It's sort of pointing west. (9)

06 21 32+ LMP Yes. (9)

06 21 32+ CDR It's really neat. That's a unique fracture, isn't (9)  
it?

06 21 32+ CC We'd like to be moving from here in about 10 minutes, so we probably better be trending back toward the Rover, unless you're seeing something really great out there. (9)

06 21 32+ LMP We ought to find what the rock is here, if you've got a little time. (9)

-- --

06 21 32+ CDR One thing I notice we do uncover. There's a lot of - oh, 2-, 3-, 4-millimeter-size fragments of glass we're kicking up all over the place. (9)

06 21 32+ LMP Yes. (9)

06 21 32+ CDR Little glass balls. (9)

06 21 32+ CDR Almost like Pete's - (9)

06 21 32+ LMP Can you come over here? I think there's some subfloor here. (9)

06 21 32+ LMP We ought to try to document it. But I tell you, most of the rocks are the fine-fragment breccias. (9)

06 21 32+ CDR Let me see if I can't get one of those little - (9)(SAMP 79170,75)(PHO 146 22419-22; 142 21795-77)

06 21 32+ LMP There's some glass. (9)(SAMP 79170,75)

06 21 32+ CDR You see if they're like Pete's - - eyeballs or whatever they are. (9)(SAMP 79170,75)

06 21 32+ LMP I think we can get some over here. If you're careful coming over here, we can get glass that looks like it may have crystallized in place there. (9)(SAMP 79170,75)

06 21 32+ CDR Okay. I'm talking about those little balls, too. (9)(SAMP 79170,75)

-- --

06 21 32+ LMP Put your gnomon right over here, and we can get that for glass, and that for subfloor. (9)(SAMP 79170,75)

06 21 32+ LMP But I'm not sure that is. It may be breccia. (9)  
 Everything is covered with dust here, and it's hard  
 to tell the types. Most of the rocks we're seeing  
 are breccias. Make sure that that glass is in your  
 stereo. (SAMP 79170,75)(PHO 146 22419-21)

--

06 21 35+ LMP Okay, the glass - looks like a glass agglutinate. (9)(SAMP 79170,75)

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06 21 35+ LMP It's a frothy - glass agglutinate is going to be in (9)(SAMP 79170,75)  
 bag 481.

06 21 35+ LMP And it looks almost like a couple - pile-type of (9)(SAMP 79170,75)  
 bomb, Bob, if you'll pardon the expression.

--

06 21 35+ LMP Although it's not flattened. It's an aggregate of (9)(SAMP 79170,75)  
 glass - or it's a pile of about four fragments, much  
 like the one we're sampling.

06 21 35+ CDR Jack, we want to get a good scoop sample here. (9)  
 Maybe can we get some of those little fine pieces of  
 glass around.

06 21 37 19 LMP And it looks like it's in place from the day it was (9)(SAMP 79170,75)  
 born.

06 21 37+ LMP I'm having a ha. time with this one. (9)

06 21 37+ CDR A piece of that rock right behind it. (9)(SAMP 79190,95)(PHO 142 21795-97; 146 22419-22)

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06 21 37+ CDR Yes. I'm going to turn around. Just not going to (9)(SAMP 79190,95)  
 be able to get that one in the bag, I don't think.

06 21 37+ CDR My sample's in - 482 is a rock, but it doesn't look (9)(SAMP 79190,95)  
 like subfloor. It looks like the blue-gray material  
 we've been seeing - the breccia-type material.

06 21 37+ LMP I don't think there's any difference. (9)(SAMP 79190,95)

06 21 37+ CDR Got it in! (9)(SAMP 79190,95)

06 21 37+ LMP Might just as well throw them in my bag. (9)(SAMP 79190,95)

06 21 37+ CDR I want a scoop out of here, though, Jack. (9)(SAMP NOT RETURNED)(PHO 142 21825-2b)

06 21 37+ CC Why don't we get that scoop sample as the first sample of Jack's radial sample? (9)(SAMP NOT RETURNED)

06 21 37+ CDR Okay. That's right. You're getting a radial sample. (9)(SAMP NOT RETURNED)

-- --

06 21 39 46 CDR Before you go back - I got to get an after picture here. And I want to get a pan of this thing. We can get a stereo pan - as you start your radial sample. (9)(SAMP NOT RETURNED)(PHO??)

06 21 39+ LMP Was. You take the after from there, and I'll go over here. (9)(SAMP NOT RETURNED)(PHO??)

-- --

06 21 39+ CDR I'm going to go over behind me and take part of the stereo. (S)(SAMP NOT RETURNED)(PHO??)

06 21 39+ LMP Where are you going to take your pan? (9)

06 21 39+ CDR From behind me, where we were. (9)

06 21 39+ LMP I think I'll just take my radial right from here to the Rover. (9)(SAMP NOT RETURNED)

-- --

06 21 39+ LMP And I'll take my pan from here. (9)(PHO 142 21798-824)

-- --

06 21 42+ CDR I think I'm out of film. (9)

-- --

06 21 42+ CDR 150. And it stopped clicking. Jack, I didn't get the rest of that crater down there. (9)

06 21 42+ CDR I only got it 12 o'clock and around. (9)

05 21 + LMP I can get it. (9)(PHO 142 21798-824)

06 21 42+ LMP Well, I'm going to be out of film, too, he... before (9)(PHO 142 21798-824)  
long.

06 21 42+ CDR Just don't worry about it then. Just press on with (9)  
your radials.

06 21 42+ LMP I got a good pan over here. Did you get the crater (9)(PHO 142 21798-824)  
at all?

06 21 42+ CDR I got the right half of it and probably two-thirds (9)  
of it, so I'm just going to have to let that do.  
I'm going to see if I can get some 500's while (PHO 139 21212-68)  
you're doing that.

06 21 42+ LMP Hey, this isn't going to be an ideal radial sample - (9)(SAMP NOT RETURNED)  
but it will have to do.

- - -

06 21 42+ CDR Bob, would you tell me what your primary desires are (9)(PHO 139 21212-68)  
again on the 500, based upon what we have?

06 21 42+ CC The primary desire will be the North Massif, the (9)(PHO 139 21212-68)  
blocks, and the trails.

- - -

06 21 42+ CDR 670, 037, 801; 670, 037, 801. (9)

- - -

06 21 44+ LMP Bag 52 Yankee is at the rim crest. (9)(SAMP NOT RETURNED)

06 21 44+ CDR I'm going to use the Rover to steady the 500, and (9)(PHO 139 21212-68)  
see what happens.

- - -

06 21 44+ LMP This isn't working out too well. I've got to get (9)(SAMP NOT RETURNED)  
rid of this scoop.

06 21 44+ CDR Just set it there and take your sample. We'll get (9)(SAMP NOT RETURNED)  
it.

06 21 44+ LMP I'll take the samples going back. (9)(SAMP NOT RETURNED)

--

06 21 47 46 CC We'd like you to press on. We'll abort the radial sample. We'd like to leave here immediately. Enough of the 500 millimeters, Gene. (9)(SAMP NOT RETURNED)  
(PHO 139 21212-68)

--

06 21 47+ CDR Eighty-five is the meg count on the 500. (9)(PHO 139 21212-68)

06 21 47+ LMP I think that's a smart move. I don't think the radial sample's going to tell you much here. (9)(SAMP NOT RETURNED)

--

06 21 47+ CDR Jack, you ought to get a scoop of that dirt, though. (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)(PHO 142 21827-29)

06 21 47+ LMP Well, there's one scoop - - (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)

06 21 47+ CDR We don't have a scoop of it, do we? (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)

06 21 47+ LMP Look what's underneath it. (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)

06 21 47+ CDR Well, I don't know what's underneath it. (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)

06 21 47+ LMP It's white. (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)

06 21 47+ CDR Well, I wanted to make sure we got some of those small glass balls. (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)

06 21 47+ LMP Yes, we'll get a scoop of it. Up on the too. (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)

06 21 47+ CC Seventeen, we're anxious for you guys to get going. (9)

06 21 49 52 CDR Here's your gravimeter reading from the surface; 670, 057, 101; 670, 057, 101. (9)

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06 21 49+ LMP Come here, Gene, quickly. We can't leave this. This may be the youngest mantle over - whatever was (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)

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06 21 49+ CDR Take pictures of it. I don't have any film. (9)(SAMP TRENCH SOIL 79220-28, 40-45, 60-65)(PHO 142 21827-29)



06 21 49+ LMP - - was thrown out of the craters. (9)(SAMP TRENCH SOIL 79220-28,40-45,60-65)

06 21 49+ CDR Take pictures of it. Rob, we've got to take 5 more minutes. We'll be right with you. (9)(SAMP TRENCH SOIL 79220-28,40-45,60-65)(PHO 142 21827-29)

06 21 49+ CDR What Jack's done is he dug a trench in a southwest-northeast direction, and he discovered about 3 inches below - 4 inches below the surface - a very light-gray material. (9)(SAMP TRENCH SOIL 79220-28,40-45,60-65)

- - -

06 21 49+ CDR Take that crust (9)(SAMP TRENCH SOIL 79220-28)(PHO 142 21827-29)

06 21 49+ LMP I'm trying to get the upper portion there. There we go. (9)(SAMP TRENCH SOIL 79220-28)

06 21 51 04 LMP The first 2 centimeters, bag 483. The next 5 - in 484. (9)(SAMP TRENCH SOIL 79220-28) (SAMP TRENCH SOIL 79240-45)(PHO 142 21827-29)

06 21 51+ CDR Got screw? (9)(SAMP TRENCH SOIL 79240-45)

06 21 51+ LMP I got quite a bit. (9)(SAMP TRENCH SOIL 79240-45)

- - -

06 21 51+ LMP And the next 10 centimeters of the light-gray material, be in - probably in 486, if we're lucky - get it off. (9)(SAMP TRENCH SOIL 79260-65)(PHO 142 21827-29)

06 21 51+ LMP I think it is 486, right? (9)(SAMP TRENCH SOIL 79260-65)

06 21 51+ CDR Yes. 485! (9)(SAMP TRENCH SOIL 79260-65)

06 21 51+ LMP 485. Okay. What did I say 483, 484? Okay. (9)(SAMP TRENCH SOIL 79260-65)

- - -

06 21 52 29 LMP Okay. The third sample is in 485. (9)(SAMP TRENCH SOIL 79260-65)

06 21 52+ LMP A possibility here is that this upper 6 inches of gray material in here is the latest mantling in the area and the light-colored debris may be what's left over from the impact. (9)(SAMP TRENCH SOIL 79220-28)

06 21 52+ CC We need Jack to put on magazine Nancy. (9)

- - -

06 21 52+ CDR Okay, I need a magazine too, Bob. I don't have any (9)  
film at all.

06 21 52+ CC That'll be Bravo if you change yours here. You (9)  
could change it at Station 10.

06 21 52+ CDR I'll change it here. (9)

- - -

06 21 52+ CDR I got Bravo. (9)

06 21 52+ LMP Okay. I got that one. (9)

06 21 52+ CDR We lost the dark slide out of Bravo, and it's in the (9)  
dirt. I'm not going to pick it up.

- - -

06 21 54+ CDR I'm changed. And I don't know what the mag count (9)  
is. Hey, we got some rocks in that big bag.

- - -

06 21 55+ CUR I can't even pick up that big bag to close the gate. (9)

- - -

06 21 55+ CC We've had a change of heart here again, as usual. (9)(SAMP CORE 79001-02)(PHO 143 21836-38)  
And we're going to drop Station 10 now that we've  
hurried you so much, and we're going to get a double  
core here. And we'd like to get some football-size  
rocks while you're doing that. And then we're going  
to leave here and go back to the LM.

06 21 55+ LMP You don't want a double core t don't think we (9)(SAMP CORE 79001-02)  
can do it, Bob. It's too r

06 21 55+ CDR You don't think we should do this s'uf' you (9)(SAMP CORE 79001-02)  
just trenched?

06 21 55+ LMP Well, I'm afraid that's all through it. (9)(SAMP CORE 79001-02)

06 21 55+ CDR Let's try it. (9)(SAMP CORE 79001-02)  
 - - -

06 21 55+ LMP Meg Nancy in on the LMP's camera. (9)  
 - - -

06 21 55+ LMP Oh, you're doing it, huh? (9)(SAMP CORE 79001-02)  
 06 21 55+ CDR I've got it started. (9)(SAMP CORE 79001-02)  
 - - -

06 21 57+ CC And we'd like to also deploy EP number 5 here. (9)  
 - - -

06 21 57+ CDR The lower is 50; the upper is 37. (9)(SAMP CORE 79001-02)  
 - - -

06 21 57+ LMP Why don't you put it up - well - you put the gnomon (9)(SAMP CORE 79001-02)  
 away. Put it fairly near that trench. At least  
 there is some documentation there. I'll try to have (PHO 143 21836-58)  
 the pen going while you're doing it.  
 - - -

06 21 59 20 LMP Okay. Pin 1 in pulled and safe. Pin 2 is pulled - (9)  
 safe. Pin 3 is pulled and safe.  
 - - -

06 21 59+ CDR The first core was easy; the second one's a little (9)(SAMP CORE 79001-02)  
 tougher; and then it got tough down at the end.

06 21 59+ LMP There, I'm getting a picture of you. Okay? (9)(SAMP CORE 79001-02)(PHO 143 21836-58)  
 06 21 59+ LMP I got it. (9)(SAMP CORE 79001-02)(PHO 143 21836-58)  
 - - -

06 21 59+ CDR Core lifter wants to slide out. It's full. No (9)(SAMP CORE 79001-02)  
 rocks in it. It looks like just the same stuff  
 we've been traveling through.

06 21 59+ CC Jack. I think you better help Gene with recovering (9)(SAMP CORE 79001-02)  
that core.

--

06 21 59+ LMP And if you'll just wait until I finish the pan, (9)(SAMP CORE 79001-02)(PHO 143 21836-5E)  
that's exactly what I'm going to do.

--

06 22 01 10 CDR Box, it's capped. (9)(SAMP CORE 79001-02)

--

06 22 01+ CDR it's very loose soil, just any little movement and (9)(SAMP CORE 79001-02)  
you'll lose some of it.

--

06 22 01+ CDR The top ranned down - oh, almost half way without (9)(SAMP CORE 79001-02)  
any effort.

--

06 22 03 11 CDR The bottom ranned down about an inch. (9)(SAMP CORE 79001-02)

--

06 22 03+ LMP And I got one sample of a radial sample. (9)(SAMP?)

06 22 03+ LMP In my pocket. (9)(SAMP?)

--

06 22 03+ LMP And we want to get a large block. (9)(SAMP 79035)

06 22 03+ CDR No, let's get a couple of them. I've got one. (9)(SAMP 79035)

--

06 22 04+ LMP Got a big rock there, too? (9)(SAMP 79035)

06 22 04+ LMP The thing that amazes me is that there's no subfloor (9)  
around here.

06 22 04+ CDR I got one here. (9)(SAMP 79035)

--

06 22 05+ LMP Bag 486 is a light-colored rock taken about 3 meters (9) (SAMP 79210, 15) to the right of the Rover. You should be able to pick it out in that last pan, unless the focus was bad.

-- --

06 22 07+ LMP Yes. You know, I don't think there is any subfloor (9) in here. The rocks are so dust covered that it's hard to be sure, but no rock I picked up looked like subfloor.

06 22 07+ CDR Get on there one time. Ready? I got three of them (9) that time.

-- --

06 22 07+ CDR Jack, there's a big one right there in my floor pan. (9) (SAMP 79035) That's what I did last time.

-- --

06 22 07+ CDR Get out of this block field, we'll be able to move (9) it a little bit.

-- --

06 22 09+ LMP Where are we needed, now that we are moving? (9-SEP)

06 22 09+ CDR Well, I'm trying to get out of the block field here, (9-SEP) then I'll head back to the southwest.

-- --

06 22 09+ LMP That must be Gatsby over there. (9-SEP)

-- --

06 22 09+ CDR That's Gatsby there, I guess, huh? (9-SEP)

06 22 09+ LMP Yes. (9-SEP)

06 22 09+ CDR It's not unlike Van Serg, though. (9-SEP)

06 22 09+ LMP Hey, you know that looks like mantling. (9-SEP)

06 22 09+ LMP Hopefully, we can get a shot looking back to the northwest - - (9-SEP)(PHO?)

06 22 09+ CDR Yes, I'll get that when I - - (9-SEP)

06 22 09+ LMP - - into Gatsby, because it looks like the mantle streams over the side from the southwest. Can you swing to your right - get up a little closer to the rim, there? (9-SEP)(PHO?)

06 22 09+ CDR Hey, here's a couple fragments in spots - (9-SEP)

06 22 09+ LMP Look at that! (9-SEP)

06 22 09+ LMP See that structure. (9-SEP)

06 22 09+ LMP - - see how the mantle streams over from the northwest. Can you get that? (9-SEP)

06 22 09+ CDR Yes. (9-SEP)

06 22 09+ LMP And from the southwest. (9-SEP)

06 22 09+ CDR Got it? (9-SEP)(PHO?)

06 22 09+ LMP Yes. (9-SEP)(PHO?)

- - -

06 22 11 41 CDR We're 236/2.1. (9-SEP)

06 22 11+ LMP What I'm looking at is the northwest portion of Gatsby, where there's a very very concentrated block field on the inner wall, except where there are, on the southwest, three streams and on the northwest and north a continuous stream, if you will, or band, radial band, of mantle that appears to be burying that field, overlying and mantling the field. We got some pretty good pictures of it, I think. (9-SEP)

06 22 11+ LMP I'm more and more convinced there's a mantle. One possibility, I guess, is that, if it's a pyroclastic mantle, that in the lunar vacuum environment and with whatever volatiles we're dealing with, the stuff becomes extremely fine upon vesiculation. We may have been on it all the time and not known it - as far as recognizing it. (9-SEP)

06 22 11+ CDR As soon as we come through this draw, how smooth or free of any debris or boulders it is on the other side of the upslope. (9--SEP)

-- --

06 22 11+ LMP I guess Sherlock's going to be right over the top over here. I saw it when we were on that other ridge. (9--SEP)

-- --

06 22 11+ OC -- and if you keep going straight to the LM, you're probably going to run into this crater area around San Luis Rey. You probably ought to head somewhat south of directly back to the LM, so we can at least tip the -- western edge of Sherlock and then pick it up and go from there back to the SEP. It looks like it might be rather rough there in that dotted-lined area. (9--SEP)

06 22 15 00 CDR Bob, I've already been doing it. I'm at 244/1.7. (9--SEP)

-- --

06 22 15+ LMP About 200 meters back, we crossed back into our standard mantle surface of about 1-percent fragment cover -- out of this -- the block field, which -- (9--SEP)

-- --

06 22 15+ CDR I can see the LM. And there's Sherlock, where those blocks are. (9--SEP)

06 22 15+ LMP Yes, that's the block field, the Sherlock block field; that's right. That is a block field. (9--SEP)

06 22 15+ CDR Some big ones there. (9--SEP)

06 22 15+ CDR Old Station 10. (9--SEP)

-- --

06 22 15+ LMP Pull close to this big block, if you can. (9--SEP)

06 22 15+ LMP And I'll try to get a reading on what it is -- some pictures of it as we come up to it. (9--SEP)(PHO?)

06 22 15+ CDR Yes. Boy that's a big one. (9-SEP)

06 22 15+ LMP Looks like our old friend, the subfloor - - (9-SEP)

06 22 15+ CDR Subfloor, isn't it? Yes. (9-SEP)

06 22 15+ LMP Yes. Vesicular subfloor. Vesicles are about a centimeter maximum size. They look like they're fairly evenly sorted. And the rock itself seemed to be massive. (9-SEP)

06 22 17 08 CDR 250/1.4. (9-SEP)

06 22 17+ LMP We're back into about a 5-percent rock cover as we cross the edge of the Sherlock block field. (9-SEP)

06 22 17+ CDR That's Sherlock over that rim over there. (9-SEP)

06 22 17+ LMP Yes. Once again, all these subfloor blocks look as if they're buried. Not mantled, necessarily, except maybe that one. Can you swing right, just a tad? (9-SEP)

06 22 17 41 CDR That one's got the mantle blowing up on it, in it's fractures and everything. (9-SEP)

06 22 17+ LMP That's the best example of that, I think. (9-SEP)

06 22 17+ CDR Take a picture of that? (9-SEP)(PHC?)

06 22 17+ LMP I got it. (9-SEP)(PHO?)

- - -

06 22 17+ LMP Everything in here so far is the tan-gray subfloor gabbro that I've seen. Oh, there's one over there that's a blue-gray. But blue-gray is not abundant. (9-SEP)

06 22 17+ CC And 17, as you're getting closer, we're going to want an LRV sample at 1.1 on the range. (9-SEP)

06 22 17+ LMP What are we now? 1.2? (9-SEP)

06 22 17+ CDR 1.2. We'll try to get block and soil. (9-SEP)

06 22 17+ LMP There's a fresh little pit. (9-SEP)



06 22 17+ LMP I am continually impressed by the lack of exotic fragments in here. (9-SEP)

- - -

06 22 17+ LMP If you head into that little - well that's a crater there. (9-SEP)

06 22 17+ CDR Let me get around it. We can go a little bit further. (9-SEP)

06 22 17+ CDR I'll go up on that flat area up there. (9-SEP)

06 22 17+ LMP Yes. There are a lots of little fragments over there by that area. (9-SEP)

06 22 17+ LMP Okay. Now swing a shallow turn. Whoa. (9-SEP)

06 22 17+ CDR Did you get any of those? (9-SEP)

06 22 17+ LMP Unfortunately, I can't see them - the shadow. (9-SEP)

06 22 17+ CDR How about that one right in front of you, in front of the television camera shadow. See that little one up there? (9-SEP)

06 22 17+ LMP It's a little big, I think. (9-SEP)

06 22 17+ CDR No upper right. Straight up the line. (9-SEP)

06 22 17+ LMP Yes. If you can get over there, I can get it. (9-SEP)

06 : 7+ CDR I can get there. (9-SEP)

06 22 17+ LMP I guess I wasn't looking at the right one. The shadow is making it impossible to see down there. Now, see what you can get. (9-SEP)

06 22 20 04 CDR We're at 253/1.1. (9-SEP)(LRV 12)

- - -

06 22 20 28 LMP Fifty-three Yankee. (9-SEP)(LRV 12)(SAMP 70320-24)(PHO 143 21892-94; 134 20455)

06 22 20+ LMP That's soil. I can't see to get a rock. (9-SEP)(LRV 12)(SAMP 70320-24)

06 22 20+ LMP Go forward just a little bit, Gene. (9-SEP)(LRV 12)(SAMP 70310-15)(PHO 143 21892-94; 134 20455)

06 22 20+ CDR I can't see the LM anymore. (9-SEP)(LRV 12)(SAMP 70310-15)  
 06 22 21 10 LMP Okay. The rock fragments, that's 54 Yankee. You got a rock right in front of you don't you? (9-SEP)(LRV 12)(SAMP 70310-15)  
 06 22 21+ CDR I see it. Rolled over. (9-SEP)(LRV 12)(SAMP 70310-15)  
 06 22 21+ LMP LMP frame for that sample - looks like about 60. (9-SEP)(LRV 12)(SAMP 70310-15)(PHO 143 21894)  
 ---  
 06 22 21+ LMP Looks like some of our gray variety of subfloor up here - around the rim of that little crater. You know, I'm starting to think that maybe the gray relatively nonvesicular subfloor may be deeper fraction, based on what we saw - well, actually, though, let's see - that could have been overturn, I don't know. Take that back. There just isn't much of it around here, although we saw a lot of it in the wall of Cochise. (9-SEP)  
 06 22 23 02 LMP What do you think this is, San Luis Rey? We're at 252/0.9. (9-SEP)  
 06 22 23+ CDR I wouldn't doubt it at all. I'll bet that's San Luis Rey. We're on the east side of it - Mariner and San Luis Rey. They're shallow - filled with rocks. (9-SEP)  
 ---  
 06 22 23 36 CDR We're at 250/0.9. (9-SEP)  
 06 22 23+ LMP Mariner should look pretty fresh. (9-SEP)  
 06 22 23+ LMP Boy, I certainly don't see much variety other than the gray and the tan subfloor variety. There's old Challenger. (9-SEP)  
 ---  
 06 22 23+ CDR Boy, I tell you there's no getting out of this stuff. You go from one to the other. (9-SEP)  
 ---

06 22 24 25 LMP Bob, we're moving in and out of areas of say (9-SEP)

1-percent to 5- to 10-percent blockiness. And where it gets blocky - not only is it more blocky, but we seem to have more of the medium-sized craters in the range of 20- to 50-meter-diameter craters. That may be Mariner right there.

- - -

06 22 24+ LMP Van Serg, let me mention again, was an unusual (9-SEP)  
experience in the plains geology here. That must be part of San Luis Rey or Mariner, one.

06 22 24+ CDR Yes. That's pretty deep. (9-SEP)

06 22 24+ LMP Yes, it is. (9-SEP)

06 22 26 13 CDR It's really big. We're at 252 and 0.6. (9-SEP)

06 22 26+ LMP The crater on our left - that is, south of us - is a (9-SEP)  
large crater. It's somewhat deeper than craters of the same size that we've seen. And it, too, though, has its large blocks mainly in the walls, although there are blocks up here in the rim, occasionally up to 3 meters.

06 22 26+ LMP Look at that string of blocks over there - that may (9-SEP)  
be it.

06 22 26+ CDR Yes. (9-SEP)

06 22 26+ LMP That's an edge of a crater, I guess. (9-SEP)

06 22 26+ CDR Want a picture of that? (9-SEP)

06 22 26+ LMP Got it. Look at the way that thing's fractured. (9-SEP)

06 22 26+ CDR This is the San Luis Rey complex because see how (9-SEP)  
elongated it is?

06 22 26+ LMP Yes. (9-SEP)

06 22 26+ CDR Fact is, we're going to cut right through the (9-SEP)  
western half here.

06 22 27 30 CDR We're at 244/0.4. (9-SEP)

06 22 27+ LMP Bob, I may have said early on up there at Van Serg (9-SEP)

that I saw subfloor, but we never did sample any that I know of. And the dust was thick enough that I'm just not sure. Breccias were the most obvious thing there.

06 22 27+ LMP it might have been a window in the plains here, of (9-SEP)

some kind. But - it's strange to see it there, with so much subfloor all around it that we saw.

06 22 28 51 CDR 252 and 0.2. (9-SEP)

06 22 29+ CDR \*\*\* point one though. We're almost to SEP. We're (9-SEP)

about - - 50 meters from SEP.

06 22 29+ LMP We're about 30 meters east of the antenna. (9-SEP)

06 22 30 11 CDR And we're measuring 221 and 0.2. (9-SEP)

06 22 30+ LMP There's a rock. I stood up down there, and I want (SEP)(SAMP 70215)  
to get it - -

06 22 30+ CDR Okay. EP 2. (SEP)

06 22 32 03 LMP Pin 1. Pulled and safe. Pin 2. Pulled and safe. (SEP)

Pin 3 is pulled and safe.

06 22 32+ LMP I'll try to put it in a depression. I'm going to (SEP)  
put it in a depression, if you want. And then I've  
got to take a pan, huh? Will a locator - yes - how  
about a locator to the LM? (PHO 143 21924)

06 22 32+ CC Be fine. (SEP)(PHO 143 21924)

06 22 32+ CDR You going to get on, Jack or walk back? (SEP)

06 22 32+ LMP I'll get on. (SEP)

06 22 32+ LMP Locator to the LM. I'll give you a frame count, 92. (SEP)(PHO 143 21924)

06 22 32+ LMP You're going to have to go left a little, right here. (SEP-LM)

06 22 32+ CDR Go left? (SEP-LM)

06 22 32+ LMP To avoid the antenna. (SEP-LM)

- - -

06 22 32+ LMP I want to point out a rock to you I set up on end. We need to get in the bag, and you can let me off there and I'll carry it. (SEP-LM)(SAMP 70215)

- - -

06 22 32+ LMP It's near the LM. (SEP-LM)(SAMP 70215)

- - -

06 22 34+ LMP I think it's that one there that's sort of dark. (SEP-LM)(SAMP 70215)

06 22 34+ CDR Up there, straight ahead? (SEP-LM)(SAMP 70215)

06 22 34+ LMP Yes. (SEP-LM)(SAMP 70215)

06 22 34+ CDR Bootprints are by it. That must be it. (SEP-LM)(SAMP 70215)

06 22 34+ LMP That's it, yes. Can you swing over so I can lean on the Rover when I put the - - (SEP-LM)(SAMP 70215)

- - -

06 22 34+ LMP That's perfect. (SEP-LM)(SAMP 70215)

06 22 34+ CDR Okay. You off? (SEP-LM)(SAMP 70215)

06 22 34+ LMP Well now, what did I do that for? (SEP-LM)(SAMP 70215)

06 22 34+ CDR What did you do. Kick it under? (SEP-LM)(SAMP 70215)

06 22 34+ LMP Yes. (SEP-LM)(SAMP 70215)

- - -

06 22 35 LMP I got my rock. It's halfway between the SEP and the (SEP-LM)(SAMP 70215)  
LM. Let me put it in the big bag.

06 22 35+ CC Is this that brown one you saw out here before, (SEP-LM)(SAMP 70215)  
Jack?

06 22 35+ LMP No, it's a gray one. (SEP-LM)(SAMP 70215)

--

06 22 35+ LMP Yes, I just lost the sample. It's in my pocket, I (SEP-LM)(SAMP 70215)  
guess. Let me get some tongs.

06 22 35+ LMP Then you can go ahead. I'll walk back. (SEP-LM)

06 22 37 47 CDR Okay, Bob. I'm back at the LM -- (LM)

06 22 37+ CDR 151, 12.0, and 001. (LM)

06 22 37+ LMP Can you get it? (LM)

06 22 37+ CDR I got to get your bag -- (LM)

06 22 37+ LMP I got it. (LM)

--

06 22 40 11 CDR The core tubes are going in SCB 7 -- (LM)(SAMP CORES 76001, 79001-02)

--

06 22 40+ CDR Did you get my bag already? (LM)

06 22 40+ LMP Yes. (LM)

--

06 22 40+ CDR We'll have one more to put in here. I'm just going (LM)  
to lay this one over here. Yes, the big one. Man,  
there's some big ones in there, too.

06 22 40+ LMP We can get some of that subfloor. (LM)

06 22 40+ CDR Yes, there's one in my footpan, too. (LM)(SAMP 79035)

06 22 40+ CDR Why don't you leave that there for a minute? (LM)(SAMP 79035)

---  
 06 22 41 53 CDR How are we fixed for samples? Here's 5, and it's (LM)  
 about 1/2 to 3/4 full.  
 ---  
 06 22 41+ LMP -- let's dump these -- (LM)  
 06 22 41+ CDR We got 3. (LM)  
 06 22 41+ LMP -- three in there, the Rover samples. (LM)  
 06 22 41+ CDR We probably ought to put the SESC in there, huh? If (LM)(SAMP SESC 70011)  
 there's room for it.  
 06 22 41+ CC Let's put the SESC someplace where it's accessible (LM)(SAMP SESC 70011)  
 to get that contamination sample.  
 ---  
 06 22 41+ CDR Let's get it now. We can get the bag cleaned up we (LM)  
 can put it in bag 5.  
 ---  
 06 22 41+ CDR Get your scoop. Let's get it over with. (LM)  
 06 22 41+ LMP I don't have a scoop, I don't even have a rake. (LP)  
 ---  
 06 22 41+ CDR Use your Rover sampler. (LM)  
 06 22 41+ CDR They both fell off when that thing (pallet) opened. (LM)  
 06 22 41+ CDR Here's a full core tube we can't forget. (LM)(SAMP CORES 76001, 79001-02)  
 ---  
 06 22 43 37 LMP I'll put it over here in 4. I mean in 7. (LM)  
 ---  
 06 22 44 20 CDR We're going to get this SESC now. (LM)(SAMP SESC 70011)  
 ---

06 22 44+ LMP You want it in front of the minus-Z footpad? (LM)

06 22 44+ CC Roger. Sort of underneath where you probably had the - - solar side of the Cosmic Ray Experiment there. Between the footpad and the ASEP doors there. (LM)

06 22 44+ CDR Let's fill it up. (LM)

-- --

06 22 45+ CDR Would you brush that white thing off for me? (LM)

-- --

06 22 45+ LMP (key). Take a couple over here. (LM)

06 22 45+ CDR Let me go past the radar. Good job. (LM)

-- --

06 22 46 43 LMP I'm on frame 96, and the short can sample - contaminated sample is documented by two stereopairs prior to that. And the before is the cosmic ray pictures (LM)(SAMP SESC 70011)  
(PHO 143 21927-30)  
(PHO 140 21381-82)

06 22 46+ CC Which SCB is that going in, Jack? (LM)(SAMP SESC 70011)

06 22 46+ LMP Number 5. (LM)(SAMP SESC 70011)

-- --

06 22 46+ CDR Yes, short can in 5. (LM)(SAMP SESC 70011)

-- --

06 22 47 47 CDR We've got the big bag, bag 7, bag 5, bag 4 at the footpad. (LM)

06 22 47+ CC We've also got SCR 3 with the Rover samples in front on (LM) the Rover.

06 22 47+ LMP No, we emptied those into 5. (LM)

-- --



06 22 47+ LMP You've got another big rock over here from the - (LM)(SAMP 79035)

06 22 47+ CDR It's in my footpan. (LM)(SAMP 79035)

06 22 47+ LMP That's from Station 9, right? (LM)(SAMP 79035)

06 22 47+ CDR Yes. (LM)(SAMP 79035)

06 22 47+ CDR That's what I told them. Station 9, I got a football-size rock, and I've put it in there. (LM)(SAMP 79035)

- - -

06 22 47+ LMP Gene's football-sized rock looks like it might be glass coated. And it might even have a shatter cone or two on it. (LM)(SAMP 79035)

06 22 47+ LMP I don't know what you're focused on - - but here's his rock. (LM)(SAMP 79035)

06 22 48+ CC Jack, we're going to let you take the Commander's camera out to the ALSEP and take a few photos that people think we need. And Gene's going to take your camera out and document the geophone. (LM)(PHO 134 20485-505)

- - -

06 22 51 46 LMP Okay. Bob. I've got the cosmic ray in the ETB. (LM)

06 22 52 02 LMP Mag Foxtrot, or Franny, I guess, we changed it to. Msg Donna, the DSEA. Mag Echo. Mag Linda. Mag Mary. (LM)

06 22 53+ CDR Are you through with the 500? (LM)

06 22 53+ CC We're through with the 500? (LM)

- - -

06 22 53+ LMP I don't think the 500's working anymore, anyway. (LM)

06 22 53+ CDR It was working - - (last time?) I used it. (LM)

06 22 53+ LMP There it is. Okay. Film cycle. Three times. (LM)

06 22 54 49 LMP Okay. Mag Karen is in. (LM)  
 06 22 54+ LMP And there are two on the cameras. (LM)  
 06 22 55 09 CDR Bob, I'm reading 670, 010, 701; 670, 010, 701. (LM)  
 ---  
 06 22 55+ LMP Yes. Take a picture for you. (LM)(PHO?)  
 ---  
 06 22 58+ CC -- did all the FSR's get off the Rover into the big (LM)  
 bag?  
 06 22 58+ LMP That's affirm. (LM)  
 06 22 58+ CDR Yes, this is the one you need anyway. That's color. (LM)(PHO 134 20473-79)  
 Why don't you see if you can grab a couple?  
 06 22 58+ LMP Yes, right here. (LM)(PHO 134 20473-79)  
 ---  
 06 22 58+ LMP Such a pose. Let me get a little different - focus. (LM)(PHO 134 20473-79)  
 That looks good.  
 ---  
 06 22 58+ LMP One more. (LM)(PHO 134 20473-79)  
 06 22 58+ CDR How's like this? (LM)(PHO 134 20473-79)  
 06 22 58+ CDR You got that camera. That's the color camera. (LM)  
 06 22 58+ LMP Yes. (LM)  
 06 22 58+ CDR You take it. (LM)  
 06 22 58+ LMP I've got to go get a neutron flux probe, I guess. (LM)  
 ---  
 06 22 58+ LMP I'm headed for the ALSEP. (LM)

--

06 23 01 33 CDR I'm ready to get out, and go to the VIP site. (LM)

--

06 23 02 11 CDR What was it happened to that one in my footpan? (LM)(SAMP 79035)

06 23 02+ LMP I put it in the big bag. (LM)(SAMP 79035)

06 23 02+ CDR Okay. Here we go, Jack. Here's one here. (LM)(SAMP 70017)

06 23 02+ LMP Yes. Let me get it, so you won't get it too dirty. (LM)(SAMP 70017)

--

06 23 02+ CDR I'll put it right over here against that background. (LM)(SAMP 70017)

--

06 23 03 11 CDR Jack has picked up a very significant rock, typical of what we have here in the valley of Taurus-Littrow. It's a rock composed of many fragments, of many sizes and many shapes.

--

06 23 05+ LMP Put that in the big bag, Geno. (LM)(SAMP 70017)

--

06 23 11 11 CDR 337, 417, 101; 337, 417, 101 (bias). (LM)

--

06 23 11+ CDR I'm going to have to take you out to the VIP site -- (LM)

--

06 23 13+ CDR The camera is under the seat. (LM)

--

(ALSEP)(PHO 134 20489-91)

06 23 15+ CC We want to take some photographs at the central station and a few selected photographs of the ALSEP. Number one, we want a 7-foot cross-sun to the south of the ALSEP central station and then a 7-foot down-sun of the central station. Over.

- - -

(ALSEP)(PHO 134 20489-91)

06 23 15+ LMP Okay. I got it. What else?

(ALSEP)

06 23 18 08 CC There's a problem with the central station - which they think the south end is buried more deeply in the dirt than they had intended.

- - -

(ALSEP)

06 23 18+ LMP You couldn't anticipate the soil, Bob. It's very soft.

(VIP)

06 23 19 30 CDR Bob, we are at VIP.

- - -

(VIP)

06 23 19+ CDR I may move just a little bit. There's a little rise here I can give you. I think I'll give it to you.

(ALSEP)

06 23 19+ LMP By the way, Bob, the soil gets more cohesive with depth. I hadn't really noticed that before.

(ALSEP)

06 23 19+ LMP It's quite a bit more cohesive at - feels about the same down to 3 centimeters out here, and then the cohesiveness goes up, so it's difficult to scrape with the Rover sampler.

(VIP)

06 23 19+ CDR Well, I think you can see almost everything from here.

- - -

(ALSEP)(PHO 134 20492-97)

06 23 29 49 LMP I'll get the heat flow pictures. One was 11-foot, I think. And then the stereopair.

- - -

(ALSEP)(PHO 134 20492-97)

06 23 30 51 LMP I'm getting the standard ones, Bob.

- - -

06 23 30+ LMP Eleven-footers and 7-foot stereos. (ALSEP)(PHO 134 20492-97)

--

06 23 30+ CC We'd like a 3-foot shot of the lunar mass spectrometer, including the orifice where the break shield was. (ALSEP)(PHO 134 20498-99)

--

06 23 30+ LMP Cross-sun? (ALSEP)(PHO 134 20498-99)

06 23 30+ CC Yes, yes, Jack; 7-foot cross-sun. (ALSEP)(PHO 134 20498-99)

--

06 23 32 15 LMP Okay. Got it. Now what? (ALSEP)

06 23 32+ CC Now we want to go over the neutron flux, Jack. (ALSEP)

--

06 23 33+ LMP What do you want me to do with the neutron flux? (ALSEP)

06 23 33+ CC We want a photograph facing south, for the 7-foot. So a 7-foot cross-sun essentially, of the neutron flux in the soil. (ALSEP)(PHO 134 20503-05)

06 23 33+ LMP Okay. Would you like to have the RTG in that picture? (ALSEP)(PHO 134 20503-05)

--

06 23 33+ CC You might take a partial pan around to the RTG. (ALSEP)(PHO 134 20503-05)

--

06 23 33+ LMP Okay. Now what? (ALSEP)(PHO 134 20503-05)

06 23 33+ CC Okay. Now let's remove the neutron probe experiment from the ground, and turn it off. (ALSEP)

06 23 33+ LMP Okay. (ALSEP)

--

06 23 33+ CC And, Jack, you might note as you withdraw just how (ALSEP)  
difficult it is to withdraw it. Whether or not it's  
been seized by the soil collapsing around it or not.

06 23 33+ LMP Not at all. (ALSEP)

--

06 23 36+ CDR I'm going to look under the seats one more time. (VIP)  
Nothing but a 500.

--

06 23 36+ CDR I got the LMP's camera (VIP)

--

06 23 39 57 CDR Ok; let me get one parting shot of - one of the (VIP)(PHO 143 21931-34)  
finest running little machines I've ever had the  
pleasure to drive.

--

06 23 39+ CDR Pin 1 is pulled. (VIP)

06 23 44 29 CC Mark that. (VIP)

06 23 44+ CDR I'm at the end of the west SEP antenna. (VIP)

06 23 44 41 CDR Okay. Pin 2 is pulled. Still safe. Pin 3 is (VIP)  
pulled, and it is still safe (EP 3).

--

06 23 44+ LMP Fifty-five Yankee is an exotic-looking rock I found (ALSEP)(SAMP 70170,75)(PHO 134 20503-05)  
about 5 meters south of the neutron flux hole. It's  
another gray - possibly gray basalt. It's just that  
there aren't many of them around here, and so I  
picked it up.

--

06 23 46 10 CDR Okay, the (SEP) transmitter is off. (VIP)

--

06 23 46+ LMP I'm at the MESA. (LM)  
 -- --

06 23 46+ CDR I need a locator here to the LM. (VIP)(PHO 143 21935-37)  
 -- --

06 23 46+ CDR My pictures are taken; I'm on the way. (VIP-LM)(PHO 143 21935-37)  
 -- --

06 23 46+ LMP I got another batch of pictures - the LM and the flag and -- (LM)(PHO 134 20506-13)

06 23 49 57 CDR Well, watch this real quick. (LM)

06 23 49+ LMP Stereo, even. (LM)  
 -- --

06 23 49+ CDR Okay, here, this is an ETB. (LM)

06 23 49+ LMP Let me - let me make sure that that's all cinched up. (LM)  
 -- --

06 23 49+ CDR And I'll try and get the big bag here cinched up. (LM)  
 -- --

06 23 49+ CDR Is it heavy? Something in that core tube you put in (LM)(SAMP 70012) there?  
 -- --

06 23 49+ LMP Tube 52. Has about three-quarters of a core - hand (LM)(SAMP 70012) pushed - half a meter inside the plus-Y footped.  
 -- --

07 00 04 46 CDR Hatch is closed. Let's see if I can lock it. (LM)

\*\*\* PRE LIFTOFF \*\*\*

(PRE LIFTOFF) (SAMP 70060-64)

07 00 37 42 LMP      ple 15 Echo has a bunch of dust and that gradually accumulated in my pocket.

--

07 00 37+ LMP      Right now I can't find the sample containment bag number 5. Number 5 collection bag will be in bag 3. (PRE LIFTOFF)

07 00 41 49 LMP      We're going to cross out 3 on the bag, and put a 5 on it. (PRE LIFTOFF)

--

07 00 56 33 CDR      Bag 7 is 32, bag 4 is 31.5, bag 5 is 21, the big bag is 71, the ISA is 22 (lbs.). (PRE LIFTOFF)

--

07 02 46+ MCC      Okay. Would you like for me to just read you all the questions, and let you mull those over before you work on it, or you want to do one at a time? (PRE LIFTOFF)

07 02 46+ LMP      One at a time's better, Ken. (PRE LIFTOFF)

07 02 46+ MCC      All right, sir. Number 1. Wanted to know if the blue-gray rocks at Station 6 are similar to those at Station 2? (PRE LIFTOFF)

07 02 46+ LMP      Ken, I think they are. But I think you'll find that the ones in Station 6 are much more metamorphic rock, or recrystallized rock, than the ones we had at Station 2. I had the impression that the ones we were sampling at Station 6 were really inclusions in the - anorthositic gabbro - and had been probably considerably metamorphosed by it being included in it; whereas, the ones we had at Station 2 were a separate rock type apparently as I recall it, anyway. (PRE LIFTOFF)

07 02 46+ MCC      Okay; that's good. (PRE LIFTOFF)

07 02 46+ LMP      Ken, let me just say that my impression is that there was a lot more action in the rocks at Station (PRE LIFTOFF)



6 than 2. I saw a lot more, a lot more was evident, the inclusions and, some of the patterns, some of the other things we saw.

07 02 52 08 MCC All right sir. Let's go on to the second one, and it said: Do we understand that there were no breccias at Station 8? (PRE LIFTOFF)

07 02 52+ LMP In the one - that apparent orthopyroxene plagioclase rock - was a breccia in the sense it was fractured and was injected by dark glass. But it would be what we would call a mosaic breccia in that respect, I think, and not the - didn't see any Station 6- or Station 2-type breccias there at all. Other than the subfloor gabbro, that orthopyroxene plagioclase rock was the only major rock type I think we saw, unless we picked up some in the rake sample. (SAMP RAKE 78525-28,30,35-99)

07 02 52+ MCC Okay. Ok; the third one says: What are your impressions of the distribution of the - familiar subfloor gabbros throughout the EVA-3 traverse? (PRE LIFTOFF)

07 02 52+ LMP Well, I think we discussed that a little bit on the traverse - quite a bit, as a matter of fact. The impression I had was that most of the traverse on the plains, with the one exception of Van Serg crater, were - we were in block fields or fragment fields that were almost - well, were dominantly subfloor. And visually from the Rover, I had no impression of any other significant rock type, with the exception of occasional blocks of the gray variety of the subfloor gabbro. And I don't know - Gene I - don't know what Gene's impression was. He was driving a lot, but - pass it on. (PRE LIFTOFF)

07 02 52+ CDR I think - we actually even commented when we hit the break in slope coming back out of Station 6 and 7, and then back off at - coming back down at 8 - how the terrain features changed. I think that was due principally to the - what we've been calling the subfloor material evident. And there again, it was, what I would say, particularly mantled, filleted, much like we have here where the LM is, with the exception of Van Serg, where we actually saw fragmental boulders for the most part, a lot less buried sitting on the surface. (PRE LIFTOFF)

- 07 02 52+ MCC all right, sir. At Van Serg, some rocks were described as gray breccias, and some contained white fragments. Was there a variety of breccias present? (PRE LIFTOFF)
- 07 02 52+ LMP I think not, Ken. My impression was that there was a variety only in their - in the degree to which they were fractured. We found and sampled, I think, the two major - one - extremely fractured rock that I said was - was friable. Anyway, it broke into small pieces very easily with a hammer or in your hand, if you worked at it. And the other was a breccia that was not - was much more cohesive than that. It was not fractured or friable at all, but they both were on the rim, and I think they were just varieties of - probably of shock fracturing. (PRE LIFTOFF)
- 07 02 52+ MCC Okay. Could the Van Serg breccias correlate with the blue-gray material at Cochise? (PRE LIFTOFF)
- 07 02 56 40 LMP That's possible, I guess. But my first guess would be that the gray at Cochise was blue-gray subfloor. And, well, I don't know. That's a good question. That's a good question. We - maybe with the pictures we have, we can work out the - an attitude - approximate attitude on that contact that I talked about in Cochise, and see if it would project over reasonably to Van Serg. I wouldn't be surprised if it would. That's a good point. To me they looked very similar. (PRE LIFTOFF)
- 07 02 56+ LMP You just - yes, Ken. I think from a distance we saw the blue-gray in Cochise, you couldn't make a definite correlation. But it's a good idea and ought to be considered as one of the possibilities. The other is that we just had a window in the subfloor that coincidentally - I mean one underneath the subfloor might be that breccia. Oh, incidentally - the Van Serg impact hit that window. (PRE LIFTOFF)
- 07 02 56+ MCC Okay. Can you tell us anything about the compie at Van Serg. Was that a clast in the breccia? (PRE LIFTOFF)(SAMP 79170,75)
- 07 02 56+ LMP It was an aggregate of irregular - looked like agglutinated glass in fragments just sitting on the rim of Van Serg. And the reason I said I thought it was in place or had fallen there and crystallized there, is that there were four or five similar (PRE LIFTOFF)(SAMP 79170,75)

fragments arranged in a small coherent area. Not making that very clear I don't think, but it looks as if it hit and broke apart upon hitting a little bit but didn't really splatter or break apart in any significant manner.

(PRE LIFTOFF), MP 79170,75)

07 02 56+ LMP There are similar things - tell you what it looks like. If anybody'd walked up the rim of Kilauea Iki in the ash out there, and on top of the ash, there are bombs that were fairly clearly molten when they hit, and they had just enough spring to break when they hit. But the individual pieces didn't move very far at all. And you can see that pattern on Kilauea Iki. And it was the same kind of thing, except that there was no directional aspect of it here.

07 02 56+ LMP And that's not to say it's volcanic glass. That's just the kind of pattern it was. (PRE LIFTOFF)(SAMP 79170,75)

07 02 56+ MCC Okay. Can you tell us if the darker material in the bottom of Van Serg was similar to the collected rim material? (PRE LIFTOFF)

07 03 00 52 LMP I think so, except as Gene pointed out, the clasts were coarser. They were coarser in the bottom than about anything we saw in the rim. (PRE LIFTOFF)

07 03 09+ MCC Okay. Are there any distinctive features, other than color, to separate tan from blue-gray breccias, such as jointing, or massive nature, continuity, anything of that nature? (PRE LIFTOFF)

07 03 00+ LMP Yes, we're - - (PRE LIFTOFF)

07 03 00+ CDR Where did we find those tan breccias? (PRE LIFTOFF)

07 03 00+ CC Challenger, this is Bob. I think we were talking about some of them, I think, at Station 1 the first night. We had both natures. In fact, I think we had - didn't we have two of those in the same rock together? (PRE LIFTOFF)

07 03 00+ LMP They were both gabbros. (PRE LIFTOFF)

07 03 01 57 LMP Bob, they were tan gabbros and blue-gray gabbros. (PRE LIFTOFF)

07 03 02 52 CC Okay, yesterday, the breccias - they were tan and blue-gray breccias yesterday at Station 2, were there not? You have the two types of breccias at Station 2. (PRE LIFTOFF)

07 03 02+ LMP Oh well, yes, yes, that's right. And now as I think back I guess that's the main difference between the tan rocks at Station 2 and Station 6, but the ones at 6 appear to be - have an igneous texture or at least a very crystalline texture and inclusion-like masses of other rocks. Whereas, the ones at Station 2 - they seem to be fragment breccias, as I recall. That's right, although they may have been recrystallized or metamorphosed they were clearly breccias at Station 2. I just forgot about that. (PRE LIFTOFF)

07 03 03 00 CC Okay, copy that. Okay, and can you amplify your description going out to Station 6. In particular were there blue-gray and tan-gray bands on the North Massif? (PRE LIFTOFF)

07 03 03+ LMP Rather than bands, there were lines that appeared to be the upper terminus of the source of the boulders that were strewn below that line. And those lines tended to be either - show a blue-gray source or a tan-gray source, if you will. (PRE LIFTOFF)

- - -

07 03 04+ CC Okay, do you have any preliminary stratigraphic sequence for the plains? (PRE LIFTOFF)

07 03 04+ LMP For the plains, huh? Well, my guess would be that the Van Serg breccias were the oldest rocks. The gabbro - subfloor gabbro's the next oldest, and the mantling material's the youngest. But that's - the only good clear relationship was mantle on top of the subfloor gabbros. We really don't have a good relationship of the breccias and I guess I lean towards thinking that Van Serg was a window in the subfloor rather than being a bed of some kind, on top of the subfloor. (PRE LIFTOFF)

07 03 06 11 CC Okay, and do you have an opinion on what underlies the Sculptured Hills? (PRE LIFTOFF)

07 03 06+ LMP Well, I think, we said - the rake sample is probably (PRE LIFTOFF)  
going to tell the tale there. My guess is from the  
boulders and subfloor around up there that - are of  
gabbro and maybe the Sculptured Hills are a version  
of the subfloor rock. I don't think that the  
orthopyroxene anorthosite rock was necessarily  
indigenous to the Sculptured Hills. It was  
glass-coated and permeated by glass so I suspect it  
may have been thrown there by an impact somewhere  
else.

- - -  
07 03 08+ CDR And I guess if you could go in - my feeling is if (PRE LIFTOFF)  
you go to the bottom of every one of those large  
craters like Camelot, you could examine some of  
these fragments on the walls and down into the  
bottom, I just get a feeling you'd find this - this  
blue-gray breccia down there.

07 03 08+ CDR I mean in all the big craters like Camelot. (PRE LIFTOFF)

07 03 08+ LMP Well we - I think maybe that's true, however, we did (PRE LIFTOFF)  
not see isolated fragments of it very often, if at  
all, out here on the plains themselves, away from  
the craters. So if the blue-gray breccia does - the  
Van Serg breccia does underlie the subfloor, the  
craters are not - it's far enough that the craters  
we have apparently have not penetrated and brought  
up much of that kind of material. Well, that's it.

- - -  
07 03 48 03 LMP Ken, this is Jack, why don't you make a note that (PRE LIFTOFF)  
mag Bravo is empty, with miscellaneous photos since  
the last report on it.

07 03 51 36 CDR And, Ken, we're stowing mag Nancy at a reading 153. (PRE LIFTOFF)

- - -  
07 12 56 + LMP Hey, Gordie, in honor of one of your comm handovers (PRE LIFTOFF)  
last night, and in the tradition of Apollo 8, I've  
got a paraphrase of a familiar poem for you.

07 12 56+ CC Ok; go ahead. (PRE LIFTOFF)

07 12 56+

LMP

Well, it's "the week before Christmas and all through the LM, not a Commander was stirring, not even Cernan. The samples were stowed in their places with care, in hopes that with you, they soon will be there. And Gene in his hammock and I in my cap, had just settled our brains for a short lunar nap. But up on comm loop there rose such a scatter, I sprang from my hammock, to see what was the matter. The Sun on the crest of the surface below gave the luster of objects, as if in snow. And what to my wandering eyes should appear, but a miniature Rover and eight tiny reindeer. And a little old driver so lively and quick, I knew in a moment, it must be St. Nick. I heard him exclaim as over the hills he did speed. Merry Christmas to all and to you all godspeed.

(PF LIFTOFF)

07 12 56+

LMP

People always said we ought to have a good one here.

(PF LIFTOFF)

07 12 56+

LMP

I don't think we've made it yet.

(PF LIFTOFF)

\* \* \* \* ORBITAL \* \* \* \* \*

03 15 01+ LMP Can you see the landing site? I think it's going to (ORBIT)  
be in the darkness.

--

03 15 02+ CDR No, it's just dark. (ORBIT)

03 15 02+ LMP Isn't it a little north of track? (ORBIT)

03 15 02+ CDR No, I think it's right below us, Jack. I think it's (ORBIT)  
right smack below us in darkness.

03 15 02+ LMP Yes, I yes, it is. I can't - I think I'm looking at (ORBIT)  
Littrow right there, right below us. But I can't  
quite tell.

03 15 02+ CDR If I could see Vitruvius, I'd have a better handle (ORBIT)  
on it.

--

03 17 07 09 LMP Okay, Houston. We've got a good shot of the landing (ORBIT)  
site.

03 17 07+ LMP The shadows, Bob, go all the way across the scarp (ORBIT)  
and very long pyramiding shadows go all the way past  
Family mountain. The - looks like the Sculptured  
Hills are lit up on this side, but it almost puts  
the entire North Massif in shadow, from where I  
stand.

03 17 08 07 LMP Quite an interesting place to land down there. (ORBIT)

03 17 08+ CDR We can now, I think, see contrast down in the (ORBIT)  
shadow. And the only part of the scarp that is  
visible - I think Jack picked it out - as being  
right where Lara is.

--

03 17 08+ CDR Bob, that's a fantastic black-and-white shot of the (ORBIT)  
landing area with the shadow stretching across most  
of it.

(ORBIT)

03 17 10 34 CDR Bob, I can now see down in through the shadow. I can see - Bear mountain. I can't really make out the slide yet. Most of the North Massif is still in shadow due to the Sculptured Hills. And just at the point where we can start really to see through the shadows and see some hummocky terrain on the North Massif, it just went out of my next reach. But, I did see some sort of albedo change that went across the canyon about in the vicinity of the scarp.

03 17 12 20 LMP Bob, with respect to the landing site - when I first had it in view - there was a clear lightening in the area of the light mantle. It was not sharply defined, but around the crater Lara and Nansen and to the west of the scarp - there was very clearly, slightly brighter - reflectivity.

- - -

03 19 11 23 CMP Okay, it's going through the landing site, now. The shadow is just up to - you can really see the scarp on there. (ORBIT)

03 19 11+ LMP See what they mean by Sculptured Hills, Gene? See the knobby characteristics in that - - area down there. That's part of the Sculptured Hills. (ORBIT)

03 19 11+ CDR That's a messif there, too. (ORBIT)

03 19 11+ LMP Now, we're just over the rim of Serenitatis, looking over the graben plains - - (ORBIT)

- - -

03 19 11+ CMP Seventeen I was just barely in the - Sherlock was just barely beyond the shadow. (ORBIT)

03 19 11+ LMP This is all supposedly covered with the dark mantle, Gene, what you're seeing down there. (ORBIT)

03 19 11+ CDR Yes, the sun angles are so that you can't tell the difference in albedo. (ORBIT)

03 19 11+ LMP And look at those mare ridges, though. (ORBIT)



03 19 11+ CDR I tell you, that's looking out into the gray - gray (ORBIT)  
desert down in there.

03 19 11+ LMP That's the old Littrow site. (ORBIT)

- - -

03 19 11+ CC Jack, Houston. Can you see any albedo difference in (ORBIT)  
the landing site area between the dark massif and  
the light area?

03 19 11+ LMP We can't see any difference between - in the low (ORBIT)  
areas, between the dark mantle and other materials  
right now. We're right at the terminator.

- - -

03 19 14+ CMP Jerry, you could really see a difference between the (ORBIT)  
South Massif and the mantle material around through  
there. The mantle is not nearly as dark as it looks  
on the pictures, though. But the massif, South  
Massif, especially, looked almost a whitish color.  
I guess it's because partly the Sun was shining on  
it.

03 19 14+ CDR Could you see anything that looks like the slide? (ORBIT)

03 19 14+ CMP Oh yes. You can see the slide on the thing and (ORBIT)  
definitely see the scarp going across through there.  
I was primarily concentrating on looking for the  
various craters so I didn't spend that much time,  
you know, concentrating on how the thing looked. I  
saw Sherlock about halfway through it and I got  
about five marks on the Sherlock for 17 I.

- - -

03 21 08+ LMP Roger. I just - we didn't get a view of the site, (ORBIT)  
though, going over this time.

- - -

03 23 01 53 LMP Okay, I got the landing site. We're right over (ORBIT)  
the top of it, and the scarp is fantastically  
detailed at this - can you see in there, Gene?  
Right down, straight down there.

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best available copy.

- 15 23 1+ CDR No, I can't. (ORBIT)
- 1 27 1+ LMP The light mantle is very obviously mantling the area. The scarp was very detailed, and, so far, I did not see any structure in the mass. I think I didn't have much time to wait for the next pass.
- 2 27 1+ LMP The slide very definitely showed the general layout of the plains area. I think the mantle is very clearly, rather than the. My operator was fairly dark at the dark.
- 3 27 1+ LMP I'll tell you, from this altitude and with the way you, there's no doubt as to the appearance of geographic features in the landing area. I think you saw some of the features that we're talking about. I think you saw the light mantle area. I think you saw the light mantle area. I think you saw the light mantle area.
- 4 12 13+ LMP Hey, we got the landing site, we're coming \*\*\* (ORBIT)
- 04 12 18+ LMP That slide really shows up beautifully. (ORBIT)
- 04 12 19 39 CDR Hey, we got the landing site, Gordo. (ORBIT)
- 04 12 19+ CDR Gordo, we got the landing site. We're coming right over the front of it. Stand by a minute. You can see the slide. I think you can see the Great Cross.

04 12 19+ CDR We've got Family mountain; we've got the massif; we (ORBIT)  
can see the scarp; we can see the light mantle; I've  
got the Great Cross, Camelot, Sherlock.

- - -

04 12 19+ LMP I see possible structure in the upper part of the (ORBIT)  
South Massif, little bit east of Station 2. It's  
subhorizontal, dipping to the southeast.

04 12 19+ CDR Houston, I can even see Poppy, right where we're (ORBIT)  
going to set this baby down.

04 12 19+ CDR I can see Rudolph. I can even see the triangle: (ORBIT)  
Rudolph, Frosty, and Punk.

- - -

04 16 16 45 CMP Hey, I think I can see a light spot down there on (ORBIT)  
the landing site where they might have blown off  
some of that halo stuff.

04 16 16+ CMP It's between Sherlock and Camelot - between - (ORBIT)

- - -

04 16 19+ CMP I didn't have my map there, but I was looking at the (ORBIT)  
landing site, and as close as I can remember, it had  
to be somewhere around about DN 83.3 on the  
200-meter scale, the TL 25-8.

- - -

04 16 29 01 CC America, while we're waiting for this lunar sounder (ORBIT)  
to operate for 2 minutes, could you - could you say  
again those coordinates you gave us. I dug out the  
map TL 25-8, and I got the 83.3, but what was the  
azimuth coordinate on that, Ron?

04 16 29+ CMP It was Dog November, and maybe just a little bit to (ORBIT)  
the right of Dog November.

04 16 29+ CC Ok; Dog November. Thank you. And you think that's (ORBIT)  
where they are, huh?

04 16 29+ CMP Yes. (ORBIT)

(ORBIT)

04 16 29+ CMP Well, there's a real white spot down there, you know. I only got a look at that thing for about 30 seconds before I had to do something else. But I'm just recalling in my mind where the white spot is with respect to those - there's Camelot and there's Sherlock, and then from Camelot to Sherlock, there were two other craters, and they were just a little bit closer to Camelot, but between those two other craters there.

(ORBIT)

04 16 29+ CC Good show. Roger.

(ORBIT)

04 16 29+ CMP There's a white spot - yes, there's a white spot on the - like it might have been dust blowing or something, you know.

(ORBIT)

04 16 29+ CC Roger. That may be the - the rocket exhaust. It might be just a little off that light spot.

- - -

(ORBIT)

04 18 11+ CMP Coming in, I can see the landing site, now - quite well. The appearance of the slide area definitely shows up. The South Massif seems to have the sun shining right on the walls. I'm looking for any type of layering, or anything like that. And can't see anything that would show up. The big difference between the massif structures and the Sculptured Hills is that the massifs look like they are a steeper slope. And they don't seem to have that type of covering over them, like the Sculptured Hills do.

(ORBIT)

04 18 11+ CMP I'm right over now. The scarp definitely cuts up through the North Massif. I can't see continuation on into the South Massif at all. But, you can definitely see a vertical exaggeration as it cuts on around up over the North Massif. And I'd have to take another look at it for sure, but it almost looks like a flow coming from Family or in the vicinity - in the direction of Family mountain - but from the direction of Family mountain - lapping up on the side of the North Massif. That's the way it looks as you go on by it. I couldn't see anything that would lead you to believe that the slide area, so to speak, would come on across anything that

would be the source of that slide area. I still think I can see the - one spot that has a lighter albedo than the surrounding area there in the Pentagon complex. And it's pretty close to the - let me get my chart out here and take a look at it again.

04 18 16 50 CMP No, it still looks like that area that's blown away there is Dog November - between Dog November and Dog Papa. And about 83.4 or something like that. (ORBIT)

04 22 09+ CMP The craters that are inside Maraldi, they're smaller-type craters and they have a definite bluish tinge to the halo that comes out as opposed to the bright craters or white-type thing and those are - have more of a darkish-bluish tinge to them. And oddly enough, that's the same type of bluish tinge that I see right in the landing site right now. In the Pentagon complex, MOCR shows up that same type of a bluish tinge to it. (ORBIT)

04 22 09+ CC Roger. Did you have any luck locating the LM area in the landing site this time? (ORBIT)

04 22 09+ CMP Yes, I don't even see the bright spot there anymore. I know where to look for it and I don't even see it. (ORBIT)

04 22 12 30 CMP Well, South Massif just went into a hole, too. (ORBIT)

04 22 12+ CC Roger. Our best estimate of their location down here. Ron is - 63 - Delta Mike 83. Delta Mike 83. (ORBIT)

04 22 12+ CMP Delta Mike 83, huh? (ORBIT)

- - -

05 09 52 09 CC Ron, if you'd like, I could give you a summary of the EVA I. I'm just sort of editing the report put out by the back room on that. (ORBIT)

05 09 52+ CMP Sure. Go ahead, Gordo; appreciate it. (ORBIT)

Okay. I'll read a few selected excerpts here. The surface around the landing site is generally an undulating plain, which was somewhat rougher and had a greater abundance of blocks than was expected by the astronauts. It is saturated with small craters not exceeding a few centimeters in size but not with larger craters. Small craters commonly have glass on their floors. Boulders ranging from about one-half meter to 4 meters are common. All of them are partially buried or covered with the dust of the dark mantle. In one locality, a crater of about 1 meter deep penetrated the relatively fine dark surface material and excavated small blocks. Other shallower craters in this area did not fully penetrate the mantle. This fact, together with the abundance of small boulders on and near the surface, indicates that the dark mantle is relatively thin. A minor amount of dust noted upon landing suggested a thin layer of fine grain unconsolidated material. Footprints and LRV tracks left firm impressions in the fine-grain material when darker material was kicked up from underneath. At the ALSEP site, the drill encountered harder material several times and definitely seem to reach harder material at about a 7-foot depth. The deep drill core apparently also bottomed in harder material. In the core, the material was noted to be cohesive, and it contained more fragments than did the surficial material. Predominant rock type between the LM and Steno crater is medium grained, vesicular or nonvesicular basalts or gabbro. They contain about equal amounts of plagioclase and pyroxene along with less abundant opaque material. The guys took a total of - well, they took a lot of pictures. They had 229 color and 197 black-and-white during EVA 1. And they got 17 samples in addition to the deep drill core. Three were large, unbagged rocks, and the total, excluding the core, estimated to weigh about 13 kilograms so far, and they traveled about 3 kilometers in the Rover. As a summary conclusion, the observations made on the first EVA support the premission interpretation that at least the upper part of the subfloor materials consist of basaltic lava flow. The overlying dark mantle may be part of the regolith on subfloor material, but the possibility that it is an independent unit remains open and will

be tested by observations on second and third EVAs. Both the dark mantle and upper subfloor units contain remarkably little foreign material between the ALSEP site and Steno which suggests comparatively young ages. Over.

05 09 52+ CMP Hey, that sounds like a good report there. Sounds like they got a lot of stuff done and also getting a lot of good information out of it already. (ORBIT)

05 09 52+ CC Yes. I think that's a safe conclusion. They're going to get a lot more today. (ORBIT)

05 09 55 52 CMP Oh, you bet. (ORBIT)

05 09 58 01 CC Ron, for your information, the ALSEP seems to be working pretty well. The Central Station and all the experiments with the exception of one are working normally. The one that's giving them trouble is the LEAM, and the data on the LEAM doesn't seem to want to sync up properly. They're thinking that one over and maybe have something for them to try to get that to work right. (ORBIT)

- - -

05 11 58+ CMP Let me take another look at the landing site. (ORBIT)

05 11 59 57 CMP Okay, the Sun's getting a little bit higher now. And as I look at the landing site and the albedo - differences in the color in there - the color in the Maraldi gamma is the same as in the landing site itself. And, also, it looks like the type of material that we say is essentially covering the whole area - goes on out to and includes the annulus of Serenitatis. (ORBIT)

05 11 59+ CMP Let's see. Did I mention that - that it looks like - the flow out of Maraldi has gone on around it and down to, and almost encroaches on the Vitruvius A. But, it's breached out of the side of Maraldi. Gone around that depression and up to the side of Vitruvius A. (ORBIT)

05 11 59+ CC Roger, Ron. (ORBIT)

05 11 59+ CMP You still get that same bluish - bluish-type tint (ORBIT)  
from the area in the landing site. At Station  
number 2, on the landslide - it's going to be a  
pretty good little depression there. The scarp  
itself - it looks like they had picked the  
least-slope portion to go up it. And, that's kind  
of between Lara - I think Lara's the one, the crater  
just to the west of the scarp.

05 11 59+ CC Roger. I haven't been on all your revs. You ever (ORBIT)  
had any - anything you'd call a visual on the LM?

05 12 02 36 CMP No, I really haven't looked that much, Gordo. See, (ORBIT)  
my optics are always pointing up in the air; so I  
can't use the sextant. The binocs - I'm having a  
heck of a time holding them still enough to - to  
concentrate on anything very small.

- - -

05 13 46 50 CMP Houston, America. Magazine Lima Lima will be (ORBIT)  
starting with frame 54.

- - -

05 14 00 30 CMP Boy, that scarp sure looks like a flow down there to (ORBIT)  
me.

05 14 00+ CC Roger. On the landing site scarp? (ORBIT)

05 14 00+ CMP Yes. I don't know how you get it to go up the North (ORBIT)  
Massif, but it sure looks like it runs that way -  
just from the shadows and everything.

05 14 02 45 CMP Gordo, does this go all the way out to Bessel? Does (ORBIT)  
it cross the annulus ridge there?

05 14 02+ CC It doesn't go all the way to Bessel. It stops short (ORBIT)  
of Bessel. About halfway across Serenity from the  
Taurus-Littrow to Bessel.

05 14 02+ CMP Oh, okay. Forgot to look where it stopped. (ORBIT)

05 14 04 13 CMP Okay. I ended up on frame 92. (ORBIT)

- - -



05 15 43+ CC We've got some data here for you, for - if you're planning on taking those red- and blue-filtered exposures across the landing site - if you want this information. (ORBIT)

05 15 43+ CMP Oh, yes. Ok; go ahead. (ORBIT)

05 15 43+ CC Okay, Ron. Here it is. It's a Nikan(SIC) - NK - November Kilo 55; VH - VM; mag X-ray X-ray. With the red-blue filtered exposure you want it all f:11, 1/125, one frame each filter; f:11, 1/250; one frame each filter. With no filter, expose at f:11, 1/1000. And if you want to use the polarizing filter, expose at f:11, 1/500 of a second. (ORBIT)

- - -

05 15 45+ CC Okay. Here's a note that I'm not sure I understand totally, but let me read it to you. "Observe targets through viewfinder and shoot as desired with polarizing filter in different positions. Mark exposure time with polarizing filter as data analysis requires the incidence angle." (ORBIT)

05 15 45+ CMP Okay. So we need the get time when we take the picture. (ORBIT)

05 15 45+ CC That's affirm - with the polarizer. (ORBIT)

05 15 45+ CC And there's another note here. Do not exceed 18 frames total for the above pictures. (ORBIT)

05 15 45+ CC And your TCA for the landing site - is 138:39:11. (ORBIT)

- - -

05 15 57+ CMP Stand by. Is it 1/500? Yes. Stand by. (ORBIT)

05 15 58 37 CMP Mark it. And the polarizer all the way to the left. Stand by. (ORBIT)

05 15 58 45 CMP Mark it. That's the polarizer all the way, counterclockwise. (ORBIT)

05 15 58+ CMP Okay. That's eight pictures. Stand by. Okay. Wait a minute. I lost the landing site. (ORBIT)

05 15 59 34 CMP Mark it. It's all the way to counterclockwise. (ORBIT)

05 15 59 42 CMP Mark it. And that's all the way clockwise. (ORBIT)

05 15 59+ CMP Frame 23 and 24. We're looking north along the ridges there. The other two polarizers - the two before that were looking at the landing site. Then I had three red ones at a 1/500 and a 1/25th and the rest 16. And, the blue one's at the same thing. (ORBIT)

05 15 59+ CMP And we're setting on frame number 25 on mag XX. (ORBIT)

- - -

05 17 57 44 CMP Okay. Maraldi gamma looks just like the rest of all of the surrounding hills around there. I think that's just it - some of the - Sculptured Hills type of material that was high and has been inundated by mare flow at one time or another. Mare flows kind of come up around it. (ORBIT)

05 17 57+ CC Okay. How about the Dcmical Hills inside of Vitruvius A, as compared to Aitken? (ORBIT)

05 17 57+ CMP Okay. I just missed that one. We'll have to get that one on the way by. (ORBIT)

05 17 58 23 CMP Next time I guess. Right now, I'm looking at the ridge system around the annulus of Serenitatis. And the dark material stops before you get up to - oh, what's the crater that sticks into the side of Serenitatis and sticks out beyond the eastern edge of Serenitatis? Anyhow, the dark material stops before you get to there. The dark material only goes up to - let's see - there's a definite rille. There's a wrinkled ridge and at the east of the wrinkled ridge, there are two craters, about 20 kilometers in diameter. And then farther east of that is the - the Rille. A graben, it looks like that goes up - and that's about the extent of the dark area that's the same as the - the same material as the landing site. (ORBIT)

- - -

05 18 03+ CC Any textural difference between the dark mantle in the site and the Sulpicius Gallus formation, Ron? (ORBIT)

(ORBIT)

05 18 03+ CMP Yes, there is.

(ORBIT)

05 18 03+ CC Would you attribute it to the actual ground or to possibly the sun angle difference?

(ORBIT)

05 18 03+ CMP I think I would attribute it really to the - to the actual ground. I guess what I am going to have to do is really wait until the sun angle gets a little bit higher there in the Tacquet region to answer that for sure. But it seems to me like the material in the landing site area is more smooth or smoother than what's in the Tacquet region. The part in the Tacquet region seems to me like it's just a rougher-looking type material. You know, not massive.

- - -

(ORBIT)

06 09 48 17 CMP The dark annulus around Serenitatis - as you look north - the dark variation there, and I'm looking a little backwards now - but that dark has no continuity with the ridge at all. Goes right down the middle of the ridges. As you look directly west of Littrow, the wrinkle ridge is there, and then you have the light tan, tannish. There's a dark tannish-gray. And then you get out to the light tan of the mare Serenitatis, itself.

- - -

(ORBIT)

06 09 54 23 CMP Looking back at Sulpicus Gallus and just to the north of that, there's a crater that's right at the end of those rilles that go north from Sulpicus Gallus. And you can really see the ejecta blanket. The ejecta blanket looks very dark, around it now in this sun. Now you look out across the Mare Serenitatis now and you're getting toward the sunset, looking back into the Sun, and the color is disappearing all except in that one spot. Now that must be either a fresh ejecta - and you look at the brightness of it or something - or it's dark. It's sure a dark ejecta blanket around it. The blanket itself goes out maybe two or three crater diameters, and it looks like it has kind of a ray-type pattern to it. I'll mark that crater. I don't even know if it has a name or not, but I'll mark it on my map.

(ORBIT)

06 15 41 39 CMP I'm looking out of window 2 now, and you can definitely get three different color textures on the thing. You've got the light tan of Serenitatis, and then you've got an annulus ring that stops somewhere in about the middle of the two ridge systems that go around. And then you come down south in the landing site area and the two dark things change - ah, I can't quite see it anymore. Then landing site is a darker - more of a gray, and it goes on up - there's a subdued crater; there's kind of a - the rilles go on up there, and there's a filled-in crater just to the west of one that's about 20 kilometers in diameter. And that's about where the dark-gray material ends, right on the edge of that crater. And then you run into the annulus that goes all the way around Serenitatis.

06 15 43 33 CMP Frame 110 and 111 were taken, just now, out of mag Oscar Oscar - one of the landing site, and one north of the landing site, trying to get the color distinction between the three of them there.

06 15 48 31 CMP Okay, 113, 114, and 115 were taken on the western edge of Serenitatis.

06 19 22 14 CC Hey, Ron, when you come up on the landing site, we would like you to concentrate on Shorty crater and F crater and then the other dark-halo craters. As you know, as I told you last night, Shorty ended up with some orange-colored material that looks an awful lot like a fumarole.

06 19 22+ CMP Fumarole?

06 19 22+ CC Looks an awful lot like it and what we're trying to do is see what you see from there, and that may give us some correlation on some of these other ones.

06 19 22 49 CMP Okay. I got to take a look and see which one's Shorty.

06 19 22+ CC Ron, it's the dark crater on the slide, the dark crater on the slide. (ORBIT)

- - -

06 19 35 38 CC Ron, is there any similarity between the highlands west of Crisium and those east of Serenitatis? (ORBIT)

06 19 35+ CMP Yes, west of Crisium and east of Serenitatis. Those seem to be a different type of highlands, and I want to check the other ones when I go by, but it looked like when I was coming up on those west of Crisium, they're more of a tan-type color, smaller - undulations smaller - they have a corn-cob effect, I guess is what you'd call it. Smaller ears of corn or small mounds closer together as opposed to, when you get over to the landing site - the ones on the landing site seem to be more - raised, I guess. In other words, you still have a group of the small mounds and what have you, but they're a little more massive; you get more of an appearance of a dark between the bumps.

06 19 35+ CC Are you getting the landing site into view now? (ORBIT)

06 19 37 34 CMP I got it in window 2. (ORBIT)

06 19 37 51 CMP Okay. I've got Shorty in the - picture. It looks like a sharper crater than any of them in the Pentagon complex. The other thing that looks sharp, just like that one, is F crater. (ORBIT)

06 19 38 48 CMP \*\*\* back to the other window. (ORBIT)

06 19 38+ CMP Did they kind of find that orange stuff on the north side of it? (ORBIT)

- - -

06 19 38+ CC Station 4 was on the south side of it. (ORBIT)

06 19 38+ CMP I'd say they just barely got into the stuff, then, because - but it looks like - kind of the north rim of it has more of a tint of a different color to it. (ORBIT)

06 19 38+ CMP I \*\*\* my pictures. (ORBIT)

06 19 38+ CC Is the color differentiation concentric around the - (ORBIT)  
the crater or is it just in splotches?

06 19 38+ CMP No. It's just in the - kind of the north side of (ORBIT)  
it.

06 19 38+ CC What would you say the color is then? Is it one of (ORBIT)  
the different tans?

06 19 38+ CMP Yes, the color - yes, it's a kind of a different - (ORBIT)  
would you believe kind of an orangish-tan through  
these binocs? I got to take another look at that  
when I go by the next time.

06 19 38+ CC Ron, when you get back - when you get done with (ORBIT)  
this, we'd like you to sketch- when you get a  
chance, the color variations - just some thoughts on  
where the color splotches are with respect to  
Shorty, in particular.

06 19 38+ CC Roger. Did you get a chance to look at F crater? (ORBIT)

06 19 41 50 CMP Yes, F crater is - is sharp, - just like - Shorty. (ORBIT)  
I hope I was getting F crater. F crater is about  
the same size as Shorty, isn't it? If not, I was  
getting one between Family mountain and -

06 19 41+ CC Just about the same size, Ron. Maybe just a tad (ORBIT)  
bigger.

06 19 41+ CC Ron, is there a cone associated with F crater? (ORBIT)

06 19 41+ CMP I didn't get a chance to look at it that much. I'll (ORBIT)  
have to check it the next time.

06 19 41+ CC Okay. Have any thoughts on what's its origin? (ORBIT)

06 19 43 02 CMP I'll have to look at F crater again the next time I (ORBIT)  
come over on the thing, because I spent most of the  
time looking at - Shorty.

06 19 43 32 CMP This formation again from - Tacquet on down to (ORBIT)  
Meneleus. Just went over that again, and I was  
looking at it with the binoculars, and I saw one  
sharp crater in the area that had a - an ejecta -  
almost the same color as the stuff around Shorty.

06 19 53 03 CC      Ron, I think if you put an order of priority on some (ORBIT) activity, as far as the geology goes, you might consider sketching out on Shorty - with just a rough handle on where you thought you saw some of the coloring differentiation up on the northern side of Shorty - and also give some thought on F crater, if you will. I know you didn't get a chance to look at it because - if we can tie what you see from orbit on Shorty to what we know we've got from the ground truth, we might really have something here, as far as matching up on some of these other craters.

06 20 08+ CMP      Okay. I think I said north and as I look at the map (ORBIT) - the orange distribution goes generally about. A crater diameter to the north, but it essentially starts - well, it you'd cut a 60-degree angle - from Dog Sierra AY 63 - cut a 60-degree angle there and then make that go around - out about a crater diameter.

06 20 08+ CC      Okay. To the north at Dog Sierra at 63? (ORBIT)

06 20 08+ CMP      Yes, Dog Sierra at 63; that's on the 400-meter scale (ORBIT) there.

06 20 08+ CC      Yes, I've got it. (ORBIT)

06 20 09 50 CMP      On TL 50. And, at the right-hand side - if you're looking at the thing from the bottom, the right-hand side is 0 - up to 60 degrees. You're 60 degrees up from the horizontal and 30 degrees down from the vertical. It'll be something about like that.

06 20 09+ CMP      It had kind of a brownish-orange tint to it. (ORBIT)

06 20 11 57 CC      Ron, I guess one of the things that at least goes through Stu's and my mind on that Shorty crater - and I think you dispelled it when you say it goes out like in a 60-degree angular cone away from it. But the question we'd really like to be thinking about - is that a concentric coloring around there, like it might be just a layering from a turned-over

frag or something like that, or whether it just seems to be some sort of a - I don't want to say flow, but something that would give it direction that one - the one 60-degree direction like that.

06 20 11+ CMP Yes, I see what you're saying. And - it all - (ORBIT)  
almost looked to me like it was gradational, as you,  
as you went away from the crater. In other words,  
more orangish closer to the crater than as you got  
away from it.

- - -

06 20 13+ CMP The crater that I described as looking comparable to (ORBIT)  
Shorty, I don't think is the one on Family mountain.  
I think it's the one on - right dot - about the same  
size dot as Shorty on the 17-1 leadin for the - 17 1  
for the landmark tracking.

06 20 14 15 CMP I think Family mountain is the bigger of the two (ORBIT)  
mounds to the west of the landing site, isn't it?

06 20 14+ CC Stand by a minute, Ron. Let me clarify that. (ORBIT)  
Roger, it's west of the landing site, and I believe  
it's the bigger of the two.

06 20 14+ CMP Yes. Okay. The one that I said that looked like (ORBIT)  
Shorty is kind of between the two mounds, and that's  
the one I looked at.

- - -

06 20 17 33 CMP Hey, when you all drew that 60-degree angle, were (ORBIT)  
you making that 60 degrees up from line 63.

06 20 17+ CC Yes. I didn't know how to handle on 63, but I took (ORBIT)  
a point at Dog Sierra and 63 and created a 60-degree  
cone away from the crater at that point.

06 20 17+ CMP No, you want to create a semicircle. That's the (ORBIT)  
center of the sem - well, let's see. With the flat  
half of the semicircle along the line that goes  
through Dog Sierra 63 and Dog Whiskey 57.

- - -



06 20 17+ CC Okay. I've connected a line - - (ORBIT)

06 20 17+ CMP Connect a semicircle to the right of that line. (ORBIT)

06 20 17+ CC Okay. To the right of that line or - to the north side of that line? (ORBIT)

06 20 17+ CMP Yes. Actually, it will be kind of to the northeast, but to the north side of it, yes. (ORBIT)

- - -

06 23 34 39 CMP You know, through these glasses, Stoney (Shorty) still looks like it's a light tannish-orange. And it's - doesn't come all the way down to the center of the crater. It's kind of tangent to the north edge or tangent to the edge - it's perpendicular to the scarp line, itself, as it goes down through there. (ORBIT)

06 23 36 09 CMP Everytime I focus on F crater I jiggle a little bit, and I can't focus. (ORBIT)

- - -

06 23 36+ CMP You know, I looked down here, just between Tacquet and Menelaus and off to the west of Menelaus, there's a crater that's about 20 kilometers in diameter. And just to the right of it, out in the brown stuff, there's a brand-new spanking-fresh impact crater that has brown ejecta on it. And then some of the other craters - that crater happens to be right on the edge of the brownish-type material, right over one of the rilles. Hope I can mark that on a picture on the map. And some of the other craters about that same size, around the area, out in there, they have the light-colored ejecta just like the normal small impact craters - recent impact craters out in the mare Serenitatis itself. (ORBIT)

- - -

07 15 21+ CMP We're passing over the Sculptured Hills. And coming into the landing site now. I still say - I'll start the old DAC. Oh, boy, that's going to be bright. (ORBIT)

- - -

07 15 21+ CMP Long, long ways off. I was pointing up to Family (ORBIT)  
mountain.

07 15 22+ CMP Through the telescope, anyhow, the whole area down (ORBIT)  
there's a lot lighter than it used to be, and I am  
sure this is due to the increase of the sun angle.  
However, the landing site itself and the whole  
valley extending on out to the Serenitatis annulus  
is still darker - darker than the surrounding  
territory, but it's the higher sun now, it's a  
lighter-ten than it used to be. Okay, in this  
sunlight, Family mountain looks like it is black on  
the top. Not black, but real dark gray on top of  
it.

- - -

08 01 16 24 CC Mark, I minute to impact. (ORBIT)

08 01 16+ CMP Okay, I minute. Yes, we're right over Vitruvius A, (ORBIT)  
now.

08 01 16+ CC 10 seconds. (ORBIT)

08 01 16+ CC Okay, we had LOS LM. And we don't believe we saw it (ORBIT)  
down here, fellows.

08 01 16+ CMP What do you mean, you don't believe you saw it? (ORBIT)

08 01 16+ CC That means that we didn't see it - on the TV. (ORBIT)

08 01 16+ CC We are picking up the signal on the seismograph, (ORBIT)  
though, the geophones.

08 01 20 08 CMP I can see a bright spot on the South Massif - on the (ORBIT)  
top of the South Massif.

08 01 20 08 CMP I can see a bright spot on the top of the South (ORBIT)  
Massif and - let me see - from the west you got the  
first hill or the first part of the mountains, then  
there's the valley, and then - there's a valley that  
kind of goes into a Y-looking it's a Y-looking  
valley. I guess, if you come from the east, it's  
the second ridge from the east, and right on top of  
that ridge is a bright spot. I don't know how big a  
crater it should make.

02 01 21 25 CMP And, I'll put a spot on my map, if I can do it here. (ORBIT)  
Just a second.

- - -

03 01 29 57 CMP I don't have a map with South Massif on it. You (ORBIT)  
know with the meridian interval on the thing and it  
looks like the only thing I can use is in the visual  
observations book here - landing site 204. And, if  
you draw a line from Shorty to that reseau mark  
that's on the top of the South Massif - and then,  
extend about a little better than one-eighth of an  
inch toward Shorty from that reseau mark. Yes,  
somewhere right in there. I'll look at it again the  
next time I come over. But, that's a bright spot on  
the top of the massif that I hadn't noticed before  
in any of the observations going by there.

- - -

08 01 29+ CMP You know that bright spot might already be there; (ORBIT)  
but I don't think so. I don't remember seeing it.

- - -

08 01 42 17 CC Do you fellows think you would have any chance next (ORBIT)  
time to take a picture of that possible impact point  
- with the handheld Hasselblad - or something?

08 01 42+ CMP Ah, sure can. You bet you. I think the best way to (ORBIT)  
do it is with the 250 lens on the Hasselblad.

- - -

08 02 55 46 CC And, America, if you guys are interested in trying (ORBIT)  
to take a couple of 250-millimeter shots of that  
tonight, we've got a little camera pad here for it  
we can pass up - if you're interested.

- - -

08 02 55+ CC Okay, it's a LM impact TCA and it's time is 197: (ORBIT)  
56:35 and the camera data is CM 5, EL, 250, CEX,  
f:5.6, 1/125, infinity. And magazine Kappa Kappa or  
Kilc Kilo, and you can use up to 10 frames on it.  
Over.

08 02 55+ CMP Okay. I think I put Kappa Kappa back, I've got Oscar on there. How about it if I use that, okay? (ORBIT)

08 02 55+ CC Okay, that's fine, Ron. (ORBIT)

08 03 18 44 CMP That was frame 145 to 150 on magazine Oscar Oscar. (ORBIT)

08 03 27+ LMP A little historical note. Passing over the Hadley Apennines sites from Apollo 15 we notice that at their landing point, there's the same slightly or distinctly brighter albedo area as there is at Taurus-Littrow site. (ORBIT)

08 03 27+ CC You mean down on the plains of Taurus-Littrow, like where the LM landed. Or do you mean where you think the LM impact was? (ORBIT)

08 03 27+ LMP Where the LM landed. As we walked along the surface, and this was true at Hadley also, you stirred up a darker zone, albedo-wise. When you look at it from orbit, the area around where the LM landed - it's a distinct bright spot on the surface of a fairly uniform gray albedo plain. And both sites look just alike - in that regard, anyway. (ORBIT)

08 14 49+ CC When you get up on the landing site, we'd like you to concentrate on Stoney (Shorty) and F crater for those textural differences we noticed the other day. (ORBIT)

08 15 04 54 CMP The landing site really shows up - even from this distance right now. We're right over Proculus and looking off across down through the hills there, you have that definite dark - and now the albedo or the colored texture of the thing to me is turning more of a gray than a tan-gray. In the early parts of it, I thought it was a dark gray-ish-tan, I guess, or something like that. Now it looks to me like it's more tan - I mean more gray, I'm sorry, more gray. It has essentially the same - - (ORBIT)

08 15 04+ CC I think if you use the binoculars on the landing site -- (ORBIT)

--

08 15 04+ CDR I've got it or and the streaked albedo changed differences very definitely. One is the dark mantle on the floor. One is the South and North Massifs and the other is the Sculptured Hills. And the Sculptured Hills are at a light-gray albedo between the massif and the dark mantle. This line is very evident and there's a definite break in slope that you can see between the South Massif the, I won't call it the slide, but the white mantle is cut on the valley floor. And from here, Shorty stands out like a sore thumb. (ORBIT)

08 15 04+ CC We're interested in all three of you on that color texture difference up at Shorty and then we'd like to have a comparison of Shorty to F crater if it is possible. (ORBIT)

08 15 04+ CMP That crater is harder than a son-of-a-buck to find. F crater is right on Family mountain, and there's one to the north of Family mountain, a little ways there's a darker crater and then there's also one to the south of it. I can't find one on Family mountain at all. I couldn't the other day so I'm going to see if I can find it today. (ORBIT)

08 15 04+ CDR Bob, to me the Sculptured Hills incorporate the albedo, both of the North Massif, or the massif and the mantle area and combine them to give you a generally in-between gray albedo, but the sculpturing is produced by the darker albedo that looks like the mantle, and the lighter albedo that looks like the massif. (ORBIT)

08 15 07 49 CC Roger. And for Ron, the F crater is just to the south of Family mountain. It's the one that you mentioned south of Family mountain. (ORBIT)

08 15 07+ CMP That's the one I saw the other day. It looks about like Shorty. (ORBIT)

08 15 07+ CC Is there a cone associated with that crater? (ORBIT)

08 15 07+ CDR From here Bob, they're both very dark - (ORBIT)

08 15 07+ CC Is there a color associated with that crater? (ORBIT)

08 15 07+ CMP Have to check that just a second. (ORBIT)

--

08 15 07+ CMP There is a definite bright spot up on the side of the hill - it's almost an extension of that slide area from Shorty. (ORBIT)

--

08 15 09+ CMP On Shorty, I still have that light orangish-tan-type material - it's essentially perpendicular to the line of the slide area there in the northern semicircle of the thing. I see F crater. Boy, I can't hold these crazy glasses still enough. (ORBIT)

08 15 09+ CC If you'll direct your attention to F crater. We'd like to know the shape of the crater profile, the rim crest, and probable or possible breaching, the smoothness and distribution of rim deposits, and the superposition-relationship with Family mountain or Family hill. (ORBIT)

08 15 09+ CMP There is a raised rim to it. It's light color down inside the crater, though. And I can't hold the glasses close enough to see if it's breached or not. (ORBIT)

08 15 10 35 CDR I can't see it any more but let me add to it what I can remember real quick. The inside is white. (ORBIT)

08 15 10+ CDR The outside is rimmed with a - it's as if the rim itself, was just dark, very dark. There's some white to the south about a crater diameter, sort of a - small distribution radially to the south, and then there is sort of a, what I would call, a free-patterned dark-like ray about 2-crater diameters, maybe 3 crater diameters, to the south just slightly to the west of this light area I was talking about, but to the south, another definite one to the west and another definite to the north, but none to the east. (ORBIT)

--

08 15 10+ CMP I'm going to draw a picture, here, while I'm (ORBIT)  
thinking of it.

- - -

08 15 10+ CDR My white spot, there, is \*\*\* the same spot. There (ORBIT)  
are two white spots I'm talking about, now. The one  
I'm talking about primarily is the one I saw right  
after landing, on the thing was a lighter grayish  
area that was evidently blown up from the LM  
landing. And that's still in the same spot. You  
can still see that all right.

- - -

08 15 13+ CC How large is the bright zone you were talking about, (ORBIT)  
Ron?

08 15 13+ CMP Right between Sherlock and Camelot there are two (ORBIT)  
small craters there and I'll have to get my map out  
to look for the name of them for sure.

08 15 13+ CMP They should have been right behind the LM. And the (ORBIT)  
bright spot is about the same size as those.

08 15 13+ CMP And it makes I would say an equilateral triangle (ORBIT)  
with those two craters.

- - -

08 15 30+ CMP Gene's drawing in the flight plan, there. That (ORBIT)  
crater -

- - -

08 17 01+ LMP The fronts of the major ring in Crisium are (ORBIT)  
strikingly different than those of the Apennines  
just in their general slopes; sharpness of  
topographical features; and in any appearance of  
having even a hint of boulder fields on their slopes  
like we observed, say, on the South Massif, anything  
like that. At least Serenitatis Massifs seem to  
locally show fairly major boulder fields on their  
flanks. And I haven't seen any around Crisium yet.  
Maybe Ron's already talked to you about that, but I  
haven't seen any.

08 17 05 28 LMP

(ORBIT)

Getting into areas that resemble, in their surface texture, the Sculptured Hills of the Taurus-Littrow landing area, here we're just passing - now where are we? - that would be - I got disoriented all of the sudden. Proclus is there, so it's in the ray-excluded zone of Proclus where there is a mare surface projecting up into terrain that looks like Sculptured Hills. And that mare has a distinct bluish-gray color, in contrast to the regolith associated with the Sculptured Hills - between the hills at least - which is a brown - let's call it a tannish-gray. Quite a sharp color hue contrast to my eyes, at any rate.

08 17 06 55 LMP

(ORBIT)

That was a projection of Fecunditatis mare, I guess, up into there. Sculptured Hills tend to have both a regional distribution and a structurally controlled distribution, the structural control being apparently related to the rims of old craters. For example, there are some Sculptured-Hills-appearing topographic materials that - again, in the ray-excluded zone, but out in Fecunditatis - we find the rim of a fairly large flooded crater - in Fecunditatis. And all of this may tie in with the possible - possibility that we saw at the landing site, that Sculptured Hills are composed of an igneous gabbroic rock. And these may represent local intrusions controlled by the structure of an old impact crater - extrusions controlled by the structure of the old impact crater.

08 17 06+

(ORBIT)

I've noticed - now I'm getting a good view of where in Fecunditatis there is a tannish - or let's call it more of a brownish-gray mare in contrast to bluish-gray mare in Fecunditatis itself

08 17 06+

(ORBIT)

And in the walls of some - of a large crater - I'll try to figure out which one it is in a minute. It's near the large crater that the Sculptured Hills define you can see in the east wall - or maybe northeast wall of that crater - an area of bluish-gray - material that is striking the normal tan-gray of that crater wall.



(ORBIT)

08 17 10 12 LMP This isn't a good viewing attitude at all, and we get a few isolated views that may be worth commenting on. The contrast, in my eye anyway, between the three color units around the landing site is a - let's call it a medium bluish-gray to gray for the dark mantle; a light blue-gray for the annulus around Serenitatis; and, then, a tan-gray for the Serenitatis mare proper. And, in Dawes, I think you can see that the overthrown - or the rim materials are made up of the brownish-gray material, and the walls underneath those rims are the bluish-gray, which is the age relationship suggested by topography. That'd be the lower unit is forming the rim with inverted stratigraphy.

(ORBIT)

08 17 10+ LMP The light blue-gray annulus is also the locus of most of the circumferential grabens, that Serenitatis is noted for, is in that area. And that's nothing new. But, in one place, there's a very subdued, flooded crater which seems to control an arcuate projection - or, let's say, a circular projection - of the light blue-gray out over the tan-gray mare. Most of the major wrinkle-ridge system of Serenitatis, of course, is outside the annulus of blue-gray, except locally, and one of those places was to the west of the Taurus-Littrow site. As we look in the southern portions of Serenitatis that wrinkle-ridge system does cross the contact between the blue-gray and the tan-gray. That's the light blue-gray and the tan-gray.

(ORBIT)

08 17 13 15 LMP The impression I've had in looking at all the mare where the wrinkle-ridge systems are developed is that they're a late feature. They - at least at low sun, and sometimes even at high sun - they have very sharply defined ridges with steep slopes on either side that, in general, give me the impression that they're constructional, possibly associated with some thrusting movement.

(ORBIT)

08 17 13+ LMP In the vicinity of Sulpicus Gallus, there are several small craters that look like impact craters that, believe it or not, have - in my eye, anyway - orange ejecta blankets.

08 17 13+ LMP Ron says that he already commented on those, and they look very obvious to me. (ORBIT)

--

08 17 13+ LMP It's a light orange, obviously, but it's in contrast to the brown-gray of the dark mantle in the vicinity of Sulpicius Gallus. There's a good one right down there. Now, that one looks like a constructional cone that's orangish. And that's right out of a raised projection of the brown-gray dark mantle out onto the light blue-gray annulus material. (ORBIT)

08 17 16 06 LMP This southern and southwestern portion of Serenitatis has a general appearance of the Sculptured Hills, although the individual hills seem to be more widely spaced than around Taurus-Littrow. Once again, historically, we're passing near the landing site of Apollo 15. (ORBIT)

--

08 17 30 19 GDR My best guess after looking down there from here is - I've got the northeast chart of the lunar surface traverses \*\*\* and about 83.3 and Delta \*\*\* point 5. We're right on the top of the "0" in Poppy. Looks to be about where we landed. (ORBIT)

08 17 30+ GDR The first thought I had about being close to Trident, I didn't think I was anywhere near that close. And, of course, when you look out there and see a big hole, you don't know how big is big when you're down there. That big hole out there might very easily could have been Poppy out at 9 o'clock. (ORBIT)

08 17 30+ CC Okay, Geno, from science we finally got it to where it converted to your map coordinates; and their guess was close. Their best guess, with all the data considered, is 83.2 and DN 0.1 - Delta November 0.1. (ORBIT)

08 17 30+ LMP That would definitely make sense, Geno \*\*\* north of where we put the \*\*\* reamer, that was a little ways away. You were at the edge of the depression, and it would - move it a little. (ORBIT)

08 17 32 11 CDR Yes, I'll buy that. That's in my scatter. And then (ORBIT)  
that crater, as I looked out at 9 o'clock, we landed  
next to was actually Poppy. Pretty sure that's that  
large crater.

- - -  
08 19 02 43 LMP My impression from Shorty the other day, and also (ORBIT)  
from seeing these craters that seem to have orange -  
that are - around them, that look very much like  
impact craters from orbit, at any rate - it may be  
if that is an alteration phenomenon, - that it's  
being localized around the structure created by the  
impact. But in this latter case, it looks as if the  
impact itself penetrated into a zone of that color.

- - -  
08 20 49 41 CC We've got a request for a little visual observation (ORBIT)  
at the landing site area, having to do with orange  
material.

08 20 49+ CC This was triggered off by your observation of orange (ORBIT)  
material last rev, I guess, and possibly earlier.  
The idea here is to look for some craters that we've  
identified on photographs that are in similar  
geologic setting to Shorty crater and see if we can  
see orange material around them. We're trying to  
determine if the orange material at Shorty is a  
one-time special occasion or whether possibly it's  
common to the area and just never been noticed  
before. And we think you'll be able to determine  
this visually, better than any other way. So, if  
you can get out the orbit charts; the orbit  
photographs; let's see, the lunar landmark maps for  
the CSM, and turn to the landing site number 2 or 4  
picture. And I'll show you where we think a likely  
point is to see craters that are similar in setting  
to Shorty, to look for orange material.

08 20 51 31 LMP I've made a couple passes with the binoculars over (ORBIT)  
the dark mantle around Litrow already, and have  
seen nothing comparable with what's around  
Sulpicius; but let's have the examples, and we'll  
make a special effort on it.

08 20 51+ CC Okay. Have you got the site photo number 2 or 4? (ORBIT)  
 08 20 51+ LMP Here it is. Stand by just 1. (ORBIT)  
 08 20 51+ LMP Tab on it. (ORBIT)  
 08 20 51+ CMP Which one is that, Gordo? (ORBIT)  
 08 20 51+ CC Number 2 of 4 of the site photos. (ORBIT)  
 08 20 51+ CC You can see the landing site there at - down about 4 o'clock, and the 7-kilometer crater on the centerline of the page, about a third of the way down from the top, the large bright crater there is Littrow B is the name of it.

08 20 51+ CC And on the southern half of the ejecta blanket from that crater, there are several dark halo craters, which we think are in similar structure as Shorty. We think that would be a likely spot to look for orange material. Farouk has circled about four or five. They show up, say, at 4 o'clock, 7 o'clock, 8 o'clock, and 9 o'clock out about a crater diameter. In other words, a crater radius beyond the lip, roughly. And use the same camera setup, with the exception of using the 250-millimeter lens, if you can, that you're going to be setting up for as per the flight plan for the orbital science photos. If you can put the 250 on there; use KK as shown; and f:8, 1/250, and infinity. What we're looking for is orange material.

- - -

08 20 58 00 LMP The craters we're seeing around Sulpicius that are orange - orangish-gray and the whole, or at least most of the crater is that way. He looked at Shorty today, and Ron said that even the little bit of orange that he saw the other day is not visible, and I'd have to agree with that. The amount of orange we saw on the surface certainly would not be comparable to what we're seeing around Sulpicius Gallus. (ORBIT)

08 20 58+ LMP And in a couple of quick scans, on previous revs, of the area, the dark mantle, near Littrow, I did not notice any obvious orange-gray craters. (ORBIT)

08 20 58+ CC We suggest that area to look for them only as a likely spot; but any evidence of craters with orange material, in the whole dark-mantle area around Littrow and the edge of Tranquillity there, is worth noting and getting a picture of, if you see it. (ORBIT)

08 21 05 58 CMP I don't think there's anything there. (ORBIT)

08 21 05+ LMP Why don't you take a couple of pictures, then. (ORBIT)

06 21 05+ CMP I've got a few. (ORBIT)

-- --

08 21 05+ CMP Okay. 5.6 at 1/250, huh? (ORBIT)

08 21 05+ CMP No, I don't either. I don't see anything comparable at all. The ones that we've been seeing the - definite orange or the light-tan stuff around are pure light ejecta blankets around them, not dark. (ORBIT)

08 21 05+ LMP I guess none of us see anything comparable to what is down by Sulpicius. (ORBIT)

08 21 05+ LMP And no obvious color either. (ORBIT)

08 21 05+ CMP Well, they're comparable to Shorty, but they're not comparable to the ones that we've been seeing the obvious orange -- (ORBIT)

08 21 05+ CDR Yes. The craters are comparable to Shorty, as Ron points out, but the color is not there. (ORBIT)

-- --

08 23 03+ LMP Areas in the landing site where we now know there are extensive blocks of the subfloor material, particularly in the walls of the larger craters, I have the impression that those block fields, from this altitude, give a light bluish-gray appearance. (ORBIT)

-- --

08 23 13 02 CMP We sure got to look and see if those things still look orange tomorrow. Because, yesterday, (Shorty) looked kind of orange there -- on the northeast rim: but, it sure doesn't today -- (ORBIT)

09 10 56+

LMP

Okay. I'm looking right down the slope of the South (ORBIT) Massif, above the slide right now - right down at the - just about the angle of the slope. And there's a very slight indentation in the slope, just opposite the maximum - the point of maximum extent of the dark - light mantle. Opposite other portions of it, though, it - there's no clear indication of any change in the direction of the Massif - front. It's very, very slight, and I'd say you'd have a hard time saying that it is a source area for the light mantle but it's - there's a slight indentation.

\*\*\* \* TRANSEARTH COAST \* \* \* \*

10 08 12+ LMP Hey, Bob. What time does the old backroom get up this morning? (TRANSEARTH COAST)

10 08 12+ CC Which backroom? (TRANSEARTH COAST)

10 08 12+ LMP The geology backroom, of course. (TRANSEARTH COAST)

10 08 12+ CC Well, beats me. I don't know if there's anyone down there or not. Let me see if I can find out. (TRANSEARTH COAST)

10 08 12+ LMP No, that's all right, Bob. I just want you to pass on a thought. I had a little trouble getting to sleep last night. And they've probably already thought of it. But it has to do with Van Sera. (TRANSEARTH COAST)

10 08 12+ CC Go ahead. I'll copy it down. (TRANSEARTH COAST)

10 08 12+ LMP No, just ask them if they've thought about the possibility that the - those Van Serg breccias might be the old indurated regolith over the subfloor. (TRANSEARTH COAST)

10 08 12+ CC Okay; I got that. (TRANSEARTH COAST)

10 08 12+ LMP That's an alternative that in the heat of battle did not occur to me at the time. It should have, and it may have occurred to some of them. (TRANSEARTH COAST)

10 08 12+ CC Okay. That's as opposed to being a window through - to the - below the subfloor, which is what you suggested the other night. (TRANSEARTH COAST)

10 08 12+ LMP Yes, sir. I think I like the regolith better. I think it makes sense from a lot of points of view: The size of the crater, the fact that we should have expected to see something but hadn't up to that time. (TRANSEARTH COAST)

10 08 12+ LMP And the breccias were, thinking back on it, could very easily have been soil breccias and just getting coarser as you got closer to the base of the sub - to the top of the subfloor, which is what we were looking at down in the bottom of the crater. (TRANSEARTH COAST)

10 22 59+ CC (TRANSEARTH COAST)

I've been talking to Don Beatty and Dick Kruse and looking over a transcript of a science press conference we edited up. It was kind of ragged but possibly interesting summary of the science as it stands now. In response to your question of items that might help you prepare for tomorrow's press conference, I can come with you with those words any time you wish.

10 22 59+ CDR \*\*\* you can come up with them now.

10 22 59+ CC (TRANSEARTH COAST)

Okay. Let's start with the LSPÉ. All eight charges have now been exploded, and they were all on schedule and produced excellent signals. These data were used in conjunction with the ascent stage lift-off and also its impact data, which should give us an excellent picture of the geologic structure of the outer 3 kilometers of the Moon. This little summary I'm reading right now is - was written by Joel Watkins. The geophone array is functioning beautifully and we're already talking about its potential in a listening mode for study of meteorite impact frequency. We still don't have precise EP locations from Ray Batson, so the following interpretation will almost certainly be changed when we get better data and field tapes, which we will use to refine our arrival times. Bearing the above in mind, my preliminary interpretation is as follows. The low-velocity layer seems to be thicker and higher in velocity than at either Apollo 14 or 16 sites. I think this may mean that the low-velocity layer here includes dark mantle material as well as the regolith. Details of the higher velocity substrata are fuzzy, but velocities increase with depth in a way which would be consistent with a thick accumulation of lava flows. This probably represents the subfloor material. And he concludes by saying, "You guys did a great job, see you after splash." On the same subject, Dr. Kovach went a little further, and he just recently admits to seeing evidence of two high-velocity layers, especially after the 6-pound charge was fired, that - evidence showed up. He also mentioned in his press conference yesterday that the data point allowed by the ascent-stage impact was very important - the fact that they got it in about 9



kilometers away and the - that data is right in a critical range where they see a big change in the percentage of - velocity change. I'm getting kind of balled up here in the words, but that data is very important because it's in - where the steep gradient of velocity change occurs. On looking through here, I guess, in summary I'll read a couple of sentences again out of the press conference. We do find evidence of lunar crust as we did in the past, but we may have to thin it considerably. We may have, in fact, have to thin it as much as to 25 kilometers instead of 60 - that they believed it was up until now. And they're thinking they may have to lower the velocity of seismic waves in the mantle, which, I guess, at last guess was around 9 kilometers per second. Now it's looking more like 7.5, and the crustal velocity is probably as low as 6.3 kilometers per second. Okay, yes. That was - that last data was really from Dr. Latham, and he was interpreting that data mainly from the S-1VB impact and readings from some of the other seismic sites. Any questions on that? I realize that this is pretty ragged. Over.

(TRANSEARTH COAST)

10 22 59+ LMP Oh, that's - that's great, Gordy. Did Kovach indicate his tentative depth for the second high -velocity layer?

(TRANSEARTH COAST)

10 22 59+ CC No. As far as the information we have here, he's just - I don't see any - the only thing I can see is he mentions we're getting a depth sample down to 3 to 4 kilometers, but that was before all the charges had gone off. So I think, as I say, he just doesn't really state that yet.

(TRANSEARTH COAST)

10 22 59+ LMP Yes, it's a little early. Okay, good. Sounds like what we saw in the field to a certain extent.

- - -

(TRANSEARTH COAST)

11 12 28 29 CC I've got an interesting little press release here. Jack Schmitt - and I'm sure all of you will be interested in, but based upon your work up on the Shorty area on the surface, the people out at Flagstaff went back and looked at the Apollo 14 250-millimeter camera frames from - and showed that it has colored frames that showed brownish and

orangish colorations on a bulbous dome in the crater Langrenus and on a 4-kilometer dark halo crater on the ejecta blanket of Theophilus. And they've made that news release today.

11 12 28+ LMP Very good. We may have triggered something. (TRANSEARTH COAST)

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11 17 27 19 OC Okay. As usual in these inflight news conferences, the questions that will be asked of you were prepared by correspondents covering the Apollo 17 mission at the Manned Spacecraft Center in Houston. They will be read exactly as written and in the order determined by the newsmen. The first question is for Jack Schmitt. If you, as a geologist, were coming home from a field trip on Earth, you'd be drafting a preliminary report and discussing it with fellow geologists. In terms understandable to laymen, can you summarize what you would be saying in your preliminary report about your field trip to Taurus-Littrow? (TRANSEARTH COAST) (PRESS CONFERENCE)

11 17 27+ LMP I think the thing we had hoped to accomplish at Taurus-Littrow was to look at as broad a spectrum of the history of the Moon as possible in one small area, as the concluding flight to the Apollo Program. And I think we did that. I think we did look at some of the oldest rocks that it is possible to see with our capability in the breccias of the South and North Massifs. I think we saw some intermediate-age rocks of fairly unexpected character, I believe, in the subfloor crystalline or igneous rocks, the gabbro, as we called them there. And we also understood, I think, that those rocks, in fact, had intruded into the breccias of the North Massif. We found, I believe, at the crater Van Serg, on the third EVA, that the regolith, or the garden zone, on the top of that subfloor gabbro, or the igneous rocks, was quite thick, or appears to be very thick, which is an expected result, and will - hopefully, those rocks will have much information about a fairly extended period of lunar erosion. And, we found that there was indeed a dark mantle over the area of - variable thickness; but, apparently, of relatively recent age, and that in turn had a light mantle of material of which we do (TRANSEARTH COAST) (PRESS CONFERENCE)

not yet understand, and I think that the samples are going to have to tell that story. It may well be a landslide that has come off the South Massif. And, then, possibly as important as any finding, we found that even later than that relatively young light mantle deposit or possible avalanche - we have alteration reminiscent of the alteration by hot waters or hot gases on Earth, and that was the orange - appears to be the orange soil that we found around the crater Shorty. And, subsequently, in orbit we started to pick up, and particularly through Ron Evans' efforts, pick up more of the apparent evidence of such alteration taking place in fairly recent time on the Moon. All of those items, I think, are extremely significant and go through the full range of our present knowledge of lunar history. And, a report I could write would initially summarize that particular sequence of events.

11 17 27+ CC

(TRANSEARTH COAST) (PRESS CONFERENCE)

Question number 2 is for Jack, again. What other probable explanations besides volcanic origin do you have for the orange rock and colored soil that you found at Shorty crater?

11 17 33 02 LMP

(TRANSEARTH COAST) (PRESS CONFERENCE)

Well, they don't necessarily have to be volcanic. Gordy. I refer to them as alteration, and much of the hydrothermal, or hot water, alteration we see on Earth is related to recent volcanism, or ancient volcanism; but, also, we know of that kind of alteration of preexisting materials to take place as a result of - of just fluids working their way up through the Earth's crust, and I presume that such a process is also possible on the Moon. The ones we saw seem to be associated with areas of dark mantle of various types, and most of the photographic evidence we have is that those dark mantle deposits are associated with volcanism, but it is not necessarily proved yet, I believe, that the - the orange soils or the alterations we've seen are volcanic. However, the process would be a related process, that is, one of internal origin.

(TRANSEARTH COAST)(PRESS CONFERENCE)

11 17 33+ CC The third question is for German or Schmitt. Your voices are so much alike that it is unclear to some of us which one of you found the orange rock and who first spotted the layer of orange soil on the crater rim.

(TRANSEARTH COAST)(PRESS CONFERENCE)

11 17 34 22 CDR Jack found it. He uncovered it as he was walking on the rim, and we worked with that, and then, as I went around the crater to take the stereo base pan from within the crater, I could see alterations radially down from the rim farther beyond where we were working down to the center.

(TRANSEARTH COAST)(PRESS CONFERENCE)

11 17 34+ LMP I don't think that that question of who found it is as specifically as important as that we were there with the equipment and the training jointly to not only recognize that but to take advantage of having recognized it, and I hope that we did.

- - -

(TRANSEARTH COAST)(PRESS CONFERENCE)

11 17 47 26 CC Question 11 is for Jack. Do you think the United States waited too long to send a geologist to the Moon?

(TRANSEARTH COAST)(PRESS CONFERENCE)

11 17 47+ LMP We're grinning because I think we predicted that question. Gordy, I think the United States waited too long to go into space in the first place, and I think they're probably going to wait too long to go back. I will always feel that way no matter who goes or what qualifications he may have or may think he has. I think that the most important thing that maybe I have done is to - to be able to show that we can build a transportation system that allows you to fly people of a wide variety of disciplines. And I think that we have shown that, and I think that it's occurred at about as soon as possible within the Apollo Program.

\* \* \* \* \* END OF TRANSCRIPT \* \* \* \* \*

TABLE 1. APOLLO 17 SAMPLE LISTING CROSS-REFERENCED TO APOLLO ELAPSED TIMES

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
70001	DRILL CORE BIT	04 21 38+ 05 03 43+
70002-08	CORE STEMS	04 21 38+ 05 03 43+
70009	TOP CORE STEM	04 21 38+ 05 03 43+
70010	FINES - OUTSIDE STEM	04 21 38+ 05 03 43+
70011	SESC	06 22 41+
70012	DRIVE TUBE - 52	06 23 49+
70017	ROCK - BASALT	06 23 02+
70018	ROCK - BRECCIA	04 18 55+ 05 00 36+
70019	ROCK - AGGLUTIMATE	06 00 20+ 06 00 39+ 06 00 47 27 06 19 58+
70030	RESIDUE - SCB 2	
70035	ROCK - BASALT	05 00 33 39 05 00 43+ 05 05 24+ 05 15 46 26
70040	FRAGMENTS - SUIT POCKET	
70050-54	FINES - BSLSS RESIDUE	
70060-64	FINES	07 00 37 42
70070	DUST & SWEEPINGS - BSLSS	
70075	CHIP - BSLSS	
70130	DOC BAG RESIDUE	04 22 24+ 04 22 46 44
70135	ROCK - BASALT	04 22 24+ 04 22 46 44
70136-39	CHIPS	04 22 24+ 04 22 46 44
70145-49	CHIPS	04 22 24+ 04 22 46 44

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
70155-57	CHIPS	04 22 24+ 04 22 46 44
70160-65	FINES & CHIP	04 22 35+
70170	DOC BAG RESIDUE	06 23 44+
70175	ROCK - BRECCIA	06 23 44+
70180-85	FINES & ROCK - BASALT	04 22 35+
70215	ROCK - BASALT	06 17 44 59 06 22 30+
70250	DOC BAG RESIDUE	05 18 41+
70255	ROCK - BASALT	05 18 41+
70270-75	FINES & ROCK - BASALT	05 18 48 24
70290	DOC BAG RESIDUE	06 17 36 31
70295	ROCK - BRECCIA	06 17 36 31
70310	DOC BAG RESIDUE	06 22 20+
70311-15	FINES & ROCK - SASALT	06 22 20+
70320-24	FINES	06 22 20 2R
71010	RESIDUE - SRC 1 & SCB 1	
71030	DOC BAG RESIDUE	04 23 29+ 04 23 35+
71035	ROCK - BASALT	04 23 29+ 04 23 35+
71036	ROCK - BASALT	04 23 29+ 04 23 35+
71037	CHIP	04 23 29+ 04 23 35+
71040-45	FINES & CHIP	04 23 34+ 04 23 35+
71046-49	CHIPS	04 23 34+ 04 23 35+
71050	DOC BAG RESIDUE	04 23 32+ 04 23 35+

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
71055	ROCK - BASALT	04 23 32+ 04 23 35+
71060-69	FINES & CHIPS	04 23 34+
71075	CHIP	04 23 34+
71095-89	CHIPS	04 23 34+
71095-97	CHIPS	04 23 34+
71130-36	FINES & CHIPS	04 23 35+
71150-57	DOC BAG RESIDUE - FINES & CHIPS	04 23 39+
71170	DOC BAG RESIDUE	04 23 39+
71175	ROCK - B-SALT	04 23 39+
1500-09	FINES & CHIPS - RAKE SOIL	04 23 46+
71515	CHIP	04 23 46+
71520	DOC BAG RESIDUE	04 23 43+
71525-29	CHIPS	04 23 43+
71535-39	CHIPS	04 23 43+
71545-49	CHIPS & ROCK - RAKE SAMPLE	04 23 43+
7155-59	CHIPS & ROCK - RAKE SAMPLE	04 23 43+
71565-69	CHIPS & ROCKS - RAKE SAMPLE	04 23 43+
71575-79	CHIPS & ROCKS - RAKE SAMPLE	04 23 43+
71585-89	CHIPS - RAKE SAMPLE	04 23 43+
71595-97	CHIPS & ROCK - RAKE SAMPLE	04 23 43+
72010	RESIDUE - SCB 8	
72130-35	FINES & ROCK - BRECCIA	05 19 13+

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
72140-45	FINES & CHIP	05 19 24+
72150	DOC BAG RESIDUE	05 19 30+
72155	ROCK - BASALT	05 19 30+
72160-64	FINES	05 19 32+
72210	DOC BAG RESIDUE	05 20 12+ 05 20 16+ 05 20 18+
72215	ROCK - BRECCIA	05 20 12+ 05 20 16+ 05 20 18+
72220-24	FINES	05 20 22+
72230	DOC BAG RESIDUE	05 20 16+ 05 20 18+
72235	ROCK - BRECCIA	05 20 16+ 05 20 18+
72240-44	FINES	05 20 22+
72250	DOC BAG RESIDUE	05 20 18+
72255	ROCK - BRECCIA	05 20 18+
72260-64	FINES	05 20 22+
72270	DOC BAG RESIDUE	05 20 18+
72275	ROCK - BRECCIA	05 20 18+
72310	DOC BAG RESIDUE	05 20 31+
72315	ROCK - POIKILITIC CLAST	05 20 31+
72320-24	FINES	05 20 36+
72330	DOC BAG RESIDUE	05 20 31+
72335	ROCK - POIKILITIC CLAST	05 20 31+
72350	DUST & SWEEPINGS - BAG 518	05 20 33 42
72355	ROCK - BRECCIA	05 20 33 42



TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
72370	DUST & SWEEPINGS - BAG 519	05 20 33+
72375	CHIP - BRECCIA	05 20 33+
72390	DOC BAG RESIDUE	05 20 33+
72395	ROCK - BRECCIA	05 20 33+
72410	DOC BAG RESIDUE	05 20 46+
72415-18	CHIPS	05 20 46+ 05 20 54+
72430-35	FINES & ROCK - BRECCIA	05 20 50+
72440-44	FINES	05 20 52+
72460-64	FINES	05 20 54 12
72500-05	FINES & CHIP - RAKE SOIL	05 20 42+
72530	DOC BAG RESIDUE	05 20 33+ 05 20 40+
72535-39	ROCK & CHIPS - RAKE SAMPLE	05 20 33+ 05 20 40+
72545-49	CHIPS - RAKE SAMPLE	05 20 33+ 05 20 40+
72555-59	CHIPS - RAKE SAMPLE	05 20 33+ 05 20 40+
72700-05	FINES & CHIP - RAKE SOIL	05 20 58+
72730	DOC BAG RESIDUE	05 20 57+ 05 21 11 10
72735-38	ROCK & CHIPS - RAKE SAMPLE	05 20 57+ 05 21 11 10
73001	DRIVE TUBE - L76, LOWER	05 21 57+ 05 22 05+
73002	DRIVE TUBE - U31, UPPER	05 21 57+ 05 22 05+
73010	RESIDUE - SCB G	
73120-24	FINES	05 21 15+
73130-34	FINES	05 21 15+ 05 21 21+

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
73140-46	FINES & CHIPS	05 21 21+
73150-56	FINES, CHIP, & ROCK - BRECCIA	05 21 17+
73210-19	FINES, CHIPS, & ROCKS - BRECCIAS	05 22 09+
73220-25	FINES & CHIP	05 21 51+
73230	DOC BAG RESIDUE	05 22 00+
73235	ROCK - BRECCIA	05 22 00+
73240-45	FINES & CHIP	05 21 56 36
73250	DOC BAG RESIDUE	05 22 05 38
73255	ROCK - BRECCIA	05 22 05 38
73260-64	FINES	05 21 58 29
73270	DOC BAG RESIDUE	05 22 07 23
73275	ROCK - BRECCIA	05 22 07 23
73280-85	FINES & CHIP	05 22 00+
74001	DRIVE TUBE - L44, LOWER	05 22 55+
74002	DRIVE TUBE - U35, UPPER	05 22 55+
74010	RESIDUE - SRC 2	
74110-19	FINES & CHIPS	05 22 29+
74120-24	FINES	05 22 34+ 06 00 44+
74220	UNSIIEVED FINES	05 22 51+
74230	DOC BAG RESIDUE	05 22 57+ 05 23 08+ 06 02 32+
74235	ROCK - BASALT VITROPHYRE	05 22 57+ 05 23 08+ 06 02 32+
74240-49	FINES, CHIPS, & ROCK - BASALT	05 22 51+ 06 00 44+

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
74250	DOC BAG RESIDUE	05 23 03 42
74255	ROCK - BASALT	05 23 03 42
74260	UNSIIEVED FINES	05 22 54+ 06 00 44+
74270	DOC BAG RESIDUE	05 23 08+
74275	ROCK - BASALT	05 23 08+
74285-87	CHIPS	05 22 51+ 06 00 44+
75010	DOC BAG RESIDUE	05 23 55+
75015	ROCK - BASALT	05 23 55+
75030	DOC BAG RESIDUE	05 23 57+
75035	ROCK - BASALT	05 23 57+
75050	DUST & SWEEPINGS - BAG 464	05 23 58+
75055	ROCK - BASALT	05 23 58+
75060-66	FINES & CHIPS	06 00 02+
75070	DOC BAG RESIDUE	06 00 04+
75075	ROCK - BASALT	06 00 04+
75080-89	FINES & CHIPS	06 00 06+
75110-15	FINES & CHIP	05 23 27+
75120-24	FINES	05 23 35+
76001	DRIVE TUBE - L48, SINGLE DRIVE TUBE	06 18 59+ 06 19 05+ 06 22 40 11 06 22 41+
76010	RESIDUE - SCB 4	
76015	ROCK - BRECCIA	06 18 26+
76030-37	FINES, CHIP, & ROCK - BRECCIA	06 19 22+

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
76055	ROCK - BRECCIA	06 19 12+
76120-24	FINES	06 17 52+
76130-37	FINES, CHIPS, & ROCK - BRECCIA	06 18 02+
76210	DOC BAG RESIDUE	06 18 26+
76215	ROCK - BRECCIA	06 18 26+
76220-24	FINES	06 18 21+
76230	DOC BAG RESIDUE	06 18 35+
76235-39	CHIPS	06 18 35+
76240-46	FINES & CHIPS	06 18 21+
76250	DOC BAG RESIDUE	06 18 39+
76255	ROCK - BRECCIA	06 18 39+
76260-65	FINES & CHIP	06 18 21+
76270	DOC BAG RESIDUE	06 18 39+
76275	ROCK - BRECCIA	06 18 39+
76280-86	FINES & CHIPS	06 18 21+ 06 18 26+
76290	DOC BAG RESIDUE	06 18 42+
76295	ROCK - BRECCIA	06 18 42+
76305-07	CHIPS	06 18 35+
76310	DOC BAG RESIDUE	06 18 50 07
76315	ROCK - BRECCIA	06 18 50 07
76320-24	FINES	06 18 45+
76330	DOC BAG RESIDUE	06 19 12+

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
76335	ROCK - BRECCIA	06 19 12+
76500-06	FINES & CHIPS - RAKE SOIL	06 18 57+
76530	DOC BAG RESIDUE - RAKE SAMPLE	06 18 50+
76535-39	CHIPS & ROCK - NORITE - RAKE SAMPLE	06 18 50+
76545-49	CHIPS - RAKE SAMPLE	06 18 50+
76555-59	CHIPS - RAKE SAMPLE	06 18 50+
76565-69	CHIPS - RAKE SAMPLE	06 18 50+
76575-77	CHIPS - RAKE SAMPLE	06 18 50+
77010	RESIDUE - SCB 7	
77017	ROCK - GABBRO	06 19 33+
77035	ROCK - BRECCIA	06 19 41+
77070	DOC BAG RESIDUE	06 19 34+
77075-77	CHIPS & ROCK	06 19 34+
77110	DUST & SWEEPINGS - BAG 561	06 19 39+
77115	ROCK - BRECCIA	06 19 39+
77130	DOC BAG RESIDUE	06 19 39+
77135	ROCK - BRECCIA	06 19 39+
77210	DOC BAG RESIDUE	06 19 37+
77215	ROCK - NORITE	06 19 37+
77510-19	FINES, CHIPS, & ROCKS	06 19 33 09
77525-26	CHIPS	06 19 33 09
77530-39	FINES, CHIPS, & ROCKS	06 19 37 05

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
77545	CHIP	06 19 37 05
78120-24	FINES	06 20 02+
78130	DOC BAG RESIDUE	06 20 12+
78135	ROCK - BASALT	06 20 12+
78150	DUST & SWEEPINGS - BAG 567	06 20 33+
78155	ROCK - BRECCIA	06 20 33+
78220-24	FINES	06 20 17 44
78230-36, 38	FINES, CHIPS, & ROCK - MORITE	06 20 17+
78250	UNSIEVED FINES - BAG 546	06 20 23+
78255	CHIP	06 20 23+
78420-24	FINES	06 20 35+
78440-44	FINES	06 20 44+
78460-65	FINES & CHIP	06 20 43+
78480-84	FINES	06 20 42+
78500-09	FINES, CHIPS, & ROCKS - RAKE SOIL	06 20 33 16
78515-18	CHIPS - RAKE SOIL	06 20 33 16
78525-28	CHIPS - RAKE SAMPLE	06 20 26+ 06 20 35+ 06 20 55+ 07 02 52+
78530	DOC BAG RESIDUE - RAKE SAMPLE	06 20 26+ 06 20 35+ 06 20 55+ 07 02 52+
78535-39	CHIPS & ROCK - RAKE SAMPLE	06 20 26+ 06 20 35+ 06 20 55+ 07 02 52+
78545-49	CHIPS - RAKE SAMPLE	06 20 26+ 06 20 35+ 06 20 55+ 07 02 52+
78555-59	CHIPS - RAKE SAMPLE	06 20 26+ 06 20 35+ 06 20 55+ 07 02 52+
78565-69	CHIPS - RAKE SAMPLE	06 20 26+ 06 20 35+ 06 20 55+ 07 02 52+

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>				
78575-79	CHIPS & ROCK - RAKE SAMPLE	06 20 26+	06 20 35+	06 20 55+	07 02 52+	
78585-89	CHIPS - RAKE SAMPLE	06 20 26+	06 20 35+	06 20 55+	07 02 52+	
78595-99	CHIPS - RAKE SAMPLE	06 20 26+	06 20 35+	06 20 55+	07 02 52+	
79001	DRIVE TUBE - 55, LOWER	06 21 55+	06 22 41+			
79002	DRIVE TUBE - 37, UPPER	06 21 55+	06 22 41+			
79010	RESIDUE - SCB 5					
79035	ROCK - BRECCIA	06 22 03+	06 22 40+	06 22 47+		
79110	DOC BAG RESIDUE	06 21 23+	07 02 52+			
79115	ROCK - BRECCIA	06 21 23+	07 02 52+			
79120-25	FINES & CHIP	06 21 28+				
79130	DUST & SWEEPINGS - BAG 480	06 21 27+				
79135	ROCK - BRECCIA	06 21 27+				
79150	DOC BAG RESIDUE	06 21 28+				
79155	ROCK - BASALT	06 21 28+				
79170	DOC BAG RESIDUE	06 21 32+	07 02 56+			
79175	ROCK - AGGLUTINATE	06 21 32+	07 02 56+			
79190	DOC BAG RESIDUE	06 21 37+	07 02 52+			
79195	ROCK - BRECCIA	06 21 37+	07 02 52+			
79210	DOC BAG RESIDUE	06 22 05+				
79215	ROCK - BRECCIATED TROCTOLITE	06 22 05+				
79220-25	FINES & CHIP	06 21 47+				

TABLE 1. CONT'D.

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
79226-28	CHIPS	06 21 47+
79240-45	FINES & CHIP	06 21 47+
79260-65	FINES & CHIP	06 21 47+
79510-19	FINES & CHIPS	06 21 28+
79525-29	CHIPS	06 21 28+
79535-37	CHIPS	06 21 28+



#### SELECTED REFERENCES

- Anonymous, 1972, Apollo 17 technical air-to-ground voice transcription: Natl. Aeronautics and Space Adm., Houston, Texas, 2000+ p.
- Anonymous, 1973, Lunar sample information catalog Apollo 17: Natl. Aeronautics and Space Adm. Doc. No. MSC 03211, Houston, Texas, 447 p.
- Apollo Lunar Geology Investigation Team, 1973, Documentation and environment of the Apollo 17 samples: A preliminary report: U.S. Geol. Survey open-file report, 322 p.
- Larson, K. B., et al, 1973, Preliminary catalog of pictures taken on the lunar surface during the Apollo 17 mission: U.S. Geol. Survey open-file report, 60 p.
- Lyndon B. Johnson Space Center, 1973, Apollo 17 preliminary science report: Natl. Aeronautics and Space Adm. Spec. Pub. 330, 648 p.