

APOLLO 16 VOICE TRANSCRIPT  
PERTAINING TO THE GEOLOGY OF THE LANDING SITE

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by

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## INTRODUCTION

The Apollo 16 lunar module Orion landed in the Descartes region of the Moon on April 21, 1972 to initiate the fifth manned exploration of the lunar surface. The Apollo 16 crew spent 20.2 hours in surface exploration and traversed approximately 27 km on the lunar roving vehicle.

This document is an edited record of the conversations between astronauts John W. Young and Charles M. Duke on the lunar surface and EVA capcom Anthony W. England at Mission Control in Houston during the descent, landing, and 71 hours of lunar stay time. It also contains landing site observations by command module pilot Thomas K. Mattingly as well as remarks by all three astronauts during 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 second in Apollo Elapsed Time (AET) when the statement was made. Apollo Elapsed Time is the true mission-elapsed time after liftoff from Cape Kennedy at 12:54 p.m. E.S.T. on April 16, 1972.

Figure 1 shows the landing site area that was described, sampled and photographed by the Apollo 16 crewmen.

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## GLOSSARY OF TERMS, ABBREVIATIONS, ACRONYMS, AND SYMBOLS

### APOLLO 16 CREW

CC	Capsule Communicator (Anthony W. England during the EVAs, other astronauts during other time periods)
CDR	Commander (John W. Young)
CMP	Command Module Pilot (Thomas K. Mattingly)
LMP	Lunar Module Pilot (Charles M. Duke)
AET	Apollo Elapsed Time - after launch from earth (days-hrs-mins-secs)
ALSEP	Apollo Lunar Surface Experiments Package
BSLSS	Buddy Secondary Life Support System
CCW	Counter Clockwise
CM	Command Module, "Casper"
Core	Drive tube coring device for collecting soil samples
CRE	Cosmic Ray Experiment
CSV	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
DOI	Descent Orbit Insertion
ETB	Equipment Transfer Bag for transport of items between LM hatch and lunar surface
EVA	Extravehicular Activity - astronaut activities on the lunar surface
FS	Map unit on the landing site geologic map
HEDC	Hasselblad Electric Data Camera

GLOSSARY CONT'D.

HTC	Hand Tool Carrier
L and A	Landing and Analysis display at Cape Kennedy
LM	Lunar Module, "Orion"
LPM	Lunar Portable Magnetometer
LRL	Lunar Receiving Laboratory
LRV	Lunar Roving Vehicle - "Rover"
LSM	Lunar Surface Magnetometer
Mag/Mags	Magazine/Magazines - photographic
MESA	Modularized Equipment Stowage Assembly - a storage area on the LM that contains science equipment
NAV	Navigation
PAN	Panorama of 70-mm photographs
PHO	Photo, photographic reference in transcript keywording
PSE	Passive Seismic Experiment
RAKE	Rake Sample - sample reference in transcript keywording
RCU	Remote Control Unit
RTG	Radioisotope Thermoelectric Generator
SAMP	Sample reference in transcript keywording
SCB	Sample Collection Bag
SEQ	Scientific Equipment Bay on the side of the Lunar Module
SESC	Special Environmental Sample Container
SRC	Sample Return Container, "Rock Box"
SWC, Solar Wind	Solar-Wind Composition experiment

GLOSSARY CONT'D.

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
TRENCH	Trench Sample - sample reference in transcript keywording
UV	Ultraviolet
WC	A fresh 40-m crater 600 m southwest of the LM
***	Garbled or clipped transmission
- - -	Deletions between statements of statements that are not geologically 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
(words?)	Explanation of words possibly said that were garbled during transmission

## EXPLANATION OF KEYWORDING

The purpose of the keywords enclosed in parentheses to the right of the transcript is to inform the reader of either the phase of the mission (DESCENT, BETWEEN EVAs, etc.) during which the statements were made, or the particular location or station (LM, ALSEP, 1 etc.) where the speaker was, or between which locations (LM-ALSEP, 1-2 etc.) the speaker was traversing. There are also separate sample (SAMP xxxxx) and photo (PHO xx xxxxx) keys to denote the particular samples and photos either being described or taken at that particular moment. Normally, where both sample and photo keys occur in the same line, the photo numbers are cross-indexed to the sample numbers in that line. The occasional exceptions can be inferred from the context of the transcript -- AET 05 02 04 01 -- where the core bit sample number is not referenced to the photos that the LMP mentioned.

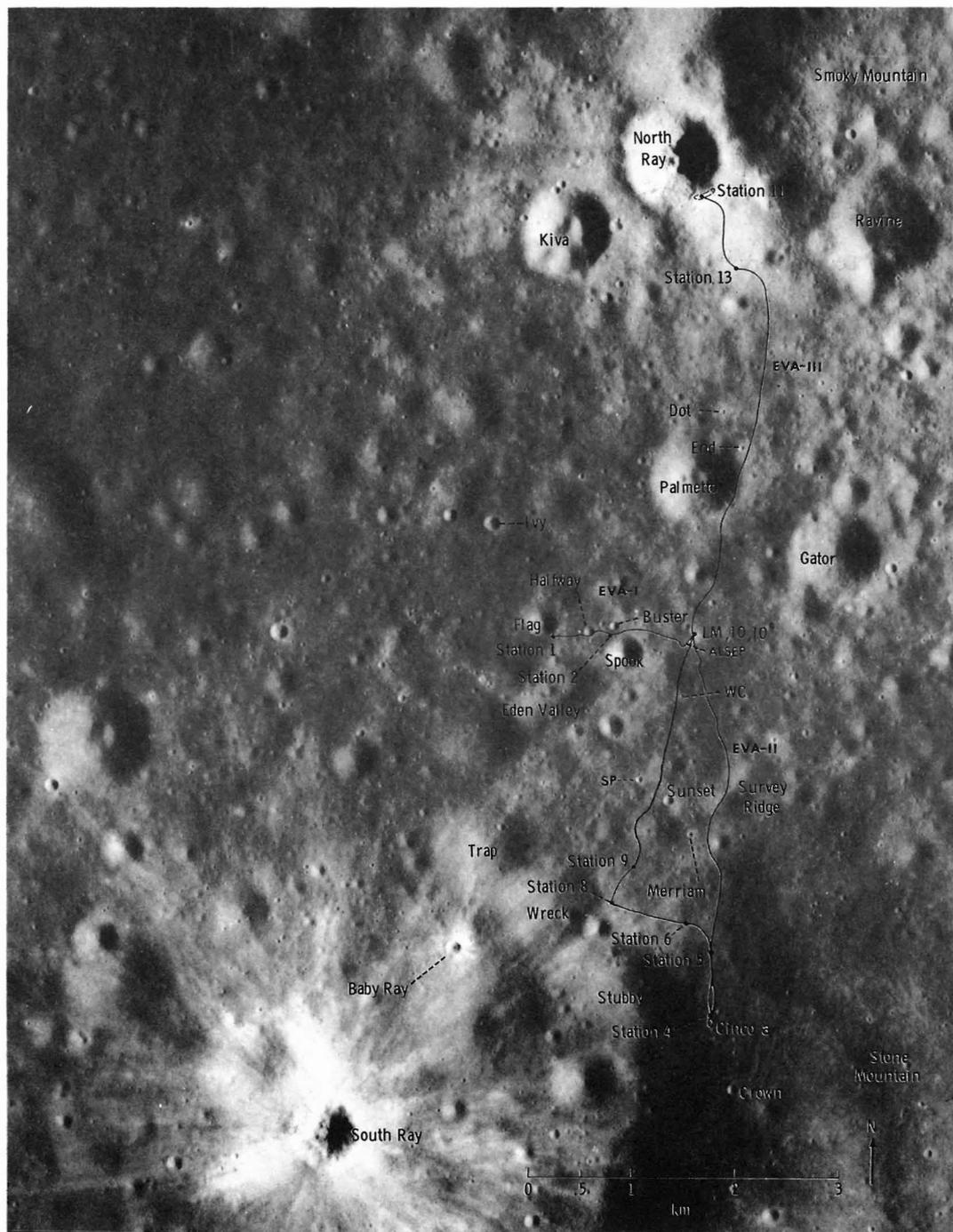
Where remarks in the beginning of a statement were neither specifically nor generally about the sampling or photography mentioned later in the same statement, the keywording was placed in the particular line containing the first mention of the referenced activities as with PHO 109 17828-36 in the statement made at 05 04 32 38.

Because the taking of specific photos was not always mentioned, we have keyed all photos known to show a sample or its location in the first line that contains sample keywording at the time the sample was collected.

Photo keys placed in the "- -" lines (where non-relevant statements are deleted) show the interval when those particular photos were taken even though not mentioned.

Conventions used in keyword sample and photo numbering:

- |                    |   |
|--------------------|---|
| SAMP CORE 60001-07 | - Sample core 60001 through 60007 inclusive                                       |
| SAMP 60090, 95     | - Sample numbers 60090 and 60095  |
| PHO 113 18296-310  | - Magazine 113, frames 18296 through 18310 inclusive                              |
| PHO DAC            | - Photographic reference to the Data Acquisition Camera<br>- mounted on the Rover |
| PHO?               | - Photo or photos taken that have not been identified                             |



The photographic base for this map is Apollo 16 panoramic camera frame AS16-4618. The station locations and traverse routes are from compilations by the Apollo Field Geology Investigations Team under Contract No. T-5874A.

EXPLANATION

LM coordinates: 8.99°S Latitude  
15.51°E Longitude

Figure 1. Apollo 16 landing site showing LM location and area traversed by astronauts during EVAs.

GEOLOGIC CONDENSATION OF THE APOLLO 16 VOICE TRANSCRIPT

\* \* \* \* DESCENT & LM WINDOW \* \* \* \*

04 08 26 55 CDR Pitchover. (DESCENT)

04 08 26 56 LMP Pitchover. Hey, there it is. Gator, Lone Star. (DESCENT)  
Right on.

- - -

04 08 27 03 LMP Palmetto and Dot, North Ray. Looks like we're going (DESCENT)  
to be able to make it, John. There's not too many  
blocks up there.

- - -

04 08 28 13 CDR Okay Houston. We're going to be just a little long (DESCENT)  
- - but we're just now abeam of Double Spot.

- - -

04 08 28 29 LMP Some big blocks over here to the left, John. (DESCENT)

- - -

04 08 29 02 LMP Perfect place over here, John, a couple of big (DESCENT)  
boulders. Not too bad.

04 08 29 08 LMP Okay, 80 feet, down at 3. Looking super. There's (DESCENT)  
dust.

- - -

04 08 29 36 LMP Contact. Stop. Boom! Pro. Engine arm. Wow! \*\*\* (LM WINDOW)  
Man! Look at that!

- - -

04 08 29 52 CDR Well, we don't have to walk far to pick up rocks, (LM WINDOW)  
Houston. We're among them.

- - -

04 08 30 13 CDR \*\*\* I can look right out to the left and see - - (LM WINDOW)  
Double Spot. And we're about - -

- - -

04 08 30 23 CDR We're -- forward and to the north of Double Spot. (LM WINDOW)  
I would guess about 200 meters to the north and  
maybe 150 meters to the west. It's not flatlands,  
though.  
- - -

04 08 31 24 LMP Hey, it sure ain't flat, John. There's that ridge (LM WINDOW)  
to the north.

04 08 31 35 LMP All we got to do is jump out the hatch and we got (LM WINDOW)  
plenty of rocks.

04 08 31 41 CDR I see Crown crater from here; I can see Ray crater (LM WINDOW)  
from here.  
- - -

04 08 31 54 CDR Charlie's got nothing but a ridge to look at. (LM WINDOW)

04 08 32 02 LMP There's a ridge out in front of us, John. (LM WINDOW)

04 08 32 07 CDR Yes. There's a ridge in front of us, one to the (LM WINDOW)  
side of us, and my guess is that we're in a subdued  
old crater that's got a lot more craters.  
- - -

04 08 32 21 LMP Say Jim this ridge in front of us does look like a (LM WINDOW)  
subdued crater and it may be the raised rim about 50  
meters in front of us, about, oh - 4 or 5 meters  
tall. About 30 or 40 percent of the surface is  
covered with boulders that are maybe half a meter in  
size.

04 08 33 58 CDR The way these blocks are laid in here out my window, (LM WINDOW)  
I'd guess they come from South Ray. There's some  
biggies out there. We got - right out in front of  
us about 100 meters, at my 10:30 position - I've got  
one that must be 3 meters across.  
- - -

04 08 36 54 CDR It's just about level, we're not going to have a bit (LM WINDOW)  
of trouble getting out - - but it sure is not - it's  
not smooth - it's not that FS smooth.

- - -

04 08 37 12 CDR It's not that FS smooth; we're in the middle of a (LM WINDOW)  
block field.

04 08 37 17 LMP There's Crown crater up there \*\*\* little blocks. We (LM WINDOW)  
may have squashed a few. And, Jim we got Crown  
crater out - John's left window about 9 o'clock.

04 08 37 37 CDR And just looking at it from here, I don't think the (LM WINDOW)  
Rover's going to have any trouble going up that  
hill. I could be wrong - slopes tend to fool you.

04 08 37 48 CDR It looked good going North Ray, too. There were (LM WINDOW)  
some big blocks on the rim, but not - the tracks  
just looked good.

- - -

04 08 39 15 CDR Man, we got a lot of rocks. That's for sure. (LM WINDOW)

- - -

04 08 39 27 CDR I wish I could tell you what kind of rocks those (LM WINDOW)  
are. But some of them are very white - and doggone,  
if I could see; I'm not close enough to them, but I  
see one white one with some black; can't tell  
whether that's dirt or not on it. But it could be a  
white breccia.

04 08 39 52 LMP Every one of them are angular, too, John. (LM WINDOW)

04 08 39 54 CDR Yeah, they're all angular. They're out of South (LM WINDOW)  
Ray, I believe.

04 08 39 58 LMP There's a pretty one over there, without any dust on (LM WINDOW)  
it at all. Out about 50 meters, by those three  
little craters.

04 08 40 16 CDR In fact, Houston, when I told you that I thought (LM WINDOW)  
this terrain might be very spectacular, boy, I was  
not just kidding. It really is something looking at  
that mountain. That is a big mountain Charlie.

- - -

04 09 14 57 LMP In my 2 o'clock position about - right on the rim of that little ridge we described earlier, there's a fresh little crater that is about 10 meters across, and it's just loaded with little 30, 40 centimeter blocks around it. Looks like you can see these blocks in the walls of that little crater. Looks like the thing is gonna be pretty blocky in the regolith. It really is bright outside. The surface looks almost white to me. (LM WINDOW)

- - -

04 10 15 45 CDR I'm up to frame number 30 on mag A, Charlie's camera, and I just finished shooting sort of a partial pan out the front window. Man, this place is - it's not anywhere flat around here. It's rolling terrain. And I really don't believe we're going to have any trouble at all getting up on the side of that hill, although the slopes up toward Crown look like maybe 20 degrees. We'll have to take that very carefully. (LM WINDOW)(PHO 113 18296-310)

04 10 16 36 CDR That first ridge is like about 10 degrees, but from there up to Cinco and Echo, it gets rather steep there. (LM WINDOW)

04 10 16 45 CC How about boulders? (LM WINDOW)

04 10 16 48 CDR It is just like we described, as very ridgy on Stone mountain. Boulders - well, we landed in a block field, you know. (LM WINDOW)

04 10 17 07 CC Right. Can you see any up on Stone? (LM WINDOW)

04 10 17 14 CDR No. Sure don't. Yeah. Maybe there is. When we get closer to it, we'll be able to tell better. I see some funny shadows up on top of it. (LM WINDOW)

04 10 17 25 CC Any problems in trafficability out on the EVA-1 direction. (LM WINDOW)

04 10 17 34 CDR It's gonna be a piece of cake, I think. (LM WINDOW)

04 10 17 40 LMP Tony, the problem looks like finding a flat spot to deploy the ALSEP. It's just hummocky, rolling terrain with 4- or 5-meter ridges. (LM WINDOW)

04 10 17 57 CDR Yeah, 100 meters from here, it's going to be on the (LM WINDOW)  
side of a hill.

04 10 18 01 LMP We can probably put it over the left there, John. (LM WINDOW)  
Tony, I looked out - down at about 4000 feet,  
assessing North Ray area. There were some large  
blocks maybe 5 percent of the surface up around the  
rim, but as you look back towards Palmetto, they  
really petered out in a hurry, and I think we're  
going to be in good shape going that way.

04 10 18 32 LMP One final comment here until I get back to work. (LM WINDOW)  
About in my 1 o'clock position, about 30 meters out,  
just beyond the LM shadow, about twice as far as the  
LM shadow, there is a secondary crater with a large  
meter-sized block still in it. It looks like it  
formed the secondary, the top 3 percent or 5 percent  
of the block is black and white. Apparently below  
that is solid white.

04 10 19 07 LMP And those black and white blocks - you can see them (LM WINDOW)  
all over the place.

04 10 19 13 CC Is the crater round, or is it oblong? Can you get a (LM WINDOW)  
direction?

04 10 19 22 LMP Yeah. It looks like to me it came from South Ray. (LM WINDOW)  
It's oblong, stoved in towards Palmetto - just like  
those ones down at the cape that they dug out with a  
bulldozer.

04 10 19 35 CDR I guess I have to stick to my earlier guess that we (LM WINDOW)  
were about - maybe 200 meters north and 100 meters  
long past Double Spot, the northernmost crater of  
it. But we'll see as soon as we get out, because  
this is the first place I was ever at on a geology  
trip that I thought I knew where I was when I  
started.

04 10 20 32 CC Roger. Okay. The one thing we would like you to (LM WINDOW)  
see if you could decide before you get out is where  
you would put ALSEP.

04 10 21 19 CDR Well, we'll keep looking at it, but the trouble is, (LM WINDOW)  
right in front of us, about 50 meters, there's a  
ridge, and I don't know what's on the other side of  
that ridge. Out about 100 meters, I can see a lot  
of blocks, but I can't tell whether there are  
craters out there or not, because we're at zero  
phase. I just don't think we could make a  
prediction at this point.

04 10 22 19 CDR Those blocks around South Ray are about the whitest (LM WINDOW)  
blocks I've ever seen, around the rim of that one.

- - -

04 10 40 50 CC Have at it. We'll take any words you've got. We (LM WINDOW)  
expended all our questions a few minutes ago with  
John, and in fact I didn't even have to ask any; he  
just answered them all, so - but press on.

04 10 41 04 LMP Okay. Looking out at 12 o'clock on the horizon (LM WINDOW)  
there is a very hilly subdued region - well, let's  
say hilly terrain at 12 o'clock that goes on out of  
view around to 11. It's rolling, with white  
pockmarked craters there, and I'd say that's maybe  
50 to 100 meters above the surrounding terrain where  
we are. As you move around from 1 to 3 o'clock  
approaching the - at about 1 o'clock, I would say we  
can see maybe a kilometer or so, but it might be  
very deceiving on that distance and we see more  
rolling terrain similar in albedo. It's a light  
gray with fresh craters being white. As we come on  
to 3 o'clock - 2:30 to 3 - the near ridge that was  
on our map so that blocks out North Ray and Stone  
mountain is, correction, Smoky is really there and  
it's about a 3- to 4-degree slope, and the ridge  
maybe goes up 10 to 15 meters. As we come into the  
near field at 12 o'clock in front of the LM maybe 50  
to 100 meters, there's this other low ridge that we  
described, beyond that we can see a depression, and  
then it rises again to another ridge, which probably  
- goes into Spook crater. I think I can see Spook  
on the horizon at about my 12 o'clock position. As  
we - that is boulder covered. The largest boulder I  
see is perhaps 2 to 3 meters in width, and they're  
angular and there are three of those boulders, and  
one is at 12. The other two are over on that second  
rise away from us at about 1:30, and I'd say those

boulders and smaller down to 1 meter cover maybe 1 percent of the surface. The trafficability out that way looks good as far as boulders go. It's going to be up and down though. As we come into 2:30 from 50 to 150 meters, I've already described that bright fresh crater with the small blocks around it, more cobbles really. Beyond that, there are two other craters, which sort of trend into this depression that runs north-south here. There's a boulder beyond that at 2:30, which is partially buried. It has a good fillet on the south side; to the north side, and to the east side, there's no fillet at all. As we come on into 3 o'clock in the near field, I see a good size crater, perhaps 30 meters to 50 meters at 2 o'clock on the inboard side, that's my side of this ridge, and we have maybe 10 percent of the surface covered with blocks of less than half a meter.

- 04 10 44 26 CC Very good Charlie. Where again was this boulder (LM WINDOW)  
with the fillet?
- 04 10 44 33 LMP It's at about 2:30, maybe a couple of hundred meters (LM WINDOW)  
out, and it's on this side of the ridge that trends  
east-west here, that blocks out Smoky.
- 04 10 44 45 CC Okay. Could it be sliding down the ridge, and (LM WINDOW)  
that's why the fillet's on the south?
- 04 10 44 52 LMP That might be the reason. I was just going to say, (LM WINDOW)  
it's downslope so that might have been what  
happened.
- 04 10 45 00 LMP Though the slope doesn't appear that steep, Tony. (LM WINDOW)
- 04 10 45 05 CC How about the Buster area? Can you identify that? (LM WINDOW)
- 04 10 45 10 LMP We sure saw it on descent. I don't see it right (LM WINDOW)  
now. There's a bright crater to the right, maybe 50  
meters of what I think is Spook, which is probably  
Buster, but I really wouldn't swear to it.
- 04 10 45 31 CC Can you tell boulders over there? (LM WINDOW)
- 04 10 45 37 LMP There's not a one, as far as I can see. (LM WINDOW)

- - -

04 10 45 49 LMP Coming down Tony on descent it looks - as John has (LM WINDOW)  
described, there's a distinct ray pattern across our  
landing site from South Ray, and the boulders  
effectively disappear by - we get to Palmetto. And  
then they don't reappear again until almost the  
flank of North Ray. You can see that depression  
that trends southward out of North Ray, and you can  
see the ridge line that I think will be an excellent  
way to climb up to North Ray in the Rover. Now this  
was all from 5000 feet, so I might be a little off  
on that, but at least the general impression was  
good. We could see Dogleg, we could see Cat; all of  
the craters that were on the stops were plainly  
visible. Hopefully, they'll be so when we start  
navigating on the ground.

04 10 46 48 CC Very good. You were mentioning the boulders and the (LM WINDOW)  
rays from South Ray. The ray itself, could you map  
out what extent it was, or was it just the whole  
general area?

04 10 47 02 LMP It was a pretty wide ray coming across here. I (LM WINDOW)  
would say it goes from our position perhaps to  
Spook. And maybe behind us maybe another 100 meters  
or so.

04 10 47 15 CC Very good. How about left-right extent, did it go (LM WINDOW)  
all the way back to South Ray?

04 10 47 23 LMP Well, you'll have to ask John that. I didn't - (LM WINDOW)  
couldn't see out that way. As we - the biggest  
block that I saw was one we flew over which is maybe  
100 meters to 200 meters behind us, and it looked  
like Volkswagen size.

- - -

04 10 53 30 CDR I can't see how far the rays go. I just assumed (LM WINDOW)  
that this is a blocked view we're in from South Ray.  
It goes about 100 meters out at 10 o'clock and goes  
over a ridge and disappears. The next time I see  
it, it's at South Ray, which is, you know, pretty  
far away from here. South Ray is a doggone  
interesting crater. I wish we could get to it. The  
boulders on the west rim of it are just thick and  
white as they can be, and in the middle of it - on  
your map where it looks like it's a depression -

there appears to be a brown - a sort of a gray patch of dirt or something that was thrown out of that side of it. And then on the north, there's another ray of very white boulders coming out of it. Of course, we could see the ray pattern long before pitchover. At 22,000, I was able to get my nose up against the window and see the clue to where we were was South Ray. Because at 22,000 and at 60-degree pitch angle, we couldn't even see Stone mountain or any of the things in the rear, but you just didn't have any doubt in your mind that that big crater, and the way the pattern went, you work your around the pattern - I used the same guages to find out where we were going to land that we used on the L & A. The inverted "V" off of Stubby; Cove, Trap, Stubby, Wreck, Trap, and it works into Cove, Hidden Valley, and into Spook and from Spook off those small craters into Double Spot. And, I think we ended up landing right by one of the smaller craters that sort of form a hook off the north side of Spook, going back into Double Spot, and I think we're about 50 meters from it at 9 o'clock but - -

- - -

04 10 55 48 CC How about the albedo? (LM WINDOW)

04 10 55 55 CDR Tremendous difference in albedo. On the North Ray is pure white - South Ray is pure white, and it blends into a gray, and then over here by us, it's almost totally gray. I guess you just get the feeling that these rocks may have come from somewhere else. There's a big subangular rock that I see at 11 o'clock at about 100 meters, that I would sure like to go over and look, because it looks like it's just one big piece of whatever rock it is. (LM WINDOW)

04 10 56 37 CDR Oh, and I do happen to see a white clast in the bottom of it. (LM WINDOW)

04 10 56 42 CC I was wondering about the albedo on your surface chart, on the strips and things, whether the rays are as obvious as they are on the high sun angle chart that you're carrying, or whether they look very much different at the low sun angle. (LM WINDOW)

04 10 56 58 CDR No, they're not, I don't think. I can see from here (LM WINDOW)  
down to - Survey Ridge and the albedo on there is a  
lot lighter. It's a general gradual downslope from  
our landing point to Survey Ridge, and it looks like  
it drops maybe a hundred meters and then starts to  
go right back up Smoky mountain. I guess you could  
see on a contour map where the low spot is.

04 10 57 38 CDR But there are some strange looking craters over (LM WINDOW)  
there on Stone mountain, and the albedo contrast is  
really pronounced in those craters. It may be a  
function of shadow, we better wait until we get over  
there. I hesitate to say, they almost look like big  
- well, they must be impact craters, I guess.

04 10 58 07 CC Okay. I was just wondering about whether you could (LM WINDOW)  
recognize whether you're on a ray by albedo as well  
as the boulder content.

04 10 58 20 CDR I think you're going to be able to; but, boy, you're (LM WINDOW)  
not going to pick up a contact; it just tails out  
into something.

- - -

04 10 58 36 CDR You're not going to be able to work across the (LM WINDOW)  
contact. But you mainly would do it by the white  
boulders in the ray, I think. I can see, on ridge  
lines - from here, three different rays out of South  
Ray, I believe. Have to go down there and look at  
them to make sure. They seem to be riding on the  
ridge lines, although that's probably deceptive  
because I can't see down in the holes.

04 10 59 05 LMP Tony, one other comment from my side, distances are pretty deceiving here for me. I'm looking out over John's shoulder, and it looks like to me you could throw a rock into South Ray from our present position; which is, I know, impossible. A second comment has to do with the orbital, since we got so much - so much look at the ground sailing around waiting to come down. Everywhere we saw the ground, which is just about the whole sunlit side. In the crater walls and on the ridges, we had the same lineation that the Apollo 15 photography showed on Hadley Delta and Hadley mountain. It was really remarkable how in the crater walls primarily, and in the ridges, and it gave you the impression that it was a fracture pattern that was all trending parallel to the - concentric around the craters, in the craters and - on the ridge, though they were sort of either parallel to the ground or at some depth, be what that may. (LM WINDOW)

04 11 00 31 CDR And I'm looking out here at Stone mountain, and I got a picture of it, and it looks like somebody has been out there plowing across the side of it. The benches just look like one sort of terrace right after another, right up the side. And they sort of follow the contour of it right around. (LM WINDOW)

04 11 00 51 CC Any differences in the terraces? (LM WINDOW)

04 11 00 58 CDR No Tony, not that I can tell from here. Those terraces could be rays out of Stubby or something like that. (LM WINDOW)

04 11 01 10 CDR Right at the edge of Stone, Stubby has got much steeper walls going off of Stone mountain than I originally imagined it. I don't think Stone mountain came up to Stubby and stopped. (LM WINDOW)

04 11 01 40 CC Okay. You think Stubby is punched into the edge - - (LM WINDOW)

04 11 01 47 CDR Well, that's my guess from here but there again, the thing is so steep that the whole side of Stone mountain right now - a good half of it is in shadow. (LM WINDOW)

04 11 01 59 CC Charlie. One thing, you mentioned two rock types - the black and white ones and then the all white ones. Do you see anything else? (LM WINDOW)

04 11 02 13 LMP Yes, there was one right out in front of the LM (LM WINDOW)  
here, just to the right of the footpad that looks  
like a breccia to me. - either that, or an  
indurated regolith. We'll tell you when we get out.

04 11 02 45 LMP Tony, we'll give you an analogy of what that black (LM WINDOW)  
and white rock looks like. It's really a gray and  
white and looks like a granitic rock with very large  
crystals to it, though I kind of doubt that.

04 11 03 13 CDR There are really some interesting rocks out here. I (LM WINDOW)  
see some that are pure snow white, and we've got the  
whole run of them. It's hard to tell at this  
sunlight, which is so bright on the surface, just  
exactly what color these things are, even with the  
naked eye. You know, it's very deceptive. I swear  
I see one out there with some pink in it, but we'd  
better wait until we get out. We'll pick it up and  
make sure.

- - -

04 11 04 36 CC Hey, Charlie. When you get a chance, could you take (LM WINDOW)  
a look at that ridge at 12 o'clock, which you  
described as 50 to 100 meters out, and see if that  
continues on around to 10 and 9?

04 11 04 50 CDR Yes, it does. (LM WINDOW)

04 11 04 53 CDR Okay, continues on around to my side. (LM WINDOW)

04 11 04 57 LMP John's original observation was that we look like (LM WINDOW)  
we're in a big old subdued crater, and that's really  
what it looks like Tony.

04 11 05 14 LMP Man, those black and white rocks really look (LM WINDOW)  
interesting Tony. I just can't wait to grab one of  
those.

04 11 05 28 LMP In fact, the impression you get is that it almost (LM WINDOW)  
looks like the color of labradorite.

04 11 05 56 LMP I guess it's really a bluish cast, instead of real (LM WINDOW)  
black to me, but in this sun it looks bluish.

04 11 06 14 CDR Well, we'll bring you a small one of each. I'll (LM WINDOW)  
tell you one thing, I'm glad we brought the rake,  
because we really can do it.

04 11 06 25 CDR We can get a rake sample out in front of the Lunar (LM WINDOW)  
Module with one scoop.

---

04 11 52 22 LMP Well I guess I can't stop talking - one final (LM WINDOW)  
observation, Tony, is that due to the lack of dust  
that we had on landing and the fact that we can see  
blocks embedded in the side of these craters, here,  
I kind of got the distinct impression that the  
regolith is not too thick around here, and we ought  
to maybe think about where would be the thickest  
place to - in order to get the drill in.

04 11 52 53 CC That's a good observation. From the films you've (LM WINDOW)  
seen of other descents, do you think the dust was  
less than any of the others?

04 11 53 03 LMP Well, John will have to really comment on that, but (LM WINDOW)  
as far as my side goes, I could see right on down  
through it - the dust film.

04 11 53 18 CC From listening to your descent, it sounded like you (LM WINDOW)  
picked it up about 90 feet.

04 11 53 26 LMP It was a little bit less than that. It was about (LM WINDOW)  
80, maybe 75.

---

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

04 23 01 47 CDR Okay. Houston, I'm standing out on the porch. I've (LM)  
got the ETB in one hand, and we're just sort of  
looking around here. My golly, what a view. I can  
see the big boulders Charlie was talking about.

04 23 04 05 CDR There you are our mysterious and unknown Descartes (LM)  
Highland Plains, Apollo 16 is going to change your  
image. I'm glad they got old Brer Rabbit, here,  
back in the briar patch where he belongs.

- - -

04 23 05 02 CDR Well, don't come out until you see what we - see (LM)  
what we just passed over.

04 23 05 06 LMP It was a big rock, I tell you. (LM)

04 23 05 09 CDR It was a big hole. (LM)

04 23 05 13 LMP Okay. Close the hatch. (LM)

04 23 06 05 LMP Wow! Look at that landing. You almost got a big (LM)  
rock with the - about a 50-centimeter rock with the  
left leg.

04 23 06 24 LMP Fantastic. That's the first foot on the lunar (LM)  
surface; it's super, Tony. Okay, Tony, we're making  
little footprints here about 1/2-inch deep, not  
kicking up really very much. We're going to have to  
pull that MESA up, John; that's too low.

- - -

04 23 13 19 LMP Well, Houston, here we are. Sleepy little (LM)  
Descartes. Boy, the old Cayley Plains are really  
something. Tell you, there are rocks all over the  
place, as we described.

- - -

04 23 14 15 LMP Tony, right behind the LM here, within 3 meters of (LM)  
the minus-Z footpad there's a hole, a crater that is  
probably 10 meters deep - 5 meters maybe, but 30  
degrees for angles on the side.

- - -

04 23 15 30 LMP Tony, if I get 20 feet back to do the pan from the SEQ bay here, I'm going to fall in that big hole. (LM)(PHO 113 18313-30)

- - -

04 23 17 36 LMP Hey, that rock under there looks like a vesicular basalt to me. The black one. (LM)

- - -

04 23 20 17 LMP John picked up the exact bottom of this old crater. (LM)

04 23 20 25 CDR There weren't any flat places around here, Charlie. (LM)

04 23 20 29 LMP Yes, but anywhere else we would have landed, we would have been on a great big slope. (LM)

- - -

04 23 22 50 LMP Watch that big rock there. (LM)

04 23 22 54 LMP About a 50-centimeter boulder right next to the minus-Y footpad, angular. (LM)

04 23 33 46 LMP Okay, Tony; I'm starting with mag Alpha at count 39. (LM)(PHO 113 18313-30)

- - -

04 23 34 32 LMP Okay, Tony, I'm gonna be about 20 meters behind - between the plus-Y and the minus-Z. If I get right into the SEQ bay, I'm in that big hole. (LM)

- - -

04 23 35 44 LMP Okay, pan complete. (LM)(PHO 113 18313-30)

- - -

04 23 35 53 CC Okay and we'd like you to take pictures of the ablated paint, Charlie. (LM)(PHO 113 18331-38)

04 23 36 00 LMP I'll do it at f:8, at about 15 feet. (LM)(PHO 113 18331-38)

04 23 36 11 CC Okay, we'd like f:8 at 250, and f:11 at 250 of all of the ablated surfaces. (LM)(PHO 113 18331-38)

- - -

04 23 36 34 LMP Tony you can see the striations caused by the (LM)  
 descent plume. It's running John.

- - -

04 23 37 05 CC Okay and when you're over at the S-band, we have a (LM)(PHO 113 18331-38)  
 couple of more pictures of that one.

- - -

04 23 37 54 CC We want you to take a picture of the white side of (LM)(PHO 113 18331-38)  
 the yoke. The yoke has a black side and a white  
 side. And on the white side, we want 1:250, f:5.6,  
 f:8, and f:11.

04 23 38 13 LMP Okay, I've got the f:8 and f:11. I'll do the 5.6 (LM)(PHO 113 18331-38)  
 one.

- - -

04 23 39 38 LMP Tony, the pan is complete. The soil around here is (LM)(PHO 113 18313-30)  
 very fine grain. Dusty, much like all the regolith  
 that we've seen samples of from the other sites.  
 The rocks are scattered. Perhaps 20 or 30 percent  
 of the surface is covered by boulders up to 25  
 centimeters. Small craters pockmark up the whole  
 place; meter to 2-meter size, covering perhaps 70  
 percent of the surface.

- - -

04 23 41 11 CDR I'm looking at a rock here that's got all kinds (LM)  
 of dark clasts in it, and that's got to be a  
 breccia. Too many different kinds. Yeah, it is.

04 23 41 27 LMP Looking at Stone mountain. You see some lineations (LM)  
 in it that are parallel to the local terrain - or to  
 the normal surface, and they follow the contour  
 lines. It looks to me it might be just some ridges  
 - small ridges in it. They're scattered about. I  
 say scattered about, that's not any good at all.  
 They look like a couple of meters wide or so, and  
 the same distance - - and separation.

- - -

05 00 02 54 LMP Okay, fine. Okay. The DAC is coming out. (LM)(PHO DAC)  
- - -

05 00 04 21 LMP Man, I tell you, if my Christmas stocking looked (LM)(PHO DAC)  
like this ETB, I'd be saved. Okay, magazine P, the  
X is in the middle, and the frame is lined up.

05 00 05 48 LMP Okay the camera is running! The 16 millimeter is (LM)(PHO DAC)  
running!  
- - -

05 00 07 35 LMP Magazine Bravo is going on the Commander's camera. (LM)  
And it's starting at frame count number 4.  
- - -

05 00 19 33 LMP I'm gonna get the control sample in. (LM)

05 00 19 35 LMP And it works. You can spin it right up, John. (LM)  
- - -

05 00 24 36 LMP We're starting the LMP's camera for the flag. (LM)(PHO 113 18339-40)  
- - -

05 00 25 02 LMP And, Tony, the Rover tracks - they are just barely (LM)  
sinking in.  
- - -

05 00 26 13 CDR Okay Charlie, say when. (LM)(PHO 113 18341-43)  
- - -

05 00 26 17 LMP One for you. Okay, wait a minute; one more. (LM)  
- - -

05 00 28 25 CDR You know, we hardly kick up any dirt at all, (LM)  
Charlie. Just hardly any.  
- - -

05 00 33 53 LMP - - I'm going out where this - man, look at that (LM-ALSEP)  
breccia, John! Right there. This big, subrounded -

- - -

05 00 39 16 LMP This ray pattern extends back about 200 meters or (LM-ALSEP)  
maybe more to the east and goes as far as we can see  
off to the west, which is maybe another 200 meters.  
I can see Smoky mountain now, and I can see Dome.  
Kennesaw is plainly visible with two big craters on  
its flanks. And if you look toward Smoky, I see  
some big craters up on the top, but I can't see  
Ravine or North Ray yet.

- - -

05 00 40 46 LMP Look at the size of that rock. It's about a 2-meter (LM-ALSEP)  
boulder, I just passed. Okay John?

- - -

05 00 41 37 CDR Charlie's down there to the southwest. (LM-ALSEP)

05 00 42 01 LMP I think that the best place here for the ALSEP is to (ALSEP)  
the LM 11 o'clock position, and I'll let John give  
you the range. But it's up on the top of a dome,  
and it's fairly flat, and I think John can drive  
about 290, maybe 28, down over a ridge for the  
thumper. There's just not any flat places here.  
This is the flattest I can find.

- - -

05 00 42 57 LMP The regolith hasn't changed any out this far. We (ALSEP)  
still have numerous subrounded to angular blocks -  
partially buried. Here's a secondary. Here's a big  
boulder, the one I described, that's 2 meters across  
with about a 50-centimeter fillet above the - -

- - -

05 00 44 01 LMP This big rock is a two-rock breccia. The matrix is (ALSEP)  
a black rock - blackish to bluish - with some very  
fine, submillimeter-size crystals.

- - -

05 00 45 07 LMP John, it sure looks like we're on a more than 2-degree landing slope, but it's not. (ALSEP)  
 - - -

05 00 45 32 LMP Okay, Tony back to this rock. The small frags in it are whitish in color with a small sub-millimeter crystal - millimeter-size crystals of - it looked like perhaps olivine in the white matrix - in the white clasts, let's say. And it's a biggie; it's right near the ALSEP. We'll get a picture for that. It'll show up in the pan. (ALSEP)(PHO 113 18344)  
 - - -

05 00 47 09 CDR - - there's just hardly any place that hasn't got craters around here. Is that where you want to put the ALSEP? (ALSEP)

05 00 47 13 LMP This is the levellest spot I could find. (ALSEP)

05 00 47 16 CDR There's just no place that doesn't have craters and things around it. Think 290 from here, huh? (ALSEP)

05 00 47 28 LMP Yeah, I'm about cross-sun here. (ALSEP)

05 00 47 34 CDR We're 1/10 on the range in distance. (ALSEP)  
 - - -

05 00 47 51 LMP Is that 290? (ALSEP)

05 00 47 52 CDR No, let me show you 290. Like this. (ALSEP)

05 00 47 58 LMP Okay; that's okay. (ALSEP)

05 00 48 00 CDR It's right down in this hole, is what it is. (ALSEP)

05 00 48 04 LMP I can move it over here another 30 feet or so. (ALSEP)

05 00 48 07 CDR Okay, do that. Oh boy, I tell you, this place is full of holes, Houston. And rocks. (ALSEP)  
 - - -

05 00 49 25 LMP How does that look out there, John? (ALSEP)

05 00 49 27 CDR It looks like everything else around here full of (ALSEP)  
holes.

05 00 49 31 LMP I know it, and lots of craters. (ALSEP)

05 00 49 33 CDR Lots of craters. (ALSEP)

05 00 49 35 CDR We're not lacking for them. (ALSEP)

- - -

05 00 50 11 CDR If the number of craters are any indication, this (ALSEP)  
has got to be old material. Even the craters have  
craters.

05 00 50 44 LMP Man, I am black already, from the knees down. (ALSEP)

05 00 50 52 CDR Okay, have you got the Central Station lined up? (ALSEP)

05 00 50 55 LMP East-west. (ALSEP)

05 00 50 57 CDR You going to deploy your drill down there, huh? (ALSEP)

05 00 51 06 LMP To the south. You need to park - (ALSEP)

05 00 51 11 CDR I'll park over there by that rock, Charlie. Heading (ALSEP)  
180?

05 00 51 18 CDR 195. (ALSEP)

05 00 51 19 LMP Yeah, that'll be good. Great. (ALSEP)

05 00 51 22 CDR I tell you why I'll park over by that rock, because (ALSEP)  
it drops off like a -

05 00 51 56 LMP We're sort of dusty here and man we're - (ALSEP)

- - -

05 00 56 16 LMP I think we may have come a little further than we (ALSEP)  
thought we were going to, Houston. I see Double  
Spot back there or what looks like Double Spot - and  
we're a good ways past that.

- - -

05 00 57 00 LMP John, we're not much off I'll tell you. (ALSEP)

- - -

05 00 59 39 LMP Tony, let me give you a question here. The down-sun (ALSEP)  
heat probe is gonna be within 2 meters of about a  
5-meter crater. That's maybe a meter deep. Is that  
okay, or do you want me to move it?

05 00 59 57 CC Can you move it to a crater-free area? (ALSEP)

05 01 00 03 LMP Yes, I can, but it will be more towards the LSM. (ALSEP)

05 01 00 12 CC Okay, we'd like to do that. (ALSEP)

05 01 00 16 LMP Okay. The one up-sun is perfect, straight up-sun. (ALSEP)

05 01 00 34 LMP This is a super place right here for this up-sun (ALSEP)  
one. Okay here we go with a big drill coming up.  
Down into the crater he goes. There's a secondary -  
little one.

- - -

05 01 01 22 CC Now, when you're standing over the Rover there, (ALSEP)  
could you read off the heading?

05 01 01 25 LMP Bearing to the LM is 033, the heading is 195. (ALSEP)

- - -

05 01 04 47 LMP Walking into a little 3-meter crater here, Tony, you (ALSEP)  
can see. Really dig in when you go into those  
craters.

- - -

05 01 06 02 LMP I'm going to have to drill away from that crater. (ALSEP)  
Tony, I'm about 4 or 5 meters away, is that okay?  
From that crater I described?

05 01 06 08 CC That sounds good. (ALSEP)

05 01 06 12 LMP Okay, we'll start drilling right here, then. (ALSEP)

05 01 06 21 CDR Well, that won't be any problem. The only thing (ALSEP)  
goes down past there is the LSM.

05 01 06 29 CDR And we may have to deploy the LSM out behind the ALSEP anyway to get it from going down in that little crater there. I think 50 foot will put me right in that hole. What do you think of that, Houston, if I deploy the LSM behind Charlie's thing here?  
 - - -

05 01 07 43 CC That's okay, John. We understand you had to deploy it almost due west of the RTG? (ALSEP)

05 01 07 51 CDR Right. (ALSEP)

05 01 08 08 CC Okay, and we need about 30 feet between that heat flow hole and the LSM. (ALSEP)

05 01 08 26 CDR Understand. We'll give you that. (ALSEP)  
 - - -

05 01 09 20 LMP I can stab it into the ground about - okay are you guys ready? Here we go. (ALSEP)

05 01 09 35 LMP Mark. Hey, that beauty is going right in. (ALSEP)  
 - - -

05 01 09 51 LMP It's not going in. Something hard in there. (ALSEP)

05 01 10 07 LMP Whatever it was, we got through it, Tony. It's speeding up again. (ALSEP)

05 01 10 13 LMP Right on down now. It's super now. It must have been a rock. (ALSEP)  
 - - -

05 01 10 27 LMP Okay, and first, the long stem is in. (ALSEP)  
 - - -

05 01 13 37 LMP Here we go, second one. (ALSEP)

05 01 13 41 LMP Mark. Look at that beauty go. Look at that beauty stop. Look at that beauty go again. (ALSEP)

05 01 14 01 LMP I'm not leaning on it. It may appear that I am (ALSEP)  
 leaning on it, Tony, but I guarantee you I am not.

05 01 14 11 LMP Okay. It's run into something hard down there. I (ALSEP)  
 can feel the torque, but whatever it is, it's going  
 through it. Yep, it was through it. It's probably  
 just some rocks down there in the regolith, Tony.  
 You know, I bet it's just like the side of that  
 fresh crater we saw back near the LM.

- - -

05 01 16 26 LMP Mark. (ALSEP)

- - -

05 01 16 48 LMP Tony, it bogs down as it goes down through rocks and (ALSEP)  
 things. Now it's getting really hard. It's giving  
 me a lot of torque. The third stem is just about  
 in.

- - -

05 01 17 20 LMP Mark. Okay, I'll call it quits on that one. (ALSEP)

- - -

05 01 25 36 LMP Okay, starting on the deep drill. (ALSEP)(SAMP CORE 60001-07)(PHO 113 18367)

05 01 25 46 LMP Mark. (ALSEP)(SAMP CORE 60001-07)

05 01 25 51 LMP Mark. That one went in like gangbusters! (ALSEP)(SAMP CORE 60001-07)

- - -

05 01 29 21 LMP Okay, Tony; I had a tough time getting the bit off (ALSEP)(SAMP CORE 60001-07)  
 the first stem. Got a little dusty in there, but I  
 got it cleaned out.

- - -

05 01 31 56 LMP The problem is that the bit won't stay stuck in the (ALSEP)(SAMP CORE 60001-07)  
 ground, and when I try to get this stuff on, it  
 spins the whole deal instead of the - -

- - -

05 01 33 19 LMP Okay, second one going in, Tony. (ALSEP)(SAMP CORE 60001-07)

05 01 33 24 LMP Mark. (ALSEP)(SAMP CORE 60001-07)

05 01 33 32 CC Right. Don't hurry it. (ALSEP)(SAMP CORE 60001-07)

05 01 33 33 LMP I'm holding back on it this time. (ALSEP)(SAMP CORE 60001-07)

05 01 34 16 LMP Mark. Okay, the second one went in with no problem, (ALSEP)(SAMP CORE 60001-07)  
 Tony.

- - -

05 01 34 54 CDR Okay, the Central Station is erected. (ALSEP)

- - -

05 01 36 47 LMP Okay, last one going on, Tony. (ALSEP)(SAMP CORE 60001-07)

- - -

05 01 37 04 LMP Boy, if that's all the sections are like that first (ALSEP)(SAMP CORE 60001-07)  
 one, pull it - right out of the ground. But I don't  
 think that's true.

05 01 37 52 LMP This ain't the cleanest place I've ever been in my (ALSEP)  
 life. Ooh. Dust is everywhere.

05 01 38 19 LMP Okay, last one, Tony. (ALSEP)(SAMP CORE 60001-07)

05 01 38 21 LMP Mark. (ALSEP)(SAMP CORE 60001-07)

- - -

05 01 38 38 LMP Slowly going in. What I'm doing is let it do the (ALSEP)(SAMP CORE 60001-07)  
 work.

05 01 39 44 LMP Mark. (ALSEP)(SAMP CORE 60001-07)

- - -

05 01 41 55 LMP We really sink in on that rim of that little crater. (ALSEP)

- - -

05 01 44 04 LMP Okay, Tony. The top of the deep core has got cap (ALSEP)(SAMP CORE 60001-07)  
 number A.

- - -

05 01 49 28 LMP John, is that (LSM) going to be all right next to (ALSEP)  
that rock?

05 01 49 33 CDR There ain't much other place to put it. If it ain't (ALSEP)  
next to the rock, it's going to be in that hole  
right next to it.

- - -

05 01 50 08 CC John, how far are you from that rock? (ALSEP)

05 01 50 14 CDR It's about - 3 feet. (ALSEP)

- - -

05 01 51 23 CC On that hole, there, instead of putting the rammer (ALSEP)  
jammer down it, I guess we would like to put the  
second heat flow probe down the hole and then  
measure it with the rammerjammer, how far it went,  
and just leave the heat flow probe in the hole.  
Does it reach over there?

- - -

05 01 51 45 LMP No, I don't think it will reach, Tony. (ALSEP)

05 01 51 50 CC Okay, then, just go ahead and measure the hole. (ALSEP)

- - -

05 01 53 00 LMP All the way down I just dropped the rammer into it - (ALSEP)  
it just fell in.

- - -

05 01 53 16 CDR Okay, Charlie. We're about ready to go with the (ALSEP)  
geophones here.

05 01 53 19 LMP Wait a minute. I got the most beautiful thing here. (ALSEP)(SAMP 60090, 95)  
I got to pick this up - before I lose it.

- - -

05 01 54 14 LMP I'm coming. Let me put this over here. (ALSEP)(SAMP 60090, 95)

05 01 54 46 LMP Tony, on the rim of that little crater, as I walked through there, there was underneath the regolith, there was a white area. I kicked up some very white soil, about 3 centimeters down. (ALSEP)

- - -

05 01 55 39 LMP Okay, Tony. I stuffed the geophone stake in, by just pushing on it about a foot. Y'all better think about that two-tenths cone penetration; at 10. It looks like the 5 would be best all the way out. I think I'll just go right up to the hilt with the two. (ALSEP)

- - -

05 02 03 46 LMP Okay, Tony. I have LMP's camera. (ALSEP)

05 02 04 01 LMP The back of - the bottom of the bit is with Bravo - and I'm going back out and take some pictures. (ALSEP)(SAMP CORE 60001)(PHO 113 18345-75)

- - -

05 02 05 05 LMP Okay. All ALSEP taken at f:11, 1/250. (ALSEP)(PHO 113 18345-75)

- - -

05 02 13 49 LMP Tony, as I look up to Smoky mountain, you can see some large blocks up on the flank of Smoky mountain. On the face, it's the side next to North Ray crater. (ALSEP)

- - -

05 02 23 02 LMP We got all the pictures except for the ones John's supposed to take of the mortar package. And I'm, skipping the heat flow ones. And we're up to 101 on magazine Alpha. (ALSEP)(PHO 113 18345-75)

- - -

05 02 24 57 LMP Did you see what I held just in front of the camera, Tony? (ALSEP)(SAMP 60090, 95)

- - -

05 02 25 04 LMP It was a solid piece of glass, spherical and part of (ALSEP)(SAMP 60090, 95)  
it's broken away, but it really - most unique piece  
of glass I've seen in all the samples.

05 02 25 33 LMP It's a solid piece of glass. (ALSEP)(SAMP 60090, 95)

05 02 25 42 LMP And it was right out here by the drill. (ALSEP)(SAMP 60090, 95)

- - -

05 02 28 56 CC Charlie, what was the cap on the bottom end? We (ALSEP)(SAMP CORE 60001)  
missed that.

05 02 29 02 LMP Baker. (ALSEP)(SAMP CORE 60001)

05 02 29 06 LMP It's all full, Tony. (ALSEP)(SAMP CORE 60001)

05 02 29 43 LMP Delta and Baker on the bottom. (ALSEP)(SAMP CORE 60001)

05 02 29 54 LMP You're losing a little bit out of the third section (ALSEP)(SAMP CORE 60001-07)  
here. Get the cap on.

05 02 30 14 LMP And Echo is on the bottom of the third section. (ALSEP)(SAMP CORE 60001-07)

- - -

05 02 37 02 LMP Okay, Tony. I'm going to get a couple of grab (ALSEP)(SAMP 60030-35)(PHO 114 18383-84)  
samples out here in front of the Rover about 15  
feet. Look like typical rocks that are in this  
area. They're mostly dust covered here, but I can  
pick up a couple that are whitish, and I'll get a  
couple of cross-suns before.

- - -

05 02 40 55 CDR I can't believe how full of holes this place is - (ALSEP)  
a general comment. You got the camera, Charlie?

05 02 41 02 LMP No, it's on the Central Station. (ALSEP)

- - -

05 02 41 15 LMP Okay, bag 351 has got a grab sample. And I won't (ALSEP)(SAMP 60030-35)  
take an after.

05 02 41 30 CC After taking pictures of the mortar package there, (ALSEP)(PHO 113 18376080)  
we would like a picture of that last thump imprint. (PHO 113 18381-82)

-- --  
 05 02 41 43 LMP Houston, I was just saying my first rock - even though I had to fall down to get it. (ALSEP)(SAMP 60030-35)  
 -- --  
 05 02 43 20 CDR Okay. What settings do you want on that, Houston? (ALSEP)(PHO 114 18383-84)  
 05 02 43 24 CC Cross-sun on it. Normal cross-sun. (ALSEP)(PHO 114 18383-84)  
 05 02 43 31 CDR You want a stereopair? (ALSEP)(PHO 114 18383-84)  
 05 02 43 32 CC That'd be fine. (ALSEP)(PHO 114 18383-84)  
 -- --  
 05 02 44 15 LMP I'm going over to this crater and get you some of this white soil. I think it is coming off of this rock here, but it looks like caliche. I never thought I'd use that word up here, but that's what the coating looks like. (ALSEP)(SAMP 60050-59)(PHO 114 18385-88)  
 05 02 44 35 LMP Come and look at it, John. It might be just a total white rock; the cross-sun, oh, man, are your settings going to be terrible. (ALSEP)(SAMP 60050-59)  
 -- --  
 05 02 45 15 LMP Get a little shovelful of that stuff. (ALSEP)(SAMP 60050-59)  
 05 02 45 25 CDR Gosh, Charlie, it does look like caliche. (ALSEP)(SAMP 60050-59)  
 05 02 45 27 LMP Doesn't it look like caliche? (ALSEP)(SAMP 60050-59)  
 05 02 45 28 CDR Yeah, but it's just a bunch of white frags, I believe. (ALSEP)  
 05 02 45 33 LMP I'm going to get this rock here, too. (ALSEP)(SAMP 60070, 75)(PHO 114 18385-88)  
 05 02 45 36 CDR Put that in there? (ALSEP)  
 05 02 45 37 LMP No, go ahead, I'll get another bag for that. (ALSEP)(SAMP 60070, 75)  
 05 02 45 49 CDR Okay, that - sample of white material is going in bag 355. (ALSEP)(SAMP 60070, 75)

05 02 46 09 LMP Okay, John, I got your pictures. (ALSEP)(SAMP 60070, 75)(PHO 114 18385-88)

05 02 46 13 CDR Charlie, what are you doing with the dirt? You just threw it all over yourself. (ALSEP)(SAMP 60070, 75)

05 02 46 17 LMP I didn't mean to - the rock fell out. (ALSEP)(SAMP 60070, 75)

- - -

05 02 46 28 LMP Okay, Tony. It's a white matrix in this rock with some clasts - it's a one-rock breccia. One of the clasts just fell out. But it really looks like a caliche matrix. Sort of friable. (ALSEP)(SAMP 60070, 75)

- - -

05 02 46 53 CDR Oh - what do you want to do with these samples? (ALSEP)(SAMP 60050-59, 70, 75)

05 02 46 56 LMP Put them in this HTC right here. (ALSEP)(SAMP 60050-59, 70, 75)

05 02 46 58 CDR Okay. This number 2 one? (ALSEP)(SAMP 60050-59, 70, 75)

05 02 47 00 LMP Yeah. That's the one that's going on somebody's back. (ALSEP)(SAMP 60050-59, 70, 75)

05 02 47 06 CDR It's got the core tubes in it, so it probably goes on your pack. (ALSEP)

- - -

05 02 47 28 LMP Okay. This white rock - that I picked up is in bag 373. (ALSEP)(SAMP 60070, 75)

- - -

05 02 47 52 LMP Okay, John. I got to change the mag on my camera. Can you give it to me? (ALSEP)

- - -

05 02 49 06 LMP Hey, Tony. Magazine Alpha is going out with 110. (ALSEP)

- - -

05 02 49 16 LMP Dust everywhere, John. (ALSEP)

05 02 49 27 LMP Okay. Magazine Golf is going on at frame count 2. (ALSEP)

- - -

05 02 49 50 LMP Okay, Golf runs. (ALSEP)(PHO 109 17746)

- - -

05 02 50 06 CDR Okay, Charlie, which bag do you want? (ALSEP)

05 02 50 10 LMP There's a set of bags over here. (ALSEP)

05 02 50 13 CDR Okay, 5, 6, 7, or 8 setting there. I'll get you one. (ALSEP)

- - -

05 02 50 29 CDR That big rock right there is a breccia - look at all those clasts in there. (ALSEP)

05 02 50 33 LMP I know it - most of them in here are breccias. (ALSEP)

05 02 50 40 LMP I picked up one. (ALSEP)(SAMP 60070, 75)

05 02 50 43 CDR Yeah, that's about a two-rock breccia there. (ALSEP)

- - -

05 02 52 47 LMP In fact, Tony - looking up-sun towards the eastern part of Stone mountain, you cannot see those lineations, but as we look across-sun those lineations are there - - (ALSEP)

- - -

05 02 53 03 LMP Yeah, and they trend sort of upslope to the northwest. (ALSEP)

- - -

05 02 53 27 CC Yeah, it's funny. It turns the same as Hadley. (ALSEP)

05 02 53 22 LMP Yeah, it does exactly. And it goes right up over the ridge, a ridge line and back down the ridge - the one that's got Cinco craters on it, and then back down into the ridge where - (ALSEP)

- - -

05 02 58 32 CDR Okay. 033 is the bearing; the range is 0.1. (ALSEP)

---

05 02 58 48 LMP Okay, Tony. Looking off to the northwest there, (ALSEP-1)(PHO 109 17747)  
you can see South Ray crater with just tremendous  
amount of blocks on it with some black streaks, and  
here we go. Heading 274, John.

05 02 59 08 LMP And it's going to be a piece of cake taking pictures (ALSEP-1)(PHO 109 17748-74)  
from here, Tony. There's a big crater. There about  
10 meters off to your left there, John.

05 02 59 17 LMP A deepy one over here. (ALSEP-1)

---

05 02 59 32 LMP Okay at 043, at 0.2, just beyond the ALSEP, there (ALSEP-1)  
are two twin craters; the biggest one's to the  
north, got blocks in it, up to 6 - 50 centimeters,  
and it's about 5 meters deep.

---

05 03 00 44 LMP We're still in this boulder field, on a heading of (ALSEP-1)  
300 now just navigating around a couple of craters,  
they are very angular. All of them look the same -  
these breccia clasts with a dark matrix with white  
clasts. Biggest one I've seen is about in the 12  
o'clock position of the Rover, and we're 065, 0.2  
and it's - about a meter across. Tony, we seem to  
be riding across a ridge top that trends east-west.  
Off to the left, it drops off drastically, about  
maybe a 5- to 10-degree slope into a valley which is  
probably Eden Valley.

05 03 01 43 LMP And white - and South Ray crater is spectacular in (ALSEP-1)  
our 10 o'clock position, and we're 072 at 0.3 now.

---

05 03 02 48 LMP 0.4, still nothing new to report. Maybe more (ALSEP-1)  
cobble in this area now. In fact there are. The  
regolith is more cobbly in appearance, still  
angular. Maybe 40 percent of the surface is covered  
with cobbles that are 10 centimeters.

- - -

- 05 03 03 28 LMP We see some small fresh craters. Okay, meter size, (ALSEP-1)  
that show some very fresh - at least, perhaps it's  
induration - indurated regolith. That's what it  
looks like, because it's - the little hard clods are  
the same inside the craters as on the rim.
- 05 03 04 00 LMP At our 11 o'clock position, we're at 089 for 0.4. (ALSEP-1)  
We have two very bright, small craters that are 2 -  
3 meters across, and we see some whitish material  
down below in the walls of the craters there.  
They're about 25 meters off.
- 05 03 04 23 CC Those rocks that you collected; were they all (ALSEP-1)(SAMP 60035, 55-59, 70, 75)  
breccias, or could you tell?
- 05 03 04 32 LMP I'm not sure, Tony. I think they were breccias, but (ALSEP-1)(SAMP 60035, 55-59, 70, 75)  
they were sort of really dust-covered, so I couldn't  
tell you, really.
- 05 03 04 40 CC Okay, understand. And have you seen any rocks that (ALSEP-1)  
you're certain aren't breccias?
- 05 03 04 54 LMP Negative. I haven't seen any that I'm convinced is (ALSEP-1)  
not a breccia.
- 05 03 05 03 LMP Okay. We're going generally west now, and at our 1 (ALSEP-1)  
o'clock position on a heading of 270 at a bearing of  
- we're 091 at 0.5 - we're in another predominant -  
another distinct ray field, ray pat - ray, let's say  
- boulder field. We sort of passed out of one, and  
we're in another one.
- 05 03 05 31 CDR Think that to the south of us is Spook? (ALSEP-1)
- 05 03 05 36 LMP It could be. (ALSEP-1)
- 05 03 05 42 LMP No, Spook's about - let's see - at 0.6, we should be (ALSEP-1)  
at Spook, huh? Let's see. Spook is at 100 at 0.9.  
Not there yet. We're only 0.6, Tony. Okay. This  
ray field has the same pebbles and cobbles and some  
good secondaries here.

- - -

05 03 06 28 LMP Okay. Turn left, John, and let's go look at that - (ALSEP-1)  
 look down over there. Boy, Tony, there is some  
 excellent little secondaries with the indurated  
 regolith in them and on the rim. The biggest one is  
 a couple of meters.

05 03 06 50 LMP You know that might have been Spook right back (ALSEP-1)  
 there. That was a pretty big crater.

05 03 06 56 CDR It sure was. (ALSEP-1)

05 03 06 57 LMP Right back there, John. Boy, it's really hard - (ALSEP-1)  
 there's an interesting rock. A layer - layered,  
 really dust-covered, like a regolith, I mean a -  
 turn left, John. There's a crater over there, a big  
 one.

05 03 07 18 CDR Boy, that is a biggie. (ALSEP-1)

05 03 07 20 LMP That's it. That's got to be - and here - Buster, (ALSEP-1)  
 right over here, with some blocks around it to my  
 right.

05 03 07 28 LMP Boy, that is a biggie. Okay, here is Spook and it's (ALSEP-1)  
 089 at 0.7.

05 03 07 38 LMP And that is a biggie. (ALSEP-1)

05 03 07 41 CDR We're almost completely past it; we're not right (ALSEP-1)  
 even with it. Where'd you say Buster is?

05 03 07 48 LMP I thought it was right over here, John. (ALSEP-1)

05 03 07 51 CC Is the rim of Spook distinct? (ALSEP-1)

05 03 07 52 LMP Right straight ahead here. Negative, it's real (ALSEP-1)  
 subdued, Tony.

05 03 08 01 CC Okay, do you see any ledges or anything inside of (ALSEP-1)  
 Spook?

05 03 08 09 LMP No, we sure didn't. We're driving on, now. I think (ALSEP-1)  
 we're coming up on the rim of Buster, and we've got  
 some - a real good boulder field around Buster.

05 03 08 24 LMP With some frags that we'll be able to get off. The (ALSEP-1)  
biggest boulder's a meter - cobbles - it's real good  
for raking here. Here it is, John. That's it,  
Buster, there it is. Okay, in Buster, Tony, I can  
see some huge boulders in the bottom of that thing.

05 03 08 45 CDR That is a big crater. (ALSEP-1)

05 03 08 49 LMP How big is Buster, Tony? (ALSEP-1)

05 03 08 53 CC About 40 meters. (ALSEP-1)

05 03 08 54 LMP That's bigger than Buster. (ALSEP-1)

05 03 08 56 CDR That's Buster, 50 meters. It's 150 feet, Charlie. (ALSEP-1)

05 03 09 01 LMP Okay. That's Buster then. (ALSEP-1)

05 03 09 03 CDR Yep, sure is. (ALSEP-1)

05 03 09 04 LMP And, Tony, we've got some - 5-meter boulders in the (ALSEP-1)  
bottom of it. Some real big ones. The biggest, 5  
meters, and the whole bottom is covered; we're going  
downslope now.

05 03 09 19 CC Okay, there should be a scarp around there some (ALSEP-1)  
place.

05 03 09 22 LMP Okay, we see it. Over to our 2 o'clock position, (ALSEP-1)  
and - it looks like the rim of a crater, but I think  
it's a scarp.

05 03 09 36 CDR What's the heading from here to - oh, man. (ALSEP-1)

05 03 09 41 LMP Okay, we want to head - just keep going west. (ALSEP-1)

05 03 09 46 LMP We want to get 100 degrees at about point - that's (ALSEP-1)  
Station 2. Wait a minute; we want 96 at 1.5. It's  
about 280. Most of the rocks that we've seen look  
like breccias to me. Off to the right, what I  
thought was a scarp - turned out to be a crater on  
the side of a ridge that runs east-west.

- - -

05 03 10 33 LMP We're out to 089 at 1.0, Tony. (ALSEP-1)

05 03 10 39 LMP In this area, the regolith is real smooth. The (ALSEP-1)  
 block - the cobble population is distinctly smaller.  
 I hope that's Spook. How big is Spook, 300 meters?  
 There it is, there's the Buster, I mean, there's  
 Flag. We're here.

05 03 11 06 CDR It sure is, isn't it? (ALSEP-1)  
 - - -

05 03 11 09 LMP Okay, 088 at 1.0 is - hey, we stop, John, about 40 (ALSEP-1)  
 meters from Plum.

05 03 11 23 CDR Hey, now, I don't see Plum. (ALSEP-1)

05 03 11 24 LMP There it is, right there. (ALSEP-1)

05 03 11 26 CDR That's Plum? (ALSEP-1)

05 03 11 28 LMP Yeah. (ALSEP-1)

05 03 11 30 CDR I ain't even on the rim. (ALSEP-1)

05 03 11 32 LMP Well, it is; - the rim is right here. We're on top (ALSEP-1)  
 of the rim.

05 03 11 40 LMP Hey, stop. It's going to be terrible walking on (ALSEP-1)  
 this thing. Why don't we go turn around and go back  
 up on the rim where it's level?

05 03 11 49 CDR Suits me. (ALSEP-1)

05 03 11 53 LMP This is a steep slope here. Okay, Tony. It didn't (ALSEP-1)  
 seem like there was that much distance between 300  
 meters since Flag. That's not 300 meters. Is that  
 300 meters right there?

05 03 12 14 CDR Charlie, you got me. I can't tell. (ALSEP-1)  
 - - -

05 03 12 24 CDR Okay. 087 at 1.1. (ALSEP-1)

05 03 12 36 LMP Well, that's a big crater anyway. (ALSEP-1)

05 03 12 38 CDR Yeah, it looks to me like we're due north of South (ALSEP-1)  
 Ray crater right now. I can look down there, and  
 I feel like I'm bisecting it. No, we're not due  
 north of it, not according to shadow.  
 - - -

05 03 13 14 LMP Okay, it was 0.9 - it was 0.6 between Buster and - (ALSEP-1)  
 that's got to be Buster.  
 - - -

05 03 13 35 CDR That's a 40-meter crater. (ALSEP-1)  
 - - -

05 03 13 38 LMP Yes; that's what I'm thinking. (ALSEP-1)  
 - - -

05 03 13 42 LMP We're going to call this Flag. (ALSEP-1)

05 03 13 48 CDR Let me park the thing - - heading south. (ALSEP-1)  
 - - -

05 03 14 40 LMP Plum crater is sitting right on the rim - on the (ALSEP-1)  
 outer rim of - Flag, and it's - what appears to me  
 to be 200 meters - pretty big crater - we call Flag.

05 03 15 12 CDR Another big one right back here \*\*\* (ALSEP-1)

05 03 15 14 LMP See that big one back up there that we called - this (ALSEP-1)  
 might be Halfway, this one right here.  
 - - -

05 03 15 25 CC Our measurements say that - - you should be pretty (ALSEP-1)  
 near Halfway.

05 03 15 31 CDR Okay, why don't we get back and try some more, (ALSEP-1)  
 Charlie?  
 - - -

05 03 17 24 LMP Okay, Tony. Based on your knowledge of our position (ALSEP-1)  
 - give us where you think Flag is.

05 03 17 32 CC It looks like Plum crater would be almost due west of you about 200 meters. (ALSEP-1)  
 ---

05 03 18 24 LMP And - this crater here is probably - Halfway, with a smaller one on the side. (ALSEP-1)

05 03 18 39 LMP That is a bigger crater than that, though. (ALSEP-1)

05 03 18 48 LMP Okay, we're underway again, Tony. (ALSEP-1)

05 03 19 04 LMP Can you go to the right, John? There's a pretty fresh batch, dead ahead. That's about a tenth of a kilometer across there, though; that's a big crater right there. (ALSEP-1)

05 03 19 21 CDR Yeah, I don't think it's a 300 meter. (ALSEP-1)  
 ---

05 03 20 27 LMP Okay, Tony, we're at 086, 1.2. We're coming into another block-ray field up ahead of us about 50 meters or so, with angular blocks. The area we have now is almost cobble free, except perhaps less than 1 percent of the surface. (ALSEP-1)  
 ---

05 03 20 30 CDR Yes, this is the South Ray - that's that big South Ray crater - ray, down here, I think. (ALSEP-1)(PHO 109 17770)

05 03 20 55 LMP You can see Eden Valley. You can see partially into Stubby. The Cinco craters are very visible up there on the side. (ALSEP-1)

05 03 21 21 CC Is there any albedo difference when you're in a ray or just the cobbles and boulders? (ALSEP-1)

05 03 21 25 CDR No, it's albedo. (ALSEP-1)

05 03 21 37 LMP There is no mistake in your mind when you're in a ray because of the blocks. (ALSEP-1)

05 03 21 43 LMP And the surface is a little bit lighter - the regolith. Blocks are very angular. (ALSEP-1)

05 03 21 53 CDR I'd like to sort of tack. I can see a lot better. (ALSEP-1)  
 Just a little north or a little south. (YOUNG:  
 Zero phase sun visibility was very poor).

05 03 21 59 CC Do you see both the white and the black and white, (ALSEP-1)  
 here?

05 03 22 05 LMP It's mostly gray, Tony, with a - there's a big (ALSEP-1)  
 crater over there, John.

05 03 22 10 CDR That's it. (ALSEP-1)

05 03 22 11 LMP Okay, that's it. We're coming into the south of (ALSEP-1)  
 Plum. Okay, this is probably Plum right over here -  
 no, I guess not. Plum is 40 meters; that's not  
 nearly 40 meters.

05 03 22 32 LMP Okay, Tony, I think we finally found Spook, here - (ALSEP-1)  
 or Flag, rather.

05 03 22 36 CC Okay, did you notice that scarp that's mapped that (ALSEP-1)  
 you should have driven across?

05 03 22 43 LMP No, didn't see it. It's all hilly and scarp here. (ALSEP-1)

05 03 22 49 CC Okay, do you notice a trend to the scarp? They all (ALSEP-1)  
 seem to be northeast.

05 03 22 57 LMP Yeah, that's probably pretty close - northeast. (ALSEP-1)

05 03 23 06 LMP Okay, here - that's got to be it, John. But I don't (ALSEP-1)  
 see Plum. Unless this is it right here.

05 03 23 13 CDR This is it right here, Charlie. (ALSEP-1)

05 03 23 15 LMP We are on the rim of it. Okay, we got to park on (ALSEP-1)(PHO 109 17774)  
 the other side about 40 meters up, do a 180 left.  
 Well, Tony, we finally found it at 087 and 1.4.

- - -

05 03 23 44 LMP It's all up and down. We're gonna be a little close (ALSEP-1)  
 here, John, but that's okay.

05 03 23 54 LMP Okay. Tony, we're parking right on the rim of Plum. (1)  
 Dismounting.

05 03 24 08 LMP Okay, your readings are 180, 088, 2.0, 1.4. (1)

05 03 24 30 CC You should be about 40 meters from Plum. Is that right? (1)

05 03 24 36 LMP No, we're not; we're right on the rim. (1)  
 - - -

05 03 24 43 CDR You'll be able to see everything we do. (1)  
 - - -

05 03 24 49 CC Are you still in the ray material there at Plum? (1)

05 03 24 55 LMP No. (1)

05 03 24 57 CC Good. We don't want to be. (1)

05 03 25 02 LMP The ray material is about 50 meters to the east of us. (1)

05 03 25 08 LMP Okay. We saw the boulders at Buster; we didn't see the northeast scarp. I'm going to get the pan up on the rim of Flag crater. Yeow! Is that some crater, Tony! Whew! It's a smooth crater, very subdued, but it's really steep, and there's some smaller craters 10 meters or so on the side. (1)(PHO 109 1775-93)

05 03 25 49 LMP I can't even see the bottom where - right where we are. (1)

05 03 26 00 LMP The sides are steep enough to cast a shadow from the sun. (1)  
 - - -

05 03 26 21 LMP To the north side of Flag is a crater right on the inner rim, that has some blocks in it that are not too big, cobble size, I'd say. (1)  
 - - -

05 03 27 05 LMP Boy, anybody that judges Cayley Plains as a flatland. (1)

05 03 27 11 LMP The sides of this thing get pretty steep. I'm not (1)  
going to get down too far, I can't see the bottom of  
it. And it's getting so steep I don't want to go  
any farther.

05 03 27 36 LMP On the southwest flank of Plum, we have a buried (1)  
boulder, and it's about a meter across. And that's  
the only boulder we see of any consequence here at  
Plum. In Flag, on the southwest rim about halfway  
down into the crater, we see a block that's sticking  
out, that's very angular, that's maybe 2 meters  
across, and it's in an area of whiter albedo. It's  
probably a buried block. I wouldn't call it  
bedrock. I see nothing that looks like bedrock.

05 03 28 15 CC Okay, how far down from the rim are you? (1)

05 03 28 18 LMP Hey, John, \*\*\* halfway. (1)

05 03 28 28 LMP A rake soil coming up. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,75-77)  
(PHO 109 17794-95; 114 18389-94)

05 03 28 32 LMP And that's done up on Flag. I can do some sampling (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,75-77)  
and radial along Flag. Oh, there's a great place  
for the rake, see, right up there?

05 03 28 50 LMP 12 o'clock? Yeah, I got the rake. Let's see, (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,75-77)  
that's all I need. I can shovel -

05 03 29 02 LMP We're going up to where it's more cobbly, Tony, to (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,75-77)  
get the rake sample. It's pretty smooth right here.

05 03 29 18 CC Okay, the rake sample should be one crater diameter (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,75-77)  
away from Plum.

05 03 29 25 CC And it doesn't have to be too cobbly there. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,75-77)

05 03 29 29 LMP Okay, this is about it then. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,75-77)

05 03 29 35 CDR Yeah, but I don't think any of - the rocks from here (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,75-77)  
may have come from Plum, but they may be some other  
place, too.

- - -

05 03 29 49 CDR How about right out there, in my shadow? There's (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)  
some right there that might be -

05 03 29 55 CDR I'm sure going to get them. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 29 59 LMP Okay, down-sun, 11-footer - (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 30 03 CDR Right here, Charlie? (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 30 05 LMP Yeah, that's fine. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

- - -

05 03 30 16 LMP Hey, Tony, I'm at 50, magazine Bravo. (1)

05 03 30 22 CDR Okay, I'm at 10, magazine Bravo. (1)

- - -

05 03 30 40 LMP There's the locator. And we'll start the old rake, (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)  
for the first time. Get that beauty right there. (PHO 109 17795)  
Look at it come through that regolith, would you?

- - -

05 03 31 38 LMP Move out and let's get around out of the way there. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)  
Another rake.

- - -

05 03 32 24 LMP Hey, man, I'm losing all of those. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 32 26 CDR Yeah. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 32 27 LMP There's three little ones, now. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 32 36 CDR Hey, better get another one. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 32 54 CDR There's a pretty good one. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 32 57 LMP John, there's a glassy one right there. I can't (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)  
tell what the other ones are.

- - -

05 03 33 02 CDR I can't either. They're all dust-coated. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 33 12 LMP Okay, Tony, we got about a half a sackful going in (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)  
bag -

05 03 33 16 CDR 373. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 33 18 LMP 372. (1)(SAMP 61510, 15-1,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 33 20 CDR 372. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 33 22 LMP 372 with three rakes. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 33 30 LMP And there were lots of smaller ones, but they got -  
more smaller ones but they fell through the tines. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 33 38 CC I take it the soil isn't too cohesive here. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 33 46 CDR Hold the bag for a second. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 33 50 LMP No, they're just small. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 33 55 LMP If we'd picked another place - I can't get the top  
off. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 34 01 CDR That's right. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 34 03 LMP Did you get it? (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 34 05 CDR Yeah, I got it. (1)(SAMP 61510, 15-19,25-29,35-39,45-49,55-59,65-69,77-79)

05 03 34 15 LMP Okay, John, if you'll step aside, I'll get a soil  
sample. (1)(SAMP 61500-05)(PHO 109 17794-95; 114 18395)

- - -

05 03 34 54 LMP That's about a kilo. One more scoopful? (1)(SAMP 61500-05)

05 03 34 56 CDR Yeah. A little one. (1)(SAMP 61500-05)

05 03 34 59 LMP Okay. (1)(SAMP 61500-05)

05 03 35 02 LMP Rock. (1)(SAMP 61500-05)

05 03 35 06 CDR Almost looks like black soil. (1)(SAMP 61500-05)

05 03 35 10 LMP Okay. Man, it's really soft here, Tony on the rim. (1)(SAMP 61500-05)  
You don't sink far, but when you walk on it, it gets  
very -

05 03 35 23 CDR That's the last time I do that with soil. (1)(SAMP 61500-05)

05 03 35 25 LMP When you rake it - did it come out? \*\*\* you mean? (1)(SAMP 61500-05)  
Look at that gnomon already, would you? Look at the  
color chart?

05 03 35 35 CDR Dropped dirt all over it. We'll just have to be (1)(SAMP 61500-05)  
more careful.

05 03 35 40 LMP Okay, this is 354. Going in bag 354, Houston. (1)(SAMP 61500-05)  
- - -

05 03 36 00 LMP We ought to start from here, John, and do a radial (1)(SAMP 61150, 55-58)(PHO 109 17796-97; 114 18396-98)  
sampling in towards Plum.

05 03 36 04 CDR Okay. (1)(SAMP 61150, 55-58)

05 03 36 05 LMP Okay, why don't you go ahead and get started and (1)(SAMP 61150, 55-58)  
I'll go get the shovel.

05 03 36 08 CDR All right. (1)(SAMP 61150, 55-58)  
- - -

05 03 37 42 LMP What are you picking up? That little old thing? (1)(SAMP 61150, 55-58)

05 03 37 45 CDR Charlie, that's as good as any of them. (1)(SAMP 61150, 55-58)

05 03 37 47 LMP It looks like it is gonna come apart, though, to me. (1)(SAMP 61150, 55-58)

05 03 37 52 CDR It might. There's three or four samples right there (1)(SAMP 61150, 55-58)  
we can get.

05 03 38 00 LMP I'll get these in the shovel. (1)(SAMP 61150, 55-58)

05 03 38 02 CDR Okay. (1)(SAMP 61150, 55-58)

05 03 38 04 LMP If you don't get out of that - if you don't get that (1)(SAMP 61150, 55-58)  
thing in the - -

05 03 38 16 CC Okay, are all of these rocks looking pretty much the (1)(SAMP 61150, 55-58)  
same?

05 03 38 21 LMP They are all covered, Tony. (1)(SAMP 61150, 55-58)  
- - -

05 03 38 27 LMP Dust. (1)(SAMP 61150, 55-58)

05 03 38 31 CDR What do you need, Charlie? (1)(SAMP 61150, 55-58)

05 03 38 32 LMP Bag. (1)(SAMP 61150, 55-58)

05 03 38 34 CDR Okay. (1)(SAMP 61150, 55-58)

05 03 38 35 LMP One. (1)(SAMP 61150, 55-58)

05 03 38 41 CDR They're angular. (1)(SAMP 61150, 55-58)

05 03 38 43 LMP All angular, though, I'll tell you that. Here's one with a white streak, looks like a caliche streak through it. Leave it. That's all; it's a white rock. (1)(SAMP 61150, 55-58)

05 03 39 05 LMP You have four samples, John. Is that good enough? (1)(SAMP 61150, 55-58)

05 03 39 08 CDR Yeah. That's in bag 371. (1)(SAMP 61150, 55-58)

05 03 39 15 LMP Get the locator. (1)(SAMP 61150, 55-58)(PHO 109 17797)

05 03 39 25 LMP Hey, wait a minute; we need a soil from there. (1)(SAMP 61140-44)(PHO 109 17796-97; 114 18396-99)

05 03 39 28 CDR Okay. Put this in your bag. (1)(SAMP 61140-44)

05 03 39 34 LMP Okay; come on over. (1)(SAMP 61140-44)

05 03 39 46 LMP Man, that crater. That is really something. Tony, on the west side of Flag, there is a small crater maybe 2 to 3 meters across; it's real fresh, has some real bright rays, and you can see a blocky interior. Wait a minute, John, just let me shoot. (1)

05 03 40 10 LMP Okay. And that's about a third of the way down from the rim. Wish we could see the bottom. (1)(SAMP 61140-44)

05 03 40 17 CDR That's going in bag 363. (1)(SAMP 61140-44)

05 03 40 26 CDR Let me get an after of that, Charlie. (1)(SAMP 61140-44)(PHO 114 18399)

05 03 40 29 LMP Okay, I'll move. (1)(SAMP 61140-44)(PHO 114 18399)

05 03 40 31 CDR I'll have to get it from the other side. (1)(SAMP 61140-44)(PHO 114 18399)

05 03 40 45 LMP Okay. Here's one right here, John, that'll make a good one. See that one right there by that footprint? That's a good sample size. About 5 centimeters across? (1)(SAMP 61170, 75)(PHO 109 17798; 114 18400-03)

05 03 41 02 CDR That one right? (1)(SAMP 61170, 75)

05 03 41 04 LMP No, that one right here to the right of my shadow. See, right there. Let me show you. (1)(SAMP 61170, 75)

05 03 41 10 CDR Right there. (1)(SAMP 61170, 75)

05 03 41 12 LMP Right here. See? (1)(SAMP 61170, 75)

05 03 41 14 CDR Okay. (1)(SAMP 61170, 75)

05 03 41 16 LMP Okay. It's an angular subangular rock, Houston. Five centimeters. I can see some white clast shining through it. (1)(SAMP 61170, 75)

05 03 41 30 CDR Bet it's dust covered again. (1)(SAMP 61170, 75)

05 03 41 32 LMP It's all - everything here is dust-covered. (1)(SAMP 61170, 75)

05 03 41 43 LMP Got that beauty. (1)(SAMP 61170, 75)

05 03 41 45 CDR That's enough. (1)(SAMP 61170, 75)

05 03 41 56 CDR Okay, Charlie. (1)(SAMP 61170, 75)

05 03 41 59 LMP Okay, Tony, it's a white matrix; it's a breccia, looks like, white clast with some greenish-looking, very small millimeter-sized phenocrysts in a black matrix. (1)(SAMP 61170, 75)

05 03 42 16 CDR Goes in bag 364, Houston. (1)(SAMP 61170, 75)

05 03 42 31 CDR Okay. Let me get that soil sample. (1)(SAMP 61160-64)(PHO 109 17798; 114 18400-03)

05 03 42 34 LMP Yeah, wait a minute. Let me get out - bounce out of the way here. Uh-oh, John - fell off. (1)

05 03 42 42 CDR You're bouncing too high. (1)

05 03 42 43 LMP No. Did you close - - (1)

05 03 42 44 CDR I'll get it. No. I didn't close the top. (1)

05 03 42 48 CDR And I didn't stuff it down in there. (1)

05 03 42 57 CDR Just about fell down. (1)

05 03 43 04 LMP I got you. Got it. Two-man job. (1)

05 03 43 15 LMP Tony, it's really spongy here. The regolith is just real loose and noncompacted if that's a - unconsolidated is the word I'm searching for. (1)(SAMP 61160-64)

05 03 43 29 CC Can you see where the TV is pointed? (1)

05 03 43 35 LMP Yes. It's pointed down towards South Ray. (1)

05 03 43 38 CC Right. Over to the right on the edge of Plum there, looks like there might be rock with some phenocryst in it. If you're over that way, you might look around and see if you see something like that. It may have just been dust on it. (1)

05 03 43 52 LMP Okay, there's a big rock - that I've already described. Did you get the after there, John. (1)(SAMP 61160-64)(PHO 114 18403)

05 03 43 59 CDR Yes, I've got the after. (1)(SAMP 61160-64)(PHO 114 18403)

05 03 44 02 LMP Okay, coming up. (1)(SAMP 61160-64)

05 03 44 17 LMP Bags are a pain, aren't they? Okay. (1)(SAMP 61160-64)

05 03 44 24 CDR It's going in bag 356, Houston. Soil sample. (1)(SAMP 61160-64)

- - -

05 03 44 52 CDR Okay, Houston. I'm on frame count now 24. (1)

05 03 45 02 LMP Hey, there's one right on the rim we can get. (1)

05 03 45 06 CDR Okay. (1)

05 03 45 07 LMP There's a good size one right over here by my footprint. Actually, I took pan 1 where pan 2 should have been. Okay, looking down into Plum Tony, there is some cobbles and things on the inner rim. But they aren't very large - maybe 30 centimeters or so is the biggest. (1)

05 03 45 28 CDR Want to get some of these here, Charlie? (1)(SAMP 61130, 35)(PHO 109 17799-800; 114 18404-08)

05 03 45 30 LMP Yeah, that's great - that definitely is a breccia right there, John. (1)(SAMP 61130, 35)

05 03 45 34 CDR Yes, see the clasts in it. (1)(SAMP 61130, 35)

05 03 45 35 LMP Yes. (1)(SAMP 61130, 35)

05 03 45 38 CDR I even forgot to ask locator on that last. (1)

05 03 45 41 LMP No, wait a minute, I think \*\*\* that's the way that thing - the way that color chart is so covered with dust, it won't matter anyway. (1)

05 03 45 52 CDR I know - I'll clean it off. Go out and get this one. (1)(SAMP 61130, 35)

- - -

05 03 46 21 LMP Hey, I'd like to go to the other side, John, of Plum because those rocks over there aren't dust-covered, if you can see them. (1)

05 03 46 32 CDR That's a good idea, Charlie. (1)

05 03 46 34 LMP See right out there towards South Ray? (1)

05 03 46 36 CDR Yes. (1)

05 03 46 37 LMP Those rocks don't look as dust-covered as these. Uh-oh, I missed. Wait a minute. (1)(SAMP 61130, 35)

05 03 46 53 CC Nice juggling. (1)

05 03 46 56 LMP Well, it wasn't dust-covered. Well, we missed it. But things really fly up here - I'm amazed. (1)(SAMP 61130, 35)

05 03 47 09 CDR My first guess is it is a breccia with white clast in it. And I see lineations all along it, in the breccia. It's a white clast breccia is what it is. I see no other clast in it. Of course, once you get the dirt off of it might all be white. At first cut, it would be a white clast breccia. Going into 362. (1)(SAMP 61130, 35)

05 03 47 44 LMP Okay, Tony. This one is a - same spot - is a breccia with a white matrix - is glass-coated on one side and then typical glass - lunar surface glass coating. (1)(SAMP 61190, 95)(PHO 109 17799-800; 114 18404-08)

05 03 47 59 CC And when you're through with this site, you can press on around Plum if you like. (1)

05 03 48 08 LMP Okay, we'd like to. There is a big boulder over there, and there are some blocks - that are sitting out and aren't filleted. We'd like to try over there. (1)

05 03 48 19 CC Okay, use your discretion. You've got the time. (1)

05 03 48 20 LMP Here, John, why don't you grab that line, that crummy thing! (1)

05 03 48 33 CDR Okay, those are big clasts, aren't they? (1)(SAMP 61190, 95)

05 03 48 36 LMP Yes. See that glass right there, on the top? (1)(SAMP 61190, 95)

05 03 48 39 CDR Yeah. (1)(SAMP 61190, 95)

05 03 48 45 LMP Okay; Tony, the general terrain here is sloping off to the southwest at about 1 to 2 degrees, and the Flag crater is about to the top of this big ridge that slopes off generally to the southwest to the west of South Ray. (1)

05 03 49 15 CC Okay; some of the boulders you see around there, do they have fillets and, if so, are they built up on any particular side? (1)

05 03 49 26 CDR That's rock bag 352, Houston. (1)(SAMP 61190, 95)

05 03 49 36 CDR I take it back; that's rock bag number 2. (1)(SAMP 61190, 95)

- - -

05 03 49 51 LMP Man, is it dark in those shadows. Want to get an after there, John? I'll get a - get it? (1)

05 03 50 00 CDR Yep. (1)

05 03 50 01 LMP Okay, soil sample coming up. \*\*\* (1)(SAMP 61180-84)(PHO 109 17799-800; 114 18404-08)

05 03 50 23 CDR Okay, that soil sample's in bag 369, Houston. (1)(SAMP 61180-84)  
 - - -

05 03 50 33 CDR Charlie, you're gonna fall down here with all these (1)  
 rocks.

05 03 50 37 LMP No. I'll get you the shovel in just a minute when I (1)(SAMP 61180-84)  
 fill up, and we'll swap.  
 - - -

05 03 50 59 LMP Now, John! Look at that footprint. Look underneath (1)(SAMP 61240-49, 55)(PHO 109 17801; 114 18409-11)  
 that regolith. When you kicked that up a centimeter  
 or so, under it is white, absolutely white, right  
 here.

05 03 51 10 CDR Well, take your old thing and do an exploratory (1)(SAMP 61240-49, 55)  
 there for a while. Let's suggest that.

05 03 51 21 LMP Look! Look at that. Come over here. (1)(SAMP 61240-49, 55)

05 03 51 24 CDR Yes. (1)(SAMP 61240-49, 55)

05 03 51 26 LMP Look at that. (1)(SAMP 61240-49, 55)

05 03 51 29 LMP Won't you look here? Okay, the top - (1)(SAMP 61240-49, 55)  
 - - -

05 03 51 40 CDR Charlie's right everywhere - (1)(SAMP 61240-49, 55)

05 03 51 45 LMP Okay, Tony, let me describe what it is. The top (1)(SAMP 61240-49, 55)  
 centimeter of the regolith is gray, and you get  
 down under that, and it's white.

05 03 51 59 LMP \*\*\* different albedo - three shades different. (1)(SAMP 61240-49, 55)  
 - - -

05 03 52 09 LMP I'll dig you a little trench here. Boy, that's (1)(SAMP 61240-49, 55)  
 going to be a hard job, John. We'll sample right  
 there and get you a scoopful of this underlying  
 regolith.

05 03 52 30 LMP It's a different albedo; it's amazing. (1)(SAMP 61240-49, 55)

05 03 52 33 CC Charlie, we can see that here. Why don't you go ahead and get a bag of the dark and a bag of the light, and then we'll press on to that block on the northwest side. (1)(SAMP 61240-49, 55)

05 03 52 42 LMP All right. (1)(SAMP 61240-49, 55)

- - -

05 03 53 00 CDR It sure is neat here. Okay; let me get a shovelful of this, right off the top here. There we go. (1)(SAMP 61240-49, 55)

- - -

05 03 53 40 CDR That is going - that top scoop is going in bag 352, Houston. (1)(SAMP 61240-49, 55)

05 03 54 01 LMP Ah! Try to get way down there, John, and get a - uh-oh. (1)

05 03 54 20 CDR Uh-oh, what? (1)

05 03 54 21 LMP I just - had a good scoopful, and I lost it. Let me dig out a little - another little trench. There. There she be. Coming up all white. That's all that's in there, John. (1)(SAMP 61220-26)(PHO 109 17801; 114 18409-11)

05 03 55 11 CDR Okay. And it's going into bag 357. (1)(SAMP 61220-26)

- - -

05 03 55 37 LMP I can't get a locator. You know we're right on the rim of - (1)(SAMP 61220-26)

05 03 55 41 CC We've located it on TV, so we have it. (1)(SAMP 61220-26)

05 03 55 47 LMP All right. Okay; we're going over to the big boulder. (1)(SAMP 61290, 95)(PHO 109 17802, 04-05; 114 18412-14, 20-21)

- - -

05 03 56 33 LMP - - looking down-sun here, down-phase at this area downslope, you get a definite feeling of lineations that run southwest, northeast - from Stone mountain, there's sort of little furrowed ridges, and pits, and things. (1)

05 03 56 53 CC Okay, you don't see any sharp scarps or anything like that, though? (1)

05 03 57 00 LMP No, sir; no, nothing like on that map. (1)

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05 03 57 29 CDR Look at that, Charlie! (1)(SAMP 61290, 95)

05 03 57 31 LMP What's that? (1)(SAMP 61290, 95)

05 03 57 32 CDR That thing has - has greenish-black clast in it. Right there in that boulder, there? (1)(SAMP 61290, 95)

05 03 57 40 LMP Looks like it to me, too, yeah. Let's see if we can get a piece of that. Okay, Tony, this is a subrounded rock - boulder that's a meter to a meter and a half across, it has a predominant fracture set of 20 centimeters on the side that run here, southeast - correction, southwest northeast. It's the predominant fracture set. (1)(SAMP 61290, 95)

05 03 58 06 LMP And it's partially buried. (1)(SAMP 61290, 95)

05 03 58 12 LMP Okay. And John, over here also as we move around, that very white material is right under John's feet. I'll take a picture of that. And he's really changed the albedo by kicking into this little crater by this big rock. Going to get all - ah, here he comes, folks. He's got the hammer out, I knew he couldn't resist. (1)(SAMP 61290, 95) (PHO 109 17803)

05 03 58 52 CDR I don't know if this will work or not, Charlie, but I couldn't pick a better spot. Here we go. (1)(SAMP 61290, 95)

05 03 58 58 LMP Going to do it. There's a piece. Let me hold you down a little bit. Hot dog! He did it. It's a very friable rock, apparently, Houston. (1)(SAMP 61290, 95)

05 03 59 20 CDR Charlie, don't do that, let me do it. (1)(SAMP 61290, 95)

05 03 59 22 LMP I got it. Leaning on the shovel. Okay, Houston, it's got some green clast, some white clast, a grayish matrix. The clasts are millimeter-size and make up 5 percent of the rock. One big crystal, 5 millimeters across, but I can't tell what it is. But it's a beauty. (1)(SAMP 61290, 95)

05 03 59 58 CC Okay; you think they're still breccia? (1)(SAMP 61290, 95)

05 04 00 05 LMP I'm not sure I think it might be - yeah, I think (1)(SAMP 61290, 95)  
it's a breccia, really, very friable.

05 04 00 13 CDR Yeah, it's a breccia, Houston. (1)(SAMP 61290, 95)

05 04 00 15 LMP Yeah, uh-huh. (1)(SAMP 61290, 95)

05 04 00 17 CDR Well, no - it's not really. It's a breccia, and I (1)(SAMP 61290, 95)  
can see at least - like Charlie said, there are two  
or three different type clasts in it. It's just a  
one-stage breccia, though, it looks like. It's  
going into bag 353.

- - -

05 04 00 45 LMP All right. We'd like to go out and get one of those (1)  
sharp rocks and a soil sample here.

05 04 00 51 CC And while you're taking pictures there, can you take (1)(PHO 109 17806-07)  
some pictures of the lineations on the ground you  
talked about?

05 04 01 00 LMP Yeah, I'll do that when I get to the right spot. (1)(PHO 109 17806-07)

05 04 01 05 LMP Okay, I'm taking a soil sample of the fillet (1)(SAMP 61280-84)(PHO 109 17802, 04-05; 114 18412-14)  
around this rock.

05 04 01 11 LMP Boulder. John, you just whacked that beauty right (1)(SAMP 61290, 95)  
off of there.

05 04 01 19 CDR Like you say, it's friable. I hit it on a fracture (1)(SAMP 61290, 95)  
set, too.

05 04 01 24 LMP Yeah. Turn the shovel that way. (1)(SAMP 61280-84)

05 04 01 28 CDR 368 this stuff is going into, Houston. (1)(SAMP 61280-84)

05 04 01 31 CC Okay, 368, the soil. (1)(SAMP 61280-84)

05 04 01 35 LMP Okay, I'll get the after on that, John. Okay? (1)(SAMP 61280-84)(PHO 109 17805)

05 04 01 39 CDR Charlie's getting the after on that soil in 368. (1)(SAMP 61280-84)(PHO 109 17805)

05 04 01 45 CC If you have time, can we do a second pan from here? (1)(PHO 114 18415-32)

05 04 01 50 CDR Yeah, I'm supposed to do that, ain't I? (1)(PHO 114 18415-32)

05 04 01 53 LMP Yeah, I was just thinking about that. That'd be a (1)  
good idea. We're right on the rim of - we're really  
right on the rim - there's rocks right on the rim of  
- both Plum and Flag.

05 04 02 08 CDR My guess is that the rock is the way - it's laid in (1)  
here, it's probably from the bottom of Plum,  
somewhere, or down there somewhere.

05 04 02 17 LMP Okay, John, I'm going to go over here and get some (1)(PHO 109 17806-07)  
of these lineations.

05 04 02 22 LMP Close up. Get something out there for scale. Tony, (1)(PHO 109 17806-07)  
the lineations might be just the - I think really  
what it is is the shadows cast by the Sun, because  
the regolith is so unconsolidated - loosely packed.  
- - -

05 04 02 52 LMP In fact, I'm convinced of that. And, okay - that's (1)(PHO 109 17806-07)  
two stereo from 7 feet.  
- - -

05 04 03 24 LMP Hey, John, I'm going to run on out and look at some (1)(SAMP 61015)(PHO 109 17808-10)  
of these angular ones out here.

05 04 03 36 LMP Tony, those lineations are definitely due to the (1)  
shadows on this loose regolith.

05 04 03 50 CC Okay. We're going to have to hustle you on pretty (1)  
soon, so you better grab those angular rocks.

05 04 03 59 LMP Okay. (1)

05 04 04 00 CDR That pan takes me through frame 53. (1)(PHO 114 18415-32)

05 04 04 08 LMP Tony, I'll document this one while John - coming (1)(SAMP 61015)  
over with the scoop. In place is a gnomon.  
- - -

05 04 04 36 CDR Did you get that biggy, Charlie? (1)(SAMP 61015)

05 04 04 38 LMP That one right there is what I'm gonna get. Think (1)(SAMP 61015)  
it will go in the bag?

05 04 04 41 CDR No. (1)(SAMP 61015)

05 04 04 44 LMP Try it. This is a great way to do it, leaning on (1)(SAMP 61015)  
this shovel. It might go in the bag, John.

05 04 04 55 CDR Nah, Charlie. (1)(SAMP 61015)

05 04 04 57 CDR Let's not even try it. (1)(SAMP 61015)

05 04 04 59 LMP Don't want to try it? Okay; this angular rock is (1)(SAMP 61015)  
too big for a bag, and it's got some glass on it and  
it think it's a breccia also, Tony. It's going in  
John's SRC.

- - -

05 04 07 30 CC As you come around there, there is a rock in the (1)(SAMP 61016)  
near field on this rim that has some white on the  
top of it. We'd like you to pick it up as a grab  
sample.

05 04 07 39 LMP This one right here? (1)(SAMP 61016)

05 04 07 41 CC That's it. (1)(SAMP 61016)

05 04 07 44 LMP This one right here? (1)(SAMP 61016)

05 04 07 45 CC That's it. You got it, right there. (1)(SAMP 61016)

05 04 07 50 CDR That's a football-size rock. (1)(SAMP 61016)

05 04 07 52 LMP It's a "Dave Scott" size. (1)(SAMP 61016)

05 04 07 56 CDR Are you sure you want a rock that big, Houston? (1)(SAMP 61016)

05 04 08 01 CC Yeah, let's go ahead and get it. (1)(SAMP 61016)

05 04 08 03 CDR That's 20 pounds of rock right there. (1)(SAMP 61016)

05 04 08 05 LMP Okay. It has some big clasts in it, John. (1)(SAMP 61016)

05 04 08 13 CDR It sure has. (1)(SAMP 61016)

05 04 08 27 LMP If I fall into Plum crater getting this rock Muehlberger has had it. (1)(SAMP 61016)

05 04 08 39 LMP Okay; I've got it. That's 20 pounds of rock! (1)(SAMP 61016)

- - -

05 04 08 56 LMP Oh, Tony, it's got some beautiful crystals in it though. (1)(SAMP 61016)

05 04 09 07 LMP Okay, put it in there, John. (1)(SAMP 61016)

05 04 09 10 CDR Put it in where? (1)(SAMP 61016)

05 04 09 11 LMP In your SCB. (1)(SAMP 61016)

05 04 09 13 CDR I don't think it'll fit. (1)(SAMP 61016)

05 04 09 23 LMP It ain't gonna fit. (1)(SAMP 61016)

05 04 09 27 CDR Put it under your seat. (1)(SAMP 61016)

05 04 09 30 LMP Yeah. Kind of dusty. (1)(SAMP 61016)

05 04 09 40 LMP Okay, here's you a good one. Okay, Tony, I'm gonna put that little glass ball - that I haven't sacked yet - look at that, John. (1)(SAMP 60090, 95)

05 04 09 52 CDR Yeah, it is a big piece of glass. (1)(SAMP 60090, 95)

05 04 09 53 LMP Solid glass. (1)(SAMP 60090, 95)

05 04 09 55 CDR Black glass. (1)(SAMP 60090, 95)

05 04 09 57 LMP Going into bag - 4. (1)(SAMP 60090, 95)

- - -

05 04 10 36 CDR We got to do something with this bag before we leave, Charlie. (1)(SAMP 60090, 95)

05 04 10 43 LMP Put it under your seat. Under my seat. (1)(SAMP 60090, 95)

05 04 10 49 LMP My frame count is 65. (1)

- - -

05 04 14 18 CDR Okay; we're going to follow our footsteps back. (1)  
 - - -

05 04 14 32 LMP Okay; we're under way. (1-2)  
 - - -

05 04 14 38 CC Okay, we're looking at a few changes there at Spook. (1-2)  
 We're going to cut that station down to about 19  
 minutes. And if you get there in time, we'll have  
 John go ahead as minimal and do the LPM. And then  
 we'll end the LPM site measurement. And Charlie,  
 you can do your 500 millimeter near the edge of  
 Spook, and do a pan near the rim of Spook, and why  
 don't you do a couple of samples of Buster if you  
 have time left. And that'll be our Station 2.  
 - - -

05 04 15 39 LMP Okay; we're making good time going back, and it's (1-2)  
 easier looking - going up-sun. You can see the  
 craters a lot better. The regolith - the  
 characteristics of the regolith are the same.

05 04 15 52 CDR Are you using the 16, Charlie? (1-2)

05 04 15 55 LMP No. (1-2)  
 - - -

05 04 16 56 LMP As I look up-sun here - you can see these (1-2)  
 lineations, mostly furrows, I'd call them, with  
 random orientation. And they're definitely the Sun  
 casting shadows on unconsolidated regolith.

05 04 17 21 LMP You can't believe how up and down this is, Tony. (1-2)  
 - - -

05 04 18 14 CDR That's Spook, isn't it? That big one right there? (1-2)

05 04 18 19 LMP Yea; I think it is. That's the one we called (1-2)  
 Buster.

05 04 18 31 LMP Okay, Tony. We're in a real blocky boulder field (I-2) here. It's probably from - thrown out from Spook. What we originally called Spook was not Spook. I think this blocky one is Spook. And we're coming up from the south side of it.

05 04 18 52 CDR Yeah, I'd say, Houston, that I was farther past - I (I-2) guess that I was farther past Double Spot.

05 04 19 07 LMP But we got 0.8 mile, John, and Spook is supposed to (I-2) be a mile. That's got to be it right down there.

05 04 19 15 CDR Buster? (I-2)

05 04 19 16 LMP No, that's Spook. (I-2)

05 04 19 19 CC Okay, Spook should look about the same size as Flag. (I-2)

05 04 19 25 CDR \*\*\* does it look the same size? (I-2)

05 04 19 29 LMP No, this is the biggest crater right over here to (I-2) the right.

05 04 19 32 CDR Okay; well, this is Buster. (I-2)

05 04 19 34 LMP Okay, that's what I thought. It's a blocky crater. (I-2)

05 04 19 36 CDR Let's stop the Rover halfway between them? (I-2)

05 04 19 39 LMP Yeah. (I-2)

05 04 19 40 CC No, near the edge of Spook. (I-2)

05 04 19 41 LMP Buster is a lot bigger than - yeah, okay, it's about (I-2) 50 meters or so. We're bearing 089.8.

- - -

05 04 20 00 CC Little bit nearer to the edge of Spook so we can see (I-2) into Spook.

05 04 20 06 LMP What you really want to see into is Buster. Buster (I-2) is about the same size as what we call Spook here. In fact, it's a more impressive crater.

05 04 20 23 LMP Tony, is there a big crater to the south of Spook? (I-2)

05 04 20 29 CDR Cove is. (1-2)

05 04 20 33 CC That'd be quite a ways. Red Rose looks about like (1-2)  
0.8 kilometer.

05 04 20 44 LMP No. Okay; well, let's park here, John. This is (1-2)  
great sampling. We've got plenty of boulders and  
everything.

05 04 20 59 LMP The Buster is a lot bigger than Plum is. The one we (1-2)  
call Plum.

- - -

05 04 21 10 LMP Okay, then we got the right place then, if it should (2)  
be. Okay, we're stopped and we're 180, 087, 2.8,  
0.8.

05 04 21 52 LMP Okay; pan one up on Spook crater. (2)(PHO 109 17811-27)

- - -

05 04 22 40 CC Okay, Charlie. Are you on a ray there? Or - I know (2)  
the blocks are angular.

05 04 22 48 LMP The blocks are angular, but they are definitely (2)  
coming out of Buster.

05 04 22 56 LMP They dissipate very quickly. In fact, they don't (2)  
even come to Flag.

- - -

05 04 24 12 LMP Under here again, right under the regolith, the (2)  
first centimeter or so, we have the white albedo  
material.

- - -

05 04 24 53 LMP Thirty. Okay. That's gonna be cross-sun, so I'm (2)(PHO 109 17811-27)  
going to do it at f:8.

05 04 25 35 LMP Let me take these pictures. (2)(PHO 109 17811-27)

- - -

- 05 04 28 40 LMP I'm going to take a few of South Ray here, with the 500. We got a good view of it here. (2)(PHO 112 18193-242)
- - -
- 05 04 29 23 LMP The 500 millimeter's up to 50. (2)(PHO 112 18193-242)
- 05 04 29 32 LMP I had a triple, vertical, stereo pan on Stone mountain, and about five frames on old North and South Ray. (2)(PHO 112 18193-242)
- 05 04 29 51 LMP Okay, I'm finished with my pan, and the 500 - I'm gonna run over to - Buster and some sampling. (2)(PHO 109 17811-27; 112 18293-342)
- 05 04 30 05 CDR Buster is really an impressive crater. The walls are so steep, and the blocks are all over it. (2)
- - -
- 05 04 30 19 LMP I'm carrying John's bag, and a shovel, and I'm not taking a gnomon. (2)
- 05 04 30 45 LMP Man, that's gonna be a little steep ridge to climb. (2)
- 05 04 31 07 LMP You get - yeow wheel! Man, John, I tell you, this is some sight up here - looking down into that beauty. Tony, the blocks in Buster are covered - the bottom is covered with blocks - the largest 5 meters across. The sides - the blocks seem to be a preferred orientation, northeast to southwest. They go all the way up the wall on those two sides, and on the other side, you can only barely see them outcropping in about 5 percent. Ninety percent of the bottom is covered with blocks that are 50 centimeters and larger. And I get a partial pan into there. (2) (PHO 109 17828-36)
- - -
- 05 04 32 33 LMP If that is a secondary, that is a big rock that hit in there. (2)
- 05 04 32 38 LMP The rocks down there are very fractured, though. The rocks down there are extremely fractured - you can see a major fracture set running - dipping about north 30 degrees on one rock. The other one is subhorizontal, so it's a - just a very impressive (2)

sight as far as the boulder goes. They're all angular. Some of them - well, I call some of them subrounded, but the majority of them are angular, and they have a grayish texture to them and that's about all I can tell. I got a partial pan from up here on the rim. And I'm gonna start sampling.

(PHO 109 17828-36)

(SAMP 62230-38)(PHO 109 17814, 37-41)

05 04 33 32 CDR Okay, can I give you - okay, X, 657, Y, 363, Z, 440; (2)  
X, 655, Y, 360, Z, 437; X, 654, Y, 354, Z, 440.

- - -

05 04 34 26 LMP Okay, there's a sort of angular to subrounded block (2)(SAMP 62230-38)  
going in bag number 5, Tony.

05 04 34 33 LMP It's dust-covered so that's all I can say about it. (2)(SAMP 62230-38)  
I got another little one, same spot; and it's got a whitish cast to it, and another little one that's got a whitish cast to the underside of it. All that in bag 5.

- - -

05 04 35 24 CDR Okay; 2 is installed. (2)

05 04 35 43 LMP And Tony, I really think we're sampling blocks out (2)(SAMP 62230-38)  
of this -

05 04 35 46 CDR Mark, Tony. (2)

05 04 35 54 CDR Did you get that mark? (2)

05 04 35 56 CC Yes, sure did and started the clock. And did you (2)(PHO 114 18433-34)  
get the picture of the location, there?

05 04 36 10 CDR Okay, do that right now. Is that okay? (2)(PHO 114 18433-34)

05 04 36 20 LMP Okay, Tony. From here is a soil sample going into (2)(SAMP 62240-49; 62315)(PHO 109 17814, 37-42)  
bag 6. This is on the rim of Buster.

- - -

05 04 37 02 CDR That was frame count 56 on magazine Baker. (2)

05 04 37 08 LMP That's the rock I want, but it's too big for the bag. But it might go in the bag. (2)(SAMP 62250,55)(PHO 109 17814, 43-44)

- - -

05 04 37 30 CDR Okay: 114 is X, 361 is Y, 356 is Z. (2)

05 04 37 42 CDR 116 is X, 360 is Y, 366 is Z; 116 is X, 357 is Y; 374 is Z. (2)

05 04 37 59 CDR Going out and turning them around. (2)

- - -

05 04 38 11 LMP There's another rock going into bag 7. (2)(SAMP 62250,55)

05 04 38 20 LMP Dust-covered. Okay, I'm going about a quarter of a diameter away from Buster and sample some more. (2)(SAMP 62250,55)

05 04 38 30 LMP The rim of Buster is pretty good slope climbing up there. (2)

- - -

05 04 40 13 CDR Okay: X is 104, Y, 403, Z, 423; X, 107, Y, 404, Z, 425; X, 110, Y, 405, Z, 425. (2)

- - -

05 04 40 44 LMP Okay, Tony, - the rock I've got here - - is a very friable rock, and it's the most shocked rock I've ever seen; it's just pure white. The whole matrix is pure white. And it's not a breccia. Hey, John, I hate to tell you this, but I dropped my bag. (2)(SAMP 62270, 75)(PHO 109 17814, 45-46)

- - -

05 04 41 26 CDR This is really some rock, really shocked. (2)(SAMP 62270, 75)

- - -

05 04 41 50 LMP Tony, on this friable rock - this shocked one; it's very friable and I'm gonna try and get it in the bag but I'm not sure it's gonna go. And if I don't get it in the bag, I don't think it's going to survive. Well, there's part of it in the bag, anyway. (2)(SAMP 62270, 75)

05 04 42 12 LMP It broke in two in my hand. (2)(SAMP 62270, 75)

05 04 42 22 LMP Okay, and that's in bag number 9. (2)(SAMP 62270, 75)

- - -

05 04 44 07 LMP Okay, bag number 10, is another one. (2)(SAMP 62290, 95)(PHO 109 17814, 47-48)

05 04 44 12 LMP It's an angular rock. (2)(SAMP 62290, 95)

- - -

05 04 45 18 LMP We got soil samples and about - that sample is going (2)(SAMP 62280-89, 62305)(PHO 109 17814, 47-48)  
into bag 11, Tony.

05 04 45 34 LMP That's a sackful, John. I don't see the high albedo (2)(SAMP 62280-89) -  
stuff underneath.

- - -

05 04 46 02 LMP Houston, I hate to tell you this, but those rocks, (2)  
these light ones here, they look like caliche to me.

- - -

05 04 48 23 LMP Okay; I'm going to take some pictures. Wow, is that (2-LM)(PHO DAC)  
Sun bright! Ooh! There's home. You see it?

05 04 48 32 LMP John, you're not going right. That navigation had (2-LM)  
us right on. You turn to 086, we'd be pointed right  
at that beauty.

05 04 48 42 CDR Let's do that. (2-LM)

- - -

05 04 49 30 LMP Hey, looking back up-sun, the rays are even more (2-LM)  
pronounced. Looking up-sun rather than down-sun,  
the blocks stand out like \*\*\* it's just like driving  
on snow. By golly!

- - -

05 04 52 30 LMP Okay, John. We need to stop out here for the Grand (2-LM)  
Prix.

- - -

05 04 52 39 CDR Here's a flat place, sort of. (2-LM)

05 04 52 41 LMP But let - we got to get over there where the - I'd (2-LM)  
like to get over there so I won't have to get back  
on, see, and pick up the core stems.

05 04 52 50 LMP You've got to arm the mortar package Central Station (2-LM)  
at switch 5, CCW. Okay, why don't we go over to the  
right, where the stems are. \*\*\* boresight it on the  
LSM now.

05 04 53 15 LMP Hey, here's a big one, John. (2-LM)

05 04 53 17 CDR Oh, man. (2-LM)

05 04 53 18 LMP Hook a right. (2-LM)

05 04 53 42 LMP Tony, again we're just driving by the ALSEP and (2-LM)  
apologize for that heat flow. The drill seems to  
work just great, though. I think it's in good shape  
right now for next flight.

05 04 54 05 CDR There's a flat place right in here, Charlie. (2-LM)

05 04 54 07 LMP Yeah, that's what I was thinking. See you could go (2-LM)  
out up that way and then out over that way towards  
the LM. Okay?

05 04 54 12 CDR Right. Right. (2-LM)

05 04 54 14 LMP Okay. Let me jump off. (LM)

05 04 54 16 CDR A day ago, it didn't look like we were even gonna (LM)  
land, and now we've sampled our first Highlands.

- - -

05 04 54 36 LMP Put this camera in here, John. Okay? (LM)

05 04 54 45 LMP Okay. Now let me see. You're suppose to drive 45 (LM)  
degrees to the Sun. Okay?

05 04 54 52 LMP Okay. Let me get the - 16 off. (LM)(PHO DAC)

- - -

05 04 55 20 LMP Let me get the camera. Let me get it set here now. (LM)(PHO DAC)  
It's 24 - gonna be using the trigger, so it's 24,  
and f - f:8 at 250.  
- - -

05 04 55 59 LMP You're right, Tony. It ain't - nothing much up here (LM)  
but a lot of rocks.  
- - -

05 04 56 08 LMP It'll open. \*\*\* close it. This thing is stuck. I (LM)  
can't get it up. Let me move out. Okay. To start,  
I'm suppose to be about 50 meters or so from you.  
- - -

05 04 56 58 LMP DAC's on - (LM)(PHO DAC)  
- - -

05 04 57 20 LMP He's got about two wheels on the ground. There's a (LM)(PHO DAC)  
big rooster tail out of all four wheels. And as he  
turns, he skids. The back end breaks loose just  
like on snow. Come on back, John. Okay, the DAC is  
running. Man, I'll tell you Indy's never seen a  
driver like this. Okay, when he hits the craters  
and starts bouncing is when he gets his rooster  
tail. He makes sharp turns. Hey, that was a good  
stop. Those wheels just locked.  
- - -

05 04 58 09 LMP Mark on. Okay. You could have gone the other way, (LM)(PHO DAC)  
but go ahead. There's the big craters there,  
though, aren't they?

05 04 58 19 CDR Yeah. I don't want to run into those holes. (LM)  
- - -

05 04 59 24 LMP Mark. Okay, John. DAC's off. (LM)(PHO DAC)  
- - -

05 04 59 41 CDR Okay. Where's your core tubes at, Charlie? (LM)(SAMP CORE 60001-07)

05 04 59 43 LMP I'll get them. (LM)(SAMP CORE 60001-07)  
 - - -

05 05 01 37 LMP Man, there's a beautiful secondary, Tony. (LM)

05 05 01 41 CC Is it oblong or round? (LM)

05 05 01 43 LMP - - meter size. It's round with a very angular (LM)  
 block in it.

05 05 01 53 CC I guess we don't have time to look at it, Charlie. (LM)  
 - - -

05 05 02 36 LMP Tony, the rocks in this ray near the Lunar Module (LM)(SAMP 60015)  
 are entirely different from the ones we've been  
 sampling. They're just different. We're gonna have  
 to make a stop here - in Station 10 - and call  
 Station 10 here, right in front of the Lunar Module  
 and sample here.  
 - - -

05 05 03 20 LMP Okay. I ran to the third mark down from full - (LM)(PHO DAC)  
 whatever that is; empty, I guess. Looks like 50  
 percent of the mag, Tony.  
 - - -

05 05 03 45 CDR Okay, first arming pin is out. Second pin is going (LM)  
 to arm. \*\*\* third pin is going to arm.

05 05 04 56 CDR Now they ought to all be armed. Either that or the (LM)  
 pins are broke off. Okay. At switch 5, we'll go  
 CCW.

05 05 05 19 LMP After you've been out in the Sun awhile, this shadow (LM)(SAMP CORE 60001-07)  
 is really dark. \*\*\* hey, Tony. The cores are in  
 the bag; breaking out the Solar Wind.  
 - - -

05 05 06 49 LMP This is foolproof. Point this side at Sun, dummy. (LM)  
 Okay. Solar Wind is planted in the Descartes  
 Highlands. Figure out where what is?

05 05 07 20 CDR Okay, I got a - okay, Houston; bearing, 022; range, (LM)  
0.1; and that's where it is. And that is no joke.  
(mortar package)  
- - -

05 05 08 10 CDR En route, now. (LM)  
- - -

05 05 08 31 CDR Ain't nothing - there's nothing plain about this (LM)  
place, Houston, I'll tell you. I don't know whoever  
thought it was plain. Cayley Plains, man.

05 05 08 40 LMP Okay, Houston. These rocks - I picked up one - - (LM)(SAMP 60015)

05 05 08 43 CC Kind of like \*\*\* smooth. (LM)

05 05 08 44 LMP - - right out here that I described that blue - (LM)(SAMP 60015)  
that - -

05 05 08 49 CDR Yeah, that's smooth. (LM)

05 05 08 50 LMP - - that blue one that I described from the Lunar (LM)(SAMP 60015)  
Module window, and by bluish color is because it's  
glass-coated, but underneath the glass, it's a  
crystalline rock that, to me, has the same texture  
as the "genesis" rock, and it's not a breccia. At  
least I can't - the part I'm looking about - at is  
it's not a breccia - maybe just one big clast. But  
the part I'm looking at is a one solid - it's an  
igneous, plutonic rock.

05 05 09 29 CC Okay. How big was it? (LM)(SAMP 60015)

05 05 09 33 LMP It's about football size, little bit smaller. Going (LM)(SAMP 60015)  
into plus-Z footpad.

05 05 09 43 CDR Okay, Houston. Your readings are - we're parked on (LM)  
a heading of north. And it says the bearing is 355,  
the range is 0, the distance is 4.2.  
- - -

05 05 10 44 LMP Okay. Tony, can I take the pictures of the SWC with (LM)(PHO 109 17863-64)  
my black and white?

05 05 11 01 LMP I've already got it on; I hope you say yes. (LM)(PHO 109 17863-64)

05 05 11 03 CC Yeah, go ahead. (LM)(PHO 109 17863-64)

05 05 11 10 CDR Okay, Houston. You're going to 3. (LM)

05 05 11 24 LMP \*\*\* every one of them. (LM)

05 05 11 26 LMP And we didn't see any at the other two craters. (LM)

05 05 11 30 CDR We might have missed some, but I agree I didn't \*\*\* (LM)

05 05 11 35 LMP Tony, I'd say 15 percent of these rocks are glass coated, and at the other - stops 1 and 2, we didn't see any. (LM)

05 05 11 45 CC And, Charlie, while you got the camera taking pictures there, we'd like you to go around and look at that cosmic ray and take a picture of it, and read off the temp label. (LM)

05 05 11 56 LMP Yeah. I already took a picture of it. (LM)

05 05 12 00 LMP -- 7-footer in color. Okay. I'll go read the temp. You want another picture? (LM)

05 05 12 09 CC No, we don't need another picture. You might comment if there's any dust on it. (LM)

05 05 12 16 LMP No, it's clean as a whistle. (LM)

-- --

05 05 12 30 CC Okay. We'd like you to take it off and put it on the minus-Y strut, in the shade. (LM)

05 05 12 39 LMP Okay. John will have to do that. (LM)

-- --

05 05 13 03 CC Okay. And, Charlie, we'd like to press on with the closeout. (LM)

-- --

05 05 13 13 LMP I've got John's bag now, and I'm gonna empty it in (LM)  
the SRC, keeping the core tubes out.

- - -

05 05 14 25 LMP John, can you take my bag off? I'm ready to \*\*\* (LM)  
you've got a whole bag. I emptied yours in there,  
and it wasn't even - it didn't even fill in the SRC,  
so take my bag off and we'll - - and I'll get on  
with this.

05 05 14 39 CC Okay, guys. We'd like to switch out the SCBs in the (LM)  
rock box. And we'd like to put SCB 5 in there  
instead of SCB 1.

05 05 14 49 LMP Tony, I've already emptied SCB 1 in there. (LM)

05 05 14 56 CDR Most of SCB 5 can go in there too, Houston. (LM)

05 05 15 00 CC Okay. Great. (LM)

05 05 15 01 LMP I think I can get them both in there. I'm emptying (LM)  
them in, Tony.

05 05 15 04 LMP Okay, Tony. Like we planned, I'm empty - I'm just (LM)  
emptying them into that.

05 05 15 10 LMP And it packs easier that way. (LM)

- - -

05 05 19 14 LMP Okay, Tony. We got all the rocks that we collected, (LM)  
except for a couple of biggies, into the SRC.

05 05 19 21 CC Outstanding, Charlie. The reason for putting those (LM)  
others in there, is they wanted the soils in the  
SRC.

- - -

05 05 22 31 LMP You finished with your pictures, John? (LM)

05 05 22 33 CDR No. I haven't done those yet. (LM)(PHO 114 18435-43)

05 05 22 34 LMP Okay. Tony, my frame count on magazine Bravo was (LM)  
120.

05 05 22 49 LMP And I'm helping John load up. I'm doing ETB right now, while he's taking pictures. (LM)(PHO 114 18435-43)

05 05 23 26 CDR Cross-sun, f:5.6 at 60; 20 feet. (LM)(PHO 114 18435-43)

05 05 23 41 CC Charlie, was your magazine Bravo or Golf? (LM)

05 05 23 48 LMP Whatever the one - whatever the one the checklist said. (LM)

05 05 23 56 LMP I'll tell you inside; I'm bringing it inside. (LM)

05 05 24 06 LMP Okay, I've got all the film, John. (LM)

05 05 24 09 LMP All I need is your camera, and the ETB is going over to the MESA table. And I got a great big rock, a "Muley". (LM) (SAMP 61016)

05 05 24 19 CDR Houston, if I take a down-sun, I'll have to stand in front of this contraption. You want me to do that? In front of the camera at 3 feet? (LM)(PHO 114 18435-43)

05 05 24 31 CC I guess if you stand a few feet away from it, it shouldn't be too bad. Move 8 or 10 feet away, though. (LM)(PHO 114 18435-43)

05 05 24 40 CDR Okay. I'll take it at 8 feet. (LM)(PHO 114 18435-43)

05 05 24 53 LMP Tony, I take that back. That rock we picked up, the big - the "Muley" is - oh, I was going to say glass crystals, but take that back. Part of it seems to be shocked, and it's a crystalline rock on the inside under all the dust. Whatever it is. (LM)(SAMP 61016)

05 05 25 14 CC Okay, fine. We'll take it. (LM)(SAMP 61016)

05 05 25 28 LMP Okay. I dropped it onto the strut; part of it broke off. I'm sorry. Big rocks, I've done. (LM)(SAMP 61016)

- - -

05 05 26 25 LMP Okay, John's frame count is 65. (LM)

- - -

05 05 29 27 LMP Okay. That's got it. Okay. I've placed the core (LM)  
 stems, I \*\*\* the SRC, HEDC, Commander unload SCB,  
 close SRC I, MESA blanket, big rocks.

- - -

05 05 30 55 LMP Tony, be advised that we are not taking any SCB's (LM)  
 up. I emptied the SCBs into the SRC.

05 05 31 10 CDR Are we gonna get them all in there, Charlie? (LM)

05 05 31 12 LMP Yeah. All the rocks went in there. (LM)

05 05 31 15 CC You might put - what are you going to put the big (LM)(SAMP 61016)  
 rock in? That might go in the SCB.

05 05 31 24 CDR Won't fit. Remember? (LM)

05 05 31 26 LMP No. One of them will. The one I just picked up (LM)(SAMP 60015)  
 will. The big one that go - that we picked up out (SAMP 61016)  
 at Flag won't fit.

- - -

05 05 33 38 CDR I tell you, Houston, my general impression of this (LM)  
 thing is i'm a lot more surprised at how really beat  
 up this place is. It must be the oldest stuff  
 around, because it's just craters on top of craters  
 on top of craters. And there's some really big old  
 subdued craters that we don't even have mapped on  
 our our photo map, I'm sure of it.

05 05 34 16 CDR Because they just show up as gentle depressions. (LM)

- - -

05 05 34 27 LMP Tony, one of those big rock bags - I mean, those big (LM)(SAMP 60015, 61016)  
 rocks I could put into the SRC. It's an  
 undocumented rock - grab sample. I don't mean the  
 SRC, but the SCB. Why don't we just leave it there  
 and get it for next time, Tony?

05 05 34 51 LMP I tell you what, I'm gonna get it. Bag 5. (LM)(SAMP 60015)

- - -

05 05 35 17 CC Charlie, we think you ought to put the one that you (LM)(SAMP 60015)  
 can get in the SCB - put it in a bag and carry it  
 up. That one that's too big, if there's no where to (SAMP 61016)  
 stow it upstairs, why don't you just leave that one  
 down.

05 05 35 29 LMP Oh, there's a place to stow it. We just don't have (LM)(SAMP 61016)  
 the big rock bag out.

- - -

05 05 39 22 LMP Okay, I'll tell you what. Let me jump up on the (LM)  
 ladder and then you hand me that. Okay?

05 05 39 32 LMP We got an SCB, a ETB, a core stem and the core stem. (LM)

05 05 39 37 CDR Okay. (LM)

- - -

05 05 46 30 CDR Okay, Charlie, here comes SRC 1. (LM)

- - -

05 05 47 57 LMP I brought the pallet. We've got an SCB, the core (LM)  
 stems, and ETB.

05 05 48 06 CDR Okay. Hardly nothing in the SCB, right? (LM)

05 05 48 08 LMP One big rock is all. (LM)(SAMP 60015)

05 05 48 19 CDR Whew! That other big "Muley" we'll get when the - (LM)(SAMP 61016)  
 with a big rock bag later on.

- - -

05 05 48 54 LMP Okay, Tony. We're bringing SCB number 5 in with a (LM)(SAMP 60015)  
 big rock.

- - -

05 05 49 46 LMP Tony, read out the ETB stuff. (LM)

- - -

05 05 49 54 CC Right, you have two HEDC mags, B and D; three HEDC (LM)  
mags, A, C, and H; one 500-millimeter mag L; three  
DAC mags P, Q, and R; your maps; and six sample  
containment bags.  
- - -

05 05 50 26 LMP I did not get those bags. I don't have that on my (LM)  
check list.  
- - -

05 05 50 35 CDR Okay, I'll go get them. (LM)

05 05 50 41 CC Okay. They're in the left front of the MESA, John. (LM)  
- - -

05 05 51 56 CC Roger. You should have six DAC mags - correction, (LM)  
six Hasselblad mags and three DAC mags.

05 05 52 06 LMP Yes, I've got all the film. (LM)

05 05 52 18 CDR These bags are on the left side of the MESA, right, (LM)  
Charlie?  
- - -

05 05 53 14 CDR I'll bring them up separate, Charlie. (LM)  
- - -

05 07 14 06 LMP Okay, Houston. SCB number 5 is in sample (LM)(SAMP 60015)  
containment bag number 5, and it weighs 14 pounds.  
- - -

05 07 14 28 CDR Bet you at least 10 pounds must be the SCB. (LM)

05 07 14 32 CC You collected a lot of rocks out there. (LM)

05 07 14 44 LMP That was only one rock, and that was a grab sample (LM)(SAMP 60015)  
that I got about 30 meters in front of the LM.  
Over.

05 07 14 55 LMP Okay. SRC number 1 weighs 42 pounds. (LM)

05 07 15 07 LMP And that's all the rocks we got. (LM)

05 07 15 42 CC Okay. I don't know how factual it is, but I remember getting a note the last week before launch that you had your rock control weight up to 215 pounds. (LM)

05 07 16 01 LMP Okay, Tony. We'll get 215 pounds of rock. (LM)

05 07 16 04 CC I bet you will. (LM)

05 07 16 05 LMP How much have we got now? (LM)

05 07 16 10 CC Oh, you have 56 pounds you called back, including the weight of the SRC, which is about 12 pounds. So that would make it about 44 pounds. (LM)

05 07 16 34 CC I bet the "Muley" special down there will double your weight. (LM)(SAMP 61016)

05 07 16 40 CDR I'm sure it will. It gave Charlie a hernia. (LM)(SAMP 61016)

\* \* \* \* EVA I DEBRIEFING \* \* \* \*

05 08 21 18 CC Good show. Okay, when Charlie was working around the LM there, he described a black vesicular basalt underneath the engine. Was that the only basalt you saw on all of EVA 1? (BETWEEN EVAS)

05 08 21 40 LMP That's all I saw. There are some more blocks than that scattered, I think, around the landing area, Tony. (BETWEEN EVAS)

05 08 21 51 CDR Yeah, and, Tony, Charlie's idea to make this area 10, I mean, to make this stop 10 is a pretty good one. There's plenty to get around here. LM (BETWEEN EVAS)

05 08 21 59 CC Okay, we understand. You said that the rocks in this area look different from what you saw. About how far west did that difference go? (BETWEEN EVAS)

05 08 22 11 CDR There you go. I was just at zero phase. I just hang on to the Rover and try to see where the next hole is. (BETWEEN EVAS)

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05 08 22 41 LMP Well, let me give it a try, Tony. I always have an opinion. The rocks around the - beyond the ALSEP, on our drive out past Spook and Buster, all had this breccia appearance to them, with the primarily grayish matrix with a dark clast. At Buster, though, there were some rocks that were very shocked, I think. In fact, they just crumbled in my hand - the one I picked up. So at least at Buster and Flag - Spook, the rocks appeared to be different in the main than they are right here. (BETWEEN EVAS)  
(SAMP 62270,75)

05 08 23 32 CC Of the rocks you saw, do you feel like you sampled all the representative types? (BETWEEN EVAS)

05 08 23 45 LMP Well, out there at Flag, they were all so dust covered, I don't know. I was really surprised when John broke that big boulder open and saw that whitish matrix with the clast. I frankly don't think that was a breccia, but it was pretty friable rock, anyway. (BETWEEN EVAS)  
(SAMP 61290,95)

05 08 24 07 CC You first described the "Muley" rock as a (BETWEEN EVAS)(SAMP 61016)  
crystalline and then switched to a - correction.  
You first described it as a breccia, then switched  
to a crystalline. I wonder if you could have some  
third or fourth thoughts on that?

05 08 24 34 LMP I'd say when I picked it up, it was pretty dust (BETWEEN EVAS)(SAMP 61016)  
covered, and only had a couple of spots to - that I  
could look. One area looked like a crystalline  
rock. If it was a breccia, then that clast is  
pretty large, a centimeter or so. If it's a  
crystalline rock, then it's a sort of a  
feldspar-looking type crystal. The other, when I  
turned it over, it had another one of those white  
specks that most of the breccias have around here,  
and that's when I switched. So it could be a  
combination, Tony.

05 08 25 37 CC Can you give us a numerical estimate on the (BETWEEN EVAS)  
proportion of the rock types in the LM area? We  
wonder if there's any correlation between rock type,  
size, shape, or angularity.

05 08 25 53 CDR Well, there probably really isn't a correlation like (BETWEEN EVAS)  
that. I was just looking out the window here. I  
see some very angular - very angular rocks that are  
white rocks. And some more grayish rocks - in other  
words, less white in them that are sort of  
subrounded - -

05 08 26 38 CC Okay. Do they correlate with sizes? (BETWEEN EVAS)

05 08 26 39 CDR - - and some rocks that are - no, these are all (BETWEEN EVAS)  
about the same size. No, the big whities are - it's  
not going to be that correlatable. I see some  
that's sitting out there in the middle of the LM  
area that look like - I swear they got some pinks in  
them, but if they were just a - pink with black  
glass in them laying across - on the way to ALSEP  
site. You can almost say they came from South Ray  
if you're a betting man. And these big ones - need  
to be predominantly the size of say, 20-centimeter  
rocks, and they're very angular. The white rocks  
are also smaller. They are on the order of 10 to 15  
centimeters. I'm just guessing because we're  
sitting right here in the middle of this thing, and

it's sort of like we can't see the forest for the trees. They seem to be a smaller rock, maybe 6 - 6 to 12 centimeters, very angular. And they're probably less than 5 percent of the rock type. The other rock - the predominant rock in the area is just an old gray, subrounded, angular rock. And I would guess that's a breccia of some type. And although the surface is very boulder-strewn, as you probably notice on the television, it looks exactly at the ALSEP site, in here, at the same amount of boulders. I guess we put the thing in the same ray almost, because it's almost on a line from here to South Ray. I guess what I'm saying is I can see what I believe to be at least three different rock types out here. The white, the pinkish, and this is from the LM so I'm really not qualified to go into that - the pinkish with the black clast in it, and the subrounded gray rock.

05 08 29 18 CC Have we sampled all three of those? (BETWEEN EVAS)

05 08 29 24 CDR No, we haven't done any sampling around the LM or stations around the ALSEP site. (BETWEEN EVAS)

05 08 29 31 CC I understood that. I just wondered if you had picked up anything that you thought was the pink with the black specks anywhere? (BETWEEN EVAS)

05 08 29 41 CDR I think most of the rocks that I was - with Charlie, when he was picking up, except for that one that we beat off over there, they're all dust covered predominantly, and I never got a chance to look at them. (BETWEEN EVAS)  
(SAMP 61290,95)

- - -

05 08 30 02 LMP Let me say something, Tony, here. I'd like to give you what I think the three major areas that we saw today. One, here at the LM, is, I'm convinced is a ray from South Ray. The rock types being predominantly - \*\*\* over by Flag, we were out of that ray. We were in the Cayley, and I sampled on the rim of Buster. And whatever made Buster, I don't think it was a secondary, because I think the rocks that we picked up there were true shock rocks. And I just can't see a secondary doing that. So the (BETWEEN EVAS)

rocks around there - we were definitely out of the ray at Buster and Flag. And also, it's - excuse me. It's Buster and Spook. At Flag and Plum, we're again into Cayley with hardly any blocks visible. So you have a Cayley without the blocks farthest out. You have the Cayley with the blocks that, I think, are some of the stuff that was made from Buster on the rim, and then in here towards the LM, we have the South Ray.

- 05 08 31 30 CDR Yeah, I believe Charlie - think Charlie's right about that. (BETWEEN EVAS)
- 05 08 31 43 CC How about that albedo change in the subsurface soil that you talked about? It seemed like, of course you saw it first time at Flag, you were probably more excited about it there. Was there any difference in its nature between there and Buster and ALSEP and LM? (BETWEEN EVAS)
- 05 08 32 10 LMP No. Only around the LM, it was just in ALSEP, it was just in spots. At Buster, correction - at Plum it seemed to be everywhere, and everywhere we dug a little scoop, my predominant impression was that the white albedo was coarser grained than the fine dust-covered on top. (BETWEEN EVAS)
- 05 08 32 41 CC The white is coarser. (BETWEEN EVAS)
- 05 08 32 46 LMP That's affirmative. It looks - it sort of - I'm not going to say ash flow, but it sure looked like it was coarse, white - let me get a better word. Let me think about that one for a description. (BETWEEN EVAS)
- 05 09 33 04 CC Okay, just a question there for you, John. When you got to Halfway or what you decided was Halfway, we understand you looped around the to south, is that right? (BETWEEN EVAS)
- 05 08 33 19 CDR That's affirmative. (BETWEEN EVAS)
- 05 08 33 28 CC Okay. In any of the craters that you looked into, was there any evidence of outcrops in the walls? You mentioned the one boulder that was sticking out the side of Flag, I think it was. Was there any other evidence of any bedrock? Any ledges? (BETWEEN EVAS)

05 08 33 47 CDR Did you see any in Buster? Charlie didn't see any, (BETWEEN EVAS)  
and I didn't see any.

05 08 33 51 CC Okay. No benches in any of these craters at all - - (BETWEEN EVAS)

05 08 33 53 CDR No, these were rather subdued craters. They do have (BETWEEN EVAS)  
rocks sticking out of them, particularly at Buster  
and there was a few at Flag. But the rest of them  
really didn't. The deceptive part of the whole  
business - you know, is you can't really tell by  
looking at the crater how big it is. I was almost  
willing to buy Halfway - for being Flag.

05 08 34 27 CDR It's a long way from being Flag crater size. (BETWEEN EVAS)

05 08 34 31 LMP Tony, let me try again. The larger craters, the old (BETWEEN EVAS)  
subdued ones, were boulder free. The only hint that  
I had was this northeast-southwest rocks - just  
boulder distribution and Buster. And that went sort  
of up the wall southeast to north - southwest to  
northeast.

05 08 35 10 CC Right; understand. I guess that's why you went (BETWEEN EVAS)  
ahead and called it a secondary. It probably isn't.  
It was just a - since it was oriented with the  
structure of the area.

05 08 35 23 LMP Man, that was a big rock that came in there, if that (BETWEEN EVAS)  
was a secondary. I'll tell you, that is a big  
crater. The walls on it are - well, the east wall  
was still in shadow to some degree with whatever our  
sun angle is now; and we couldn't see in the bottom  
of Flag or Spook. The walls - you just couldn't get  
up close enough to the rim to see into the bottom.

- - -

05 08 36 37 CC Okay. On this Station 10, we're perhaps considering (BETWEEN EVAS)  
beefing it up, and letting you do some sampling in  
that area. And from what you've been saying now, it  
sounds like you think that the LM-ALSEP area would  
be a good place to spend some time. You think from  
your experience with the drill there, you could  
drive the double core all right? And how does a  
rake sample in that area look?

05 08 37 08 CDR Yeah, we can get a lot of rocks in a rake sample. (BETWEEN EVAS)  
Charlie says the double core will go.

- - -

05 08 43 04 CC One more geology question here. Was there any (BETWEEN EVAS)  
difference between the rocks in the bottom of Buster  
and those on the rim of Buster?

05 08 43 28 LMP You want me to guess Tony? I don't think so. (BETWEEN EVAS)

05 08 43 38 LMP Okay. And the reason I don't think so is that the (BETWEEN EVAS)  
rocks in the bottom were all shattered and  
crumbly-looking and sort of mounds of rocks with  
many fractures in them which was just like the one I (SAMP 62270,75)  
sampled that crumbled up in my hand. So,  
texturally, from 50 meters, they look the same.

05 19 33 25 CC

I can just sit here and talk a few words about the traverse today, if you like. I haven't really organized the - my notes on it, so it may ramble a little bit, but I've gotten a briefing by the planning team. It looks like an interesting plan here. The traverse is almost - well, it's exactly like normal EVA 2. From Ken's words, he can see definite benches in Stone mountain and thinks that you'll have a pretty good chance of identifying them. He can see layers in South Ray, which makes the rays at Station 8 a whole lot more interesting than we had even anticipated. So right now, we'd like you to do a normal 4, 5, and 6. The main thing identifying 6 is being on the - on the slope part of the down - the bottom of the slope of the lowest bench, Station 5 being on top of the first bench, and Station 4 being on top of the second bench - in fact, it may be a little above. Right now, we're thinking that we won't have you aim for Crown, because Crown is probably a little bit more subdued than we'd like, and probably not worth the effort to get to. Cinco D and E is, as we talked about before. Probably be Station 4, probably be a good place. At the end of Station 5, we may have you do an LPM. I'll update this all in real time for you, I'm just talking about what we'll probably do here. And Station 7 we're going to eliminate and save time back - take the whole time and put it at Station 10 so you'll be able to do that primary sampling we asked for. We think that sounds great. As you drive from 6 to 8, we're more interested now that you do get some pictures of Stubby as you go along, of that area, because we don't have Station 7; so we'll ask you to turn your DAC over that way as you're driving. A DAC pointed down-sun probably wouldn't see much, anyway, in that zero phase.

(BETWEEN EVAS)

05 19 35 32 LMP

Okay, Tony, I think you'll be able to come up on Stone there. It looks like to me you're gonna be able to see right into - into South Ray and right into Stubby and all those craters. The general topography here is a downslope. From North Ray, it

(BETWEEN EVAS)

leads from the ridge to our immediate right all the way down to South Ray, and - with the lowest point really being maybe south of Survey Ridge. Over.

05 19 36 06 CC Okay, right. And we could see - I think I could see (BETWEEN EVAS) the bright area of South Ray on the TV pan. It really stands out down there. But our really exciting station looks like it might be Station 8, and we're really going to encourage you to scout around and see if you can get the samples of the dark layers that we see in South Ray.

05 19 36 31 LMP It looks like the base of Stone mountain is really (BETWEEN EVAS) topographically lower than we are right now.

05 19 36 42 CC Okay. And, also, on Station 9, it may turn out to (BETWEEN EVAS) be difficult to find a pristine area. We'll let you scout around a little bit, and pick your own Station 9 of whatever looks like isn't ray material. And on the location of Station 10, we'd like you to put it just about where you said it might go as you were driving back yesterday. It sounds like the contact between the ray and the non-ray material is just west of you there, and we'd like to run the penetrometer array along the contact but in the ray material; that is, the penetrometer array would now go in a northeast-southwest direction, and a double core would be something like 50 meters to the southwest of the deep core. Let me correct that a second here. Hold on. I'll correct that. The double core will be about 50 meters towards the LM but along the contact, so it'll be about 50 meters closer to the LM than the deep drill. And at Station 10, since you'll have a longer sampling time, we'd like you to sample on both sides of the - of the - of the ray; in other words, in the ray, along the line between the deep drill core, and the LM, and off the ray to the west.

05 19 48 14 CC Okay. As you drive from Station 6 to 8, we'd like (BETWEEN EVAS) for you to swing the DAC over and take pictures into Stubby, and all points to the south. And then we're going to really stress Station 8, because it may be chance to sample many of those materials that Ken was able to see in South Ray, so Station 8 is a key station. Station 9, we're not at all sure that

you'll be able to recog - that we'll - the nominal Station 9 is a pristine area, so we'll just let you scout around and see if you can - find the best you can. And Station 10 will be longer.

05 19 49 03 LMP I was going to say, Tony. I guarantee you we'll find a place. It is out of sight of the LM that's 3 or 4 kilometers away. (BETWEEN EVAS)

05 19 49 11 CC Okay, good show. And Station 10 will be 12 to 15 minutes longer now, and we'd still like it on a line between the deep core and the LM, so it will be on a northeast line. And we'd like it in the ray that you described, but near enough to the edge so that you can sample off the west edge of the ray. Also, we'd like you to pick up that particular basalt that you described underneath the engine bell. (BETWEEN EVAS)

05 19 49 48 CDR I don't know how big this ray is, but the sample on the west edge of it. I don't understand how we're going to do that. (BETWEEN EVAS)

05 19 50 04 CC Where do you think that west edge was? Was it all the way back towards Spook? (BETWEEN EVAS)

05 19 50 15 CDR It's not that far, but I think, like if we go due west of the LM, we can go 300 meters. And we'll probably run into some really big boulders, which are probably in the center of the ray, and then they thin out a little off to the other side from the ray. And it probably runs over that way for a good long ways. (BETWEEN EVAS)

- - -

05 19 51 03 CDR All I'm saying is the ray must be 350 meters wide, and we're on probably the east half of it. (BETWEEN EVAS)

- - -

05 19 54 41 CDR Okay. Tony, in my opinion, we probably should sample the edge of ray and we should go east maybe about 100 meters. (BETWEEN EVAS)

05 19 54 59 CDR I said, it would probably be best to go east a hundred meters and sample the edge of the ray. We'd be closer to the edge. (BETWEEN EVAS)

05 21 40 06 CC Okay, I got this result on the quick look on the x-ray. I just thought I'd pass it up to you. The Descartes area is higher in aluminum silicon than Mare, but it's not as high as the highlands east of Smythii. (BETWEEN EVAS)

- - -

05 22 44 54 CC Okay, John, you're go for egress. Charlie, we'd like - - (BETWEEN EVAS)

- - -

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

05 22 47 35 CDR Charlie, watch out for the big rock in the footpad. (LM)(SAMP 61016)

05 22 47 38 LMP Yeah, I know it. I put it there. That's old beauty. (LM)(SAMP 61016)

05 22 49 29 LMP Okay, Tony, I'm on the old lunar terrain again. (LM)

- - -

05 23 05 39 CC And, Charlie, when you're taking that pan, let me know. I have another picture for you. (LM)

- - -

05 23 06 26 LMP Oh, the old dark slide. Come out. - Expose one picture. (LM)

05 23 08 00 LMP Oh. John, make sure that I did all the things on - the ETB is emptied, and magazine Lima is on the camera 500, all the other film is stowed. (LM)

- - -

05 23 08 56 LMP Wait a minute I got to get a pan, John. So it'll be a few minutes. Why don't you run around and pick up a rock. (LM)(PHO 107 17420-40)

05 23 09 02 CDR Hey! Outstanding suggestion. Give me a rock bag, Charlie. (LM)

- - -

05 23 10 13 CC And John, if you're picking up a rock, could you get that - - the vesicular basalt underneath the engine bell? (LM)

05 23 10 24 CDR Yep. Sure could do that. (LM)

05 23 10 27 LMP Tony, that is a double "Muley" - that rock. (LM)

- - -

05 23 10 59 CC And just forget that big rock for now. That's too (LM)  
big to handle.

05 23 11 07 CDR It's inaccessible; it's underneath the engine cover. (LM)  
- - -

05 23 11 15 CDR But there's probably another nice rock - I'm sure (LM)  
there's another good rock around here that I've been  
eyeing out my window I wanted to get anyway.

05 23 11 27 LMP I hate to tell you, but I need your camera for the - (LM)(PHO 107 17420-40)  
here, take mine with the black-and-white and let me  
have yours for the pan.  
- - -

05 23 12 18 LMP Pan quad III. Well, guess what? I'm on the wrong (LM)(PHO 107 17420-40)  
side. If you want some of this blackish rock, John,  
a small one that's bagable, there's a bunch right  
out here that look just like what I call that  
basalt. In fact, there's hundreds of them.

05 23 13 08 CDR Yeah. They're out from that little impact crater we (LM)(SAMP 60025)  
just landed beyond. And I want to get this nice  
white one right here.

05 23 13 18 LMP Okay. The old pan - - starts at f:11 at 250. Okay. (LM)(PHO 107 17420-40)  
Exactly 60 feet to the left, Tony.

05 23 13 46 LMP \*\*\* the best pan. Boy, it sure looks different (LM)(PHO 107 17420-40)  
looking up-sun. And you can still see those  
lineations in Stone mountain, Tony. In fact,  
they're maybe a little bit more pronounced.

05 23 14 14 CC Okay. Do you feel like they're the same angle? (LM)

05 23 14 18 LMP Yeah. Exactly the same angle. Down at the bottom, (LM)  
there aren't any. They start in one place, that is,  
and it's a little ridge that's to the east of -  
Cinco, down at the base; the - what we call the base  
here. There's two pretty predominant craters over  
there. Right there, there aren't any.

05 23 14 43 LMP All over the mountain. Okay. I don't think we're (LM)  
going that far east, but - -

05 23 14 49 CC Okay. Those extra pictures - - (LM)

05 23 14 51 LMP Hey, Tony. What is the other pic - (LM)(PHO 107 17441-42)

05 23 14 53 CC Right, of the Cosmic Ray Experiment. So if you'll go over to that side, we'd like a cross-sun, at f:11, 250 at 15 feet. (LM)(PHO 107 17441-42)

05 23 15 05 LMP Okay. Cross-sun, f:11, 250 at 15. (LM)(PHO 107 17441-42)

05 23 15 08 CDR Okay. Houston. I just picked up this rock. It's a white rock, a very white rock, but it has a black glass layer on the back of it, or what appears to be black glass - a thick black glass; and it's about a hand-size specimen. I can't get it in the bag, but I'll get it anyway. And it has a lot of zap craters in it, and lining the zap craters are some whitish substance. (LM)(SAMP 60025)(PHO 110 17866-68; 113 18303)

05 23 15 38 CC Charlie, we'd like an up-sun of that cosmic ray also. And the settings on that will be f:5.6. (LM)(PHO 107 17441-42)

05 23 15 46 LMP Okay. Looking up-sun. Okay. (LM)(PHO 107 17441-42)

- - -

05 23 15 59 LMP Okay; that's what it is. I don't think you're going to see much in this picture, but I'll take it. It's just really gonna show you how it's sitting. Okay. That's done. (LM)(PHO 107 17441-42)

- - -

05 23 16 38 LMP Okay, we're ready for the loadup, and I'll swap cameras with you. \*\*\* put yours on your seat, John. (LM)

- - -

05 23 17 15 LMP I got two core tubes sitting up there, too. Don't let me forget those. (LM)

05 23 17 19 CDR Where? Up on the thing? (LM)

05 23 17 20 LMP Yeah. Up on the - handtool carrier - (LM)

05 23 17 22 CDR You want them in this SCB here - - (LM)

05 23 17 24 LMP No. They go back in here. (LM)

05 23 17 27 CDR What are we gonna do with this SCB right here? (LM)

05 23 17 28 LMP That is going on my back. That's the one I emptied yesterday. (LM)

05 23 17 33 CDR Okay. Fine. And I'll get that. (LM)

05 23 17 36 LMP The other one - you're going to be chock full of core tubes today, babe. I'll tell you. This is core-tube-taking day. And a suprise - whatever. Okay. I'm ready for loadup, I guess. (LM)

- - -

05 23 18 03 LMP Ah, the old lunar surface. We really kicked this stuff up, Tony, right around the Lunar Module where we walked, where you don't have the footprints and the tracks, it's very smooth, very white albedo. (LM)

- - -

05 23 18 20 LMP Yeah. Very white albedo. Where we've kicked it up, it's about two shades grayer. It's a lot darker albedo. And you know why I think that is, Tony? You look down-sun, and it's not that way. You look up-sun, and it is. I think it's the shadows that the Sun casts on the particles that have been disturbed that causes it to give a darker albedo. (LM)

- - -

05 23 21 47 LMP Happy day. Okay; LRV prep. HDEC to RCU - left seat to RCU. Pan, I got. HEDC, RCU to left seat. (LM) (PHO 107 17420-40)

05 23 21 59 CC And Charlie, verify the Q mags on the DAC and that the DAC's running - or it runs. (LM) (PHO DAC)

05 23 22 07 LMP It's not running, but the Q mag is there. (LM) (PHO DAC)

05 23 22 11 CC Roger. We just wanted you to verify that the DAC was working. (LM) (PHO DAC)

05 23 22 16 LMP Okay. Just a minute. Yep. (LM) (PHO DAC)

05 23 28 10 LMP You rat! \*\*\* why I didn't see that secondary from (LM)  
out here on the ground. You can't see the rocks are  
buried from -

05 23 28 21 CDR Look at the rocks around there, Charlie. (LM)

05 23 28 26 CDR There's your basalts and things. Those are black. (LM)  
They're probably glass covered, don't you think?

05 23 28 31 LMP They are. I picked up one out there. See where my (LM) (SAMP 60015)  
footprints go?

- - -

05 23 31 21 LMP Okay. DAC's coming on - (LM)

05 23 31 25 LMP Mark. (LM) (PHO DAC)

05 23 31 29 CDR Okay, give me that first heading again, Charlie. (LM) (PHO DAC)

05 23 31 31 LMP 164. (LM)

- - -

05 23 32 04 LMP As we cross out to the west here - or south, we see (LM-4)  
a lot of these black rocks with the white  
phenocrysts.

05 23 32 17 CDR Also, we see big white rocks with black phenocrysts. (LM-4)  
Black glass, I mean.

05 23 32 32 LMP Okay. We've got a great view of all the way into (LM-4)  
Stone. We're right up on a ridge here. We're at 10  
degrees bearing, 1.1 range. There's a 3-meter -  
1-meter boulder to the right that's very angular,  
that's just as we've already described: the black  
with the whitish inclusion. We can see all the way  
to the base of Stone mountain and Survey Ridge.  
There are some secondaries around. The terrain is  
covered with - about 3 percent of the surface with  
cobbles up to 15 centimeters, a couple of indurated  
little secondaries - - that are a meter or so.

- - -

05 23 33 32 LMP Now we're going down an incline downslope at 356 at (LM-4)  
0.3, that is about - what would you say, about a  
5-degree slope, John? And the boulder population  
and the cobble population has picked up over here to  
about 10 percent, I'd say.

- - -

05 23 34 18 LMP Phantom crater's over a ridge. I think we're coming (LM-4)  
by WC, is what we're really coming by. I'll try 1  
o'clock - make it 3 o'clock now, 350 at 0.3.

05 23 34 35 LMP Okay. The largest blocks we see are a meter. The (LM-4)  
regolith seems to be loosely compacted, much like  
the regolith over at the - which is characteristic  
of all of the Cayley here. Most of the rocks are  
angular to subrounded.

05 23 34 59 CC Okay. Do you feel you're still in that ray? (LM-4)

05 23 35 02 LMP Still in this ray. (LM-4)

05 23 35 05 CDR Yep. (LM-4)

05 23 35 07 CDR Just covered with blocks and holes. (LM-4)

05 23 35 12 LMP Lots of secondaries. (LM-4)

- - -

05 23 35 30 LMP We've got 0.6 now. When we get there, we should be (LM-4)  
353 at 1.3. We're traveling a little bit east. You  
look like you're headed just about for our spot.  
See Survey Ridge down there?

- - -

05 23 36 07 LMP Still down about a 2-degree - 2- to 3-degree slope (LM-4)  
now. Old Barney's really driving the beauty.

- - -

05 23 36 30 LMP Tony an observation here. The dust-covered rocks (LM-4)  
are mostly rounded. The angular rocks seem to be  
free of dust.

05 23 36 44 CDR And there sure are a lot of rocks here. (LM-4)

05 23 36 50 LMP \*\*\* still as we described, cobbly, cobble size is still the same. Maybe 10 percent of the surface, now. But we're starting out with the correct magazines, as per checklist. (LM-4)

05 23 37 15 LMP Lot easier driving down here, isn't it, John? Not any real big craters. Lot of subdued - - (LM-4)

05 23 37 22 CDR It's not any easier; it's just that you can see what you're doing. (LM-4)

05 23 37 25 LMP Yeah. But it didn't seem to be as rough, is what I thought. Okay. We're at 348 at 0.8 now; still in indurated secondaries. (LM-4)

05 23 37 52 LMP We see Survey right up there. That was properly mapped. Most of the secondaries - the craters here, Tony, are in the meter size. Some of the larger ones may be 5 meters. Okay. It's getting a lot rougher now. A lot more hummocky at 346 at 0.9. Slowing down to about 6 clicks. That's gonna be a steep slope up there, John. (LM-4)

05 23 38 43 LMP Looks like that's Survey dead ahead. (LM-4)

05 23 38 54 CDR Looks like to me. (LM-4)

05 23 39 02 LMP Apparently, this ray is pretty extensive. We haven't got out of this cobble field yet, and we're now 1.0 at 348, and the percentages are just exactly the same. Characteristics of the regolith are identical, and it still appears loosely compacted. Almost like a freshly plowed field that's been rained on. (LM-4)

05 23 39 43 LMP Right now we're in an area, at 1.1 at 345 - 346, with four blocks that are meter to a meter-and-a-half size - make that six blocks now. And we're in a - off to our right, there's a slight depression that's maybe 20 meters below us, that extends over to a ridge that blocks out Stubby. Okay. We're coming up to the biggest rock now we've passed on our traverse. Click. Got a picture of it. And it's got - it looks like a breccia also, Tony. It was rounded. (LM-4) (PHO?)

- - -

05 23 40 40 LMP That looks like a pretty good path off about 2 o'clock - 1 o'clock, John. (LM-4)

05 23 40 49 LMP Okay. Now the percentage of cobbles is picking up, Tony, at 1.2 at 344, and maybe now 20 percent of the surface is covered with cobbles up to 15 - make it 30 centimeters, with the largest blocks in the meter size. Looks like these larger ones are caused by - there's some craters here 5 meters or so that appear to me to be a series of secondaries right in this area. (LM-4)

05 23 41 36 CC You might bear back to the right 10 degrees. (LM-4)

05 23 41 43 LMP Okay, I think that's a good plan. Okay. We'll do that. You can still see the rim of South Ray, spectacularly white. It just stands out above the surrounding terrain by an order of magnitude. (LM-4)

05 23 42 12 CDR Okay, what's the heading down Survey Ridge, where I think we are right now, Charlie? (LM-4)

05 23 42 15 LMP Come down Survey at about 227, 0.4. Yeah, this is Survey. Top of Survey, Tony, has got a lot of secondaries. Thirty percent of the surface with cobble, predominantly in the 10-centimeter range, but some greater than that, up to 50 centimeters. (LM-4)

05 23 42 46 LMP Very blocky. (LM-4)

05 23 42 51 LMP I'm clicking them off as fast as my finger'll pull the trigger. (LM-4) (PHO?)

05 23 43 04 LMP I got it. Okay. Okay; I'd say now 70 percent - in this area, 70 percent is covered; 347 at 1.5. (LM-4)

05 23 43 18 LMP Tony if we'd have gone to 353 on Survey originally, we'd have been down in a big depression. (LM-4)

05 23 43 36 LMP Oh, man, John. This is really a ray; it just goes right in to South Ray. (LM-4)

05 23 43 40 CDR Boy, you just can't believe the blocks. The block population on Survey - what is it, 50 percent? (LM-4)

05 23 43 47 LMP Oh, I would say - estimating 60 to 70. And you can track it right in, up across, over the ridge - it blocks out Wreck and Stubby - into South Ray. We're going downslope now, off of Survey; still heading southeast. (LM-4)

05 23 44 25 CDR \*\*\* got to get out of these, Charlie. (LM-4)

05 23 44 27 LMP No. I think - yeah, the Rover's hacking it with no sweat over these little ones. (LM-4)

05 23 44 31 CDR Yeah, but I mean \*\*\* spend the rest of the day in the ray. (LM-4)

05 23 44 39 LMP Yeah. I think you can hook a right here a little bit, John. Looks pretty good. There's really a lot of craters here, Tony, at 1.6 at 348. The top of Survey is just pockmarked. They're pretty subdued, though. We can drive through them up to 3-meter ones with no problem. You're still making 6 clicks, John. The characteristics of the rocks, Tony, are the same as around the Lunar Module. (LM-4)

05 23 45 13 CC Okay. If you get a chance to look at the southeast side of Survey - - (LM-4)

05 23 45 23 LMP That's one of the white ones - - (LM-4)

05 23 45 24 CC - - you might see if you see any beds in there. (LM-4)

05 23 45 31 LMP No, not a chance. (LM-4)

05 23 45 36 LMP It's pretty well rounded. The only predominant feature is this ray pattern with all the secondaries (LM-4)

05 23 45 55 LMP Boy, it'll be no trouble sampling the South Ray at 8; it looks like that this ray goes right across it. (LM-4)

05 23 46 07 LMP We're 1.7 now at 352, and sort of back down in - almost - we've dropped maybe 20 meters. Just passing a secondary that's 10 meters across. (LM-4)

05 23 46 23 CC Okay. You should see Merriam over to your right. (LM-4)

05 23 46 30 LMP Merriam would be down over the ridge. (LM-4)

05 23 46 35 LMP Man, there's a great split boulder right there. (LM-4)

05 23 46 42 LMP It was an east-west split there. Very undulating terrain, hummocky; the hummocks are - oh -  
- - - (LM-4)

05 23 47 12 LMP Fifty-seven for 0.4. We should be 005 at 1.6 to cross - then we turn south again. We're at 1.8, but that's because we're a little - I think we could go straight for them, John. There's Cinco's, right up there on the hill. (LM-4)

05 23 47 39 CDR I think we should go straight for them; I want to get out of this ray. (LM-4)

05 23 47 44 LMP Okay. We are we're going 180. This is terrible, this ray, isn't it? (LM-4)

05 23 47 50 CDR Yep. That's why I want to get out of it. (LM-4)

05 23 47 52 LMP Yeah. Okay. We must be coming to the edge of it. My estimate of the cobbles is back down to about 20 percent now. We have secondaries within secondaries; predominant crater size is still meter or so. Only a very few of the secondaries are indurated. Coming up on one now at 2.0 at 355. Boy isn't it something? (LM-4)

05 23 48 38 LMP You're still going 8 clicks, though, John. Apparently, we're still on Survey. It's a wide ridge that's furrowed parallel to the long axis. Now there's a big crater off to the right, John, and here's five right up here at about 12:30. Are - the Cincos are right south of Crown, though; so it's the ones to the right where we want to go. See that big crater up there below Crown? (LM-4)

05 23 49 24 LMP Okay, now you're headed right for it. And the Cincos are right to the right of that. Apparently, in fact, that big one is probably Cinco E. (LM-4)

05 23 49 37 CC From where you are, Cinco should be right in line with you, John - - (LM-4)

05 23 49 39 LMP Okay. So it is, Tony. Right now. We got it spotted. (LM-4)

05 23 49 48 LMP Got a little crater on the inner flank. Okay. (LM-4)  
Doing 10 clicks, and it's still in the cratered saturated downslope of Survey Ridge at 354 at 2.2 block population is still the same. Looks like we don't get out of the ray, really, until we hit and start climbing upslope at Station 6.

05 23 50 21 CDR Houston, the best idea I can give you of what this looks like, is it looks like about halfway up to that crater that we went to out at the Nevada test site. Man, I tell you, I've never seen so many blocks in my life. (LM-4)

- - -

05 23 50 49 LMP Now between us and the Survey, Tony, we really drop off again down to the base of Stone. We're going down to the base of Stone. We're going down about 4- or 5-degree slope that's still apparently, ejecta - South Ray ejecta. We're down to perhaps 10 percent now on block frequency. The character of the regolith is still the same, loosely consolidated with a raindrop pattern. It probably looks that way because of the Sun. I'm convinced of that. The rocks are mostly grayish with white clasts in them. (LM-4)

05 23 52 03 CC Okay, what's the bearing and range for that getting off the contact? (LM-4)

05 23 52 09 LMP We're right now at 354 at 2.5. We're still in a block field. It'll be another 2 clicks before we're out of it. (LM-4)

05 23 52 24 CDR I just don't think you can identify these things as contacts per se. (LM-4)

05 23 52 30 CDR They just fade out and then they go away. (LM-4)

05 23 52 37 CC Okay, you're about 200 or 300 meters from the contact, as it's mapped, with the Descartes or the feathering out there. We'd like you to keep an eye out for any changes in regolith. (LM-4)

- 05 23 52 52 LMP I think that's a pretty good guess as far - at least (LM-4)  
that's where the slope of Stone starts. That Stone  
mountain looked like it was right on top of us, and  
we've come 2.6 kilometers and we - it still looks  
just as far away.
- 05 23 53 15 LMP Okay, Tony, characteristics are still the same as up (LM-4)  
on Survey. Ten percent cobbles about the same size;  
maybe a smattering more of the larger ones, 50  
centimeters and up. Some of the rocks seem in good  
shape - are hardly fractured, others appear to be  
badly fractured, but still homogeneous.
- - -
- 05 23 54 02 CDR I haven't seen but one split boulder so far. Not (LM-4)  
that I've been looking, but I would if there were  
some.
- - -
- 05 23 54 25 LMP Eight clicks, Tony. We got up to 12 there, once. (LM-4)  
We're at 355 at 2.8. Still have Crown and Cinco E  
in sight.
- 05 23 54 47 LMP We got to go over another depression - down through (LM-4)  
another depression before we hit the upslope.  
That's about 100 meters in front of us. Boy, it's a  
spectacular view looking out to the west, Tony. In  
fact, it looks like a whole mountain itself back to  
the west.
- 05 23 55 18 LMP That poop about being able to see the LM all the way (LM-4)  
on traverse 2, I think, was gonna be bum dope.  
We've come down some big swales.
- 05 23 55 31 CDR They may call them swales in your part of the world, (LM-4)  
Charlie. They call them mountains in mine.
- 05 23 55 36 LMP In my 9 o'clock position, out about a kilometer - (LM-4)  
and we're 355 at 3.0 - is a tremendous boulder that  
must be so far away, but it's very predominant on  
the skyline. Must be 5 meters or so. I can't give  
you any new words, Tony. The regolith is still the  
same. We're still in a block field. We're just  
about to start upslope here. Have we been climbing,  
John?

05 23 56 25 CDR Nope. (LM-4)

05 23 56 26 LMP Look at that pitch meter. (LM-4)

05 23 56 30 CDR Maybe we have been climbing. I doubt it. (LM-4)

05 23 56 33 LMP Pegged out high. (LM-4)

05 23 56 36 CC Okay. Charlie, we'd like that DAC on 12 frames per second. (LM-4) (PHO DAC)

05 23 56 42 LMP Okay; 12 frames a second coming up. You got it. (LM-4) (PHO DAC)

05 23 56 52 LMP Okay, you're looking right at Cinco and it doesn't feel like we're climbing, but we've been climbing for quite a while here. I just looked at the pitch meter, and it was pegged out a minute ago. (LM-4)

05 23 57 08 LMP We're climbing up about a 10-degree slope now. (LM-4)

- - -

05 23 57 26 LMP Okay, see that one that's sort of a funny shape. Looks like it's got a breach in the southeast side at 12 o'clock? (LM-4)

- - -

05 23 57 37 CDR Okay. Well, Houston, now that we get up to Stone - I mean up to Stone mountain, my assessment is it's not any worse than what we've been driving down. (LM-4)

05 23 57 50 LMP I think this is one of our benches here, John. (LM-4)

05 23 57 54 LMP Yeah, we're at 33, and 5 should be at 33 and - okay, Tony; we're on a flat area now at 355 at 3.3, and I think it apparently is a bench. We're passing Station 5, a little to the east. (LM-4)

- - -

05 23 58 21 LMP And it's just as blocky here - the block population is up again to about 40 to 50 percent. (LM-4)

05 23 58 30 CC Okay, you might look for a fresh crater that would punch through that ray material in the Descartes for Station 5 when you come back. (LM-4)

- - -

05 23 58 48 CDR Look at old South Ray, Charlie. (LM-4)

05 23 58 50 LMP There's Baby Ray, John. (LM-4)

05 23 58 59 LMP And it's got black sides to it. Okay, here's a crater, Tony - remind us at 354 at 3.4 - that's about 15 meters across and about 5 meters deep, and I'll bet you it punched through. (LM-4)

05 23 59 25 LMP And that should be a good Station 5. (LM-4)

05 23 59 30 LMP Man, we are really going up a hill, I'll tell you. (LM-4)

05 23 59 37 CDR That's the only one I see \*\*\* (LM-4)

05 23 59 39 LMP Okay. See over here by this oblong one - which I think is Cinco E, John. We go up a steep slope, but then it seems to level out right up on top. (LM-4)

05 23 59 50 CDR Yeah. Look at that bench in Crown. (LM-4)

05 23 59 52 LMP I know it. No, we can't see Crown now. (LM-4)

05 23 59 55 CDR What is that thing with a V in it? (LM-4)

05 23 59 56 LMP That's Cinco E. (LM-4)

05 23 59 59 CDR The one with the V in it? (LM-4)

06 00 00 00 LMP Yeah. (LM-4)

06 00 00 02 CDR Let's go sample that. (LM-4)

06 00 00 04 LMP Okay, that's what I was thinking. See, it seems to be at the steep slope going up to it, but it looks like a bench or a little ridge on top. Okay, we're at 354 at 3.6, and you ought to see that Baby Ray, Tony. It's got a real good raised rim. It's got lots of blocks around it that are hard to estimate the size. And we are going up a steep, steep slope. (LM-4)

06 00 00 43 LMP And it's got black streaks coming out of it. (LM-4)

- - -

06 00 00 58 LMP This is going to be spectacular! I can see Wreck, (LM-4)  
and Trap and orange juice. There's a little bench  
on up there, a little bit more, John.

06 00 01 17 CDR Yeah, we're getting up on a bench right now. (LM-4)

06 00 01 19 LMP This is going to be such a spectacular view, you (LM-4)  
can't believe it. Okay, we're at Cinco, Tony. We  
feel it's 3.7 at 355.

06 00 01 35 CDR See it anywhere, Charlie? (LM-4)

06 00 01 37 LMP What? Cinco? Yeah, this is it. Here's the one. (LM-4)  
There's one, and the big one is just to the left  
over there with the V in it.

06 00 01 43 CC Charlie, you probably are at one of the lower (LM-4)  
Cincos, not D or E. You should have something like  
4.0.

06 00 01 52 LMP Okay. We'll go on up. (LM-4)

- - -

06 00 02 10 CDR Charlie, let's go up here to this big blocks crater. (LM-4)  
Man, that's really good.

06 00 02 15 LMP That's Crown. (LM-4)

06 00 02 16 CDR You don't want to go up to there? (LM-4)

06 00 02 17 LMP Yeah, that's fine with me. Look's like a pretty (LM-4)  
steep slope.

06 00 02 30 LMP I don't think I'm going to be able to see Stubby (LM-4)  
from -

06 00 02 35 CDR Can you see it from here? (LM-4)

06 00 02 36 LMP Yeah, I can see it now. Boy, it's a bad place to (LM-4)  
stop here.

06 00 02 49 LMP We're in a pretty good right roll, Tony. About 5 to (LM-4)  
10 degrees right roll, and climbing up a steep  
slope. And, John, here's a great ditch right up  
here. It might be a crater. Just right in front of  
us about 20 meters. Why don't we stop there?

06 00 03 09 CDR Right up there, you mean? (LM-4)

06 00 03 10 LMP I'm talking about just really right here. See this (LM-4)  
big block at about 1 o'clock - at 12:30?

06 00 03 18 CDR Right here? (LM-4)

06 00 03 20 LMP Yeah, right here. (LM-4)

06 00 03 27 LMP Go ahead, go ahead. (LM-4)

- - -

06 00 03 31 CDR Okay, because it's on a flat bench, too. (LM-4)

06 00 03 32 LMP We're at 4.0 at 355 - - (LM-4)

06 00 03 40 LMP I think we're just about to Crown crater. (LM-4)

06 00 03 46 CC Okay. The main thing is to make sure that we have a (LM-4)  
crater that's big enough - -

06 00 03 52 LMP Maybe - maybe not. (LM-4)

06 00 03 53 CC - - to punch us through any ray material from South (LM-4)  
Ray.

06 00 03 57 LMP This one does. Don't worry. This is a 10-meter (LM-4)  
crater that's got blocks on the inside of it that  
are partially covered with fillet material.

06 00 04 09 LMP And that's at 354 at 4.0. How about hooking left. (LM-4)  
Hey, this is going to be pretty good. Look at those  
blocks.

06 00 04 25 CC We think you're at one of the sharp Cincos - - (LM-4)

06 00 04 26 LMP I do, too. Hey, can't we get up there closer - (LM-4)  
right in that block, John? We won't have so far  
to walk. Upslope. Seems to be a flat place about  
right up here.

06 00 04 47 CDR Yeah. This is almost flat? (LM-4)

06 00 04 50 LMP Well, according to the pitch meter, it's not. It's (LM-4)  
pegged out.

- - -  
 06 00 05 14 CDR I'm going up here, and set it in a crater so it (LM-4)  
 doesn't go anywhere.  
 06 00 05 26 LMP This looks pretty good. I don't think it's going to (LM-4)  
 go downslope. Tony, you can't believe it, this view  
 looking back to the east. We see Ravine, we see the  
 rim of North Ray that's got some really good blocks  
 on it. Look at this slope. Look at what we have  
 been coming up. But we cannot see in the North Ray;  
 it's above our positon.  
 06 00 05 55 LMP We can see the old Lunar Module! Look at that, (LM-4)  
 John. Okay, 270 on the heading.  
 06 00 06 04 CDR I want to go back down there and park in that flat - (LM-4)  
 in that crater right there.  
 06 00 06 13 LMP Yeah, okay. Looks like to me, from my side, if you (LM-4)  
 just turn real sharp left, you'd have it. But  
 that's fine where it is.  
 06 00 06 19 CDR It's not flat, Charlie. It's pointing too downhill. (LM-4)  
 06 00 06 22 LMP Not sideways, it wouldn't be. (LM-4)  
 06 00 06 24 LMP Sideways. We got to park 270. But that'd be fine. (LM-4)  
 Why don't you go down there, John?  
 06 00 06 43 LMP Which one are you going to park in? (LM-4)  
 06 00 06 52 CDR That one right down there, where that block is. (LM-4)  
 06 00 06 54 LMP The right? (LM-4)  
 06 00 06 55 CDR Yeah. (LM-4)  
 06 00 07 07 LMP That's a good overturnable one right there, John. (LM-4)  
 Hey, we could roll that thing downhill.  
 06 00 07 26 LMP Look at that beauty climb over those 1-meter blocks. (4)  
 We're parked, Tony, at heading 270, 354, 5.2, 4.1.  
 - - -

06 00 09 26 LMP DAC's off, Tony. (4)(PHO DAC)

06 00 09 33 LMP Okay, the mag's empty on the DAC. My frame count is 82. (4)(PHO DAC)

06 00 09 46 LMP I'm around to get the 500. You can see the Lunar Module, you can see North Ray with boulders on the southwest side, and where Station 12 is, there's one huge boulder that's going to be just great. It looks like we can get up there, and there's a great ray pattern going up the side of Smoky mountain from North Ray. (4)

- - -

06 00 12 56 LMP Okay, starting with the 500. (4)(PHO 112 18243-77)

06 00 13 06 LMP Tony, you can see the rays of South Ray come out across the landscape, albedowise. And it's really predominant. They cross right across, go right up Survey, and it's definitely a ray pattern that we were crossing. Okay, 500 of Stubby, 15 and - that's not worth 15 pictures, Tony. (4) (PHO 112 18260-68)

06 00 13 39 CC And, John, before you start sampling - - (4)

06 00 13 42 LMP Can't see much. (4)

06 00 13 44 CC - - could you give us a general impression of the rock types? (4)

06 00 13 49 CDR It looks to me like this rock pile that we're seeing in there is about the same type of rock. As you can see, they're angular. Let me go over there and look at this big one. I think they're right friable. They have a very shocked appearance. There's a boulder we could turn over, Charlie. (4)

06 00 14 20 LMP That's what I was saying. (4)

06 00 14 22 CDR It's a big one. Right behind us. The trouble is, I don't want to push it into the Rover. (4)

06 00 14 29 LMP I'm taking some 500 of South Ray. I can see into the rim on the inner wall on the south side. And the characteristics of the thing; it's got black streaks and white streaks coming out of the wall right over the rim, which says to me, there's two types of rocks down there. (4)(PHO 112 18243-52, 55-59)

06 00 14 52 CDR That's right, Charlie. That's what it says. And that's why your dark streaks show up on your photograph. It's not that that thing wasn't throwing out blocks in every which direction. That dark streak right down through the middle of your photograph is probably - it looks as dark as in the area, and it's probably dark material from South Ray. (4)

06 00 15 17 LMP Stubby is a very subdued old crater. It's not worth 15 pictures really. It's not much to it. (4)(PHO 112 18260-68)

06 00 15 36 LMP No outcrop at all. I see some secondaries in the inner flank. (4)

06 00 15 43 CDR It doesn't look much different than the subdued craters that we've just come across. (4)

06 00 15 49 LMP I've just got to get a picture with the 500 of the old Orion sitting out there. (4)(PHO 112 18269-77)

06 00 15 56 LMP Okay, I'm going to take a couple of North Ray. (4)(PHO 112 18269-77)

06 00 16 05 CDR Most of these rocks have a whitish cast to them, Houston, but - (4)

06 00 16 13 LMP I'm up to frame count 90 on magazine Lima. (4)(PHO 112 18269-77)

- - -

06 00 17 08 LMP Look upslope, Tony. Okay, look on upslope, and you see all this rock field that we're in here. Okay. Anyway I put the rake, the rake's coming next, John. (4)

06 00 17 19 CDR Okay. I was just going to get this one sample. (4)(SAMP 64430, 35)(PHO 107 17443-47)

06 00 17 21 LMP Okay, go ahead. Then we need a pan. That's after penetrations. (4)

- - -

06 00 18 23 LMP I just came up about a 20-degree slope, and it is really loosely compacted here. (4)

06 00 18 38 CDR I've got a hard rock. I think it's glass coated, but it's so dust covered I can't tell, and it's going in bag 394. (4)(SAMP 64430, 35)

- - -

06 00 19 02 LMP The block population here in this immediate area is 60 to 70 percent, with the biggest one being right in our little crater here that's a meter or so. They're all very angular but the majority - prime size - the majority of them are less than, oh, less than 30 centimeters or so, though there's a good proportion of 50 - - (4)

06 00 19 35 CDR Let me put this in your bag, Charlie. (4)(SAMP 64430, 35)

06 00 19 37 LMP Got to get the rake. Most of them are dust covered. Well, not most of them; in fact, most of them are not dust covered. (4)

06 00 19 56 CDR Got the rake? (4)(SAMP RAKE 64530-89)(PHO 110 17947-48; 107 17448-50)

06 00 19 58 LMP Yeah, I got it. (4)(SAMP RAKE 64530-89)

06 00 20 00 CDR Shovel. (4)

06 00 20 01 LMP Okay. (4)

06 00 20 03 CDR No, we don't need the shovel. You want to use that thing, or do you want me to use the rake? (4)

06 00 20 05 LMP Let me rake this time and then I'll get on with the penetrometer, okay? (4)(SAMP RAKE 64530-89)

06 00 20 09 CDR Okay, fine. (4)(SAMP RAKE 64530-89)

06 00 20 10 LMP There's a place right up here, John, that looks like it's a good - - (4)(SAMP RAKE 64530-89)

06 00 20 16 CDR Okay, let's not go too far. (4)(SAMP RAKE 64530-89)

06 00 20 18 LMP I'm not. It's pretty steep. There's a place right here that's got a lot of good ones. (4)(SAMP RAKE 64530-89)

06 00 20 38 LMP Let me get up-sun. An 11-footer. (4)(SAMP RAKE 64530-89)(PHO 110 17947)

06 00 21 00 LMP Okay, got it. And let me get a locator from up here, too. Underneath this regolith up here, we've still got the same deal. Top centimeter or so is - - (4)(SAMP RAKE 64530-89)(PHO 110 17948)

06 00 21 24 CDR Now we rake. (4)(SAMP RAKE 64530-89)

06 00 21 37 CDR Okay. Most of these rocks were white clasts. (4)(SAMP RAKE 64530-89)

06 00 21 43 LMP Glass coated, too - a little - - (4)(SAMP RAKE 64530-89)

06 00 21 45 CDR Glass coated. (4)(SAMP RAKE 64530-89)

06 00 21 46 LMP - - on some of them. (4)(SAMP RAKE 64530-89)

06 00 21 50 CDR There's 12 or 13 in that first scoop, and there's - they're mostly white clast rocks. (4)(SAMP RAKE 64530-89)

06 00 22 00 LMP Here comes one that's got a lot of glass on it. (4)(SAMP RAKE 64530-89)

06 00 22 10 CC You think you're getting breccias there, then? (4)(SAMP RAKE 64530-89)

06 00 22 17 CDR No, we're not sure because they're dust coated too, and there's glass - there's glass on them. They could be just shocked rock. (4)(SAMP RAKE 64530-89)

06 00 22 27 CDR Okay, that's going into bag 395. (4)(SAMP RAKE 64530-89)

06 00 22 30 LMP I don't get the impression - - they're breccias, myself. (4)(SAMP RAKE 64530-89)

06 00 22 34 CDR I don't either. But it's just an impression. (4)(SAMP RAKE 64530-89)

06 00 22 48 LMP You want to get an after of that, John? I'll get a shovelful. (4)(SAMP RAKE 64530-89)(PHO 110 17450)

- - -

06 00 23 22 LMP Want to get that kilo. Okay. (4)(SAMP RAKE 64500-25)(PHO 110 17947-48; 107 17448-50)

06 00 23 29 LMP Some of that white stuff in the bottom. (4)(SAMP RAKE 64500-25, 15-19, 25)

06 00 23 32 LMP That's what I was going to say. Underneath this top gray layer, it's white again up here, just like on the Cayley. (4)(SAMP RAKE 64500-25, 15-19, 25)

06 00 23 42 LMP That's a kilo, isn't it? (4)(SAMP RAKE 64500-25, 15-19, 25)

06 00 23 45 CDR Yeah. (4)(SAMP RAKE 64500-25, 15-19, 25)

06 00 23 46 LMP Your old rake is finished. (4)(SAMP RAKE 64500-25, 15-19, 25)

06 00 23 56 CDR And it's in bag 396. (4)(SAMP RAKE 64500-25, 15-19, 25)

06 00 24 06 CDR Now, you want me to throw it in my bag. (4)

06 00 24 10 CDR Weren't we supposed to leave core tubes in there? (4)

06 00 24 11 LMP No, you've got core tubes. Let me carry the rocks. I'll have an easier time getting the core tubes out if your bag is empty. (4)

- - -

06 00 24 24 CC Hey, Charlie. We're having a hard time getting - - a perspective on that crater. Could you give us the dimensions, please? (4)

06 00 24 31 LMP Where we're standing? (4)

06 00 24 32 CC Right. (4)

06 00 24 36 LMP What do you think, 10 meters, John? (4)

06 00 24 38 CDR Yeah. It's an old 10-meter crater; it's really an old one. These other rocks around here might have been caused by this - matter of fact, this might of - no, I don't think so. I think these rocks were laid in here when South Ray came in. (4)

06 00 24 59 LMP On the penetrometer, it's benched. We'll call this crater The Bench if you want to, and I'll get one uphill, one downhill, and two in the bottom of the crater. (4)

06 00 25 19 LMP I'll start with a 0.5. (4)

06 00 25 29 LMP John, I'm glad we got those two core tubes. I think the other two fell off back at the LM. (4)

06 00 25 37 LMP I don't think I ever put those back in your bag. (4)

06 00 25 57 CDR I'm looking at a rock here that is a very angular rock, and it has white clasts with a breccia, or it has a brecciated appearance. I'll take a picture of it and sample it for you. (4)(SAMP 64470, 75-78)(PHO 107 17451-54, 57)

- - -

06 00 29 08 CDR Don't step right there, Charlie. Here's a glass splatter. (4)(SAMP 64450, 55)(PHO 107 17455-56)

06 00 29 12 LMP Oh yeah. I see it. A whole big bubble of it, isn't it? (4)(SAMP 64450, 55)

06 00 29 22 CDR I'm going to grab sample this glass splatter behind the Rover. (4)(SAMP 64450, 55)

06 00 29 33 LMP Good. John, if you see it, there's one under that rock. Is that the one you're talking about? (4)(SAMP 64450, 55)

06 00 29 40 CDR Yeah. (4)(SAMP 64450, 55)

06 00 29 41 LMP Okay. Tony, can I start on number 5 on the penetrometer? (4)

06 00 29 44 CC Okay. (4)

06 00 29 49 LMP Okay. I'm going up out of this crater - up on the top part of it. (4)

06 00 29 57 CDR And that's going into bag 397. (4)(SAMP 64450, 55)

06 00 30 05 LMP Tony, you just can't believe that South Ray crater. It is perfectly - cylindrical - circular. And it's amazing. It's just really apparent that we got two types of rocks there. Okay, I'm about up on the side now, starting with 5. And we're pushing it in. (4)

06 00 30 56 LMP Okay. That's as far as it's gonna go, Tony. And it went to half - about three-quarters of the way up to the red mark. (4)

06 00 31 15 CC Okay. We'd like you to - - (4)

06 00 31 16 LMP \*\*\* going back down in the flat part. (4)

06 00 31 18 CC - - change to 220. (4)

06 00 31 22 LMP Okay. And, Tony, when you push on the thing, you can't push with a very smooth force, and you're gonna see some spikes on the recording, I'm sure. (4)

06 00 31 45 LMP And if you want my opinion on the thing, I don't think we're hitting hard ground. I think what I did is probably hit a rock, and I should have probably moved this thing over a little bit. (4)

06 00 31 59 CC Okay. We'll just go with the 0.2 and see how that does. (4)

06 00 32 04 LMP Okay. (4)

06 00 32 15 CDR I'm sampling independently, and I've got four samples in bag 398. They're so dust covered that I can't tell anything about them - - but I suspect they're lying by this big rock, and they may be the same kind of rock Charlie, I'm going to get that bag out from underneath your seat and put the samples in there. (4)(SAMP 64470, 75-78)

06 00 32 39 LMP You know, John, with all these rocks here, I'm not sure we getting Descartes. (4)

06 00 32 47 CDR That's right. I'm not either. (4)

06 00 32 48 LMP We ought to go down that crater without any rocks. (4)

06 00 33 01 LMP The 0.2 went all the way in. (4)

- - -

06 00 33 16 LMP It was very light pressure. It just depends on whether you hit a rock down there or not. This is really loosely consolidated - this regolith - loosely packed. (4)

06 00 33 36 CC Was that Index on 6? (4)

06 00 33 41 LMP That's affirmative. Going to 7. (4)  
 - - -

06 00 33 55 LMP Hey, turn the big eye up to the right, Tony, if you (4)  
 want to watch this other one.

06 00 34 12 LMP It seems a little more firmly packed here. (4)

06 00 34 23 LMP Okay, that one bottomed out now. (4)

06 00 34 28 LMP It's up above the red mark. And it got (4)  
 progressively harder. So I think that was a good  
 reading. I don't think that was necessarily a rock  
 down there.

06 00 34 49 LMP Okay. Going to 8 and I'm going downslope. (4)

06 00 35 02 LMP John, this crater over here looks like it might be - (4)  
 just downslope here looks like it might be one of  
 the Cincos, and it could be Descartes material,  
 because it's just some little blocks around it. And  
 there's some little blocks inside the rim, too.

06 00 35 31 CDR Okay, Houston. I'm digging an exploratory trench (4)(SAMP TRENCH 64420-25)(PHO 107 17458-62)  
 right here to see if the material is black.

06 00 35 43 CDR Now - it's sure not. I mean the material is not (4)(SAMP TRENCH 64420-25)  
 white. It's just the same as it -  
 - - -

06 00 36 02 LMP I went down. That one bottomed out. (4)

06 00 36 12 LMP But it went all the way in. (4)

06 00 36 19 CDR I've gone down about - (4)(SAMP TRENCH 64420-25)

06 00 36 35 CDR Shovel width, and it's all the same material. And I (4)(SAMP TRENCH 64420-25)  
 don't see any layering in it or anything.

06 00 36 50 LMP I've gone to number - sequence to number 9, and I'm (4)  
 stowing this beauty.

06 00 37 01 LMP And that one test downhill was on the steepest part. (4)  
 - - -

06 00 37 23 LMP Tony, do you want this double core - in the ditch here or downslope where I think is probably closer to Descartes? (4)(SAMP CORE 64001-02)(PHO 110 17949-51)

06 00 37 43 CDR I've got a sample out of the deepest part of this trench that I'm digging, and it's going into bag - (4)(SAMP TRENCH 64420-25)

06 00 38 00 CDR Bag 399. (4)(SAMP TRENCH 64420-25)

- - -

06 00 38 16 CC Charlie. Why don't we just go ahead and take it downslope there about your last penetrometer place? (4)(SAMP CORE 64001-02)

06 00 38 24 LMP John, I'm going to come over there - - and get a couple of cores from you. (4)

06 00 38 39 CDR Okay. I'm going to leave those two cores in that bag. (4)

06 00 38 53 CDR I wish I could say these rocks look different, but they don't. (4)

06 00 38 58 CC And do you see a blocky rim crater within walking distance? (4)

- - -

06 00 39 23 LMP Yeah. That was one right up there. Uh-huh. Yeah. That's 30 meters away - up there. Getting out of this little crater is pretty hard; but I think you'll be able to hack it. (4)

- - -

06 00 40 23 CDR Charlie, get a picture of the LM. (4)

06 00 40 25 LMP I did - with the 500. (4)(PHO 112 18269-77)

- - -

06 00 41 05 LMP The old double core is assembled. Tony, in the regolith, you see little bright speckles looking at you, and I think it's glass particles. John has already sampled - some of them. (4)(SAMP CORE 64001-02)

06 00 41 56 CDR Here's some blocky rim secondary. Here's a nice little one. (4)

06 00 42 04 CC Okay, John. That might be a good place to get a rock. We're really looking for one where the rock around the secondary - rock around the crater - should come from the crater; not from the secondary. (4)

06 00 42 19 CDR Yeah. I would suppose that all of them - do you think all the blocks on the upslope side were the secondary that made it? Don't you reckon - if it's from South Ray? Let me go down and sample off the south rim. (4)

- - -

06 00 42 39 CDR I think you really need a primary impact crater to avoid the problem. (4)

06 00 42 49 LMP I don't want to get down there too far. This thing is deep. I'm to the 2:30 position of the Rover, and I'm going to start with this double core - got it assembled. Okay. I pushed it in. I got in almost to the top of the first stem by pushing it in. (4)(SAMP CORE 64001-02)

06 00 43 32 LMP There comes your 7-footer cross-sun, and I'll get you a locator. I'm just going to get you a locator now that I'm downslope. It won't be in the ground. (4)(SAMP CORE 64001-02)(PHO 110 17949-50)(PHO 110 17951)

- - -

06 00 44 00 LMP Okay, Tony, about halfway up the second one - it's getting a little harder, but it's going on in. (4)(SAMP CORE 64001-02)

06 00 44 18 CC Okay. Maybe we're getting down to Descartes there. (4)(SAMP CORE 64001-02)

06 00 44 27 LMP Huh? That might be. Boy, those rays from South Ray - you can just track right across through Stubby right on up to Survey. You know, Tony, South Ray was mapped as big a crater as North Ray, and it's not nearly as big. It's just the ray pattern - the whiteness that makes it look this big. (4)

06 00 45 09 CDR I'm standing on the rim of this crater over here. (4)(SAMP 64800-04)(PHO 107 17463-66)  
The only rock I see on the south rim of this obvious  
secondary is not too big. I can get down into the  
crater and look down in it, and see if I can scratch  
away to a bench, if you'd like to do that.

06 00 45 43 CC Okay. I don't think we need to do that, John. (4)  
Charlie will bring up a rake there; and, maybe from  
that, we'll be able to get Descartes.

06 00 45 59 CDR Are you getting a rake, Charlie? (4)

06 00 46 01 LMP I'm finishing up the double core right now. I've (4)(SAMP CORE 64001-02)  
got it back here, and I'm taking it apart.

06 00 46 11 LMP Capped, bottom section. (4)(SAMP CORE 64001-02)  
- - -

06 00 46 35 LMP That's full. Bottom section was 38. (4)(SAMP CORE 64001-02)  
- - -

06 00 47 05 CDR What I'll do, Houston, is get a soil sample off this (4)(SAMP 64800-04)  
rim. That's the only thing I can be assured of  
that's Descartes right at this point.

06 00 47 20 CDR That's going in bag 400. (4)(SAMP 64800-04)

06 00 47 31 LMP Top section is number 43. (4)(SAMP CORE 64001-02)  
- - -

06 00 47 52 CDR Okay. From this vantage point I'd like to shoot a (4)(PHO 107 17467-89)  
pan.

06 00 48 00 CDR It might be able to make some stereo with it. (4)(PHO 107 17467-89)

06 00 48 29 CDR I tell you, this is a graphic illustration of a (4)  
secondary from South Ray, though, and it'll show up  
good if I can bend over good enough to get it.

06 00 48 47 LMP Okay, Tony, the double core is under my seat - (4)

06 00 48 51 LMP All finished. Do you really want me to grab the (4)  
rake, Tony? I got to go up and help John.

- - -  
 06 00 49 07 CC Yeah, we'd like you to take the rake on up there. (4)  
 06 00 49 12 LMP Okay. I'm putting it together now. (4)  
 - - -  
 06 00 50 01 CDR Roger. Do you know where we landed? Charlie Alpha (4)  
 81!  
 06 00 50 12 CDR Charlie Alpha 81. We're about 200 meters north of (4)  
 Double Spot.  
 06 00 50 21 LMP Yeah. There's Double Spot. (4)  
 06 00 50 23 LMP Exactly north of Double Spot, John. (4)  
 - - -  
 06 00 50 43 LMP Hey, John, did you make those little footprints here (4)  
 around in this stuff? Yes, I guess I did.  
 06 00 50 48 CDR No, sir. I didn't. I came across that ridge there, (4)  
 and I don't advise you to get down in there either.  
 06 00 50 56 LMP This is steep. Where do you want this - (4)(SAMP RAKE 64810-37)(PHO 107 17465-66, 90-91)  
 06 00 51 00 CDR On the rim, I think, Charlie. (4)(SAMP RAKE 64810-37)  
 06 00 51 01 LMP Why don't we get outside the rim? That would be (4)(SAMP RAKE 64810-37)  
 definitely Descartes - right down here.  
 06 00 51 05 CDR The object is to get the stuff that's been knocked (4)(SAMP RAKE 64810-37)  
 out of the ground and landed on the rim.  
 06 00 51 10 LMP Okay, I'll sample right up here. That's a definite (4)(SAMP RAKE 64810-37)  
 secondary right there, isn't it?  
 06 00 51 19 CDR Boy, I mean to tell you if that's not I never saw (4)(SAMP RAKE 64810-37)  
 one.  
 06 00 51 27 CDR - Hank Moore would like to see that. (4)(SAMP RAKE 64810-37)  
 06 00 51 37 CDR Let me get the rake sample, Charlie. Get it. (4)(SAMP RAKE 64810-37)

06 00 51 43 LMP Okay. There's a lot of goodies right there on the inner rim. (4)(SAMP RAKE 64810-37)

06 00 51 48 CDR That's where I'll rake - right there. (4)(SAMP RAKE 64810-37)

06 00 51 53 LMP Okay. Don't fall into that Mutha. (4)(SAMP RAKE 64810-37)

06 00 51 59 CDR Pretty good size, isn't it? (4)(SAMP RAKE 64810-37)

06 00 52 01 LMP Yeah. Here, let me have the shovel. Okay. I got it. (4)(SAMP RAKE 64810-37)

06 00 52 13 LMP That's a clod. That's an indurated clod. Here's some rocks. Good deal, boy. That's great. Hey, let's fill this one up, and then -  
- - - (4)(SAMP RAKE 64810-37)

06 00 52 41 LMP Real dust-covered, mostly centimeter size, Tony - about 15 frags - some smaller than that. (4)(SAMP RAKE 64810-37)

06 00 52 52 CDR I've already got my shovel full here, Charlie. (4)(SAMP RAKE 64810-37)

06 00 52 54 LMP Okay. Of the dirt? (4)(SAMP RAKE 64810-37)

06 00 53 03 LMP I hate to tell you this, but I think it's indurated regolith. (4)(SAMP RAKE 64810-37)

06 00 53 07 LMP Because I'm just breaking it up. (4)(SAMP RAKE 64810-37)

06 00 53 10 CDR Very friable. Like dust - dirt clods. (4)(SAMP RAKE 64810-37)

06 00 53 14 LMP Which is probably what it is. (4)(SAMP RAKE 64810-37)

06 00 53 17 CDR Want to get another one? (4)(SAMP RAKE 64810-37)

06 00 53 19 LMP Yeah. Can you try another one? (4)(SAMP RAKE 64810-37)

06 00 53 28 LMP I don't think these are rocks. If they are, they are very friable. I think it's just indurated regolith. (4)(SAMP RAKE 64810-37)

06 00 53 40 CDR Well, there may be a rock or two in there. (4)(SAMP RAKE 64810-37)

06 00 53 55 CDR Maybe some of them are rocks. That was three scoops, and we're not documenting this to the best of our ability, because I think we're standing too close to the rim here to - (4)(SAMP RAKE 64810-37)

06 00 54 09 LMP Down-sun, I'd be in big hole. (4)(SAMP RAKE 64810-37)

06 00 54 12 CDR If Charlie goes down-sun to take the picture, we're in trouble. (4)(SAMP RAKE 64810-37)

06 00 54 17 CDR It ought to be in the pan. (4)(SAMP RAKE 64810-37)

06 00 54 18 CC Right. We see it. (4)(SAMP RAKE 64810-37)

06 00 54 19 CDR The locator shot will be in the pan, and I'm going to shoot this - this is an up-sun, after, of the rake sample, stereo. (4)(SAMP RAKE 64810-37)(PHO 107 17490-91)

06 00 54 31 LMP That was in bag 401. (4)(SAMP RAKE 64810-37)

06 00 54 37 LMP We can get the dense rocks here for the padded bags. There's plenty of them around, but they'll probably be out of South Ray. All these blocks that we see here came out of this secondary. (4)(SAMP RAKE 64810-37)

06 00 54 54 CDR Yeah. (4)(SAMP RAKE 64810-37)

06 00 54 55 LMP Every one. (4)(SAMP RAKE 64810-37)

06 00 54 56 CC We'll collect the padded bags back near the Rover. There's no point in going back up there. (4)

06 00 55 08 LMP Well, that's what we're going to do. I just wondered if secondary was okay for you. (4)

06 00 55 14 CC We're getting them to work it. We will need a second pan in the area of the penetrations there. (4)(PHO 110 17952-74)

06 00 55 24 LMP I'll do that. Boy, isn't it loose? On your footing here, John, it feels like I'm really sinking in. (4)(PHO 110 17952-74)

06 00 55 35 CDR Charlie, you really are. (4)

06 00 55 53 LMP You know, John, that black stuff is glass - on those rocks. (4)

06 00 55 57 CDR Sure it is. That's what I said. (4)

06 00 56 04 CC Okay, fellows, we'll save the padded bags for later. (4)

06 00 56 17 LMP I think we have enough rocks from the South Ray. (4)

06 00 56 25 LMP I got to get one more view from up here. I'll take (4)(PHO 110 17952-74)  
the pan from right here.

- - -

06 00 56 49 LMP Okay, let's see; how do I do this? Fill at 74. Do (4)(PHO 110 17952-74)  
you want me to change the mags on the - 16? It's (PHO DAC)  
about empty.

06 00 57 15 CC That's affirmative. (4)(PHO DAC)

- - -

06 00 57 21 CC Should be mag R. (4)(PHO DAC)

06 00 57 25 LMP If I get this - top of this one in that picture - (4)(PHO 110 17952-74)  
it's going to be a miracle.

06 00 57 44 LMP Doing this pan, I've moved about 2 feet downslope, (4)(PHO 110 17952-74)  
so I don't know if things are going to match up too  
well or not.

06 00 57 55 LMP Okay. And, after that pan I'll be leaving here with (4)(PHO 110 17952-74)  
frame count 110.

06 00 58 12 LMP You, dog, you! (4)

06 00 58 14 CDR What are you talking about? Did you drop it, (4)  
Charlie?

06 00 58 15 LMP Yeah, but I got it. Get downslope here, and it's a (4)  
piece of cake.

- - -

06 00 59 23 CDR Okay. I think the fact that we didn't run across (4)  
any white soil may be significant around here.

- - -

06 01 00 13 CDR My frame count is 76, magazine Charlie. (4)

06 01 00 19 LMP John, could you give me magazine Romeo? (4)(PHO DAC)

06 01 00 24 LMP Hey, Tony. I think on this next one we ought to stop away from any boulders down at 5, so we can get some Descartes. (4)

- - -

06 01 01 03 LMP Okay. We could move 40 feet - 50 meters, downslope, and I think we'd have Descartes, but we'll look. (4)(PHO DAC)

06 01 01 17 CDR I've got the frame count. DAC's mag's R - and the bags we're skipping. Okay; DAC, f:8, 250. (4)

06 01 01 27 LMP I've got to change that. (4)

06 01 01 35 CC Okay. That 50 meters downslope you described - is that a blocky rim crater, or why do you think that is Descartes? (4)

06 01 01 44 LMP Because there's no blocks around it at all. (4)

06 01 01 48 CDR It's just an old subdued crater. (4)

06 01 01 51 LMP It's got a few blocks around it. Tony, I can see that one downslope that you wanted us to stop at that's at Station 5. It won't be any trouble getting there, but if you give us a vector, that'll be certain. (4)

06 01 02 09 CC Okay. The vector will be 352 heading and 0.7. (4)

- - -

06 01 02 42 CC What they're looking for is a primary impact crater at Descartes. (4)

06 01 02 43 CC What we're looking for is a primary impact with a blocky rim crater. (4)

06 01 02 52 LMP Suppose we give you a primary impact with no block? (4)

06 01 03 10 CC And we don't want one without blocks. It'll almost have to be blocky. (4)

06 01 03 20 LMP Strapped in. Let me turn the camera on. (4)(PHO DAC)

06 01 03 30 LMP Okay, wait a minute. I don't feel it - running. (4)(PHO DAC)

06 01 03 50 CDR We'll have to get it next time. (4)(PHO DAC)

06 01 03 55 LMP Must not have the mag in there right because it's not running. (4)(PHO DAC)

06 01 04 01 CDR Can't fix it without getting out. (4)(PHO DAC)

06 01 04 11 LMP The camera's not running this time. I'll fix it when we get down to 5. You won't miss much. (4)(PHO DAC)

06 01 04 31 LMP See that string of secondaries in Stubby? (4-5)

06 01 04 43 LMP On the south flank of Stubby? (4-5)

06 01 04 48 LMP Hey, what should our bearing and range be back to the LM, Tony, when we hit that crater? (4-5)

06 01 05 07 CC It'll be 354 at 3.4. (4-5)

06 01 05 16 LMP Okay. We're headed 354 and going - that thing is taking us straight for the LM, John. Downslope is easy. (4-5)

- - -

06 01 06 07 LMP You know, it was really not apparent we were climbing this steep a slope. (4-5)

- - -

06 01 06 33 LMP Okay, we've got a 354 bearing back to the LM right now, so we'll just keep on that. (4-5)

06 01 06 58 LMP Coming back downslope 354 at 3.8 is about the same stuff. (4-5)

06 01 07 17 LMP We're about to cross our tracks. (4-5)

06 01 07 32 LMP We're going back down our tracks. (4-5)

- - -

06 01 07 43 LMP That big crater I was thinking about is right back there - it looks like. (4-5)

06 01 07 52 CDR No wonder we broke the pitch meter. Just as well we did. (4-5)

- - -

06 01 08 13 CC Probably a good idea you couldn't see how steep it was going up. (4-5)

06 01 08 18 CDR Darn right it was. (4-5)

06 01 08 41 LMP I'm keeping my eye out for a blocky rim one. (4-5)

- - -

06 01 09 03 CDR How about this one right here, Charlie? (4-5)

06 01 09 04 LMP Yep, that's it, John. That's a good one. (4-5)

06 01 09 13 LMP Okay. It's stop 5. We're supposed to park at - (4-5)

06 01 09 18 LMP 180. (4-5)

- - -

06 01 09 35 LMP That doesn't look like a secondary, John. (5)

06 01 09 38 CDR It doesn't look like one to me either. (5)

06 01 09 41 LMP It might be a primary impact, but I think those blocks - the rocks there are from South Ray. I think we ought to get a rake sample here. (5)(SAMP RAKE 65510-88)(PHO 110 18019-20; 107 17492-95)

06 01 09 50 CC How big is that crater? (5)

06 01 09 55 LMP About 15 meters across. (5)

06 01 10 05 CDR We're parked right on the rim of it. (5)

06 01 10 11 LMP The biggest blocks we see are about 50 centimeters, or bigger; and they're in the bottom and all over the crater - no preferred orientation. Okay. We're parked at 174, 353 5.9, 3.5. (5)

06 01 10 48 LMP Wow! (5)

06 01 10 58 CDR In a hole? (5)

06 01 11 01 LMP No, it's downslope for me over here. (5)

06 01 11 16 CDR Me too, Charlie. Fact is, let's bring the Rover (5)  
back up here.

06 01 11 23 LMP Well, I'm out - I'm not getting out again, and (5)  
getting back in.

06 01 11 26 CDR No, I don't mean that. I mean let's bring the Rover (5)  
back up here.

06 01 11 29 LMP Oh, you want to pick it up, huh? (5)

- - -

06 01 11 36 CDR Okay, now. We've got to swing it around. (5)

- - -

06 01 11 51 CDR That's more like it. (5)

- - -

06 01 12 15 LMP The camera didn't run. X is still there. The film (5)(PHO DAC)  
looks good.

- - -

06 01 13 47 CC Our best bet here at this crater is to look for - - (5)  
a rounded, as well as angular - the angular boulders  
are probably from South Ray. And maybe the rounded  
ones are working their way out of the regolith here.  
So that may be a clue to our getting Descartes.

06 01 14 12 CDR Roger. Well, I'll tell you what. If we do a rake (5)(SAMP RAKE 65510-88)  
sample in the wall, would probably be our best bet.

06 01 14 20 LMP That's what I would like to do. (5)(SAMP RAKE 65510-88)

- - -

06 01 14 39 LMP Man, we come a long way. I thought this thing was just right next door to us. (5)

- - -

06 01 15 14 CDR Even South Ray looks like it's accessible. There may be blocks down there that won't quit. (5)

06 01 15 27 LMP There's some big black ones. See those big black blocks there, John? (5)

06 01 15 30 CDR Yeah. (5)

06 01 15 31 LMP On the side of it. And there's some big white ones there, too. The black ones are the biggest. (5)

- - -

06 01 16 13 CDR Let me get the rake sample here. (5)(SAMP RAKE 65510-88)

06 01 16 18 CDR F:11 and 11. (5)(SAMP RAKE 65510-88)

06 01 16 21 LMP Okay, go ahead, pick a place. I'll get the gnomon. You going to get it? Okay. (5)(SAMP RAKE 65510-88)

06 01 16 44 LMP We seem to be on a bench here that's about 50 meters wide, and the slope here on the bench is only about 2 degrees - maybe 3 or 4 degrees - maybe 10 - no, about 5 degrees. (5)(SAMP RAKE 65510-88)

06 01 17 02 CDR Here's about a foot and a half across secondary - looks like a primary that cut into the rim - the upper rim of this 10 - or 20-meter - yeah, this 20-meter secondary. How about sampling out of the wall of that one? (5)(SAMP RAKE 65510-88)

06 01 17 27 LMP John, I don't think - this big crater is a secondary. (5)(SAMP RAKE 65510-88)

06 01 17 33 LMP That little one is. (5)(SAMP RAKE 65510-88)

06 01 17 34 CDR This little bitty one is probably a primary, too because - look at the glass on the bottom. Man, you've got to have velocity to do that. (5)

06 01 17 42 LMP Yeah, I agree. (5)

06 01 17 43 CC Okay, does it look like it knocked out any rocks? (5)

06 01 17 50 CDR Yeah. I don't think the rocks that are there were there because of - (5)

06 01 17 55 LMP Yeah, it does, John. There's some rocks right in that corner there, right by your footprint. (5)

- - -

06 01 18 03 LMP See that one right there - by the rake? (5)(SAMP RAKE 65510-88)

06 01 18 05 LMP And here's one right in the very bottom. Why don't you get that scoop going? And I'll go over here and get a locator. (5)(SAMP RAKE 65510-88)(PHO 110 18020)

06 01 18 18 CC We'd like a documented sample of a glass-covered rock, if you can find one. (5)(SAMP 65016)

06 01 18 30 CDR We've got several - we've already picked up a couple of beads for you, but we didn't document them. (5)(SAMP 65016)

06 01 18 55 LMP Now, that's a good bagful. (5)(SAMP RAKE 65510-88)

06 01 18 57 LMP One scoop. (5)(SAMP RAKE 65510-88)

06 01 19 00 CDR Want me to do it again? (5)(SAMP RAKE 65510-88)

06 01 19 02 LMP Well, we got a bagful. (5)(SAMP RAKE 65510-88)

06 01 19 03 CDR Notice the color of the material, Charlie, in the bottom of it - it's white. We get a kilo of soil. (5)(SAMP RAKE 65510-88)

06 01 19 11 LMP That's what this is. This isn't rocks. (5)(SAMP RAKE 65510-88)

06 01 19 14 CDR Friable soil? (5)(SAMP RAKE 65510-88)

06 01 19 15 LMP Yeah. (5)(SAMP RAKE 65510-88)

06 01 19 16 CDR That could be Descartes, Charlie. (5)(SAMP RAKE 65510-88)

06 01 19 19 LMP That rake soil - sample was in 332, and I just, pinched one of the rocks, and it broke. (5)(SAMP RAKE 65510-88)

06 01 19 34 LMP It's probably going to be a bagful of soil when we get it back. (5)(SAMP RAKE 65510-88)

06 01 19 38 CC Well, that may still be Descartes. (5)(SAMP RAKE 65510-88)

06 01 19 44 CDR It may be. (5)(SAMP RAKE 65510-88)

06 01 19 46 LMP I think it is. (5)(SAMP RAKE 65510-88)

06 01 19 47 CDR The lower material in the crater is - - lighter  
albedo \*\*\* somewhere between the gray and the white  
out on the plains. (5)(SAMP RAKE 65500-04)

- - -

06 01 20 08 LMP Want another one? (5)(SAMP RAKE 65500-04)(PHO 110 18019-20; 107 17492-95)

06 01 20 10 CDR Yeah. Lighter albedo - much lighter albedo. And if (5)  
I had my druthers, it's somewhere between the gray  
and the white out on the plains.

06 01 20 24 LMP That's good, John. It's about a kilo. (5)(SAMP RAKE 65500-04)

06 01 20 25 CDR It's somewhere between the gray of the surface and (5)(SAMP RAKE 65500-04)  
the white material that we picked up out on the  
plains. And we got a bagful of most of that from  
scooping underneath the rock samples.

06 01 20 40 CC After this, we'd like you to move to the rim of the (5)  
main crater, and spend some time just describing the  
rocks you see, and then sample the rim.

06 01 20 58 CDR There's one of those glass jobs, Charlie, right (5)  
there.

06 01 21 01 LMP Where? (5)

06 01 21 02 CDR Right there. (5)

06 01 21 10 LMP I don't see it. (5)

06 01 21 11 CC Okay. We'd like a documented glass sample, if you (5)(SAMP 65016)  
have a chance.

06 01 21 17 CDR That wasn't big enough to document. (5)

06 01 21 20 LMP But we'll look for a rock that's glass-coated, Tony. (5)(SAMP 65016)

06 01 21 27 LMP If we were to sample on the upslope side of this crater where it's shielded toward South Ray and the wall if it wasn't caused by South Ray then we ought to be looking at the real Descartes. (5)(SAMP RAKE 65710-95)(PHO 110 18021-22; 107 17496-99)

- - -

06 01 22 03 LMP Here's a glass-covered one right here. (5)

06 01 22 09 LMP Remember that right by that footprint. Right where I stopped walking. Man, you're going to get me down in that crater. (5)

06 01 22 19 CDR No, I'm not. (5)

06 01 22 20 LMP I'm not going to get a down-sun of that. (5)

06 01 22 23 CDR I don't think you ought to. (5)

06 01 22 24 CC No, let's forget the down-sun. (5)

06 01 22 25 LMP I'll get the cross-sun, okay? (5)(PHO 110 18021-22)

06 01 22 27 CDR Now, the only rocks we see are really angular, and they're on this rim. And I guess the problem is - it was a cratering event (which) was probably so long ago. There's just not even a hint of any ledges or bedrock in this rascal. (5)(SAMP RAKE 65710-95)

06 01 22 56 LMP John, why don't you take the rake right here in front of the gnomon - I've already documented that area - and see what you get? (5)(SAMP RAKE 65710-95)

06 01 23 04 CDR Take the rake what, Charlie? (5)(SAMP RAKE 65710-95)

06 01 23 06 LMP And just right here in front the gnomon and see what you get. One scoop and - it might be - (5)(SAMP RAKE 65710-95)

06 01 23 12 CDR Okay. (5)

06 01 23 13 LMP I got the pictures. (5)(SAMP RAKE 65710-95)(PHO 110 18021-22)

- - -

06 01 23 27 CDR I don't think you're gonna get anything but soil! One or two. (5)(SAMP RAKE 65710-95)

06 01 23 31 LMP I don't either. There's some rocks, 2. (5)(SAMP RAKE 65710-95)  
 - - -

06 01 24 12 LMP There we got a few of those. Let me try one more (5)(SAMP RAKE 65710-95)  
 scoopful.

06 01 24 17 CC Okay. Do those look like clods too? (5)(SAMP RAKE 65710-95)

06 01 24 23 LMP No, they don't. There's at least one of them that's (5)(SAMP RAKE 65710-95)  
 glass coated.

06 01 24 34 CDR Hey, there's some. (5)(SAMP RAKE 65710-95)

06 01 24 36 LMP These are whitish type rocks, very small, they may (5)(SAMP RAKE 65710-95)  
 have come from South Ray.

06 01 24 49 LMP How about one more scoop John? (5)(SAMP RAKE 65710-95)  
 - - -

06 01 25 10 CDR Hey, look at that - (5)(SAMP RAKE 65710-95)

06 01 25 13 LMP And all of those are rounded. (5)(SAMP RAKE 65710-95)

06 01 25 14 CDR And Charlie pointed out the different (5)(SAMP RAKE 65710-95)  
 characteristics of these rocks that we're just  
 getting right now and maybe that's the key is that -  
 they're more rounded, than the South Ray crater  
 rocks are.

06 01 25 31 CDR There are a few angular in there, but these are (5)(SAMP RAKE 65710-95)  
 mostly rounded; and I see some little black glass on  
 one, but they're mostly rounded, whitish rocks  
 covered with dust, of course.

06 01 25 42 LMP These are a couple of good ones. (5)(SAMP RAKE 65710-95)

06 01 25 49 LMP Bag 334. (5)(SAMP RAKE 65710-95)  
 - - -

06 01 26 01 LMP Houston, do you want us to go sample the rim of this (5)  
 thing again - some more?

06 01 26 06 CDR They want us to get a glass-coated one, and there's (5)  
 a good one right up on the -

06 01 26 10 CDR Let's go up there and get it. (5)  
 - - -

06 01 26 18 CC Did you get your soil there? (5)

06 01 26 22 CDR No. We didn't. I'll get a scoopful. (5)

06 01 26 25 CC You're doing so well inside the rim there, we'd kind (5)(SAMP RAKE 65700-04)(PHO 110 18021-22; 107 17496-99)  
 of like you to stay inside the rim and just kind of  
 work around and see what you can find.

06 01 26 35 LMP Okay. Let me get some soil here. (5)(SAMP RAKE 65700-04)

06 01 26 51 CDR Wait a minute, Charlie. (5)(SAMP RAKE 65700-04)

06 01 26 53 LMP You really feel like you're on the verge of (5)(SAMP RAKE 65700-04)  
 instability, don't you?

06 01 26 59 CDR Yeah. (5)(SAMP RAKE 65700-04)

06 01 27 04 CDR I've got the gloves so dirty. There's a - 100 (5)(SAMP RAKE 65700-04)  
 kilos. Okay. That's 100 kilos that's going into  
 bag 402.

06 01 27 16 CDR Hope you're able to document it with the TV, because (5)(SAMP RAKE 65700-04)  
 we've stomped all over it.

06 01 27 22 LMP These after pictures are going to be - on this kind (5)  
 of terrain, you're bouncing so much trying to keep  
 your balance, that you just sort of obliterate the  
 place you picked it up.

06 01 27 26 CC When you dig down there, you're not getting - - any (5)  
 of that white soil. Is that right?

06 01 27 43 CDR That's correct; we're not. I kicked some of it away (5)  
 to see just how -

06 01 27 51 LMP Here's an old rounded rock that's fractured, badly (5)(SAMP 65070, 75)(PHO 107 17500-02)  
 beat up. Let's get that one.

06 01 28 04 LMP I was going to say take a picture of that. This (5)  
 gnomon is worthless. It's against the stops.

06 01 28 17 CDR That one right there? (5)(SAMP 65070, 75)

06 01 28 18 LMP Yeah. That one right there. (5)(SAMP 65070, 75)

06 01 28 19 CDR I'll get a - cross-sun. (5)(SAMP 65070, 75)(PHO 107 17500-02)

06 01 28 23 LMP That's all we're going to be able to get. (5)

06 01 28 26 CDR Well, it's sort of an up-sun. (5)

06 01 28 33 CDR I'll shoot these at 5.6. Stereopair up-sun. I can (5)  
get the location all right.

06 01 28 40 LMP Oh, don't work at that, John. (5)

06 01 28 42 CC We can get the location off the TV. (5)

06 01 28 47 CDR Was an old rock, wasn't it? \*\*\* it crumbled to (5)(SAMP 65070, 75)  
pieces.

06 01 29 01 CDR That was fruitless there. (5)(SAMP 65070, 75)

06 01 29 05 LMP Get it - get that - that right there. (5)(SAMP 65070, 75)

06 01 29 07 CDR I am. I'm trying to get upslope on it. (5)(SAMP 65070, 75)

06 01 29 10 LMP Here let me - I can get it. (5)(SAMP 65070, 75)

06 01 29 28 LMP Okay. I got it. (5)(SAMP 65070, 75)

06 01 29 32 CC The white rock that you picked up and the ones you (5)(SAMP 65070, 75)  
just have here, can you see any crystals in it?

06 01 29 40 LMP Yes, sir. I sure can. It's a bluish crystal, a (5)(SAMP 65070, 75)  
couple of millimeters size.

06 01 29 49 CDR Bluish? (5)(SAMP 65070, 75)

06 01 29 51 LMP Well, that's what it looked - grayish maybe - and (5)(SAMP 65070, 75)  
one corner of it's got a glass rind on it about a  
half a centimeter thick.

06 01 30 08 LMP It doesn't look like a breccia, Tony. It looks (5)(SAMP 65070, 75)  
like a crystalline rock.

06 01 30 13 CDR Yeah, it's got a lot of - it's fine grained - it (5)(SAMP 65070, 75)  
seems to be a fine-grained crystalline rock anyway,  
the part that we can see. The particles in it are  
millimeter size, though. I see some millimeter-size  
sparklies flashing at me. That's going in bag 403.

06 01 30 34 LMP Hey, John, I'm having (to) about strike out on this (5)(SAMP 65030, 35)(PHO 110 18023-26; 107 17503-07)  
rake here. I can't - get a couple of little ones  
each time, but - - about it.

06 01 30 47 LMP Want to move on around there about 10 feet or so? (5)(SAMP 65030, 35)

06 01 30 50 CDR Okay. (5)(SAMP 65030, 35)

06 01 30 51 LMP Pick a spot. I'll follow in your tracks. You're (5)(SAMP 65030, 35)  
sliding downhill about 2 inches every time you - I  
can't get going , here. Look at that glass-covered  
one right there, John.

06 01 31 12 CDR Let's get it, Charlie. (5)(SAMP 65030, 35)

06 01 31 14 LMP I'll back off and get the - cross-sun here. (5)(SAMP 65030, 35)(PHO 110 18023-24)

06 01 31 26 CDR Yeah, I'll have to get an up-sun here, or else do a (5)(SAMP 65030, 35)  
lot of work.

06 01 31 34 LMP Gonna be just one rock and one bag here. (5)(SAMP 65030, 35)

06 01 31 52 LMP Hey, Tony. We just picked you up a glass rind rock (5)(SAMP 65030, 35)  
- at least a quarter of it's got glass on it, and  
it's so dust covered that it - - defies description.

06 01 32 12 CDR 404 is the bag number - - (5)(SAMP 65030, 35)  
- - -

06 01 32 30 LMP Okay. Let me try a rake here - let me get an after (5)(SAMP 65030, 35)(PHO 110 18025-26)  
here.

06 01 32 32 CDR Get an after, Charlie. (5)(SAMP 65030, 35)(PHO 110 18025-26)

06 01 32 33 LMP Okay. Got it. Here, let me rake up here. Here's (5)(SAMP RAKE 65310-66)(PHO 110 18023-26; 107 17503-07)  
some - these are either clods or - -

06 01 32 56 LMP That was a whitish rock. That one probably came from South Ray. Wait a minute. Here's some good ones - dusty ones. (5) (SAMP RAKE 65310-66)

- - -

06 01 33 26 CDR Most of those are either little rocks - - (5) (SAMP RAKE 65310-66)

06 01 33 33 CDR There's a round one, Charlie. (5) (SAMP RAKE 65310-66)

06 01 33 34 LMP Hey, there's a great one, John. There's a good rock right there. (5) (SAMP RAKE 65310-66)

06 01 33 37 CDR I don't think this is going to be a simple problem, even after you - - get the rocks back because they're so dark - so darn - dark - it's 405. (5) (SAMP RAKE 65310-66)

06 01 33 54 CDR Go in bag 405. That's a big round rock that's dust covered. I see white streaks through it, and I can't tell from the clasts showing through that I can see whether it - I don't know whether I can see any glass on it or not. But it's a friable white rock, and it's rounded. (5) (SAMP RAKE 65310-66)

06 01 34 17 CDR Going into bag 405 with Charlie's rake sample. (5) (SAMP RAKE 65310-66)

06 01 34 24 CDR You see because there is so doggone many craters around here, I mean - - (5)

06 01 34 29 CC We'd like you to find the steepest slope that you can work on there, and dig as deep as you can with that rake. (5) (SAMP RAKE 65920, 25-27) (PHO 107 17508-09)

06 01 34 38 CDR Let me do that, Charlie. (5) (SAMP RAKE 65920, 25-27)

06 01 34 40 LMP We're on it right now, babe. I'll tell you. (5) (SAMP RAKE 65920, 25-27)

06 01 34 42 CC Okay, can you dig into the face of the slope a bit? (5) (SAMP RAKE 65920, 25-27)

06 01 34 45 CDR Let me dig. Charlie, let me do that. (5) (SAMP RAKE 65920, 25-27)

06 01 34 49 LMP Okay. I'll swap with you. (5) (SAMP RAKE 65920, 25-27)

06 01 34 53 CDR Hold the gnomon. (5) (SAMP RAKE 65920, 25-27)

06 01 35 00 LMP Hey, how about right up here, John. Here's a steep part, or right over there where we walked from. Where you going? (5)

06 01 35 07 CDR On a steep slope. (5)

06 01 35 08 LMP Okay, right to your left is a good one. Right where we been. (5)

06 01 35 15 CDR Steepest is closest to the rim. (5)(SAMP RAKE 65920, 25-27)

06 01 35 18 LMP That's right. Right up there. (5)(SAMP RAKE 65920, 25-27)

06 01 35 21 CDR Man, you don't make much headway. (5)

06 01 35 53 LMP Okay, Tony. We've gone vertically into the wall, about a foot, and it all looks the same. Occasionally, you see a white splotch. (5)(SAMP RAKE 65920, 25-27)

- - -

06 01 36 19 LMP Hey, John, I tell you what. Let me get upslope. (5)

06 01 36 28 CDR Move out of the shadow, Charlie. I can't see it. (5)

06 01 36 33 CDR Whoop. One thing about being on a 20-degree slope. You can get down on your knees. (5)(SAMP RAKE 65920, 25-27)

- - -

06 01 37 17 LMP Looks like just indurated regolith, doesn't it. (5)(SAMP RAKE 65920, 25-27)

06 01 37 21 LMP Don't see any rocks. Here let me do this. (5)(SAMP RAKE 65920, 25-27)

06 01 37 35 CDR There's one. (5)(SAMP RAKE 65920, 25-27)

06 01 37 36 LMP Yeah. (5)(SAMP RAKE 65920, 25-27)

06 01 37 42 CDR There's some. (5)(SAMP RAKE 65920, 25-27)

06 01 37 50 LMP Yeah, they're rocks all right. Going in bag 335, three little ones, Tony. (5)(SAMP RAKE 65920, 25-27)

06 01 37 56 LMP No, they aren't; they're clods. (5)(SAMP RAKE 65920, 25-27)

06 01 38 05 LMP But, anyway, 335. (5)(SAMP RAKE 65920, 25-27)

06 01 38 11 LMP Here, let me have the rake a minute. Let me try something. (5)

06 01 38 15 CDR Here you go. (5)

06 01 38 16 CC Well, you think the rock concentration near the surface is a lag surface, then? (5)(SAMP RAKE 65920, 25-27)

06 01 38 27 LMP Apparently so because in this wall here, we're not getting a thing. (5)(SAMP RAKE 65920, 25-27)

06 01 38 32 CC Okay, why don't you take a soil right there - - fill up a soil bag. (5)

06 01 38 37 LMP And there's less soil here - I mean less rocks here than on the other side of the crater. The side towards the Rover is - - (5)(SAMP RAKE 65920, 25-27)

06 01 38 56 CDR This could be a South Ray, course, that's downslope too. (5)

06 01 39 04 LMP Now there is a pure - there are two rocks, right there. (5)(SAMP 65900-09, 15-16)(PHO 107 17508-09)

06 01 39 08 CDR Hey, Charlie, I got to put this one in your bag before I can get it. (5)

- - -

06 01 39 32 LMP Get you a soil - they want a soil bag full. Hate to waste a bag on that one, but - - (5)(SAMP 65900-09, 15-16)

06 01 39 39 CDR Let's put the soil in there with the \*\*\* (5)(SAMP 65900-09, 15-16)

06 01 39 42 CDR Bag 406 will have one rock in it and a soil sample from this low area. (5)(SAMP 65900-09, 15-16)

06 01 39 55 LMP Let's fill up the bag. (5)(SAMP 65900-09, 15-16)

06 01 39 59 LMP And, Tony, a lot of this soil is coming out from about 6 inches down - - out of this crater. You know, John, I think if we got a running start straight at the Rover, we'd make it up the other side. (5)(SAMP 65900-09, 15-16)

- - -

06 01 40 22 CDR Let's go around the rim. (5)

06 01 40 25 CC Okay, the plan back at the Rover is now we'd like (5)  
John to take an LPM measurement and, Charlie, if you  
could sample around the rim there near the Rover and  
take both angular and round whatever you find.

- - -

06 01 41 07 LMP Hey, John. It's easier to go straight across. That (5)  
was fun.

06 01 41 11 CDR I haven't had any trouble. (5)

- - -

06 01 41 17 CDR Going 45 feet on an LPM is - gonna put me over the (5)  
edge here. I'm gonna go out at right angles to the  
Rover, around this crater rim, for this measurement,  
Houston. It may not be exactly 45 feet, but it'll  
be close.

06 01 41 39 CC Charlie, we'd like some fist-size samples here. (5)

06 01 41 46 LMP Okay, we've got a ton of them. We'll get them for (5)  
you.

- - -

06 01 42 11 CC And, John, why don't you take a pan when you (5)  
document the location of that LPM tripod. That'll  
take care of our pan.

- - -

06 01 42 23 LMP I already took one pan. (5)(PHO 110 17991-18018)

- - -

06 01 42 37 CC Charlie, where did you take your pan from? (5)(PHO 110 17991-18018)

06 01 42 50 LMP On the south rim of that crater. (5)(PHO 110 17991-18018)

06 01 42 56 LMP About 10 feet to the 4 o'clock position of the (5)  
Rover.

06 01 52 48 CC And, while you're up there, you might adjust the DAC. Maybe you can get it running. (5)(PHO DAC)

06 01 52 55 LMP I already did, and it's running. It'll be running. (5)(PHO DAC)

- - -

06 01 53 10 LMP That is a crystalline rock if I've ever seen a crystalline rock. (5)(SAMP 65015)

06 01 53 14 CDR First one today. (5)(SAMP 65015)

06 01 53 16 LMP Yeah. (5)(SAMP 65015)

06 01 53 17 CDR At least the first one you could say was one, maybe. \*\*\* - - (5)(SAMP 65015)

06 01 53 19 LMP That is a great rock. Okay, John, could you - when you get around there, could you give me a film mag, black and white? (5)(SAMP 65015)

- - -

06 01 53 32 CC Call that one that "great Young." (5)(SAMP 65015)

06 01 53 37 CDR Oh. Come on. (5)(SAMP 65015)

06 01 53 40 LMP It's not very big, but it's just a nice rock. (5)(SAMP 65015)

06 01 53 46 LMP Yeah, it was made about - it looks like it's about 3 days old. No, it must be on the order of 4 billion. (5)(SAMP 65015)

- - -

06 01 54 09 LMP - - magazine I. (5)

- - -

06 01 54 55 LMP Okay, Tony. Magazine India. (5)

06 01 55 01 LMP And starting with frame count number - about number 3. I guess I fired off a couple. (5)

- - -

06 01 58 36 CC And, Charlie, DAC on as you start back - - (5)(PHO DAC)

06 01 58 40 CDR Okay. We're in and we're on our way. (5-6)

06 01 58 43 LMP It's already on. (5-6)(PHO DAC)

06 01 58 45 CC That Station 6 will be completely nominal. (5-6)

06 01 58 46 LMP This is 3.60 at 2.9. Why don't we just make it 3.5 (5-6)  
at - at 2.9.

06 01 59 01 CDR Okay, Charlie. I want to follow my tracks down this (5-6)  
thing.  
- - -

06 01 59 12 CC We would like Station 6 at the lowest terrace on (5-6)  
Stone mountain and a blocky crater, if possible.  
- - -

06 01 59 44 LMP There's a pretty big crater, with some blocks around (5-6)  
it. I think that might do.  
- - -

06 02 00 04 LMP Look, there's one right down there, John; 12 (5-6)  
o'clock, there's one, about 200 meters.  
- - -

06 02 00 26 CDR I'm just glad that we don't have that - watch the (5-6)  
Rover go TV. Or I don't think we'd be going.  
- - -

06 02 00 46 LMP Just to the left there, John. See those blocks over (5-6)  
there in that crater?

06 02 00 50 CDR Say, where? (5-6)

06 02 00 51 LMP Okay, your 10 o'clock position. (5-6)

06 02 00 54 CDR That big block there? (5-6)

06 02 00 55 LMP No, well, on over farther than that. (5-6)

06 02 00 56 CDR You want to take off and go that way now? I can't (5-6)  
see nothing. I got my blinder down.

06 02 01 05 LMP Oh, I'm sorry. Okay, now hook a left. No, not through this crater. (5-6)

06 02 01 13 LMP Right on the other side of this crater. (5-6)

- - -

06 02 01 18 LMP Well, that's only 3.3, John. Why don't we go down a little bit further. (5-6)

06 02 01 24 CDR This one right here? (5-6)

06 02 01 26 LMP Yeah, that one's only 3.3 down. They think about 3.0. Turns out it's not a crater at all anyway. It's just a swale. (5-6)

06 02 01 39 LMP Yeah. Really some interesting angular blocks here. Okay, Tony. It's still apparently - well it's - we veered - we're steering about 340 now, and - we're getting some angular blocks and cobbles just as we described before - 20 percent of the surface, perhaps. (5-6)

- - -

06 02 02 55 LMP Over on - Smoky, I can see the lineations over there, but they are more widely spaced than on Stone here and mostly parallel to the Cayley. Bear left a little bit, John, if you can. Okay. We're at 3. We can start looking for a place now. (5-6)

06 02 03 32 CDR Here's the bench right down here, I think. (5-6)

06 02 03 33 LMP Yeah, I see it. (5-6)

06 02 03 35 LMP Now if we drive along the bench, maybe we'll find a blocky crater. (5-6)

06 02 03 51 CDR Want to go right or left? (5-6)

06 02 03 53 LMP Left. Because then Station 8's on over to the left. (5-6)

06 02 04 05 CDR Look at that block there, Charlie. (5-6)

06 02 04 06 LMP Where? (5-6)

06 02 04 07 CDR That big block right over there. (5-6)

06 02 04 09 LMP I know it. That's the one I described. It's a (5-6)  
giant size.

06 02 04 21 LMP We're at 3.0 at 355. Driving west, along a bench, (5-6)  
trying to find a blocky crater.

06 02 04 43 LMP Passing these big glass-splattered rocks that (5-6)  
apparently came out of South Ray. Think every one  
of them did, frankly.

06 02 05 06 LMP Here's a crater, John, that's about 10 meters, - (5-6)  
fairly blocky rim, angular. Want to stop here?  
It's a secondary on this side.

06 02 05 21 LMP It's a secondary. We're at 357 at 3.1, and we got a (5-6)  
secondary that's fairly blocky rim. There's one  
just a little upslope from us that might be better.  
But there's not as many blocks on the rim. Same  
size crater.

06 02 05 44 CC Okay; we'd like some more blocky ones. (5-6)

06 02 05 51 LMP Okay, I think it's a secondary. (5-6)

06 02 05 54 LMP Okay, you can park a 180 here, John. (5-6)

06 02 05 59 CDR Okay, but - I can't park 180. If I park 180, we'll (5-6)  
be downslope from it.

06 02 06 07 LMP No, the crater's over to the left. (5-6)  
- - -

06 02 06 17 LMP Why don't you just park north? I can point that (5-6)  
antenna north.

06 02 06 24 LMP You ought to get over here to the right a little bit (5-6)  
so the TV won't be looking into the Sun.

06 02 06 37 CDR Now I'll just swing around and point it north. (5-6)  
- - -

06 02 07 21 LMP 180, 357, 6.7, 3.1. (6)

- - -  
 06 02 08 16 CDR Now this is harder \*\*\* (6)  
 06 02 08 18 LMP It is. (6)  
 - - -  
 06 02 08 22 LMP It's a lot harder. (6)  
 06 02 08 23 CDR Yeah, we didn't sink near - of course, we're not (6)  
 standing on the rim of a crater. But this is  
 harder, because we just sort of bounce here.  
 06 02 08 31 LMP Yeah, it's a lot more - the regolith character - as (6)  
 John said, it's really changed.  
 06 02 08 44 LMP When we walk, we don't bounce as much - I mean, we (6)  
 don't sink in as much.  
 - - -  
 06 02 09 31 CDR What you doing there, Charlie? (6)  
 06 02 09 33 LMP \*\*\* what this rock's made out of. I'm trying to get (6)  
 a fresh surface.  
 06 02 09 38 CDR I wouldn't do that. It's not worth doing. (6)  
 06 02 09 54 CDR \*\*\* help you there. That okay? (6)  
 06 02 10 00 CC Ah, thank you much there, John. (6)  
 06 02 10 01 CDR Man, that is some rock. (6)  
 06 02 10 05 LMP That matrix there's pure white with black phenocryst (6)  
 in it. It might be clast. It might be a breccia.  
 And it's got some lathlike crystals in it.  
 06 02 10 31 LMP That's the one I'm talking about. See, I just broke (6)  
 that open.  
 06 02 10 34 CDR Yeah, that's a two-rock breccia. Let me get a (6)  
 bigger piece of it, Charlie.

06 02 10 37 LMP You can't whack it off. (6)

06 02 10 40 CDR Too hard to whack? (6)

06 02 10 41 LMP Yeah, I've whacked about five times, as hard as I could. (6)

06 02 10 44 CDR It has a white matrix with a square clast and elongate clasts in it. (6)

06 02 10 51 CDR And it's rounded, too. (6)

06 02 10 59 LMP Looks like some more of them right down here, John, that are - that are sample - - that are sample size. (6)(SAMP 66030-37)(PHO 108 17627; 107 17512-17)

06 02 11 08 CDR Okay, let's get some of those. (6)(SAMP 66030-37)

06 02 11 10 LMP I'll start the pan. (6)(PHO 108 17606-26)

- - -

06 02 12 07 LMP Okay, pan's complete, Tony. (6)(PHO 108 17606-26)

06 02 12 11 LMP Grab the gnomon, John, and how about a set of tongs and a shovel? (6)

- - -

06 02 12 35 LMP Yeah. That's the gnomon stick. See the legs? (6)

06 02 12 39 LMP They're still in the bag. (6)

06 02 12 53 CDR See what happened? (6)

06 02 12 55 CC No. We can't see it now - - (6)

06 02 12 56 LMP Pulled it right out of there. (6)

06 02 12 58 CDR You blew it. (6)

06 02 13 01 LMP Okay, I got the wand, and the legs stayed in the bag. Okay, give me a shovel, John. We can use the scoop. (6)

- - -

06 02 13 13 CDR Where do you want to go? (6)

06 02 13 15 LMP I don't care. Anywhere is fine. Here's a nice little cracked one right there. (6)(SAMP 66030-37)

06 02 13 21 LMP These are angular - there's some angular and rounded rocks right there. (6)(SAMP 66030-37)

- - -

06 02 13 32 LMP You can stick the tongs in there, John. (6)(SAMP 66030-37)

06 02 13 36 LMP It'll go in the ground. I tried that a minute ago. It worked great. I don't see why I'm doing a down-sun - but I'll do it. (6)  
(PHO 108 17627)

06 02 13 53 LMP Hey, Tony, can you get a locator from the TV on this sample? (6)(SAMP 66030-37)

06 02 13 56 CC I sure can. We've got it now. (6)(SAMP 66030-37)(PHO 110 18021-22)

- - -

06 02 14 37 CDR That's going in bag 407. It was some soil and some dirt, a rounded rock. (6)(SAMP 66030-37)

06 02 14 53 CDR Let's grab this angular one next. (6)(SAMP 66050, 55)(PHO 108 17627; 107 17512-17)

- - -

06 02 15 03 CDR Let me get it with the tongs. (6)(SAMP 66050, 55)

06 02 15 16 LMP Might be the same kind, John, that you picked up up the way there. (6)(SAMP 66050, 55)

- - -

06 02 15 30 LMP That is - partially sacked. There we go. You got it. (6)(SAMP 66050, 55)

06 02 15 33 CDR Get the after. Got it. 408 is the bag number. (6)(SAMP 66050, 55)(PHO 107 17515-17)

06 02 15 55 CDR Why don't you get a soil sample? (6)(SAMP 66040-44)(PHO 108 17627; 107 17512-17)

06 02 15 57 LMP Okay; that's a good idea. (6)(SAMP 66040-44)

- - -

06 02 16 07 LMP Maybe we could go to one more area. And so we won't salt it with it, this is just one broken-up block here. (6)(SAMP 66040-44)

06 02 16 28 LMP 338 is the soil sample. (6)(SAMP 66040-44)

06 02 16 36 LMP See anything down under there, John? (6)(SAMP 66040-44)

06 02 16 45 CDR No. This is the second - this is rim of it. It's very soft. I didn't have any trouble digging down with the shovel. (6)(SAMP 66040-44)

06 02 16 56 LMP Solid gray all the way - - (6)(SAMP 66040-44)

06 02 16 57 CDR Solid gray all the way down. I see no layering. (6)(SAMP 66040-44)

06 02 17 01 LMP Let me put this in your bag. (6)

06 02 17 11 LMP John, how about on the upper rim there? (6)(SAMP 66080-86)(PHO 108 17628-29; 107 17518-20)

06 02 17 15 LMP This might have been a secondary. (6)(SAMP 66080-86)

06 02 17 17 CDR Look at that right over there, Charlie. (6)(SAMP 66080-86)

06 02 17 18 LMP It's a really unique white-looking something -or-other. (6)(SAMP 66080-86)

06 02 17 32 LMP I think it's soil. (6)(SAMP 66080-86)

06 02 17 40 CDR Well, you want to get some of it? It's unusual soil, if it is. (6)(SAMP 66080-86)

06 02 17 45 LMP It looks like a little teeny impact, doesn't it? (6)(SAMP 66080-86)

06 02 17 56 LMP Hey, let's get a quick one and then go on up here and get some of these blocks on the upper rim. (6)(SAMP 66080-86)

06 02 18 02 CDR There's fall. It's a down-sun. Turn around and get a locator. (6)(SAMP 66080-86)(PHO 108 17628-29)

06 02 18 28 LMP Got you a bag coming, John. Hey, Tony, what we're picking up is a white - it looks like a little patch of indurated regolith, and it's whitish in color. (6)(SAMP 66080-86)

06 02 18 51 LMP Let's get a little bit more of the white, John. (6)(SAMP 66080-86)  
That got most of it; it was just on the end of the  
scoop.  
- - -

06 02 19 24 LMP That's got it. I'll get your after. (6)(SAMP 66080-86)

06 02 19 27 CDR I'll get it, Charlie. (6)(SAMP 66080-86)(PHO 107 17520)

06 02 19 28 LMP Okay, that's in bag - that soil sample's in 339. (6)(SAMP 66080-86)

06 02 19 37 CDR I'm through frame count 106, now. (6)

06 02 19 46 CDR Maybe we can get a chance to get up another (6)(SAMP 66070,75)(PHO 108 17630-31; 107 17521-22)  
sample \*\*\*  
- - -

06 02 20 02 CDR I been hankering for a piece off that rock. (6)(SAMP 66070,75)

06 02 20 05 LMP Here's an old-rounded one right here, John. With (6)(SAMP 66070,75)  
the white spots - in it. Here's a real angular one  
right over here. It's probably out of a -

06 02 20 20 CDR Let's get this rounded one, Charlie - - just on a (6)(SAMP 66070,75)  
hunch.

06 02 20 24 LMP Okay, I agree. Down-sun, here. (6)(SAMP 66070,75)(PHO 108 17630)

06 02 20 38 LMP Got it. (6)(SAMP 66070,75)(PHO 108 17630)

06 02 20 39 CDR Wait a minute. Get a locator. (6)(SAMP 66070,75)(PHO 108 17631)

06 02 21 12 CDR In bag 409, Houston. And it's so dust-covered that (6)(SAMP 66070,75)  
I'm unable to describe it, although it's a white  
subrounded rock. And I can't distinguish any  
crystalline structure in it. It's going in bag 409.

06 02 21 34 CDR Charlie, put that one in mine. Yours is full. (6)(SAMP 66070,75)

06 02 21 36 LMP Okay. Yours is getting full, too. We got to change (6)  
our bags. Whoops! My bag is full?  
- - -

06 02 21 56 LMP Bring me the scoop a minute. Let me whack this (6)(SAMP 66090,95)(PHO 107 17523-26; 108 17632-33)  
thing right here. It's so good that I can't pass it  
up. All right, there's a good place to whack.

06 02 22 15 CDR Oh, that's hard - you got it! (6)(SAMP 66090,95)

06 02 22 18 CDR Demolished it. (6)(SAMP 66090,95)

06 02 22 19 LMP That's a great rock! Look at that! I'm sorry we (6)(SAMP 66090,95)  
didn't get it documented before, but that is a good  
sample. I think it's a crystal rock.

06 02 22 32 CC Okay, let's go ahead and document it now - - so we (6)(SAMP 66090,95)  
get the location of the one that's still in place. (PHO 107 17526)  
It didn't look like it moved.

06 02 22 40 CDR No, he didn't move anything there. I'm gonna do an (6)(SAMP 66090,95)(PHO 107 17523, 25)  
up-sun on this documentation.

06 02 22 44 LMP Okay, I'll get a cross-sun here. It's a grayish (6)(SAMP 66090,95)(PHO 108 17632-33)  
bluish - rock, Tony, in the matrix with some white  
clast in it.

06 02 23 06 LMP Let me get it with this - it isn't any trouble, (6)(SAMP 66090,95)  
John.

06 02 23 22 LMP The matrix is so fine-grained, I can't tell, but (6)(SAMP 66090,95)  
it's definitely got a blue cast to it and there are  
inclusions of a whitish - it looked like plag to me.

- - -

06 02 23 45 CDR And then, needle-like black crystals in it, too. (6)(SAMP 66090,95)

06 02 23 49 CDR I see one in there that's a millimeter wide by 3 (6)(SAMP 66090,95)  
millimeters long, and some other needle-like  
crystals in it.

06 02 23 58 LMP Here's another piece - came off the same rock. (6)(SAMP 66090,95)

06 02 24 02 CDR It has this white clast in it. It's got to be a (6)(SAMP 66090,95)  
breccia, Charlie.

06 02 24 07 LMP Think so? (6)(SAMP 66090,95)

06 02 24 09 LMP They don't really look like - (6)(SAMP 66090,95)

06 02 24 13 CDR That's going in bag 410. (6)(SAMP 66090,95)  
 - - -

06 02 25 46 LMP Hey, is the DAC supposed to be on? Yes, the DAC's (6)(PHO DAC)  
 on. Okay. Turning the DAC on.

06 02 25 58 LMP The DAC is on. (6)(PHO DAC)  
 - - -

06 02 27 12 CC We'll need a frame count. (6)

06 02 27 19 CDR \*\*\* mine's III. (6)

06 02 27 29 LMP Fifty for me. (6)  
 - - -

06 02 29 36 LMP Look at that blue rock - that we just whacked on! (6)(SAMP 66090,95)  
 - - -

06 02 30 02 LMP Okay. Okay, we're going - cross-slope, Tony and I (6-8)  
 feel like I'm about to fall out. We're still in the  
 blocky field. In fact, it's just South Ray  
 material, I think, just all over the place.  
 - - -

06 02 30 44 LMP Okay, I can still see old Orion. We sure parked on (6-8)  
 a - you landed on a - the highest point around,  
 John. Even down in that crater - you can still see  
 it.

06 02 31 03 LMP Okay, we're back into a thicker part of the ray. (6-8)  
 The regolith is here covered with cobbles about 40  
 to 50 percent. You're gonna have to bear way left,  
 John. Look at that piece of glass we just rolled  
 over. This'll be great - - 015, we've got to go.

06 02 31 41 CDR What do you want, 015? (6-8)

06 02 31 44 LMP Yeah. (6-8)  
 - - -

06 02 32 15 LMP We're not going to be able to see Stubby. It's on (6-8)  
the other side of a big ridge.

06 02 32 24 LMP The map was wrong. It's been mapped wrong. We're (6-8)  
down in a little swale now, and there's about a  
30-meter ridge off to our left about 300 meters; it  
blocks out Stubby. You want us to go up and travel  
along that ridge?

06 02 32 46 LMP We could do it. I'd like to see back into Stubby. (6-8)

06 02 32 57 CC Well, why don't you press on up there? (6-8)

06 02 33 07 CDR Might as well. We've got to go by that big rock. (6-8)  
Is that where we're going, to that big rock?

06 02 33 13 LMP That'd be a great place to sample the ray. That's (6-8)  
probably on the ray. But we want to go left, about  
10 o'clock, up on the - top of that ridge.

06 02 33 21 CDR Okay; will you be able to take pictures? (6-8)

06 02 33 22 LMP Yeah. (6-8)

06 02 33 37 LMP This is really a ray. Coming out over the ridge - (6-8)  
you can distinctly see the rays from South Ray - the  
whiter albedo and the contact between the white ray  
and the Cayley here. Quite apparent.

06 02 34 04 LMP We're now at 005 at 3.0. And the contact I'm (6-8)  
talking about this is at 12:00 probably a couple  
hundred meters.

06 02 34 15 CDR I don't want to be discouraging about this sort of (6-8)  
thing, but I feel like this may be a problem we're  
going to have to attack statistically out here.  
Because it is really difficult to tell - just  
looking at a rock, except for the roundness, what  
kind of rock it is. Now there's a vesicular-looking  
rock right there.

06 02 34 42 CDR That's the first rock I've seen with vesicles in it. (6-8)

06 02 35 02 LMP Okay, Tony, we're traveling now - southwest. We're (6-8)  
at 006 at 3.0 -

06 02 35 11 LMP And we've still got a couple hundred meters to go up (6-8)  
to the ridge. John, why don't you swing directly  
south and let's go straight up that beauty, see what  
we see up there. Probably nothing but another  
ridge.

06 02 35 27 CDR It's pretty steep, Charlie. (6-8)

06 02 35 40 CDR That's really a steep ridge. (6-8)

- - -

06 02 36 00 CDR We've lost the rear-wheel drive. (6-8)

- - -

06 02 36 21 CDR And with that in mind, I'd just as soon not go up to (6-8)  
this ridge.

06 02 36 27 CC Okay; we suggest you head on towards 8 and stay on (6-8)  
fairly flat ground.

- - -

06 02 37 14 LMP At 007, 3.1 - passing another secondary that's (6-8)  
elongate in the direction of South Ray. Those are  
the big blocks they were talking about, John. Right  
over there, there are four or five of them.

- - -

06 02 38 10 LMP How about stopping up there in the middle of all of (6-8)  
those big boulders, John?

06 02 38 25 CDR Call that Station 8? (6-8)

06 02 38 16 LMP Call that Station 8. That's gonna be about it. (6-8)

06 02 38 50 LMP There's one that's overturnable, I'll bet you. (6-8)  
Right there. Look at that elongate one.

06 02 39 12 LMP Okay, Tony, we're at 010 and 3.0, and we've got (6-8)  
about three or four - 2- or 3-meter-size blocks, one  
black and some white ones.

06 02 39 32 LMP Okay, 180 John, on the heading. No, 270; they want (6-8)  
a NAV update.

06 02 39 43 CC Okay, and we're looking primarily for blocks from (6-8)  
 South Ray. So if you feel like this is the ray,  
 this sounds great. And we don't need a NAV update,  
 so 180 is great.

- - -

06 02 40 08 LMP This is fine here. (6-8)

06 02 40 19 LMP 176, 011, 7.9, 2.9. (8)

- - -

06 02 42 25 LMP Starting our pan from about the 1 o'clock position (8)(PHO 108 17663-81)  
 of the Rover, sort of bracketing these blocks here.

06 02 42 36 CDR Okay; Station 8. (8)

- - -

06 02 42 41 CC And verify the DAC's off. (8)(PHO DAC)

- - -

06 02 43 08 LMP Thanks for the reminder, Tony. (8)(PHO DAC)

- - -

06 02 43 23 LMP And the regolith here, is firmer than up on - Stone. (8)  
 We're in a blocky field here. Predominant size is  
 10 to 15 centimeters, but the biggest one is a  
 couple of meters. And you'll see that 12 o'clock  
 from the Rover.

06 02 43 50 CC Wow! That's a real boulder. (8)

06 02 43 51 LMP It has a bluish cast to it - black maybe. Okay, you (8)  
 already see it, huh? And beyond that, there's a  
 white one. It looks like that big one that John  
 sampled. Think we ought to get one of those. Okay; (PHO 108 17663-81)  
 pan's complete. Double core here is the first  
 thing. And I'll sample - I think we're in the ray,  
 so I'll just sample - right out - do it right over  
 here.

- - -

06 02 45 09 LMP Yeah, I need to get a double core or two. (8)(SAMP CORE 68001-02)(PHO 107 17529; 108 17682-86)  
 - - -

06 02 46 29 CDR There's a boulder over here we can split. (8)

06 02 46 36 LMP That one off to your right down there - I think we (8)  
 could turn that one over.

06 02 46 45 CDR Yeah. I think you're right. I think we could turn (8)  
 that one over, Charlie.

06 02 46 48 LMP How about samples of those two? That white one and (8)  
 that big one on the other side over there?  
 - - -

06 02 47 05 CDR Okay, well I can get a rake soil here while you're (8)(SAMP RAKE 68510-37)(PHO 107 17527-31)  
 doing that.

06 02 47 09 LMP I'll just have to take the scoop off. Can you do (8)  
 that rake soil by yourself, you think?

06 02 47 17 CDR Yeah. (8)

06 02 47 24 CDR Rake soil away from the boulders. (8)(SAMP RAKE 68510-37)

06 02 47 47 CC How near are you to the edge of this ray? (8)

06 02 47 56 LMP Goes in both directions as far as we can see. (8)  
 - - -

06 02 48 01 LMP The whole area is just covered with these rocks. (8)  
 - - -

06 02 48 21 CC I guess we're just looking for a variety then in the (8)  
 boulder protocol.

06 02 48 28 LMP Okay, we can give you that, I'll tell you. There's (8)  
 two big boulders at 12 o'clock that are going to be  
 a great sampling. One of them is a rounded and -  
 but the biggest - and the other one is a white - and  
 it's black. The other is white and it's very sharp,  
 very angular.

06 02 48 58 LMP Okay, I pushed the double core in about halfway up (8)  
the first.

06 02 49 12 CDR Charlie, I get a locator on you and a down-sun, too. (8)

- - -

06 02 49 58 CDR What's the matter, Charlie? (8)(SAMP CORE 68001-02)

06 02 50 01 LMP Not going in too well. (8)(SAMP CORE 68001-02)

06 02 50 05 CDR Pretty hard around here. (8)(SAMP CORE 68001-02)

- - -

06 02 50 32 LMP Nope, I can't do it. I can't get down that far. (8)(SAMP CORE 68001-02)

06 02 50 51 LMP Now I'm going to have to go get the tongs. (8)(SAMP CORE 68001-02)

06 02 50 55 LMP And the hammer. I don't think the double core is (8)(SAMP CORE 68001-02)  
going to go in. Do you want me pull it out and  
shake it out and try another place? I think I hit a  
rock - -

06 02 51 06 CC Okay, yeah, we'd sure like you to do that. (8)(SAMP CORE 68001-02)

06 02 51 13 LMP That one just stopped all at once, so I think I did (8)(SAMP CORE 68001-02)  
hit a rock.

- - -

06 02 52 05 CDR Out of five scoops, I've got about 10 rock frags, (8)(SAMP RAKE 68510-37)  
one of which has some interesting black glass along  
the sides of it, the other of which is covered with  
black glass - but in the most there's not much of  
that material around here. That's going into bag  
411.

06 02 52 39 CDR Where you're away from boulders there's hardly (8)(SAMP RAKE 68510-37)  
anything but soil - very few rocks, in other words.

- - -

06 02 53 50 LMP Hey, there are little glass beads all over the place (8)(SAMP RAKE 68500-05)(PHO 107 17527-33)  
here, John.

06 02 53 53 CDR And places where little white rocks seem to have hit, too. I'll get a soil sample here. (8)(SAMP RAKE 68500-05)

06 02 54 46 LMP Boy, it is hard under here, Tony. (8)(SAMP CORE 68001-02)

06 02 54 49 CC Right, it sure looks it, but I can see you're getting it down. (8)

06 02 54 50 LMP \*\*\* it's in. (8)(SAMP CORE 68001-02)

06 02 54 58 LMP It's a little off vertical, but you're just going to have to take it. (8)(SAMP CORE 68001-02)

06 02 55 03 LMP Boy, I hope that thing is full of gold, because that was a hard one. Whew! (8)(SAMP CORE 68001-02)

06 02 55 23 LMP I can't believe it. It comes out so easy. (8)(SAMP CORE 68001-02)

06 02 55 34 LMP The bottom one is 36. (8)(SAMP CORE 68001-02)

- - -

06 02 55 41 CDR Okay, the soil sample here is going in bag 412. (8)(SAMP RAKE 68500-05)

06 02 56 13 CDR I don't know what this is staring here at me here, but I'm going to pick it up because - (8)(SAMP 68030, 35)(PHO 107 17532-37)

06 02 56 23 CC Anything that stares at you, you'd better pick up. (8)(SAMP 68030, 35)

06 02 56 24 CDR It's a glass, but in this sunlight, it's reflecting red, green - like a rainbow. (8)(SAMP 68030, 35)

06 02 56 46 LMP Found the first prism on the Moon, John. (8)(SAMP 68030, 35)

- - -

06 02 58 01 CDR I don't know if that thing will last or not. No, I guess it was just black glass but it was the way the sun was reflecting off of it. Isn't that too bad? Anyway, that's a sample - and it's going in bag 413. (8)(SAMP 68030, 35)

06 02 58 25 LMP The bottom core was 36 and the top part is 29. (8)(SAMP CORE 68001-02)

- - -

06 03 00 05 CDR How about if we just leave the TV on - just drive (8)  
over to where we're going to sample these boulders  
and test this thing out a little. Will that mess  
you up too bad? Or do you lose SYNC or something  
and never get it back.

- - -

06 03 03 02 LMP There's a lot of glass around here. (8)

- - -

06 03 08 01 LMP This is really some rock. It's a two-rock breccia, (8)  
with the matrix being blue to me, in this light  
anyway, and the white clasts are fragments of  
crystalline rocks - that appear to be fairly  
coarse-grained - take that back - let's say,  
fine-grained -

06 03 08 42 CDR That's the one you want to turn over, Charlie. (8)

06 03 08 45 LMP This thing! Gosh! I can't even budge it. (8)

06 03 08 48 CDR It's a biggie. (8)

06 03 08 49 LMP Hey! I did budge it. (8)

06 03 08 53 LMP I want to get a chip out of it. Look at that rock (8)  
over there, John. If that's not a crystalline rock,  
I'll - -

- - -

06 03 09 07 CDR Stereo on it? (8)

06 03 09 08 LMP Yeah, but I didn't get a closeup. I don't think we (8)(PHO 108 17693-96)  
can turn that one over, John. I can move it. I can  
rock it.

06 03 09 17 CDR Wait a minute. Let's go over here and look. Let's (8)  
not put no effort into it. I believe we can push it  
this way.

06 03 09 27 LMP Well, let's get a chunk off of it before we - - push (8)  
it.

06 03 09 32 CDR No, I don't think so either. (8)

06 03 09 34 LMP There's a better one to turn over right down there. (8)(SAMP 68110, 15)(PHO 107 17541-47)  
It's about half this size.

06 03 09 37 CDR Yeah. It'll work good. (8)

06 03 10 03 CDR Got a few footprints around it for scale now, (8)(SAMP 68110, 15)  
Houston. You got your hammer Charlie?

06 03 10 11 LMP Yeah, I got the hammer, and I'm bringing the tongs (8)(SAMP 68110, 15)  
and the scoop for a little fillet sample around it. (SAMP 68120-24)

06 03 10 23 LMP We might think of a padded bag sample here. This (8)  
big one's a breccia, but the other one looks like a  
crystalline rock. (SAMP 68110, 15)

06 03 10 45 LMP Let's see, let me get a little closeup of this thing.(8)(PHO?)

06 03 10 54 CC Okay, why don't you try to chip out some of those (8)(SAMP 68110, 15)  
clasts there, and we won't worry about overturning  
this one, but maybe you can get a fillet here. If (SAMP 68120-24)  
you haven't messed up the fillet by getting in there  
too close.

- - -

06 03 11 30 LMP Okay. John, let's find a good place to whack. (8)(SAMP 68110, 15)

06 03 11 33 CDR Let's get the fillet first, though - (8)(SAMP 68120-24)(PHO 107 17541-47)

- - -

06 03 11 41 CDR Actually, I don't see any fillet, per se. I think (8)(SAMP 68120-24)  
it just hit and made a - stick it in the dirt. \*\*\*  
end it up in the dirt, Charlie. \*\*\* tell which way  
is up. How about right there?

06 03 12 13 CDR \*\*\* cross-sun stereo, where are you gonna \*\*\* (8)(SAMP 68120-24)(PHO 107 17541-43)

06 03 12 17 LMP Okay, just take a picture of it and I'll hold the (8)(SAMP 68120-24)(PHO 107 17541-43)  
scoop in.

06 03 12 21 CDR \*\*\* standing in the shadow, Charlie. Get the after, (8)(SAMP 68120-24)(PHO 107 17544-47)  
Charlie.

06 03 12 27 LMP Huh? (8)(SAMP 68120-24)(PHO 107 17544-47)

06 03 12 29 CDR Get it in the after. (8)(SAMP 68120-24)(PHO 107 17544-47)

- - -

06 03 12 45 CDR Okay, here we go. Man, you can't see anything with  
\*\*\* down in the shadow like that. There we go.  
Hey, John, here's a little piece just sitting up  
here on top of the rock. (8)(SAMP 68120-24)

06 03 13 26 CDR That sample's in bag 374. (8)(SAMP 68120-24)

- - -

06 03 13 35 LMP We got to find a place to chip that. (8)(SAMP 68110, 15)

06 03 13 44 CDR Here's a place that's hanging out, Charlie. (8)(SAMP 68110, 15)

06 03 13 52 LMP Okay, let me get a before. Why don't you put your  
hammer down there. (8)(SAMP 68110, 15)(PHO ?)

06 03 14 03 CDR They've got enough documentation on the scale. (8)(SAMP 68110, 15)

06 03 14 06 LMP Okay. That looks great. Got to hit it, it looks  
like. (8)(SAMP 68110, 15)

06 03 14 13 CDR Yeah, but it's right at a fracture, so it'll come  
off in good shape. (8)(SAMP 68110, 15)

06 03 14 20 LMP Man, the whole rock's coming apart. Super job,  
John. (8)(SAMP 68110, 15)

06 03 14 30 CDR It was one of those fractures that's all included  
with glass. (8)(SAMP 68110, 15)

06 03 14 39 CDR See those glass fractures that - - (8)(SAMP 68110, 15)

06 03 14 41 CDR I think the after on this one will be pretty  
interesting. (8)(SAMP 68110, 15)(PHO 107 17547)

06 03 14 44 LMP Okay, Tony, that - - (8)(SAMP 68110, 15)

06 03 14 46 CDR Don't stick that in the bag. (8)(SAMP 68110, 15)

06 03 14 47 LMP Yeah - is going in 340. (8)(SAMP 68110, 15)  
 - - -

06 03 15 14 LMP There we go. How cameras keep running in this dirt, (8)  
 I'll never know.

06 03 15 26 CDR Ah, plop. (8)

06 03 15 32 CDR Got it. Now, how about that rock over yonder. (8)(SAMP 68410, 15-16)(PHO 107 17548-50; 108 17697-98)

06 03 15 37 LMP That's the one I'm going for. Did you get the (8)(SAMP 68410, 15-16)  
 after?

06 03 15 40 CDR No, I sure didn't, but I \*\*\* won't have any trouble (8)  
 putting this back in place.

06 03 15 57 LMP Look at that beauty, John! That is a crystalline (8)(SAMP 68410, 15-16)  
 rock, no breccia.

06 03 16 03 CDR A no-breccia, crystalline rock, huh? (8)(SAMP 68410, 15-16)

06 03 16 07 LMP And it is whitish to gray, with a lot of zap pits in (8)(SAMP 68410, 15-16)  
 it.

06 03 16 14 CDR It even has what look to be - no, those are zap (8)(SAMP 68410, 15-16)  
 pits, aren't they?

06 04 16 24 LMP Yeah. In fact, the whole area - there's a lot of (8)(SAMP 68410, 15-16)  
 this rock here, scattered all over - scattered  
 around.

06 03 16 33 CC We'll need a picture, and then we'll see if you can (8)(SAMP 68410, 15-16)  
 turn it over.

06 03 16 42 CDR No, we can't turn that one over. (8)(SAMP 68410, 15-16)

06 03 16 46 CDR Think we can turn that over, Charlie? (8)(SAMP 68410, 15-16)

06 03 16 47 LMP Yeah, we might, if we grab hold of this corner. I'd (8)(SAMP 68410, 15-16)  
 like you to get a big sample first, though. Get a (PHO 108 17697)  
 down-sun.

06 03 16 55 CDR Where do you want a sample from? (8)(SAMP 68410, 15-16)

06 03 16 57 LMP See that sharp corner? Right up at the top there? (8)(SAMP 68410, 15-16)

06 03 17 00 CDR Off the top? (8)(SAMP 68410, 15-16)

06 03 17 02 LMP Yeah. (8)(SAMP 68410, 15-16)

06 03 17 06 CDR Okay. \*\*\* think I can get that. It's fractured  
right there. (8)(SAMP 68410, 15-16)

- - -

06 03 17 27 CDR Well, if that ain't pure plag, I never seen it. (8)(SAMP 68410, 15-16)

06 03 17 31 LMP Don't it look like pure plag to you? (8)(SAMP 68410, 15-16)

06 03 17 32 CDR I don't know what it is, though. (8)(SAMP 68410, 15-16)

06 03 17 35 LMP It's pure feldspar, looks like - - (8)(SAMP 68410, 15-16)

06 03 17 38 CDR Pure feldspar. Don't it look like it's been - it's  
so sandy looking, it could have been reworked or  
something. (8)(SAMP 68410, 15-16)

06 03 17 48 LMP Maybe partially shocked. (8)(SAMP 68410, 15-16)

06 03 17 49 CDR Shocked, yeah. (8)(SAMP 68410, 15-16)

06 03 17 51 LMP But it's pure plag - it's plag, Tony. (8)(SAMP 68410, 15-16)

06 03 17 56 LMP And it's in 341. Whack off - another piece right  
here, John. (8)(SAMP 68410, 15-16)

06 03 18 03 LMP This rock is pretty predominant. (8)(SAMP 68410, 15-16)

- - -

06 03 18 08 CDR No, it isn't friable; it just fractured. (8)(SAMP 68410, 15-16)

06 03 18 12 CDR Where do you want to hit it off, Charlie? (8)(SAMP 68410, 15-16)

06 03 18 14 LMP Right at that sharp - right there; yeah. See how  
that comes off. Pretty friable isn't it? (8)(SAMP 68410, 15-16)

06 03 18 22 CDR Yeah. Bet it's shocked. (8)(SAMP 68410, 15-16)

06 03 18 25 LMP Yeah. (8)(SAMP 68410, 15-16)

06 03 18 32 CDR Put that in the same bag? (8)(SAMP 68410, 15-16)

06 03 18 33 LMP Yeah, let's put them all - and there's another piece (8)(SAMP 68410, 15-16)  
down there.

06 03 18 37 CDR We got to get the after. (8)(SAMP 68410, 15-16)(PHO 107 17550)

06 03 18 38 LMP Okay, I'll get the after of that right here. (8)(SAMP 68410, 15-16)(PHO 108 17698)

06 03 18 43 CDR Okay, the first two pieces - the first piece was off (8)(SAMP 68410, 15-16)  
the top of the rock, the second piece is under the  
shadow of the gnomon shovel, and they're both going  
in bag number whatever Charlie says.

06 03 18 56 LMP 341. (8)(SAMP 68410, 15-16)

06 03 18 58 LMP We're gonna have another piece that came out of the (8)(SAMP 68410, 15-16)  
same - the second whack.

06 03 19 08 LMP John, let's put this other piece in another bag, (8)(SAMP 68410, 15-16)  
because this one has got no dust in it at all. Just  
hold that gnomon, let me \*\*\* this one up.

06 03 19 18 CC And we'd like you to still have a try at turning it (8)  
over.

06 03 19 20 LMP Let's do it without getting any - (8)

06 03 19 25 CDR Okay. Try to get that rascal over? (8)

06 03 19 30 LMP Well, we can try. (8)

06 03 19 31 CDR We ought to try rolling it down in that hole. (8)

06 03 19 39 CDR \*\*\* greenish hue to it, too, I'm making that up, (8)  
maybe.

06 03 19 43 LMP The other piece of that rock's going in 342. I see (8)(SAMP 68410, 15-16)  
at least 10 other rocks around here that have that  
same appearance, so it's not a completely anomalous  
rock.

06 03 20 04 LMP The bag's getting full, John. (8)

06 03 20 13 LMP I don't think we can turn that one over, but I think (8)  
we can turn that one over down over there.

06 03 20 22 LMP I was going to push it that way - - (8)

06 03 20 23 CDR Think you're right. (8)

06 03 20 24 LMP - - because we can get down below it. (8)

- - -

06 03 20 29 CDR Here's a rock with glass splattered all over its body. (8)

06 03 20 36 CDR Let me do that, Charlie. (8)

06 03 20 37 LMP No, we can both lift it. (8)

06 03 20 46 CDR No way. (8)

06 03 20 47 CC Okay, let's forget that one. (8)

06 03 20 49 LMP - - budged once, but I don't think we're gonna do it. Tony, there's one off at the 3 o'clock position of the Rover that I think we can turn over. (8)

- - -

06 03 21 13 LMP Unfortunately - - you'll never budge that rock. (8)

06 03 21 30 CC I'm not so sure we got a good fillet on this last one, so we might be willing to sample another. (8)(SAMP 68820-25)(PHO 108 17699-701)

06 03 21 39 LMP Okay. Sorry that y'all gonna be looking up-sun, Tony, but - oh, man, John, that's a biggie. Looks bigger than I thought. (8)(SAMP 68820-25)

06 03 22 05 CDR Big? (8)(SAMP 68820-25)

06 03 22 06 LMP Yeah. (8)(SAMP 68820-25)

06 03 22 08 CDR Now, we take the documentation first, right? (8)(SAMP 68820-25)

06 03 22 14 LMP Yeah, let me take a cross-sun - - (8)(SAMP 68820-25)(PHO 108 17699-700)

06 03 22 17 CDR I'll get the cross-sun. (8)(SAMP 68820-25)

06 03 22 18 LMP Okay, then we'll see if we can move it. I don't think, we can. It's got a pretty big base to it. Okay, 7 foot at f:8. I got it. Hey, I - got a good (PHO 108 17699-700) fillet around it.

06 03 22 43 CDR It does. (8)(SAMP 68820-25)

06 03 22 48 LMP It doesn't have any dust on the top of it. I thought we could get the fillet sample here, but it doesn't have any dust on the top. (8)(SAMP 68820-25)

06 03 22 58 CC We don't need dust from the top. If this is a better fillet than the other, you might take a soil sample there, and then a reference soil away, and then a chip off the rock, and we'll have a good fillet sample. (8)(SAMP 68820-25)

06 03 23 09 LMP Okay, this is a better - this is a better fillet than the other one. (8)(SAMP 68820-25)

06 03 23 13 CDR Okay, but I thought you didn't want breccia. (8)

06 03 23 21 LMP Just crystalline or tough breccia for fillet sample. (8)(SAMP 68820-25)

06 03 23 25 CDR I don't know whether it's tough or not. You mean hard. (8)(SAMP 68820-25)

06 03 23 29 LMP Yeah. (8)(SAMP 68820-25)

06 03 23 30 CDR Not tough. (8)(SAMP 68820-25)

06 03 23 32 LMP Yeah, hard \*\*\* let's try it, John, okay? (8)(SAMP 68820-25)

06 03 23 36 LMP We'll fill that square. Okay, fillet coming in from this side. There's a good one right over here. Already got the cross-sun. (8)(SAMP 68820-25)  
(PHO 108 17699-700)

06 03 23 57 CDR My personal guess is that the fillet didn't come off that rock. (8)(SAMP 68820-25)

06 03 24 01 LMP Mine, too; 375. (8)(SAMP 68820-25)

06 03 24 16 CDR \*\*\* Charlie, wait a minute. Let me put this in your bag and give you a hand \*\*\* turn that. Got to get a rock off the top before we turn it, right? (8)  
(SAMP 68815)(PHO 108 17699-701; 107 17553-54)

06 03 24 28 LMP No, they don't have to do that. They want a chip off of it, though. (8)(SAMP 68815)

06 03 24 35 CDR Okay, let's get the chip. (8)(SAMP 68815)

06 03 24 37 LMP I got a footprint in, but the scoop will be right west of where the fillet was taken. (8)

06 03 24 53 CC We'll need a reference soil. (8)(SAMP 68840-48)(PHO 108 17702; 107 17555-57)

06 03 25 02 LMP Yeah, we'll get it. (8)(SAMP 68840-48)

06 03 25 04 CDR Lift up, Charlie. (8)(SAMP 68815)

06 03 25 05 LMP That's a hard breccia, ain't it? (8)(SAMP 68815)

06 03 25 06 CDR A hard, hard rock. (8)(SAMP 68815)

06 03 25 10 LMP Hit it right here on this corner right here in the in your shadow now. Down a little bit. There you go. (8)(SAMP 68815)

06 03 25 24 CC Hey, Charlie, you just dropped a sample. (8)

06 03 25 26 CDR That just opened up. Charlie, you're bouncing around too much - - your top came loose. (8)

- - -

06 03 25 49 LMP Could you stick that back in my bag, John? (8)

- - -

06 03 26 28 CDR Let me get it, Charlie. (8)(SAMP 68815)

06 03 26 34 LMP Dadgun thing's gonna be too big to go in there, anyway. (8)(SAMP 68815)

06 03 26 44 LMP Go ahead. (8)

06 03 26 50 CDR I got you. (8)

06 03 26 52 LMP Get it? (8)

06 03 26 53 CDR Yeah. (8)

06 03 26 58 LMP Want to crack it in two or bring the whole - it's not gonna be any good unless we can get it in the sack. (8)(SAMP 68815)

06 03 27 02 CDR It isn't gonna be any good unless we put it in the sack? (8)

06 03 27 05 LMP I don't think they'll ever recognize it again. (8)(SAMP 68815)

06 03 27 07 CDR Oh, yeah; throw it in my bag. (8)(SAMP 68815)

06 03 27 11 LMP Let's - okay. Okay, Tony, that fillet - that chip off that block - - (8)(SAMP 68815)

06 03 27 22 CDR Okay, and it opened up a clear fillet, and there's a lot of - this is a vesicular type of breccia \*\*\* after stereo there - (8)(SAMP 68815)  
(SAMP 68815)(PHO 107 17553-54)

06 03 27 36 LMP Another piece that fell off here. (8)(SAMP 68810)(PHO 108 17699-701; 107 17553-54)

06 03 27 39 LMP Well, I was gonna put it in a sack so they'll make sure - all that hammering, I don't want them to lose it. Yeah. (8)(SAMP 68810)

06 03 27 50 CDR Hey, let's push it over. (8)(SAMP 68810)

06 03 27 52 LMP Don't think we can. Okay, that came off the rock right there. Okay, Tony, a loose piece off the side of the rock is going in bag 343. (8)(SAMP 68810)

06 03 28 15 CDR \*\*\* to push that rock. (8)

- - -

06 03 28 20 LMP - - the other way, downslope with it, John. (8)

06 03 28 30 CDR Okay, lean on it. (8)

06 03 28 38 LMP That's too much work, John. (8)

- - -

06 03 28 42 LMP We can rock it out of there. (8)

06 03 28 49 LMP Getting a full sack too. (8)

06 03 28 59 CDR \*\*\* hold this here for a second, Charlie? (8)

06 03 29 01 LMP Yeah, wait a minute. Let me get this top closed. Turn around just a minute to your right; thank you. Okay. Go ahead. \*\*\* think you can do it, John. \*\*\* what I was trying. (8)

06 03 29 24 CDR You were trying to pick it up? (8)

06 03 29 25 LMP That's what I tried - yeah, I tried from that edge, (8)  
too. \*\*\* not even budging it.

06 03 29 32 CDR Well, you just can't get a grip on it. (8)

06 03 29 34 LMP No, you can't, not with these gloves. Here's your (8)(SAMP 68840-48)  
hammer back. We got to go off 5 meters and get a  
reference soil.

- - -

06 03 30 04 CDR I think the reference soil is back there at the soil (8)(SAMP 68840-48)  
sample.

06 03 30 08 LMP Okay, here's 5 - here's a pretty pristine area right (8)(SAMP 68840-48)  
over here, John, we haven't been walking - we can  
just go over here and get it. Take the shovel down  
there and I'll - is that 5 meters?

06 03 30 24 CDR Yeah, that's about 5 meters. Fifteen feet, maybe. (8)(SAMP 68840-48)

06 03 30 26 LMP Yeah. Okay, I get the down-sun. (8)(SAMP 68840-48)(PHO 108 17702)

06 03 30 32 CDR Okay, the shovel will be in the rocks. \*\*\* near (8)(SAMP 68840-48)  
these rocks, and we had the shovel to pick it up  
with.

06 03 30 49 LMP And that serves as a locator, too, Tony. (8)(SAMP 68840-48)(PHO 108 17702)

- - -

06 03 31 03 CDR I was looking for a boulder to turn over, and I (8)  
can't see any.

06 03 31 06 LMP There's a little one right up there; it's about a (8)  
foot and a half.

06 03 31 09 CDR That one right there? (8)

06 03 31 10 LMP Yeah, uh-huh. Okay, Tony; is one scoopful enough? (8)(SAMP 68840-48)

06 03 31 18 CC Roger. One scoopful. (8)(SAMP 68840-48)

06 03 31 32 LMP Got a little glass bead in it, John. (8)(SAMP 68840-48)

06 03 31 36 LMP That's good. Went right in. Okay, that one (8)(SAMP 68840-48)  
shovelful, is in 344.

06 03 31 56 LMP Put it in my bag, John. Yours is full. (8)(SAMP 68840-48)

- - -

06 03 32 12 LMP There's one down here, but that's quite a ways down (8)  
to your left. There's one down there, but it's  
pretty far downslope.

06 03 32 22 CDR How about - this one right here - we can turn it (8)  
over, Charlie. It just isn't very big, that's all.

06 03 32 26 LMP That's right, that's what they just said; they don't (8)  
want that one.

- - -

06 03 32 50 LMP Okay, here we go. There goes a bag. There goes (8)  
another bag - -

06 03 32 56 CDR - - sample bag. (8)

06 03 32 57 LMP - - two bags. Dadgunnit. (8)

06 03 33 05 CDR I think we ought to trade those bags - samples. (8)

06 03 33 09 LMP Yeah, I'm gonna empty them in the seat. (8)

06 03 33 12 CC Right, those babies look about full. (8)

06 03 33 13 CDR Yeah, I think we should do that. (8)

06 03 33 21 CDR They really are full. We ought to go trade them out (8)  
right now.

06 03 33 26 CDR Both sets. \*\*\* our hard work here. Let's go trade (8)  
them, Charlie.

- - -

06 03 34 42 CC - - we'd like you to take some 500 millimeters, when (8)(PHO?)  
you get a chance, of Stone mountain.

06 03 34 48 LMP All righty; I'll do it. (8)(PHO?)

06 03 34 58 LMP When I shade my eyes I can still see those lineations climbing right up to the southwest, and starting at the Cayley and going right on up across the mountain. Let's change these bags. (8)

- - -

06 03 38 15 LMP Tony, we're breaking out bag 4. (8)

- - -

06 03 39 40 CDR Charlie, since I don't have to carry the gnomon any more, I could carry a sample bag in one hand. We could use that technique. (8)

06 03 39 54 LMP That's yours now; it's on. (8)

06 03 40 02 LMP Okay. Now, there's one under my feet that's partially full of rocks. Let me get that. Just use that. (8)

06 03 40 06 CDR That thing is full, that's why, and there is another rock under there that has to go in - (8)(SAMP 68815)

06 03 40 11 LMP Okay; we'll just break out a new one then. (8)

06 03 40 23 LMP Okay; I'm breaking out bag number 6. (8)

06 03 40 27 CC Okay: SCB 6. (8)

- - -

06 03 41 08 LMP Okay; I was just gonna say - there's some good crystalline, that white crystalline rock that we picked up there. There's some good fist-size ones that would make good padded bag samples. (8)

- - -

06 03 42 26 CC Okay; Charlie. What SCB did you have on before - - (8)

06 03 42 34 LMP I think it was number 2, stand by. (8)

06 03 42 41 CDR It was number 2. (8)

06 03 42 47 CDR No; sorry. That was mine. Charlie had number 1. (8)

06 03 42 59 CDR And I had number 2. (8)  
- - -

06 03 44 07 LMP Okay, Station 8, 10. Got the sampling. Rake soil (8)  
was done. Okay; only one boulder sample. Sorry we  
couldn't turn one over. Tony. Okay; that was frame  
count 120, Tony.  
- - -

06 03 44 45 LMP Okay; we've still got three quarters of a mag on the (8)(PHO DAC)  
magazine R. Do you want me to turn it on?

06 03 44 57 CC Yeah. Let's go ahead and turn it on. (8)(PHO DAC)

06 03 45 02 LMP Okay. We'll let her run, one frame a second - - (8)(PHO DAC)  
f:8.  
- - -

06 03 45 15 CDR Roger, my frame count is 142. (8)  
- - -

06 03 46 27 LMP You know, it's a shame we never did \*\*\* get to see (8)  
into Stubby.

06 03 46 33 CDR I thought you were looking in it from Stone there. (8)

06 03 46 34 LMP Oh, I did from there, but you can't see this east (8)  
side of it to see whether the thing is really filled  
in from a flow or not or whether it's just  
subsequent. That's what I really wanted to find  
out.  
- - -

06 03 48 15 CDR Okay, Houston; we're proceeding to Station 9. (8-9)  
- - -

06 03 49 10 LMP Still in a cobble area, with boulders up to a meter. (8-9)  
Looks just like our last stop. This is a shallow  
saucer area, but there's no boulder to sneak up on.  
- - -

06 03 49 50 LMP I can still see the ascent stage of Orion. And (8-9)  
 we're in a boulder field now that has a population  
 of cobble size up through 15 centimeters covering 30  
 percent of the surface.

- - -

06 03 50 21 LMP This 015 for 2.7 - according to them, we're almost (8-9)  
 there.

06 03 50 29 CDR I think we're just too close to the ray patterns off (8-9)  
 South Ray.

- - -

06 03 51 08 CDR All righty, we have just found your place. (8-9)

06 03 51 09 LMP There it is right over there. See that big rock (8-9)  
 John?

06 03 51 14 LMP Down in that big hollow. (8-9)

06 03 51 24 CDR That ain't a hollow; that's a crater. (8-9)

- - -

06 03 51 24 LMP That one - it's over there about 50 meters, 2 (8-9)  
 o'clock.

- - -

06 03 51 32 LMP It's on the side facing the LM. (8-9)

06 03 51 38 CC You say it's on the side facing the LM? We wouldn't (8-9)  
 want to face the LM. We want to not see descent.

06 03 51 46 LMP I blew it. It's on the side of the crater away from (8-9)  
 the LM.

06 03 51 55 LMP Yeah, no way to see the LM from over here. (8-9)

06 03 51 57 CDR Yeah, but Charlie, we can't get off the samples (8-9)  
 around - -

06 03 52 02 LMP Why not? (8-9)

06 03 52 04 CDR Oh, okay; let's drive up here. (8-9)

06 03 52 22 LMP This rock's so big you can't even reach over it. (8-9)

06 03 52 29 LMP But you can sneak around on the side. This is a steep slope right here, babe. (8-9)

06 03 52 36 CDR That's what I was telling you. How about that rock right there? (8-9)

06 03 52 43 LMP That one right here is fine. (8-9)

06 03 52 44 CDR Okay. (8-9)

06 03 52 51 LMP Yeah, this is - 180 parking, I guess. Yeah. Let's don't get too close - we've got to sneak up on it. (8-9)

06 03 53 12 LMP You parked right in a crater, for me. That's good, now. (8-9)

06 03 53 18 CDR Yeah, but that ain't 180. (8-9)

- - -

06 03 53 48 LMP We're at 176, 0.7 - 007, 8.7, 2.6. (9)

06 03 54 28 CC We copy that and DAC off. (9)(PHO DAC)

- - -

06 03 55 21 LMP I'll get a pan out here. (9)(PHO 108 17714-39)

06 03 55 39 LMP Let's see, number 8. (9)

- - -

06 03 56 45 LMP Okay, pan is complete. Okay, we need the surface samplers. And that starts with the Beta and then the velvet and then a skim and a scoop. (9)(PHO 108 17714-39)  
(SAMP 69003-04)(PHO 108 17740-41; 107 17558-65)

06 03 57 04 CDR Hey, we snipped that rock over there, the one I'm gonna sneak up on, Charlie. (9)(SAMP 69003-04)

- - -

06 03 58 03 LMP I'm going to get a shovel for the scoop. And I (9)  
 thought we'd maybe start on a double core for the  
 CSVG.

06 03 58 24 CDR Okay; well, let me get these samples out of the way. (9)(SAMP 69003-04)

06 03 58 31 CC And, Charlie, was that DAC off? (9)(PHO DAC)

06 03 58 42 LMP Yeah, I got the DAC off. (9)(PHO DAC)

- - -

06 03 59 03 LMP If you'll pan left, we'll show you the rock we're (9)(SAMP 69003-04)  
 going to sneak up on.

06 03 59 19 LMP Don't open it - don't open that. (9)

06 03 59 26 CDR It's between us and the LM. It's between the LM and (9)(SAMP 69003-04)  
 us.

06 03 59 30 LMP They don't want you to open this thing until you get (9)  
 right up next to the rock.

- - -

06 03 59 40 LMP I'm going to get the other one. (9)(SAMP 69003-04)

- - -

06 04 01 51 CC Okay. Did that disturb the surface on the other (9)(SAMP 69003-04)  
 side there?

- - -

06 04 02 06 CDR \*\*\* no, we didn't disturb it at all. (9)(SAMP 69003-04)

- - -

06 04 02 17 CDR There you go. Get it? (9)(SAMP 69003-04)

06 04 02 22 LMP Yeah. In an area that wasn't - that that didn't go (9)(SAMP 69003-04)  
 in, right?

06 04 02 25 LMP John was sneaking just like this. He really got up (9)(SAMP 69003-04)  
 to it before it even knew he was coming.

- - -

06 04 02 43 LMP Man, that's a great sneak. Okay; that's good. (9)(SAMP 69003-04)  
right there.

06 04 03 03 LMP Beautiful. You picked some up on that one. Only on (9)(SAMP 69003-04)  
one corner. He got some on one corner, Houston.

- - -

06 04 03 19 LMP I'd say about 20 percent of it's covered. (9)(SAMP 69003-04)

06 04 03 31 LMP I mean 20 percent of the whole thing is covered. (9)(SAMP 69003-04)  
These go in your rock bags, don't they? I mean in  
the SCBs?

06 04 03 39 CDR Yeah. I don't know. Let me take them back and put (9)(SAMP 69003-04)  
them under the seat. I don't know where they go.

06 04 03 43 LMP I think they go in the SCBs. Tony, do these go in (9)(SAMP 69003-04)  
the SCBs?

06 04 03 48 CC They'll go in the SCB that doesn't go in the SRC. (9)(SAMP 69003-04)

06 04 03 53 LMP Yeah, okay. We've already got that one collected. (9)

- - -

06 04 04 18 LMP Okay, now we got to go get - after two, place the (9)(SAMP 69003-04)  
gnomon. I'll put the shovel. We got a cross-sun (PHO 107 17558-60)  
after, and a down-sun on locator.

06 04 04 28 CDR Okay. Well, that's going to be hard to get. Don't (9)(SAMP 69003-04)(PHO 107 17558-60)  
put the dirt all over there!

06 04 04 31 LMP I didn't. I missed it. (9)

06 04 04 44 LMP You can get a cross-sun from over on the this side. (9)(SAMP 69003-04)(PHO 107 17558-60)

- - -

06 04 05 12 LMP I'll go get the down-sun. There we go. (9)(SAMP 69003-04)(PHO 108 17740)

06 04 05 20 CDR Turn and get a locator. (9)(SAMP 69003-04)(PHO 108 17741)

06 04 05 42 CDR I'm looking back at the LM. Charlie, you can get a (9)(SAMP 69003-04)  
picture of the - I can get a picture and it'll show (PHO 107 17560)  
that - that rock is between us and the LM.

- - -

06 04 06 08 LMP We got to get a skim. (9)(SAMP 69920-24)(PHO 108 17740-41; 107 17558-63)

06 04 06 17 CDR Can we skim where the pristine sample was? (9)(SAMP 69920-24)

06 04 06 19 CC We'd like to skim next to it. (9)(SAMP 69920-24)

06 04 06 20 LMP No, they want it right beside it, right there \*\*\* (9)(SAMP 69920-24)

06 04 06 23 CDR You can't see any of that stuff. (9)(SAMP 69920-24)

06 04 06 24 LMP Yeah, I can see. Okay, here we go. Get me a bag ready. (9)(SAMP 69920-24)

06 04 06 48 LMP Tony, I probably got 5 millimeters on that skim. (9)(SAMP 69920-24)

- - -

06 04 06 59 CDR What setting should I open this up to show you these prints we got in the vacuum here? I mean in the shadow? (9)(SAMP 69920-24)(PHO 107 17561-63)

- - -

06 04 07 23 CDR That's going into bag 376? (9)(SAMP 69920-24)

- - -

06 04 07 43 CC John, 5.6 at 250th. (9)(SAMP 69920-24)(PHO 107 17561-63)

06 04 07 52 CDR Okay. I'll get you a little flight line of that. Charlie's scoop is being taken right under the - (9)(SAMP 69940-45)(PHO 107 17561-63)

06 04 08 10 LMP You got it. (9)(SAMP 69940-45)

06 04 08 28 LMP Okay, there you go. That's going in bag 377, Houston. (9)(SAMP 69940-45)

06 04 08 38 CC We'd like to get that CSVC. (9)(SAMP CSVC 69001)(PHO 108 17742-43)

06 04 08 43 LMP Okay, Tony. We can turn this rock over. If you want us to get that sample in, we need an extension. (9)(SAMP CSVC 69001)

06 04 08 59 LMP Yeah, I'll go get the CSVC then. (9)(SAMP CSVC 69001)

06 04 09 00 CC All right. We'll go ahead and do the CSV. (9)(SAMP CSV 69001)

06 04 09 03 LMP John, you want to start sampling while I do that. Okay, I'm going. (9)(SAMP 69930,35)(PHO 108 17740-41; 107 17558-60,64-6-72 71-72)

06 04 09 25 CC John, can you turn that over by yourself? (9)(SAMP 69930, 35)

06 04 09 30 CDR Well, I'm going to give it a go. (9)(SAMP 69930, 35)

- - -

06 04 10 12 LMP Getting a sample off of it, John? (9)(SAMP 69930, 35)

06 04 10 14 CDR Yeah. (9)(SAMP 69930, 35)

06 04 10 29 CC John, you lost the bag? (9)

06 04 10 32 CDR Yeah, lost my whole set of bags. Oh, shoot. (9)

06 04 10 56 LMP May I borrow your hammer, John? This core, I think might be able to push it in, but - (9)(SAMP CSV 69001)

06 04 11 07 LMP Okay, we'll just do it right here. Tony, I'm 15 meters out to the left of the - - (9)(SAMP CSV 69001)

06 04 11 18 CC Roger. We're watching you, Charlie. (9)(SAMP CSV 69001)

06 04 11 31 LMP Okay, there we go. Pushed it in halfway, Tony. (9)(SAMP CSV 69001)

06 04 11 36 CC Okay. And remember not to hammer this one all the way in. (9)(SAMP CSV 69001)

06 04 11 46 CDR The top of that rock is a hard breccia, and I'm just going to throw it under your seat, Charlie. (9)(SAMP 69930, 35)

06 04 11 58 LMP Is it in a bag? (9)(SAMP 69930, 35)

06 04 11 59 CC Did you have a bag number? (9)(SAMP 69930, 35)

- - -

06 04 12 03 CDR 373. (378) (9)(SAMP 69930, 35)

06 04 12 16 LMP Okay, Tony, that's about 7 centimeters out. (9)(SAMP CSV 69001)

06 04 12 19 CC Looks good to us. (9)(SAMP CSV 69001)

06 04 12 25 LMP Feels good to me, too, to get that over. (9)(SAMP CSVC 69001)

06 04 12 30 CDR Yeah, that's got it all - on three sides. (9)

06 04 12 58 CDR Here's the picture to show where the top rock came out. Charlie, I got it! (9)(SAMP 69930, 35)(PHO 107 17572)

- - -

06 04 13 14 LMP He did it, Houston! He did it. (9)

06 04 13 23 CC So you can not only sneak up on them, you can flip them over, huh? (9)

06 04 13 31 CDR Yeah. That's a biggie. Man, it looks like it's been sitting there for quite a while. Look at that soil underneath. (9)

06 04 13 43 CDR Before I stomp all over it, Charlie, sneak over here and let's get some of this soil. (9)(SAMP SOIL 69960-65)(PHO 107 17573-80)

06 04 13 46 LMP Okay. (9)(SAMP SOIL 69960-65)

06 04 13 47 CC Right. A chip off the bottom and the soil will probably do it. (9)(SAMP 69950,55; SOIL 69960-65)

06 04 13 54 CDR A chip off the bottom. (9)(SAMP 69950,55)(PHO 108 17741; 107 17573-80)

06 04 14 00 LMP I see a place where we can get a chip off the bottom. (9)(SAMP 69950,55)

- - -

06 04 14 18 LMP Hey, John, let me cap this little beauty here before we lose it - before I forget about it. Yeah, I'm coming with the scoop. What else do you need? (9)(SAMP CSVC 69001)

06 04 14 35 CDR I need the hammer. (9)

06 04 14 36 LMP I got it. (9)

06 04 14 44 CDR Hey, why don't you just sort of sneak up so you don't sprinkle any dirt down in the bottom of this place where we turned it over. (9)(SAMP 69950,55)

06 04 14 50 LMP Yeah, okay. (9)(SAMP 69950,55)

06 04 14 52 LMP Look at that soil! It's all cake looking, isn't it? (9)(SAMP SOIL 69960-65)

06 04 14 54 CDR Yeah, it is. (9)(SAMP SOIL 69960-65)

06 04 15 01 LMP Okay. Let me get the soil before you start whacking. Okay? (9)(SAMP SOIL 69960-65)

06 04 15 04 CDR Yeah. (9)

06 04 15 05 LMP The bottom is glass covered, Houston. (9)(SAMP 69950,55)

06 04 15 14 CDR Yeah, white glass. (9)(SAMP 69950,55)

06 04 15 18 LMP No, the black stuff is the glass. That other is the crystal. That's a crystalline rock. (9)(SAMP 69950,55)

- - -

06 04 15 32 LMP And it looks just like an alkali flat in the cake that's under it, Tony. And that's right from the deepest part. That sample is right in the middle, which happens to be the deepest penetration that boulder made. (9)(SAMP SOIL 69960-65)

06 04 16 02 LMP There's a sackful. 379. (9)(SAMP SOIL 69960-65)

06 04 16 29 LMP Where are you going to whack it, John? (9)(SAMP 69950,55)

06 04 16 31 CC And, Charlie, your SCB is open, so a rock might come out. (9)

06 04 16 37 LMP Okay. Real friable, isn't it? (9)(SAMP 69950,55)

06 04 16 49 CC Now you found a real rock. (9)(SAMP 69950,55)

06 04 16 50 LMP Aha! Look at that piece here, let me get it, John. Back up. I'll go get it. There it is right there. (9)(SAMP 69950,55)

06 04 17 10 CDR Can't you just pick it up with your shovel? (9)(SAMP 69950,55)

06 04 17 12 LMP I don't want to get it too dirty. (9)(SAMP 69950,55)

06 04 17 21 LMP Okay, we got you about a 4-centimeter chip. (9)(SAMP 69950,55)

- - -

06 04 17 38 LMP And that's not glass, John. Those are crystals. (9)(SAMP 69950,55)  
Those are big crystals. At least 5 millimeters,  
with a bluish cast to them.

06 04 17 59 CDR That's going in bag 380, Houston. (9)(SAMP 69950,55)

06 04 18 07 CDR It looks to me like it's a shocked rock with a lot (9)(SAMP 69950,55)  
of - and this is a guess - a lot of black glass in  
the fracture patterns.

06 04 18 23 LMP Okay, I'll hold it. (9)(SAMP 69950,55)

06 04 18 45 LMP Okay, that was about a 5-footer, Tony. A little (9)(SAMP 69950,55)(PHO 108 17741)  
down-sun, and the shovel is right where the - -

06 04 18 52 CDR Bag was. (9)(SAMP 69950,55)(PHO 108 17741)

06 04 18 53 LMP - - bag was. Close my top on that thing, John. (9)(SAMP 69950,55)(PHO 108 17741)  
- - -

06 04 19 43 LMP Yeah, I've got to close this CSVC up; take me a (9)(SAMP CSVC 69001)  
couple of minutes. You could go get a sample.  
Okay?

06 04 19 51 CDR Fair enough. (9)

06 04 19 56 CC Okay, we'd like you to pack up, John, if you could (9)  
help Charlie. I think we'll have to get on.

06 04 20 05 LMP He can't help me with it. (9)(SAMP CSVC 69001)

06 04 20 07 LMP Unless you could get the top of that CSVC. (9)(SAMP CSVC 69001)

06 04 20 23 CDR Where is it? (9)(SAMP CSVC 69001)

06 04 20 32 LMP It's in the SCB number 2. (9)(SAMP CSVC 69001)

06 04 20 34 CDR Where? I'll get it. Just stay there. (9)(SAMP CSVC 69001)

06 04 20 43 LMP The plunger went right down. It's about 4 (9)(SAMP CSVC 69001)  
centimeters from the top.

06 04 21 06 CC And before you stick it in there, could we have the (9)(SAMP CSVC 69001)  
core tube number?

06 04 21 12 LMP Thirty-four. (9)(SAMP CSVC 69001)  
 - - -

06 04 22 54 CC All right Charlie, that CSVC goes in the SRC. (9)(SAMP CSVC 69001)

06 04 23 00 LMP Roger. Okay. (9)

06 04 23 09 CDR Okay. Back to Station 10, Charlie. (9)

06 04 23 15 CC And Charlie, before you get on there, we'd like the (9)(PHO DAC)  
 DAC on at 12 frames per second.  
 - - -

06 04 23 51 CC We need frame counts. (9)

06 04 23 55 LMP I'm leaving with about 161. (9)

06 04 24 02 CDR I got 165. I probably ought to change this mag. (9)

06 04 24 09 LMP Do you want me to change the mags, Tony? (9)

06 04 24 16 CC Yeah, let's both change. (9)  
 - - -

06 04 24 25 LMP Tony, I don't have a black and white left. I'm (9)(PHO 108 17744)  
 going to run off a couple, John.

06 04 24 34 CDR Okay. I'm out. Three frames to go and I'm out. (9)(PHO 107 17581-83)  
 - - -

06 04 24 47 LMP Okay, magazine Bravo has got something in it - a few (9)  
 frames. You used about 50 on it yesterday. And we  
 can use magazine Delta. Both put color on. Is that  
 okay, Tony?

06 04 24 59 CC Okay. That sounds fine. Let's put Bravo on John's (9)  
 since he doesn't shoot while he's driving.  
 - - -

06 04 25 25 LMP Delta for me and Bravo for you. (9)  
 - - -

06 04 26 01 LMP Magazine Delta is working, and I'm starting with  
frame count number - oh, about 1. (9)(PHO 115 18471-72)

- - -

06 04 27 14 LMP The DAC is set at f:8 at 12 frames a second. And  
I'm not going to turn it on until we start moving,  
Tony. (9)(PHO DAC)

- - -

06 04 27 34 CDR Frame number 66 on Bravo. (9)

- - -

06 04 30 54 LMP Tony, I can't get over how hilly this place is.  
It's one hill right after the other - or ridge. (9-10)

- - -

06 04 31 20 CDR Okay, pictures (DAC) are going. (9-10)(PHO DAC)

06 04 31 24 LMP Tony, you're not going to see much out the right  
side of my in-motion Hasselblad because this DAC  
camera magazine effectively blocks out that part of  
the field. (9-10)(PHO 115 18473-553)

- - -

06 04 32 06 CDR Anybody that ever called this place Plains, Cayley  
Plains, really didn't know what he was talking  
about. There isn't a plain around here. (9-10)

- - -

06 04 32 25 LMP John picked the only flat place within a kilometer  
to land. (9-10)

- - -

06 04 32 38 LMP I don't know what this big crater is over here.  
This one - Tony, really the ridges here and we're  
looking off - we're now at 007. You'll see it in  
the Hassel - and in the 16, but off to the 2 o'clock  
from 007 to 2.6, at north headings; there's an old  
subdued crater that's probably 30 meters deep. (9-10)  
(PHO 115 18482)

06 04 33 06 CDR And how many meters around? (9-10)

06 04 33 10 CDR 900 meters long. (9-10)

06 04 33 12 LMP No, not that much. Better than 300, anyway. (9-10)

06 04 33 16 CDR Yeah, it's 300 meters across. (9-10)

06 04 33 20 LMP And it didn't even show on the map. (9-10)

06 04 33 23 CDR I tell you what it did show in. (9-10)

06 04 33 27 CDR Those low angle looks that we got at the landing site. (9-10)

- - -

06 04 33 43 LMP We're coming in an area that's not quite as blocky. (9-10)  
I'd say maybe - 10 percent of the surface is covered  
with cobbles. Still same size. There's one big  
boulder that I just got a picture of. (PHO 115 18486)

06 04 34 05 CDR Buried. (9-10)

06 04 34 06 LMP It's just buried 3 meter - well, it's buried all (9-10)  
over. I was going to say it's mostly from - wasting  
from upslope, but that is not true.

06 04 34 33 LMP Off to our right is the big crater - the big, deep - (9-10)  
very subdued that just shows - I see no large rocks,  
no outcrops at all anywhere around there. All I do  
is see big boulders that are part - apparently part  
of this ray, the biggest one being 2 meters.

06 04 35 09 CDR I'm making 11 clicks now on this relatively smooth (9-10)  
region.

06 04 35 28 LMP Tony, it's a very old surface, apparently. The - (9-10)  
every crater here is very subdued, from the  
half-meter size up to the 4- or 5-meter size.

06 04 35 42 LMP Completely saturated. Here come a couple of angular (9-10)(PHO 115 18487)  
blocks that you just got a picture of. They remind  
me of the one we sampled up there at Station 8.  
We're getting into an area now at 007, 2.6 - where  
it's more pebbly than cobbly, being 4 centimeters  
or so.

- - -

06 04 36 49 LMP Okay. We're at 007 at 2.6, and we can - - see just (9-10)  
the top of Orion.

- - -

06 04 37 15 CDR Here's a glass-covered one right there. Little (9-10)  
round - looks like a bowling ball.

06 04 37 19 CDR We're doing V-max now, 8 clicks - 9 clicks, because (9-10)  
we're going up a real steep slope.

- - -

06 04 37 52 LMP We just topped out on a rise, and we're going down (9-10)  
into another swale. I can see Flag crater off at 11  
o'clock, and we're heading 007. It's boulder strewn  
on the south side. Pointed straight ahead of us,  
it's between us and the Lunar Module. It's a -  
uh-oh.

06 04 38 22 CDR What's the matter, Charlie? (9-10)

06 04 38 24 LMP The range keeps still saying 2.6. I think it's (9-10)  
working. Well, anyway, you better delay that range,  
Tony. It's been 2.6 for quite a while.

06 04 38 46 LMP We can see the LM, though. (9-10)

06 04 38 49 LMP Now we're going down in another 2 to 300-meter - (9-10)  
maybe 500-meter subdued crater. That's really going  
to be a steep slope, if we go straight into it, but  
John is adroitly maneuvering around it.

06 04 39 05 CDR I'm not going down that critter. (9-10)

06 04 39 07 LMP That is really steep. (9-10)

06 04 39 09 CDR Look at that hole in the bottom of it. (9-10)

06 04 39 10 LMP I know it. Tony, it's a subdued crater without any rim at all. It is sort of oblong - - (9-10)

06 04 39 19 CDR But look at that - that hole in the bottom has a ledge in it. (9-10)

06 04 39 26 LMP I know it. This reminds me of Big Sag. You know Big Sag on the map, west of North Ray. (9-10)

06 04 39 40 CDR Up. Up. Up. (9-10)

- - -

06 04 40 14 CC - - by time and speed, you're about 1.2 kilometers. (9-10)

06 04 40 20 LMP Okay. Then our distance and range is stopped. (9-10)

06 04 40 25 CDR Our distance is - our bearing appears to be okay. (9-10)

06 04 40 34 LMP Hey, Tony, you remember out in Hawaii at Kapoho where we saw those very small little sink-hole craters? (9-10)

06 04 40 46 LMP This looks like a big one of those. (9-10)

06 04 40 47 CDR The one down in the middle of that hole? (9-10)

06 04 40 48 LMP Yeah. (9-10)

06 04 40 49 CDR I agree with you. That's what I was thinking. (9-10)

06 04 40 52 LMP In fact, the whole area looks like just a big slump. Something fell out the bottom. Because there's no rim to this thing at all, John. (9-10)

06 04 41 01 CC It'd sure be good if you could swing the DAC over that way, if it's still running. (9-10)(PHO DAC)

- - -

06 04 41 11 LMP It's running, but I don't have strength in my hands. Let John turn over that way and we'll give you a couple of - as he swings around, I'll give you a couple of pictures of it. Can you make a 360, John? (9-10)(PHO DAC) (PHO 115 18507-11)

- - -

06 04 41 39 CDR Let's just make a 360 this way. (9-10)(PHO 115 18507-11)

06 04 41 41 CC Okay, and get it on your Hasselblad, please. (9-10)(PHO 115 18507-11)

06 04 41 18 LMP Okay, that's what we're doing. (9-10)(PHO 115 18507-11)

06 04 41 50 CDR That would be a neat way to take a pan, Charlie. (9-10)(PHO 115 18507-11)

06 04 41 52 LMP That's just what I'm doing, taking a pan of that thing. We got it. (9-10)(PHO 115 18507-11)

06 04 42 00 LMP We got a pan from the Rover, Tony, with a 360. (9-10)(PHO 115 18507-11)

06 04 42 03 CC Okay. And if you can turn the DAC off, please turn it off. (9-10)(PHO DAC)

06 04 42 11 LMP Okay, wait a minute. Well - apparently it wasn't running, Tony, because I've still got half a mag left. I'll turn it back on. (9-10)(PHO DAC)

06 04 42 36 LMP My arms are just too short - - to get that thing on and off from the Rover seat. I should have turned it on on the side, but at 12 frames a second I thought we'd just run too much out. Okay, it's running now. (9-10)(PHO DAC)

- - -

06 04 43 30 LMP Okay, still in a cobbly area. There are apparently two distinct sizes. Those are the 6-centimeter size and below - well, around 6 centimeter - and those around 15 centimeters. Cover 30 percent of the surface. (9-10)

- - -

06 04 44 08 LMP The NAV system is gone completely, John. That bearing's not even working, I don't think. (9-10)

- - -

06 04 45 30 LMP We got to go on top of that ridge over there, and then we'll be there. John, see those blocks up on the top of Smoky? (9-10)

06 04 45 37 CDR Yes. (9-10)

06 04 45 38 LMP If you head for those, the LM was right in line with (9-10)  
those from our last stop. And I'm convinced that  
bearing was good from our last stop because we  
haven't changed much. Okay, Tony, coming up into  
the area now to our 9 o'clock - we're heading 020 -  
it looks like another one of those old subdued sag  
areas.

06 04 46 09 CC And we're going to cut back on our Station 10 just (9-10)  
a little bit here, and we'll skip that photography  
of the heat flow cable. We'd like you to park  
halfway between ALSEP and the LM, and do a nominal  
Station 10, except we'll drop the trench.

- - -

06 04 46 56 LMP We're coming up on that area now as we top a rise - (9-10)  
a ridge that is bouldery, about 10 to 12 percent of  
area is covered with boulders greater than 50  
centimeters. And it's cobbly covering about 60  
percent. Apparently a secondary around here  
somewhere caused all this. But we don't see the  
crater.

- - -

06 04 47 46 LMP There's the secondary. We're coming up on our 10 (9-10)  
o'clock position. There's about a - what, 50  
meters, John, you think?

06 04 47 56 CDR Yep. (9-10)

06 04 47 57 LMP Fifty-meter crater that's a secondary or at least - (9-10)  
it might be a primary, with these blocks just being  
out of it. And it's quite deep.

06 04 48 12 CDR That's probably a prim - I don't know whether that's (9-10)  
a secondary or primary, though.

06 04 48 18 LMP We could tell. The block distribution seems to be - (9-10)  
radially equivalent. I think that was probably a  
primary punched into the old Cayley.

06 04 48 45 CDR It (DAC) is empty. Reading empty. (9-10)(PHO DAC)

06 04 40 48 LMP Okay, it's off. (9-10)(PHO DAC)

06 04 48 53 CDR What's that thing up there on the hill, Charlie? (9-10)

06 04 48 58 LMP Where? Straight ahead? (9-10)

06 04 49 00 CDR Yeah. (9-10)

06 04 49 02 LMP That's a rock. (9-10)

06 04 49 04 LMP We got to get over this ridge, John, and we'll see (9-10)  
the old LM. Man, I am covered from head to foot -  
with dust.  
- - -

06 04 49 47 LMP I think we're going to probably come out a little (9-10)  
east of - where we need, John.

06 04 50 08 LMP We ought to cross the tracks if we get too far east. (9-10)  
- - -

06 04 50 21 LMP Must be a pretty steep slope here. Man, look at (9-10)  
those angular blocks there, would you. Around  
there. Tony, here are 30 or 40 very angular blocks  
- 50 centimeters or so - and they have the same  
character as the ones we sample bagged, so -  
apparently, a ray material.

06 04 50 48 LMP A little comment about the regolith. The regolith (9-10)  
is texturally the same throughout. The only  
difference is a white - the difference in albedo  
that you can see on some of the fresh craters and  
also in the rays as we were going towards South Ray.  
- - -

06 04 52 05 CDR Okay, Houston, we just topped the ridge and the LM (9-10)(PHO 115 18547)  
is about 200 meters from us.  
- - -

06 04 52 55 LMP How about swinging right and let me get a picture of (9-10)(PHO 115 18549)  
that, John? With the Rover and - a little bit more.  
We want a nominal Station 10, so it's between the  
core - -  
- - -

06 04 53 28 CDR \*\*\* between the mortar package and the mortar package and the Rover? (9-10)

06 04 53 33 LMP Yeah, that's a good place to park. I've got to go over here and get the penetrometer in line. Yeah, that'd be good. Mortar package and the Rover. (9-10)

- - -

06 04 54 13 CDR Which way we want to park on this one, Charlie? (9-10)

06 04 54 15 CC 180. (9-10)

06 04 54 16 LMP Pointing south again. 180. Hook a right. I can't believe how hilly this place is. There's not a flat place around. (9-10)

06 04 54 27 CDR Right, except where that LM is. (9-10)

06 04 54 29 LMP Except right there where that LM is. (9-10)

- - -

06 04 54 51 LMP The heading says we're at 176, 65. (10)

- - -

06 04 57 47 LMP I'm starting on the double core, Tony. (10)(SAMP CORE 60009-10)(PHO 115 18555-58)

06 04 57 50 CC John, since we're running behind here, I wonder if you could operate the penetrometer. (10)

06 04 58 07 CDR A piece of cake. (10)

- - -

06 04 59 16 CDR Look at that, Charlie. (10)

06 04 59 23 CDR Somebody up there likes us. That's bag number 4. See where it is? (10)

06 04 59 30 CDR Came off, and it's hanging between the fender and the frame. (10)

- - -

06 04 59 44 CDR Double core. Okay, can be anywhere out in front of the Rover. (10)(SAMP CORE 60009-10)

- - -

06 05 00 29 CDR Want me to help you with the penetrometer? (10)

06 05 00 32 LMP Well, I've got the double core right now. (10)

06 05 00 46 LMP I bet you I don't get this in here, but I'll try it. (10)(SAMP CORE 60009-10)

06 05 00 49 CDR I think you will. (10)(SAMP CORE 60009-10)

06 05 00 55 LMP I don't know. Okay, that's pushed in. (10)(SAMP CORE 60009-10)

06 05 00 59 CDR Let me do that, and you do the penetrometer because I know how to do that one. (10)(SAMP CORE 60009-10)

06 05 01 02 LMP Okay. That's a good swap. (10)

06 05 01 14 LMP John, see if I got the red dot on my camera. It stopped running. (10)

06 05 01 22 CDR Sure do. (10)

06 05 01 23 LMP Okay, how about spinning it once for me. (10)

06 05 01 43 LMP Cross-sun as far as you can push it in. Okay. You want to hammer on this? (10)(SAMP CORE 60009-10)(PHO 115 18557-58)

- - -

06 05 02 20 LMP Okay, Tony, which - you want me to start with the 0.5? (10)

06 05 02 27 CC Right, it will be the 0.5 - well, actually you have the 0.2 on there. Why don't you do the string of 0.2 and then we'll come back and get the 0.5 near the double core. (10)

06 05 02 38 LMP Well- no I took the 0.2 off. (10)

06 05 02 42 LMP I don't have anything on here now. (10)

06 05 02 44 CC Fine, let's press for the 0.5. (10)

06 05 02 49 LMP Okay. It gets hard down there, doesn't it, John? (10)(SAMP CORE 60009-10)

06 05 02 54 CDR Yeah, I don't think it's going to go. How many hits (10)(SAMP CORE 60009-10)  
you want me to give it, Houston, before I quit?

06 05 03 15 LMP Now, you're getting it a little bit, John. It's (10)(SAMP CORE 60009-10)  
going in, John, about a quarter inch a stroke.

- - -

06 05 04 32 LMP It's in. John, it's in. That's far - (10)(SAMP CORE 60009-10)

06 05 04 36 CDR How far do you want to drive it, Charlie? (10)(SAMP CORE 60009-10)

06 05 04 38 LMP That's far enough. (10)(SAMP CORE 60009-10)

06 05 04 41 LMP Yeah, they don't want any more than that. (10)(SAMP CORE 60009-10)

06 05 04 42 CDR Gee, it came right back out, too. (10)(SAMP CORE 60009-10)

- - -

06 05 05 09 CC Okay, John, you want to turn that over? That stuff (10)(SAMP CORE 60009-10)  
may come out of that.

06 05 05 36 LMP I finally got that 0.5 back on. And I got number 6, (10)  
Tony. Is that okay? I don't think I've used 6.

- - -

06 05 06 11 LMP I'll bypass - no, I'm on 9 - (10)

06 05 06 13 CC Yeah, 9's good, Charlie. (10)

06 05 06 14 LMP I'm going to bypass 9 and go to 10. (10)

06 05 06 18 LMP I just passed it on. I'm going to go to 10. (10)

06 05 06 27 CDR Okay, it's full in the bottom of it, anyway. (10)(SAMP CORE 60009-10)

06 05 06 31 CC Okay. And that one should be fairly near the double (10)  
core, Charlie.

06 05 06 38 LMP It is, within 3 meters - 2 meters. (10)

- - -

06 05 07 04 LMP Okay, that bottomed it out, Tony. (10)

06 05 07 07 LMP \*\*\* 0.5 (10)

06 05 07 08 CC Why don't we go to a 0.2 and do it just in the same place. (10)

06 05 07 13 LMP Okay. And then work towards the - (10)

06 05 07 19 CC Work towards the deep core. (10)

- - -

06 05 07 45 CDR Yeah, that rammer-jammer only went in an inch. (10)(SAMP CORE 60009-10)

- - -

06 05 08 13 CDR There's the 0.2. (10)

06 05 08 16 LMP Going to 11, Tony. (10)

- - -

06 05 09 40 LMP Okay, Tony. Here come the 0.2. (10)

- - -

06 05 10 06 LMP The 0.2 almost went in all the way. (10)

06 05 10 11 CDR Okay, the upper one was 45, the bottom one was (5)4. (10)

06 05 10 23 LMP Okay, Tony. Be advised I'm sorry that I'm spiking this thing out occasionally, but this is the only way we can do it. (10)

- - -

06 05 10 34 LMP Okay, I'm moving - I've got two more to do, cycling 12. And this is about a fourth of the way - right here. Okay, number 12. (10)

06 05 10 59 CC And, John, we should wait on your pan until Charlie's through there. (10)

06 05 11 08 LMP Okay. That's about the same distance, Tony. (10)

06 05 11 14 LMP Cycling to 13. (10)

06 05 11 36 CC Hey, John. While you're sampling - - there, you (10)(SAMP 60110,15)(PHO 114 18445-48)  
might look around and see if you see any of that  
vesicular basalt.

06 05 11 46 CDR That's what I'm a looking for. (10)(SAMP 60110,15)  
- - -

06 05 12 16 LMP It's in. It is - all but about 5 inches. (10)  
- - -

06 05 12 49 LMP - - cycling to 14. (10)

06 05 13 06 LMP And I'm right by the double core. I - I mean the (10)  
deep core.

06 05 13 13 LMP The ground's pretty beat up with footprints. Should (10)  
I go to a pristine area or stay here?

06 05 13 23 CC Just move it over out of the footprints. (10)

06 05 13 27 LMP Okay. I've got a good spot. About 2 meters toward (10)  
the Central Station.

06 05 13 48 LMP That one's going all the way in, too. If I didn't (10)  
lose my balance.  
- - -

06 05 14 17 CC Okay, Charlie. One flat plate by the double core, (10)  
and that'll about do it.  
- - -

06 05 16 04 CDR But, Charlie. I just don't see any vesicular (10)(SAMP 60110,15)  
basalt.  
- - -

06 05 16 37 CC And, John, as Charlie takes - - that penetration, we (10)(PHO 114 18449-67)  
can go ahead and take your pans.

06 05 16 48 LMP Tackling the 15. (10)

06 05 16 54 LMP And it's somewhere between this mass of footprints - (10)  
 aha, there it is. Okay, Tony, right beside double  
 core.

06 05 17 22 LMP It went in about - 6 centimeters. (10)

06 05 17 42 LMP Yeah. Let me try one out here in pristine area a (10)  
 couple of meters away, here. I wonder whether they  
 did with all that foot walking over there. Might  
 have just fouled that up. Nope. That one went in  
 about the same.

- - -

06 05 18 46 CDR Okay, Houston. I collected one sample, which was a (10)(SAMP 60110,15)  
 sharp angular.

06 05 18 57 CC Okay. And we're going to have to pack up and head (10)  
 home.

06 05 19 03 LMP Okay. Home is about 50 meters away. (10)

06 05 19 12 CDR Can you put this back there, Charlie? (10)

06 05 19 23 CDR That sample is going in bag sample 381, and I'll (10)(SAMP 60110,15)  
 shoot the pan here in a second. (PHO 114 18449-67)

06 05 19 42 CDR And it was a black rock but I don't think it was (10)(SAMP 60110,15)  
 vesicular basalt; I think it was a breccia.

06 05 19 49 CDR That way, it's the same type as we've been sampling (10)(SAMP 60110,15)  
 it. Going into sample bag 4 on top of the - sample  
 (Station) 9 samples.

06 05 20 03 LMP I'm up to frame count 91 on magazine Delta. (10)

06 05 20 14 LMP Does the CSVC go into the rock box? (10)

06 05 20 26 CC Yes, it does. (10)

06 05 20 40 LMP Hey, John, I'm going to take that samp - SCB number (10)  
 2, my camera, and I'm heading home.

- - -

06 05 21 08 CDR Good, that pan completes me up to frame of 89. (10)  
 - - -

06 05 23 06 CC Okay. Charlie, we can put four core tubes plus CSVC (LM)  
 in the rock box and then plus what documented  
 samples you can get in there.

06 05 23 16 LMP Four core tubes, CSVC, documented sample, gotcha. (LM)  
 - - -

06 05 24 21 CC And, John, as you get off the Rover, we'd like you (LM)(PHO 114 18468-70)  
 to take a picture of the UV camera; it should be  
 about f:5.6 at 250.  
 - - -

06 05 24 43 CC Just take it anywhere. As long as we can see that (LM)(PHO 114 18468-70)  
 location, that's all we're looking for.  
 - - -

06 05 26 25 LMP Hey, Tony, I'm putting core tubes 29, 43, 45, and 54 (LM)  
 in the rock box.

06 05 26 49 LMP CSVC is in the rock box. Packing it in there. (LM)

06 05 26 56 LMP You want an unbagged rock in the rock box, Tony. I (LM)  
 don't think you do.  
 - - -

06 05 27 37 CC Charlie, yeah, you can put unbagged rocks in the (LM)  
 SRC.  
 - - -

06 05 28 13 CDR I think this bag here has got so little in it we (LM)  
 can -

06 05 28 20 LMP Let's empty it into the SRC, there's some more will (LM)  
 go in the SRC.

06 05 28 23 CDR Well, okay. But this is only - this has got those (LM)  
 two whatchacallems there.

06 05 28 27 LMP What you mean? (LM)

06 05 28 30 CDR All those. They can't go in the SRC. Where do they go, in the ETB? (LM)

06 05 28 36 LMP Oh, no, in a rock box - in a rock bag somewhere. Why don't you put them back here in mine, John. It's back on the Rover here. (LM)

- - -

06 05 29 26 LMP We're packing up the rock box, Tony. (LM)

06 05 29 30 LMP Got the rocks in it. The liner's coming off and I put the other core tubes in a - tell you in a minute. (LM)

06 05 29 49 CDR Beautiful, they just fit right in the top. (LM)

06 05 29 52 LMP Good. What's the number on that one, John? (LM)

06 05 29 56 CDR That's SCB 2. No, yeah, I. (LM)

06 05 30 02 LMP John's crystalline rock in the two bore for the two - other core tubes go in - in number 3, Tony. (LM)

06 05 30 17 LMP Where'd those two core tubes go that you had? (LM)

06 05 30 20 CDR I put them in here. Four (54?) and 45 are in your seat. (LM)

06 05 30 23 LMP Oh, okay, then I got them already. (LM)

- - -

06 05 30 41 LMP Okay. We got two bags out that we - - (LM)

06 05 30 45 CDR Yeah, extra. (LM)

06 05 30 47 LMP Well, good. Okay, we're going to have three - I don't know how full mine is. (LM)

- - -

06 05 31 20 CDR Okay. We hardly got any rocks in it at all. (LM)

06 05 31 22 LMP I think I can stuff them in this other bag over here, John. (LM)

06 05 31 26 CDR Okay. I'll take SCB 1 and put it by the footpad, Charlie. (LM)

- - -

06 05 32 04 CC Okay, Charlie, you called out that you put two core tubes and John's crystalline rocks in SCB 3; that should have some empty core tubes and core caps in it. Could you straighten that out? (LM)

06 05 32 18 LMP It had two core tubes empty, and we used the bag, Tony, that's true - (LM)

- - -

06 05 33 00 LMP How about core tubes? (LM)

06 05 33 02 CDR That's aft, a couple of core tubes in number 1. (LM)

06 05 33 03 LMP Oh, good, okay, we'll take those out. (LM)

06 05 33 05 CDR Are they empty? (LM)

06 05 33 06 LMP Yeah, they're empty. Okay, put them under my seat. (LM)

- - -

06 05 33 23 LMP Okay, SCB 3 is going to go up with us, the SRC is going to go up with us, and I'm packing the ETB. (LM)

06 05 33 31 CDR And I'm going to put these two bags under - under your seat, Charlie. (LM)

06 05 33 38 CDR Now here's a - something like that \*\*\* critter. (LM)

- - -

06 05 34 41 LMP John, could you get those goodies in the left seat bag there in my bag and pass them over? (LM)

06 05 34 51 CC Okay, and verify you got those rocks in the bags that you tossed under the seat. (LM)

06 05 35 01 LMP Yes, that's - let's see, there's one - no, there's (LM)  
one over there I think at the corner - it's at a -  
no, we got them all. Yeah, there it is.

06 05 35 10 CDR That's it. (LM)

06 05 35 13 CDR That's a glass ball that I found out there, Houston, (LM)(SAMP 65016)  
I never said nothing about.

- - -

06 05 35 42 LMP John, here's another - piece of glass - hollow ball. (LM)(SAMP 65016)

06 05 35 47 CDR Yeah, let's put it in this here thing. (LM)(SAMP 65016)

06 05 35 54 CDR Aw, rats! (LM)

06 05 35 56 LMP Those things just bounce out of your hand - (LM)

06 05 36 11 CDR Okay, I got magazine Lima; the 500's going back (LM)  
under the seat.

- - -

06 05 36 46 CDR Okay, SCB number 1 is sitting over there on a foot (LM)  
strut, Charlie.

06 05 36 52 LMP Your mike's coming off the 16, batteries into the (LM)  
Sun - - into the ETB.

- - -

06 05 38 26 LMP Okay, two padded bags, we're just going to leave. (LM)  
One set maps, we got; one mag from DAC, one mag.  
Okay, it's all loaded. Padded bags are staying  
under the seat, Houston.

- - -

06 05 39 16 LMP And we don't have big "Muley" yet - don't let us (LM)(SAMP 61016)  
forget to get big "Muley" here.

- - -

06 05 41 27 LMP Two SCBs, we got. Looks like we're going to have everything. Pallet 2 to ascent stage, two SCBs to ascent stage. (LM)

06 05 42 09 LMP Okay, John, I'm gonna take one of these up to the ascent stage. (LM)

06 05 42 13 LMP Oh, rats. (LM)

06 05 42 20 CDR He did kick it open. Wait a minute. Move, Charlie. Let me get it. (LM)

06 05 42 27 CDR Where's that sample that was in it? (LM)

06 05 42 38 LMP There you go. The top just wasn't too closed. (LM)

06 05 42 47 CDR Okay, I got the bag. No, wait a minute. \*\*\* do with the sample? There it goes. (LM)

06 05 42 53 LMP Another sample. (LM)

06 05 43 13 LMP The thing's not designed to fit in there, John. (LM)

06 05 43 15 CDR It goes in there. (LM)

- - -

06 05 51 46 CDR Are you ready for a rock box? (LM)

- - -

06 05 53 39 LMP Okay, babe, you got two rocks - two SCBs and an ETB to come up. (LM)

- - -

06 05 54 53 LMP Okay, two SCBs and we got it. (LM)

- - -

06 06 04 04 CDR Close hatch and lock. (LM)

\* \* \* \* BETWEEN EVA 2 AND EVA 3 \* \* \* \*

06 07 08 23 LMP Okay, the SRC number 2 weighs 41 pounds. SCB 3, (BETWEEN EVAS)  
which is in sample containment bag number 3, weighs  
30 pounds. SCB 1, which is in sample containment  
bag number 4, weighs 26 pounds.

- - -

06 08 13 07 CC Okay. Discussing Station 4 here, we'd like your (BETWEEN EVAS)  
general impression of the rocks. Especially the  
bigger blocks. You described mostly breccias and  
white crystalline rocks. Were there any others -  
and could - could you just talk about them a little  
bit?

06 08 13 33 CDR Well, we didn't see any that we recognized or we'd (BETWEEN EVAS)  
have told you about it. I think the big blocks were  
just big brothers to the little blocks. That  
secondary that we were working up there was a  
classic. It really was. And the pan showed it.  
Must have come from South Ray. It had a great block  
land in the middle. It was a breccia surrounded by  
all kinds of little blocks. I think that's - that's  
about the only rock that we saw. You know, we're  
not really sure. It's our first guess as to what  
those rocks are up there - whether they're breccias  
or crystalline rocks. I'm sure you all know that.  
But most of them were very dust covered. I only saw  
one clear crystalline in the whole - in the whole  
EVA except for the ones I get in ray and - and that  
was the one I picked up - I think it was Station 5,  
or 6.

06 08 14 54 LMP I think, Tony, my view is the same. We had only a (BETWEEN EVAS)  
predominance of South Ray ejecta all around. Mostly  
some of the smaller rays were given to Descartes.  
It just occurred to me that everywhere we were,  
there was a boulder field of varying sizes and  
intensity and you could see eruptive force - you  
could look back at South Ray and you could see the  
rays coming our way and spreading and fanning out as  
they flow.

06 08 15 34 CDR You know, it just may be that South Ray crater is - (BETWEEN EVAS)  
is so \*\*\* everything or most everything around here.  
You know, the - like we said about the rays at South  
Ray, some were white and some were black rays and  
just a little layer of dust. I didn't see a -  
hardly a clear surface all day long. I felt right  
at home like we were back in the United States  
studying geology - and everybody said the rocks  
would be crystal clear. Well, here it's all covered  
up. And it is my opinion when you hit one and got a  
cleavage surface - that made all the difference in  
the world to a rock description, but a person may  
not be able to do that often.

06 08 16 30 LMP Does that answer your question, Tony? (BETWEEN EVAS)

06 08 16 32 CC Right. And the Station 4, 5, and 6 area - you (BETWEEN EVAS)  
mentioned that 5 and 6 got progressively - the  
surfaces got progressively firmer. I wonder, could  
you see any contact or was it a gradual thing?

06 08 16 51 LMP No, we couldn't. Just when we got off the Rover and (BETWEEN EVAS)  
felt it under your feet. The softest spot was up on  
the top, at Station 4. Progressively firmer as we  
went out, like you say, went down to 6. And you  
just noticed it when you got out.

06 08 17 10 CC Okay. Understand. (BETWEEN EVAS)

06 08 17 12 CDR Of course, when we were working, it felt - we were (BETWEEN EVAS)  
working in a couple of craters on Station 4. Right  
on the - you know - right on the rim of the craters,  
we suspected it'd be softer, too.

06 08 17 25 CC Okay. And Station 4, 5, and 6 also, we're - we're (BETWEEN EVAS)  
pretty confident that your - that the ejecta or the  
rocks at Station 4 were from South Ray. At 5 and 6  
in particular, though, was there any indication that  
the craters either by their orientation or from the  
secondary blocks lying around - that the source was,  
in fact, South Ray?

06 08 17 51 CDR Yeah, I would think the crater itself - it probably (BETWEEN EVAS)  
be South Ray crater. Although the rocks generally  
looked more rounded, may be from a different layer.  
The - the cross work of patterns you should be able

to see that in the film, but the pattern of rocks were all in the - in the far wall, which was away from South Ray crater.

- 06 08 18 14 CC Hey, incidently, the backroom is really impressed. (BETWEEN EVAS)  
They are very excited about your choice of sampling on that inner wall of that crater - I guess it was at 5 or 6 - and think that you did - you had a good chance there of getting real Descartes. In fact, they think they've got it in the box. What they're thinking right now is that the mat - the areas where you're able to kick up and see white underneath are ray materials. But you didn't see that at 5 and 6. So, we think we may - you may have got Descartes there.
- 06 08 18 47 CDR Okay. I'll tell you one thing. If this place had air, it'd sure be beautiful. It's beautiful with - with or without air, but the scenery today up on top of that Stone - on top of Stone mountain - you'd have to be there to see and to believe it. It's just dazzling. And I hope it showed up good on television - - (BETWEEN EVAS)
- 06 08 20 09 CC Okay. And we've lost one piece of - - hardware here. We wonder where SCB 2 went? (BETWEEN EVAS)
- 06 08 20 23 LMP Okay. I dumped that in the SRC and it's on the Rover. We're gonna use it tomorrow. (BETWEEN EVAS)
- 06 08 20 54 CC We were wondering if - wondering what happened to the SESC that was in the pocket there, but it looks like we're in good shape. (BETWEEN EVAS)
- 06 08 21 01 CDR The SESC is back on the Rover. I was looking at it just before we got in. (BETWEEN EVAS)
- 06 08 21 43 CDR Okay. Tell everybody in the backroom thank you and we really enjoyed it today. By golly, that view from up on Stone mountain is something else. (BETWEEN EVAS)
- 06 08 22 10 LMP Tony, I'd like to say the same thing. Thanks. I think they did a great job and they kept us thinking and on our toes and came up with the right sugges - suggestions at the opportune times and thank you, too, for keeping us going. It was a good job. (BETWEEN EVAS)

06 08 22 28 CC Hey, I went back in the backroom after the EVA and (BETWEEN EVAS)  
they're just ecstatic back there. I know you didn't  
- you didn't - we didn't see exactly what we  
expected to see, but we think you got - you got  
everything that we went up there for. We're in  
really good shape.

06 08 22 57 LMP You just can't believe the ridges and valleys and (BETWEEN EVAS)  
ridge rilles, here. I tell you - the local slope  
might be 2 or 3 degrees, but, man, that Double Spot  
- whoever picked that place to land - it's the only  
level spot around here. Any place else, you'd  
really be in trouble.

06 10 22 38 LMP Hey, Tony, one final comment. We've been talking (BETWEEN EVAS)  
about that crater that we took a pan of as we spun  
around and - gosh, it - I said, looked like Big Sag.  
John and I are leaning towards Endogenesis on that,  
and hopefully from the films that we got you might  
be able to sort that out.

06 10 22 58 CC Okay. We'll sure take that in consideration. I (BETWEEN EVAS)  
don't know whether it'll affect tomorrow, but - but  
I think it's a good obser - observation. We'll see  
you.

- - -

06 19 45 52 CC Okay. Fine. Do you want a quick briefing on the (BETWEEN EVAS)  
traverse today?

06 19 46 00 LMP Okay. One comment, Tony, that - about - we were (BETWEEN EVAS)  
talking about last night that we didn't pass on,  
that the feeling we got from all the crystalline  
rocks was that they had a sugary texture to them.

06 19 46 46 CC The only change right after egress, Charlie, instead (BETWEEN EVAS)  
of putting on mag L, I'll ask you to put mag M on  
the 500 millimeter. That will give you a full mag,  
and that would be all you need. That will save a  
change up at Station 11, and at the LM site there,  
we'd like you to shoot off some pictures of - a pan  
of Stone mountain, but I'll call you on that when  
you get out; otherwise, the LM area is nominal. And  
you go up to Station 11 slash 12, which will be just  
one station for about an hour and 5 minutes. We're

going to drop the near-field polarimetry up there, and we'll concentrate on big boulder samples, a permanently shadowed sample, and the padded bag sample on the - the special samples area. We'll still like a stereopan, a far-field polarimetry of the crater interior; we'll try to get about an 80-meter base on that, and, when you get up there, Charlie, I'll brief you on what looks like the best way to do that. And we'll return along the same route you went up, and about a - one-half to 1 kilometer off the rim when you still feel you're on the continuous ejecta blanket, we'll call that Station 13. We'll do a Station 13 with the TV, and we'll lengthen it to 15 to 20 minutes. I've got a - a fixed time here, but I don't see it right in front of me right now, and that instead of a rock soil will be a rake soil and - plus a couple of documented samples. And then the rest of the time will be spent back in the LM area. We'll put a - we'll make a Station 10 prime which is about 50 meters west of your Station 10. So it makes a triangle with the deep core, which would be south of it and the Station 10 which would be northeast of it and the Station 10 prime which makes that northwest corner of the triangle, and we'll ask for a rake soil at Station 10 prime, a - a double core at that station, a rake soil at Station 10; and then whatever time is left to 35 minutes will be documented samples. Now, the end of the EVA is pretty much nominal except, John, when you go out to the permanent parking location of the AL - or of the Rover, we'd like you to make sure you take a camera along, and we'll do an LPM measurement there after you've parked it, and we'll also ask you to try to find us a dense crystalline rock if you can find it. If you can't find a crystalline one, then at least a dense breccia, and we'll do the rock on top of the LPM measurement. And that's pretty much it. I'm going to try to keep you to the time line - the time line as much as possible because we've really got a hard time for getting back in. I know - I know the - they won't allow us to go over at all.

06 20 38 46 CC

Incidentally, you have about 123 pounds of rocks, which means you can get about another 100 pounds.

(BETWEEN EVAS)

\* \* \* \* EVA 3 \* \* \* \*

06 21 39 38 CC Out again on that sunny Descartes Plains. (LM)

06 21 39 45 CDR Ain't any plains around here, Tony. I told you that (LM)  
yesterday.

- - -

06 21 41 04 CDR They won't tell us apart today. We both have red (LM)  
stripes. Have to mush today, Charlie.

06 21 44 43 CC Okay, the change on that 500 millimeter is magazine (LM)  
Mike.

06 21 44 58 CC And while you have it in your hand, we'd like a pan (LM)(PHO 105 17054-116)  
of Stone mountain with it.

- - -

06 21 45 52 LMP Okay, Tony, you said magazine R to the right seat. (LM)  
I'm going to use magazine S on the DAC. We used up (PHO DAC)  
R yesterday.

06 21 46 50 LMP Magazine Mike. (LM)

- - -

06 21 49 41 CDR And the big rock bag is on the hand tool carrier. (LM)

- - -

06 21 50 38 LMP The 500 is complete. I'm up to frame count 65. (LM)(PHO 105 17054-116)

06 21 50 44 CC Okay. On Mike 65. (LM)(PHO 105 17054-116)

06 21 50 50 LMP I got a horizontal pan east-to-west - three levels (LM)(PHO 105 17054-116)  
of it. Top to bottom of the mountain.

06 21 51 02 CC How about those lineations? Do you see them still (LM)  
today.

06 21 51 12 LMP Yeah, they're still there. They seem wider apart (LM)  
today than they did yesterday, though.

- - -

06 21 56 59 LMP Okay, Tony, pan is complete. (LM)(PHO 116 18563-91)  
 - - -

06 21 57 19 LMP I could use some bags John. (LM)

06 21 57 23 CDR Okay, this one here goes on me. This is bag 4. (LM)

06 21 57 27 LMP And we could put this one on me. That's the one (LM)  
 with SESC in it.

06 21 57 40 LMP Here let me put that one on. Is that the SESC? You (LM)  
 want me to put this one on you?

06 21 57 45 CDR Okay. (LM)  
 - - -

06 22 09 13 CDR Okay. We're all set to go. And off we go. (LM-11)

06 22 09 18 LMP Our first heading out of here is 030. The DAC is (LM-11)(PHO DAC)  
 on.

06 22 09 51 CC Charlie, can you turn that DAC off for another 19 (LM-11)(PHO DAC)  
 minutes.  
 - - -

06 22 09 58 LMP Okay, it's off. (LM-11)

06 22 10 06 CDR This ridge up here would be a good place to park the (LM-11)  
 Rover. It's reading 162 and 0.1 now. And that's  
 how far away we are.  
 - - -

06 22 10 33 LMP We're topping out now on the little ridge. We can (LM-11)  
 see Dome and Smoky. On top of the ridge there are  
 boulders just like we saw yesterday. A half meter  
 or so. Cobbles about 5 percent of the surface.  
 Looks like a lot of the secondaries though. The  
 boulder population is really concentrated around the  
 secondaries, and we'll get some pictures of that.  
 The regolith up here is identical. You can see  
 these little lineations which is, I think, a  
 function of sun angle.

06 22 11 25 CDR I think the boulder population is starting to thin, (LM-11)  
Charlie.

06 22 11 27 LMP I do too. The cobbles are getting smaller like we (LM-11)  
might be just out of this ray. We don't see any of  
the - maybe one or two of the half-a-meter size  
boulders now.

06 22 11 41 CC There are a couple of those mounds mapped about 200 (LM-11)  
meters off to your left. We're wondering if you can  
see those.

06 22 11 51 LMP No, we're at 180 at .3 and topping out really on top (LM-11)  
of a ridge here.

06 22 12 05 CDR Better go over this way more, Charlie. (LM-11)

06 22 12 07 LMP Yeah, there's North Ray right up there. Look at the (LM-11)  
big rocks, John. We got a good view of North Ray  
here, and as I look at it there's a northeast  
-southwest line of boulders that come out from the  
southwest rim and go up the northeast rim on to  
Smoky mountain.

06 22 12 33 CDR There's Palmetto too. (LM-11)

06 22 12 35 LMP Yep, we see Palmetto. Coming down the ridge now, we (LM-11)  
look like we're going into a "Big Sag" type area.  
It's at 12 o'clock at 3 or 400 meters and we are now  
at 188 at .4.

06 22 12 53 CDR We may be into Palmetto right now, Charlie. That (LM-11)  
may be Palmetto.

06 22 12 58 LMP No, that's over there on the rim, isn't it? That big (LM-11)  
thing right there? No, Palmetto's at - - 2.1

06 22 13 05 CC You should be about half way to Palmetto. You're (LM-11)  
looking right below Turtle mountain, we bet.

06 22 13 11 CDR That's where we are. (LM-11)

- - -

06 22 13 28 LMP Okay, we're going downslope now, Tony. About a (LM-11)  
5-degree slope and we're going to go down perhaps 50  
or 60 meters before we start climbing back out again  
toward Palmetto. Up around North Ray we see two  
tremendous blocks at about Station 11 and 12, that  
appear to be black in color. Black with white  
spots. We're just about out of the ray material  
now. We only see a few cobbles left.

06 22 14 02 CC Might be a good idea to try to get there for our (LM-11)  
Station 11.

06 22 14 10 LMP That's what I thought we were going to pick. Those (LM-11)  
two big rocks there on that ridge. That's Palmetto  
right there I guess, off to the left there isn't it  
John? Course we've only been .6 though.

06 22 14 24 LMP We're at 195 at .6 and there's a big depression off (LM-11)  
to our 2 o'clock position, on a heading of 030 with  
some white boulders on the inner rim. It's a very  
subdued feature.

- - -

06 22 14 53 LMP The east side is a very shallow slope into this pit. (LM-11)

- - -

06 22 15 20 LMP This big depression off to the left that I was (LM-11)  
describing is - on the east side it's a very shallow  
slope into it, about 4 or 5 degrees. But on the far  
end the west side and the southwest side, it has  
very steep walls - 20 degrees or so.

06 22 15 37 CC You're looking right at the base of Turtle mountain. (LM-11)

- - -

06 22 15 57 CDR Where's Turtle mountain? Right here. (LM-11)

06 22 15 58 LMP It's way off to the left. We just passed it. We (LM-11)  
could do a 360 and get a pan of it.

06 22 16 03 CDR How about that rock there Charlie? (LM-11)

06 22 16 08 LMP Sure has got some lineations in it. (LM-11)

06 22 16 09 CDR Yeah, look at the size of it. (LM-11)

06 22 16 13 LMP Oh, this big one coming up you mean? (LM-11)

06 22 16 15 CDR Yeah. (LM-11)

06 22 16 16 LMP It seems to me that this is a more subdued surface (LM-11)  
over here than going towards South Ray. Not as many  
craters. It's almost, except for 3 or 4 meter-size  
craters, it's all subdued and just hummocky and  
rolling.

06 22 16 37 CDR Yeah, that's true. It's much better driving. We're (LM-11)  
doing 10 clicks.  
- - -

06 22 16 51 LMP There's about a 4-meter boulder with a good (LM-11)  
fillet - -

06 22 16 61 CDR That's been there for awhile. (LM-11)

06 22 17 01 LMP - - we're just passing it at 195 at 0.9. And it's (LM-11)  
rounded.

06 22 17 04 CC How are we doing now on the rounded versus angular (LM-11)  
boulders?

06 22 17 08 LMP And we can see in to Ravine - okay; most of them (LM-11)  
over here are, half and half rounded to angular.  
There are some small, indurated secondary craters,  
and as we approach Palmetto, the boulder population  
is beginning to pick back up.

06 22 18 09 LMP As you look to the northeast you get quite a (LM-11)(PHO 114 18449-67)  
spectacular terrain view of rolling hills  
occasionally pock-marked with large boulders. The  
craters are very subdued, and the hills almost  
appear smooth - off to the northeast. That might be  
a function of the sun angle though.  
- - -

06 22 18 47 LMP I think we're coming up on the rim now John. There (LM-11)  
it is.  
- - -

06 22 18 57 LMP Okay, Tony, we ropped out on the rim of Palmetto, (LM-11)  
and hit it right on the nose at 1.2 at 189, and it's  
a tremendous crater. The walls to the northwest,  
south and the southeast here are steeper than the  
wall to the northeast. It looks like it almost  
breached to the northeast.

06 22 19 42 LMP John's cutting away from the rim now because it's a (LM-11)  
little bit easier going. There's a good ejecta  
blanket of half-meter-sized boulders around the rim  
of Palmetto and there's some of these secondary  
craters here.

06 22 20 00 CDR Palmetto is as big as Meteor isn't it? (LM-11)

06 22 20 06 LMP Of cobble size, I'd say 30 or 40 percent of the (LM-11)  
surface - let's make it 30 percent in the half-meter  
size, and maybe one for every 10 square meters.

06 22 20 30 CDR We're traveling about a 100 meters inside the rim (LM-11)  
and we're at 195, 1.4 now.

- - -

06 22 20 44 LMP To the northwest you can see large blocks on the (LM-11)  
rim.

06 22 20 52 CDR Hey Charlie, there's Dot. (LM-11)

06 22 20 53 LMP Yeah, I see Dot. Right on the rim. The large (LM-11)  
boulders over there seem to be 3 or 4 meters to the  
northwest on the flank of Palmetto, but I think they  
came from North Ray.

- - -

06 22 21 21 LMP Angularity is sorta rounded. (LM-11)

06 22 21 25 LMP Apparently the only thing preserved there is the (LM-11)  
large blocks out of North Ray. But we don't see  
very many small ones. I think our trafficability is  
going to be excellent. Though it looks like a steep  
slope climbing that rim, doesn't it?

06 22 21 47 CDR It's not near as bad as Stone mountain. (LM-11)

06 22 21 52 LMP The boulder field out of North Ray does not reach (LM-11)  
 Ravine. It stops on the outer flank of Ravine about  
 a 10th of a crater diameter away.

06 22 22 15 LMP Most of the rocks here are rounded. We got some (LM-11)  
 real good secondaries. The types are very difficult  
 to identify as we go by. We're now at 193 at 1.7.

- - -

06 22 22 38 LMP Palmetto has a very definite raised rim to it. And (LM-11)  
 we're going to be going off the rim down probably a  
 5- to 10-degree slope into a valley before we start  
 climbing up to North Ray.

- - -

06 22 22 58 LMP These valleys in here tend to trend towards Big Sag. (LM-11)

06 22 23 09 CC Charlie could you go ahead and - - put the DAC on (LM-11)(PHO DAC)  
 now?

- - -

06 22 23 24 LMP Okay, it's running. (LM-11)(PHO DAC)

06 22 23 30 LMP And I got it pointed off to the left. (LM-11)(PHO DAC)

06 22 23 35 LMP We're now in an area at 195 at 1.9 that is about a (LM-11)  
 half meter-size boulder every 5 meter square. Some  
 of these blocks are angular. They're fractured,  
 they appear to be grayish in color, dust covered.  
 Most all of them have fillets. Man, look at that  
 slope! That's End crater right there, just over that  
 rim there - just to your left. End crater is on  
 about a 10 to 12 degree slope, pointed toward North  
 Ray.

06 22 24 30 CDR We're traveling due east here for awhile to pick up (LM-11)  
 a little smooth ground.

06 22 24 36 LMP What do you say? Are we going down about a 5-degree (LM-11)  
 slope here or 10?

06 22 24 41 CDR Yeah, 5 or 10. More like 10. (LM-11)

06 22 24 43 LMP We're about maybe a half a crater diameter to the (LM-11)  
 northeast of Palmetto. About a 10 degree slope, and  
 the boulder population is about 5 degrees here, and  
 the small cobbles have just about disappeared. Very  
 smooth regolith, except for these 20- to  
 30-centimeter boulders, which are not very numerous.  
 We're really moving out downslope, at about 12 to 15  
 kilometers an hour.

06 22 25 29 LMP It's remarkable how subdued all these craters are. (LM-11)  
 It's almost a smooth plain - except for a few of the  
 5-meter craters or so. The 1-meter size and smaller  
 are just about gone. They're just - apparently -  
 very subdued. We're at 2.2 at 195. We'll swing the  
 camera around towards the front. It's looking off  
 to the right now.

06 22 26 14 CDR Let's get a better heading here from 2.2 to 195. (LM-11)

06 22 26 22 LMP Okay. End crater was 2.1. What they want is about (LM-11)  
 - just directly north, John.

- - -

06 22 26 29 CDR We're down to where the rock population is almost (LM-11)  
 nonexistent.

- - -

06 22 26 40 LMP It's really easy going, Tony. Well he's got his (LM-11)  
 full blower at 11 clicks and we're just going over  
 an undulating terrain. The ridge lines here  
 predominantly trend east-west, and they are about 5  
 meters in relief, and really the only significant  
 craters that you have out here are the ones that are  
 5 meters and larger, and they're only maybe -  
 cover 30 percent of the surface.

06 22 27 18 CDR Look at that view! Look at those boulders! (LM-11)

06 22 27 20 LMP Look at those rocks. Tony, there are some (LM-11)  
 tremendous boulders on North Ray, they get bigger as  
 we go near them.

06 22 27 28 CDR Okay, one reason why North Ray looks like in the photos, it had such steep walls on one side, is because the rim is raised on one side higher than the other, don't you get that impression, Charlie? (LM-11)

06 22 27 41 LMP Yeah, I sure do. (LM-11)

06 22 27 45 CC Do you think you'll be able to recognize the edge of the continuous ejecta blanket? (LM-11)

06 22 27 52 LMP Right now I can't - - (LM-11)

06 22 27 59 CDR I think we're starting to get into it right now, Charlie. (LM-11)

06 22 28 01 LMP Well the cobbles or boulders are picking up. We're at 2.6 at 192 and beginning to pick up a high frequency, maybe 10 percent now, of cobbles and boulders. John, I think it looks like - see that white boulder dead ahead? Looks like the greatest variety of boulders is going to be over there, but that is farther east than our Station 11, but further north than Station 11, is called for. It's almost at the foot of Smoky - (LM-11)

06 22 28 43 CDR Let's go up on the rim and see what we've got up here. (LM-11)

06 22 28 48 LMP Okay, I'd love to. (LM-11)

- - -

06 22 29 04 LMP Okay, Tony in this area now for 192 at 2.7 we're getting into a greater frequency of 1 meter size craters and it's making it a little bit bumpier ride. (LM-11)

06 22 29 16 CC Okay, you might watch for a change in soil color or albedo as you go along there. (LM-11)

06 22 29 24 CDR That's what we're watching for. I get the (feeling that) the real change comes up - - a little closer to the - that one. (LM-11)

- - -

06 22 29 45 LMP John I don't think we're going to go straight (LM-11)  
between those two big rocks. Looks like to me like  
that's a pretty steep slope. If we swing them a  
little bit east here, and then go up just on the  
edge of that boulder ray right there, we'll make it.

06 22 30 01 CDR Over here? (LM-11)

06 22 30 02 LMP Okay, Tony now that we get over here and can see (LM-11)  
down off the flank of North Ray, we can see good  
boulder rays out of North Ray that go for perhaps -  
I'm going to say half a crater diameter, boulders  
greater than a meter size.

06 22 30 24 CC Okay, could you take a look up at Smoky area there (LM-11)  
and see what kind of structure and texture you can  
see on the face.

06 22 30 34 LMP Been looking at that - can't see anything except for (LM-11)  
a couple of rays - the boulders out of North Ray -  
that trend, one goes almost into Ravine that I  
described, and one goes on up to the top. In the  
northeast wall of Ravine, you can see the lineation.  
To the northeast they are horizontal; to the north  
they are dipping east about 30 degrees.

06 22 31 01 CC Can you push your camera up that far to get a (LM-11)  
picture of that?

06 22 31 08 LMP I'll take the camera off and do it. (LM-11)

06 22 31 14 CDR Charlie, don't do that. (LM-11)

06 22 31 16 LMP No sweat. (LM-11)

06 22 31 33 CDR Take a picture of that crater the road had us going (LM-11)  
through.

06 22 31 40 LMP Oh, yeah, I did. (LM-11)

06 22 31 41 CDR That's a nice one. (LM-11)

06 22 31 45 LMP That to me looks like just a big sink feature John. (LM-11)

06 22 31 56 CDR Okay, we're definitely in the regolith right now (LM-11)  
because see how these blocks are all laid in there?  
Remember how it was up at that crater - at Schooner?

06 22 32 10 CDR Those rocks are laid into the ejecta blanket. (LM-11)  
That's where they came from.

06 22 32 13 LMP At 191 at 3.1 we're coming into some good size (LM-11)  
whitish-looking rocks that are 3 and 4 meters  
across, they are fractured. There's probably a  
permanent shadowed sample - no that wouldn't be - -

06 22 32 28 CDR If you didn't know better you say that they were (LM-11)  
bedrock outcrops, but they are just laid in there  
I'm sure from North Ray.

06 22 32 36 LMP And as we go to the southeast side of North Ray, (LM-11)  
there is a big sink feature - a big pit, that's  
elongate east-west and we could drive in it from the  
east, but once you get into the south of South Ray  
it is really a deep pit, Tony. And that ridge line  
that we saw from the LM is on the west side of that  
deep pit. It's probably a hundred meters below the  
rim of North Ray.

06 22 33 15 CC And on the boulders you are looking at now that you (LM-11)  
think might be thrown in, you might talk about the  
fillet sizes away and towards the crater, see if  
that corresponds with the secondary.

06 22 33 35 LMP We are not close to any of them right now. We're in (LM-11)  
a very smooth area. At 3.4 at 190, we're down in  
this area where I've just described it goes into  
that big pit off to our west.

06 22 33 57 LMP About a crater diameter from North Ray off to the (LM-11)  
east, I see some 3-meter boulders that are all  
rounded and sitting in the regolith with good  
fillets. Okay, now here's one, Tony off to the  
right - - at 34.

06 22 34 19 LMP It's a 2 meter size boulder with a fillet that looks (LM-11)  
like sort of equidimensional around the boulder.

06 22 34 35 CC Okay, I understand. Do you see any clasts in these (LM-11)  
boulders?

06 22 34 37 LMP We just passed another, 1 meter - they just look (LM-11)  
whitish to me.

06 22 34 46 LMP That was another one we just passed. 1 meter size. (LM-11)  
It had the biggest fillet upslope.

06 22 34 51 CDR Here's a new crater right there Charlie. (LM-11)

06 22 34 53 LMP Right to the right. (LM-11)

06 22 34 54 CDR Yeah. (LM-11)

06 22 34 55 LMP These craters that we call secondary, that are (LM-11)  
indurated, I frankly think are very, very fresh  
craters, because it looks very cloddy around them,  
and the other ones that are secondaries do not  
appear that way, over.

06 22 35 27 CDR I'm not so sure that this isn't such an old crater, (LM-11)  
that the secondaries aren't eroded down. We've  
really got good going right here. Before we get too  
far along, let's study this thing and see if we can  
figure out a way to get up that rim without going  
through all the boulders - -

06 22 35 34 LMP John, see that big one off to the right over there. (LM-11)

06 22 35 38 CDR I see that. (LM-11)

06 22 35 39 LMP Okay, I think up that slope looks to me to be the (LM-11)  
best. Of course, it might be straight ahead might  
be best.

06 22 35 45 CDR I don't see any rocks straight ahead. (LM-11)

06 22 35 49 LMP We're heading about 3.0 and 187. The large boulders (LM-11)  
will be off to our right. There's a black brownish  
looking one and then there is a solid white one  
that's right at the base of Smoky mountain and North  
Ray. That might be worth a little jog over there if  
it's not too far. It's the most unique white  
boulder we've seen.

06 22 36 21 CC Okay. We'll keep that in mind on the way back. (LM-11)

06 22 36 29 LMP Okay we're at 3.7 and 186. And we just passed two (LM-11)  
frothy looking boulders. The biggest one is perhaps  
5 meters across, and they have vertical jointing or  
fracturing to them, and they have a frothy  
appearance to it. I'm about 20 meters from it now.

06 22 36 58 LMP Man, that is a big rock! (LM-11)

06 22 37 04 LMP Okay Tony there's not any house size rocks but the biggest ones are maybe 5 meters. And it's really smooth except for these big rocks out here, it's smooth going. (LM-11)

06 22 37 23 LMP There's a real fresh little crater right there. See the rays - - off to the left? (LM-11)

06 22 37 28 LMP It's about a meter size. (LM-11)

06 22 37 29 CC Hey could you use a couple more words - - to describe that frothy rock? (LM-11)

06 22 37 38 LMP It's got a hackly surface to it - - (LM-11)

06 22 37 41 CDR It's black in color. Right Charlie? (LM-11)

06 22 37 44 LMP Yeah. (LM-11)

06 22 37 46 CDR Okay we're going up a pretty steep slope right now Houston. I think we're almost to the rim, Charlie. (LM-11)

06 22 37 54 LMP Yeah we are. Looks like we're just about 20 meters from the rim. (LM-11)

06 22 37 59 CDR I'm going to slow down here. (LM-11)

06 22 38 01 LMP How about hooking a right over here, John. (LM-11)

- - -

06 22 38 23 CC Okay, we'd like you to go to 12 frames per second. (LM-11)(PHO DAC)

06 22 38 29 LMP Okay. You got it. (LM-11)(PHO DAC)

- - -

06 22 38 41 CDR We're on a relatively flat surface now. (LM-11)

06 22 38 45 LMP The rocks here Tony are all rounded. Most of them - (LM-11)  
70 percent are rounded and the other ones are  
subangular, mostly dust-covered grayish in color.  
The big rocks are not on the rim. The big rocks are  
further away from the rim. At least we can't see  
any big rocks as we approach the rim, but we're  
still climbing upslope.

06 22 39 17 LMP Man, look, there's a tremendous one - there's a 10 (LM-11)  
meter boulder off to the right over there John.  
There's a fresh crater. Really fresh one that has a  
white interior that's punched in about 2 meters  
deep, and that was at 181 at 4.0. Hey there's some  
beautiful white ones over there - - John, at 2  
o'clock. Think this is the rim, right here?

06 22 39 56 CC We still think you're about 500 meters to the rim. (LM-11)

06 22 39 59 LMP We'll be able to sample these white ones. Here's (LM-11)  
some - we are, there's the rim, up there.

06 22 40 07 CDR Sure is. (LM-11)

06 22 40 11 LMP Sure is, Tony. You were right. We just climbed - (LM-11)  
what we thought was the rim was one of these little  
hummocks.

06 22 40 18 LMP Little hummocks - - it was a pretty steep hummock. (LM-11)  
- - -

06 22 40 27 LMP Okay I'm going to pan the DAC around to get to that (LM-11)(PHO DAC)  
boulder field that goes up to north - Smoky  
mountain. It's really tremendous. The boulders are  
very angular over there. They're dark gray in  
color. Some of them are almost solid white. The  
most unique ones appear to be solid white. Up on  
the rim here they appear to be almost white, none of  
the dark ones. And we're at 180 at 4.1. Smooth  
regolith. John, the rim is left.

06 22 41 09 CDR The rim's right there. (LM-11)

06 22 41 10 LMP No sir. I bet it's over there to the left where (LM-11)  
those rocks are. But you might be right. That's  
too far away. You're right that's probably too far  
west.

06 22 41 22 CC We think the most direct route from where you are to (LM-11)  
the rim would be about a heading of 350.

06 22 41 33 LMP We're heading that way and those white rocks are - - (LM-11)

06 22 41 40 CDR Right on the rim Charlie. (LM-11)

06 22 41 41 LMP - - right on the rim. (LM-11)

06 22 41 42 CC Outstanding. Can you see on around to see if there (LM-11)  
are any black rocks around at 3 o'clock in the  
crater?

06 22 41 51 LMP Well, we can't see in the crater. But around at the (LM-11)  
3 o'clock position, yeah there's a biggy. The  
biggest one is this 10- to 15-meter boulder that is  
on the rim and it's blackish.

06 22 42 04 CC Okay is there any chance of working around towards (LM-11)  
that contact? If we could get both the white and  
black in one stop that would be really fine.

06 22 42 15 CDR No way. (LM-11)

06 22 42 18 LMP That's pretty far. I think we could do it with a (LM-11)  
short stop over there. When we get up there we  
might be able to find a black rock.

06 22 42 28 LMP We're definitely on the ejecta blanket here. And, (LM-11)  
oh, within 100 meters or so I think of the rim.

06 22 42 44 LMP The rocks are just white, crystalline white looking. (LM-11)  
- - -

06 22 42 56 CDR Yeah we're 179 at 4.4 right now. (LM-11)  
- - -

06 22 43 08 CDR He wants us to park - - (LM-11)

06 22 43 10 LMP 360. Go on out to the rim. Okay that's a breccia. (LM-11)  
That white one is a breccia.

06 22 43 20 CDR There's the rim. (LM-11)

06 22 43 22 LMP Yeah there it is. Okay I think we can get over (LM-11)  
there, maybe get them a picture. We're headed about  
360 aren't we?

06 22 43 31 CDR Yep. (LM-11)

06 22 43 35 LMP I can't believe the size of that big black rock over (LM-11)  
here. And I don't think that's a breccia John.  
But, although it might be. I see some large white  
clasts.

- - -

06 22 44 15 CDR What I'd like to do is park where it's flat. (LM-11)

06 22 44 30 LMP Right here's where they get a great view of the (LM-11)  
interior - of the upper third of the wall. Okay  
Tony we're on the rim.

06 22 44 50 CDR If we go 360 and park right here it'll be flat. (LM-11)

- - -

06 22 45 15 LMP - - 360 179, 5.5, 4.5 (11)

- - -

06 22 46 25 LMP John, read my frame count. (11)

- - -

06 22 46 31 CDR 165. You better change that out. (11)

06 22 46 33 LMP Okay. Took 165 pictures coming up here, Tony. (11)(PHO III 18034-192)

- - -

06 22 46 44 LMP I'm going to put another black-and-white on, Kilo. (11)

- - -

06 22 47 14 CDR Man, does this thing have steep walls. (11)

06 22 47 16 LMP They said 60 degrees. (11)

06 22 47 18 CDR Now, I tell you, I can't see to the bottom of it, (11)  
and I'm as close to the edge as I'm going to get.

- - -

06 22 48 48 LMP Okay, do you want me to start out with the 500? (11)(PHO 105 17118-82)

06 22 48 50 CC Right. Go ahead and start out with your 500. (11)(PHO 105 17118-82)

06 22 48 52 LMP Okay. I have magazine Kilo frame count 1, I think (11)  
it was.

06 22 49 13 LMP Those rocks you're looking at now, Tony, are white (11)  
and they look like breccias to me. The big black  
one is off behind the TV, and you're going towards  
the rim on the crater right now.

06 22 49 34 CDR The unfortunate thing about it, Houston, is that (11)  
rascally rim - it goes down - it slopes in to it  
about - say 10 or 15 degrees, which is the kind of  
slope I'm standing on right now and then all of a  
sudden in order to see the bottom, I've got to walk  
another 100 yards down a 25 to 30 degrees slope and  
I don't think I'd better. Maybe we can drive around  
to the other side and see down into it.

06 22 50 13 CC Man, is that a hole in the ground. (11)

06 22 50 14 LMP The inside - it really is. I see no bedrock, (11)  
though. All I see is boulders around the crater.  
There's nothing that reminds me of bedding, just  
loose boulders, though, it might very well be it's  
so shocked that they could be real boulders - I mean  
real bedrock there.

06 22 50 37 CDR The boulder layers are horizontally oriented and of (11)  
course, they are all covered with talus. Over on  
the north wall in particular, about one-third of the  
way from the top, is a line of boulders which you'd  
probably ought to be able to see on the TV, but  
they're all oriented right in that line, which would  
lead one to think that it's bedding there. Don't  
you see that line right over there, Charlie?

06 22 51 11 LMP I'm worried about trying to get this crazy camera (11)  
going here.

06 22 51 24 CC That line of boulders on the north wall, what color (11)  
were they?

06 22 51 30 CDR In this light they appear to be dark boulders. (11)

06 22 51 36 CC The white rocks you see there. Do they look like (11)  
the Cone crater type white rocks?

06 22 51 48 LMP No, not to me. (11)

06 22 51 55 CDR Better let me get a piece of one, Charlie. This is (11)  
definitely a breccia right here, a big foot and a  
half breccia. It's a white matrix with dark clasts,  
and it looks to be a three-rock breccia; some of the  
dark clasts here even darker clasts than those.

06 22 52 24 LMP Okay, Tony, I picked up magazine Mike - it's on the (11)  
500.

06 22 52 30 CDR Okay, Houston, I just picked up a grab sample of (11)(SAMP 67030-35)  
breccia. It's very friable. It looks shocked. It  
has black glass in it - glass a couple of  
millimeters across, and it's so worn down that you  
know what it really looks like? It looks like a -  
if I can use the analogy. I'm not sure what the  
heck it is. It looks like a (tuff?) - it just looks  
like a rock - the clasts are sticking out of it.

06 22 53 20 LMP Okay, Tony, what other pictures do you want me to (11)  
get with the 500? I've done the interior of the (PHO 105 17118-82)  
crater. Did you say you wanted Smoky or Stone  
mountain?

06 22 53 29 CC Okay, we'd like some more pictures of Smoky. (11)(PHO 105 17183-215)

06 22 53 41 CC And John, in your mineral description, could you see (11)(SAMP 67030-35)  
crystal shape?

06 22 53 44 CDR Could I see a crystal shape? Now the clasts in (11)(SAMP 67030-35)  
there are very angular. Maybe that's a zap crater -  
the white matrix doesn't have any crystalline  
structure that I can recognize.

06 22 54 34 CC And Charlie verify that you turned the DAC off. (11)(PHO DAC)

06 22 54 41 LMP Yeah, I think so, I'll check again. (11)(PHO DAC)

- - -

06 22 54 48 CC We'd like Charlie there to go ahead and take the (11)(PHO 116 18592-614)  
far-field pan of the crater and go on around and do  
a full pan. It looks like you could probably do the  
thing from one place and John, we'd like you to  
start ranging out in the most - the best traverse  
direction for about 80 meters if you can go that  
far, and survey the area as you go out, and Charlie  
will follow you along, and sample as you come back.

06 22 55 17 CDR Okay, that would be 80 meters to the northeast here. (11)

- - -

06 22 55 29 LMP Pan is complete and I'm up to 165 on magazine Mike. (11)(PHO 116 18592-614)

06 22 55 38 LMP My description of the crater: 60 percent of it is (11)  
covered with boulders up to 3 meters - make that 50  
percent of it on the interior. We cannot see the  
bottom. The boulders are sprayed out from the  
center in rays - that about every eighth to quarter  
of a crater you have a definite ray.

06 22 56 10 CC John did you get bag number on that? (11)(SAMP 67030-35)

06 22 56 12 LMP Do you still want me to take the 500? (11)

06 22 56 16 CDR Yeah. Excuse me 373 I think. (382) (11)(SAMP 67030-35)

06 22 56 21 CDR It's in the bottom of SCB 7. Anyway I can identify (11)(SAMP 67030-35)  
that rock for you.

- - -

06 22 56 31 CC After your 500 millimeter do the far-field pan and (11)(PHO 116 18592-614)  
the 3 polarizer settings of the far side of the  
crater, and then when you follow John along take the  
500 millimeter with you.

- - -

06 22 57 08 LMP Okay, Tony, I'm starting this polarimetry from about (11)(PHO 106 17239-77)  
the 10 o'clock position of the Rover.

- - -

06 22 57 28 LMP I'm starting in the right position, I've got f:6, (11)(PHO 106 17239-48)  
125th at 74. And I'll do a partial pan with each  
film - with each setting. It's going to be about an  
eight-picture pan.

06 22 57 51 LMP Man I wish I could see the bottom of this beauty. (11)

06 22 58 00 LMP That was in the right - going from right to left in (11)  
the right setting - center setting going from left (PHO 106 17249-62)  
to right.

- - -

06 22 58 34 LMP In the left setting, going from right to left. Tony (11)(PHO 106 17263-77)  
we can look out at my 12 o'clock position here, I can  
look down and see a large block that on this inner  
flank here that I can't - - it's dust-covered, and I  
can't tell you what type it is.

- - -

06 22 59 27 LMP Okay, Tony, magazine Kilo, I'm up to 40 with the far (11)  
field.

06 22 59 35 LMP I'm in the left position - I'm going back to the (11)  
right. You want that stereo base, right?

06 22 59 42 CC That's right. We'd like you to leave the polarizer (11)  
on and take the 500 millimeter with you also and then  
range out your 80 meters.

- - -

06 23 00 14 CDR It (SCB) fell off enroute. (11)

06 23 00 19 LMP Hey Tony if that thing (SCB) fell off - the SESC was (11)  
in it.

- - -

06 23 00 46 LMP I'm going to get the shovel. Tony are you going to (11)  
want a rake sample along the rim here?

06 23 00 59 CC No, let's go get the polarizer first and polarizing (11)  
pictures and we'll do the sampling on the way back.

06 23 01 10 CDR This is about as far as I'd like to go. (11)

06 23 01 14 LMP That's about 80 meters. Man are we dusty. (11)

06 23 01 19 CDR I can't see the bottom of the crater though. (11)

06 23 01 20 LMP I know it. That's a shame. You see that big rock beyond John, Tony? (11)

06 23 01 28 CC Yeah, we sure do. How about rolling that one over? (11)

06 23 01 33 LMP No way. (11)

- - -

06 23 02 02 LMP Right under the upper dull gray soil there's a layer of whitish material, much like it was at South Ray. (11)

06 23 02 26 LMP I'll go over and there's the shovel you can use to pick that up with John. (11)

06 23 02 32 LMP Okay I'm going to get the far field from right here and I must have a 70 to 90 meter base, I'd say. (11)(PHO 106 17278-317)

06 23 02 46 LMP Maybe only 50 - let me move down a little bit further. (11)(PHO 106 17278-317)

- - -

06 23 02 56 CDR Okay, Houston I'm going to pick up a sample which I think is the black type rock, but it is sort of dust covered. (11)(SAMP 67050,55)(PHO 116 18615-18)

06 23 03 13 LMP Starting the pan in the right position, Tony. (11)(PHO 106 17304)

06 23 03 17 LMP From right to left. (11)

06 23 03 33 CDR No, I was wrong, it was a very friable, must be shocked white rock with a lot of black clasts - looks like about 50 percent of the rock is black clasts, which was a lot more than the last rock I picked up and it sure is friable. So that means it's taken a heck of a beating and that's going into bag number 383. (11)(SAMP 67050,55)

06 23 04 40 LMP The pan is complete in all three settings and I'm up (11)(PHO 106 17278-317)  
to 80. Do you want a 500 from here also, Tony.

06 23 05 11 CC Right, sure do, you probably have 20 or 25 pictures (11)  
left in that 500 so maybe that'll give you the  
entire inside of the crater there. We'll just shoot  
up the rest of the roll in there.

- - -

06 23 06 40 LMP I'm doing some vertical stereo's of these rays (11)(PHO 105 17216-35)  
coming out of the crater. Ah, out of film.

06 23 06 56 CC How much of the inside did you get? (11)

06 23 07 02 LMP Oh, I got 1 partial pan of about 3 quarters of the (11)  
way up of the entire wall, and then 2 ray, 2  
vertical - almost 2 vertical rays.

- - -

06 23 07 54 LMP Look at this rock right here, John. Pure white. (11)(SAMP 67070,75)(PHO 106 17318-19)

06 23 08 00 LMP Yeah, it's really shocked whatever it is. It looks (11)(SAMP 67070,75)  
like chalk, Tony, it's so shocked. It's about  
pebble size and it's broken open, let's make it 5  
centimeters long, broken open. Let me get this one  
documented. Okay, the polarizing filter's coming  
off, I hope.

- - -

06 23 09 11 CDR The black clasts in this rock are really, really (11)(SAMP 67015)(PHO 116 18619-23)  
black material. It's either a very fine-grained  
black breccia, I'll tell you what it looks like,  
it looks like that black breccia, fine-grained  
lined(?) that had that white clasts in it on Apollo  
15. Although here, the matrix is white and the  
clasts are black.

06 23 09 54 CC How large are the clasts? (11)(SAMP 67015)

06 23 09 57 CC Is this black breccia frothy too? (11)(SAMP 67015)

06 23 10 03 CDR Three centimeters. No, it's not frothy at all. (11)(SAMP 67015)  
 It's dense.

06 23 10 10 CDR It could be a very dense basalt-like rock. It looks (11)(SAMP 67015)  
 like it has the 90-degree cleavage on it and I'm  
 hard put to tell that. That's just the way it  
 breaks. But it's sure shocked. It's too big to go  
 in the bag but I'm going to put it in there anyway.

06 23 10 36 CDR At least it has a shocked appearance. (11)(SAMP 67015)  
 - - -

06 23 10 44 LMP I was going to get this one over here. (11)(SAMP 67070,75)

06 23 10 47 LMP I finally got the polarizing filter off, Tony. (11)

06 23 10 55 LMP Okay, looking back from where we are, Tony, towards (11)  
 the west - south rather, I can see South Ray.

06 23 11 07 CDR I'd like to make sure we're not overlooking (11)  
 something here, Charlie.

06 23 11 11 LMP That's why I'd like to go on down to that black rock (11)  
 down there, John.  
 - - -

06 23 11 19 LMP Big one. (11)

06 23 11 20 CDR Okay, here's a small secondary up here on top of the (11)(SAMP 67090,95)(PHO 116 18624-28)  
 rim. It's about a meter across, about a meter deep  
 and it has either very angular black clasts or part  
 of this black rock in total, and they must be 4 or  
 5 centimeters across in there and I'll get one or  
 two of those babies.

06 23 12 02 LMP Hey, John. Can I get a bag from you. (11)(SAMP 67070,75)  
 - - -

06 23 12 19 LMP I picked up that white - (11)(SAMP 67070,75)

06 23 12 25 CDR I'll get it for you. (11)(SAMP 67070,75)

06 23 12 26 LMP Thank you. That white shocked rock. It's broke in (11)(SAMP 67070,75)  
two. There's two pieces of it. Partially  
documented, the before's anyway, and 384. (PHO 106 17318-19)

06 23 12 43 LMP I'm going back and get some bags. (11)

06 23 12 50 CDR Now, I've got Charlie's shovel for scale for the (11)(SAMP 67090,95)(PHO 116 18624-27)  
before shot.

- - -

06 23 14 04 LMP Y'all didn't see any bags fall off anywhere, did (11)  
you?

06 23 14 08 CC No, we didn't see them. (11)

06 23 14 15 CDR The outer surface of that rock is dust covered. It (11)(SAMP 67090,95)  
appears to be a really black glass. It's going into  
385.

06 23 14 44 LMP You can see Baby Ray, way on past Kennesaw, where (11)  
there's a bright fresh crater down there on it's  
flank.

- - -

06 23 15 03 CDR What really attracts me to this rock, even though (11)(SAMP 67090,95)  
it's dust covered, Houston, is the fact that it has  
right angles to it. It did, before I picked it up.

- - -

06 23 15 44 CDR Yeah, this next one that's going in, was so dust (11)(SAMP 67110,15)(PHO 116 18624-28)  
covered after I picked it up and dropped it into the  
dirt, I can't describe it to you. Other than to say  
it's dust covered. It's going into bag 386.

06 23 16 01 LMP Okay, Tony, the 500 is complete. What do you want (11)(PHO 105 17216-35)  
me to do now?

06 23 16 05 CC Just go back and sample. We'd like big boulder (11)  
samples and look for that - well, I guess, we're  
just boulder sampling now.

06 23 16 16 LMP I'd like to go up to the southwest around the rim (11)  
the other direction from John and try my hand at  
these large white rocks.

06 23 16 28 CDR I don't think we can drive the Rover over to here. (11)

06 23 16 31 LMP No, I agree. I was just going up here a little bit, (11)  
John, and do some of the flight-line stereo of this (PHO 106 17323-30)  
3 meter block up here. Tony, some of these places  
are - rocks are glass covered. They are all  
fractured - very beat-up looking.

- - -

06 23 17 11 CDR If you're going to boulder sample, Charlie, I'd (11)(SAMP 67430,35)(PHO 106 17320-22)  
better come and help you.

06 23 17 14 LMP No, I'm just going to whack - I'm not gonna really (11)(SAMP 67430,35)  
do - the true thing. I'll be down there to help you  
in a minute.

06 23 17 21 CDR Charlie, you want to go down to this big boulder (11)  
down here?

06 23 17 24 LMP I'd like to in a minute. I wanted to make sure we (11)(SAMP 67430,35)  
get whatever this is up here on these white rocks.

06 23 17 32 CC John, how far away is that big boulder? (11)

06 23 17 38 CDR It is about 150 meters but the rocks around it are (11)  
really something else. That's the problem - its  
trafficability up to it.

- - -

06 23 18 23 LMP Okay - here's an old glassy rock, Tony, that's glass (11)(SAMP 67430,35)  
coated. Anyway, it went into 415.

06 23 18 45 LMP And it was hackly looking on the surface - that's (11)(SAMP 67430,35)  
why I stopped to get it.

06 23 18 57 CDR Charlie, we could probably get a pretty good cross (11)  
section up here with just a rake sample.

06 23 19 01 LMP Yeah, I agree. (11)

06 23 19 26 LMP I'm going to give you a little stereo on this (11)(PHO 106 17323-30)  
boulder.

06 23 19 30 CC If you see any clasts - - or anything in it, a (11)(PHO 106 17327-30)  
closeup might look good.

06 23 19 36 LMP That's what I'm going to do. (11)(PHO 106 17327-30)  
 - - -

06 23 19 49 CDR Want to give me a hand with this rake sample, (11)  
 Charlie.

06 23 19 54 LMP Yeah, if you can standby just a minute, John. (11)

06 23 20 01 CDR Did you describe this one with the black streak (11)  
 running through it?

06 23 20 09 LMP No. (11)

06 23 20 14 CDR It has a black fracture pattern running right (11)  
 through the middle of it. It's about 6 - it looks  
 like a Sudbury breccia.  
 - - -

06 23 20 35 CC Charlie, while you're up at that boulder, if you can (11)(SAMP 67460-64)(PHO 116 18632-33; 106 17333-36)  
 get - - some of that fillet as well as the boulder?

06 23 20 43 LMP Okay, I don't have anything to fillet with, but (11)(SAMP 67460-64)  
 we'll see.  
 - - -

06 23 21 12 LMP There's one of these white rocks up here, John, (11)(SAMP 67450,55)(PHO 106 17331-32)  
 that's got a fracture on it.

06 23 21 19 CDR Got a hammer? (11)(SAMP 67450,55)

06 23 21 20 LMP Yeah, I got the hammer. It's just loose, the stuff (11)(SAMP 67450,55)  
 is lying up there on the top.

06 23 21 30 LMP Hey, Tony, we'll fillet sample for you up here. (11)(SAMP 67460-64)

06 23 21 39 CDR Got a shovel? (11)(SAMP 67460-64)

06 23 21 40 LMP No, I don't have a shovel but I got a hammer. (11)(SAMP 67460-64)

06 23 21 48 CDR I'll come up there and help you. We can do the rake (11)  
 sampling.

06 23 21 57 CC Charlie, if possible, we'd like some samples on that (11)(SAMP 67450,55)  
stuff on top of the boulder.

06 23 22 03 LMP That's what I'm going to do. (11)(SAMP 67450,55)

06 23 22 13 LMP I'm not going to give you any scale, though. (11)(SAMP 67450,55)

- - -

06 23 22 27 LMP It looks like the same thing that John had (11)(SAMP 67450,55)  
described. It's a friable breccia with a black  
clast being aphanitic. The largest clast I see is  
not in the sample but it's a black one that's a  
centimeter across. It has a bluish tint to it. It  
looks like all those shocked rocks that Fred Horz  
was telling us about. Exactly, and that's in bag  
416.

- - -

06 23 23 35 CDR Charlie, put that in my bag. (11)(SAMP 67450,55)

06 23 23 37 LMP Okay. You don't have a bag. It fell off. Let's (11)(SAMP 67450,55)  
just use this one, okay? They want a fillet up  
here, John. Could we get a fillet - up there where (SAMP 67460-64)  
that gnomon is? I'll get the cross-sun. (PHO 106 17333-34)

06 23 24 24 LMP That fillet is 417. (11)(SAMP 67460-64)

06 23 24 40 CDR Okay, I'll get the down-sun here. (11)(SAMP 67460-64)(PHO 116 18633)

06 23 24 45 LMP There's an after and I'll try to get a locator from (11)(SAMP 67460-64)(PHO 106 17335)  
up here. (PHO 106 17336)

- - -

06 23 24 58 CDR Did you get the boulder off the top? (11)(SAMP 67450,55)

06 23 25 01 LMP Yes, I did. I got that sample. (11)(SAMP 67450,55)

06 23 25 03 CDR It's a multi-rock breccia. (11)(SAMP 67450,55)

06 23 25 09 LMP The matrix is the white - with the black being the (11)(SAMP 67450,55)  
clasts.

06 23 25 15 CDR Yeah, I see at least 2 different colors of  
light-dark clasts. They must be at least a 3  
rocker. (11)(SAMP 67450,55)

06 23 25 27 CC You feel like you got all three? (11)

06 23 25 28 CDR The rake sample, Charlie. (11)(SAMP RAKE 67510-76)

06 23 25 29 LMP Okay, good idea, John. (11)(SAMP RAKE 67510-76)(PHO 116 18637-40)

06 23 25 35 CDR I can't imagine how they wouldn't be in the clasts  
that Charlie picked up. Look at these rocks here,  
that I just stepped on. (11)

06 23 26 00 LMP Hey, John, I'm chipping out this little tiny, this  
big black clast here. It's coming right out. I  
don't think we got any of it in that sample that I  
got. And this thing is so friable. Hey, I got it.  
- - -

06 23 26 35 LMP This black clast I chipped out is an aphanitic  
matrix, it looks like a typical basalt to me. I got  
a picture of it after I chipped it out. I didn't  
think I was going to be able to, but it came out,  
get a 5 footer. It's going in 418. (11)(SAMP 67475)(PHO 106 17337)

06 23 27 15 LMP I haven't seen a rock like that before in the Apollo  
samples. (11)(SAMP 67475)  
- - -

06 23 27 38 CDR I have a rock here that is a fine white crystalline  
rock. It's pretty well dust covered, but I don't  
see any clasts in it. (11)(SAMP 67410,15)(PHO 116 18634-36)

06 23 27 57 CDR Of course it could be just a hunk of matrix that got  
busted loose. But as fine as these clasts are in it  
- that's going into bag 387 as fine as these rocks  
are, I don't see how you can miss one. (11)(SAMP 67410,15)

06 23 28 16 LMP Sorry, we're working behind that big rock there  
Tony, from the tube. John why don't we get out - -  
and do a rake sample where they can see us. (11)

06 23 28 29 LMP Just anywhere we rake, we got a good rake-soil sample. (11)  
 - - -

06 23 28 48 CDR Let's get a soil sample right here. (11)(SAMP 67480-89,95)(PHO 116 18637-40)

06 23 28 51 LMP Okay. (11)(SAMP 67480-89,95)

06 23 28 54 CDR Here, take this. I can get it with this. (11)(SAMP 67480-89,95)

06 23 28 56 LMP Okay, you want to document it? (11)(SAMP 67480-89,95)

06 23 28 59 CDR Yes, we can, but it don't really see much - (11)(SAMP 67480-89,95)  
 - - -

06 23 29 27 LMP The regolith here, Tony up on this crater rim is really soft. We're sinking in on the slopes about 6 inches or so. (11)(SAMP 67480-89,95)

06 23 29 49 LMP The soil sample here is 419. (11)(SAMP 67480-89,95)  
 - - -

06 23 30 07 LMP Let's get in a clear spot, John, to rake, okay? (11)(SAMP RAKE 67510-76)

06 23 30 10 CDR Well we can do it down there too. (11)(SAMP RAKE 67510-76)

06 23 30 11 LMP It looks almost fruitless up here. Oh no, there's some rocks. (11)(SAMP RAKE 67510-76)

06 23 30 18 CDR Lot of rocks there, Charlie, one rake sample. (11)(SAMP RAKE 67510-76)

06 23 30 21 LMP One rake sample right out here, Tony. (11)(SAMP RAKE 67510-76)

06 23 30 27 LMP You can see us on the tube. (11)(SAMP RAKE 67510-76)

06 23 30 29 LMP It's going in 420. (11)(SAMP RAKE 67510-76)

06 23 30 36 CDR Just hold still. (11)(SAMP RAKE 67510-76)

06 23 30 39 LMP Oh, he's got some nice ones there. (11)(SAMP RAKE 67510-76)  
 - - -

06 23 30 46 CDR Got them in there? (11)(SAMP RAKE 67510-76)

06 23 30 47 LMP Yes. (11)(SAMP RAKE 67510-76)

06 23 30 51 LMP They're so dust covered I can't really see what they (11)(SAMP RAKE 67510-76)  
are.

- - -

06 23 31 04 CDR Let me put that one in. (11)

06 23 31 07 LMP Okay, where you want to go? (11)

06 23 31 08 CDR Going back to it. (11)

06 23 31 09 LMP I got it, I got it, John (11)

06 23 31 12 CDR Let me get it. Over there. (11)

- - -

06 23 31 26 LMP Hey give me my bag, I'm not carrying a bag. (11)

06 23 31 35 LMP Why don't we go down half way, John, and do another (11)(SAMP RAKE 67610-76)(PHO 106 17338; 116 18641-43)  
rake sample and then go on down to the big black  
rock.

06 23 31 43 CDR Alright. (11)(SAMP RAKE 67610-76)

06 23 31 46 LMP That'll be about 150 meters radial - not radial, but (11)(SAMP RAKE 67610-76)  
concentric sampling.

- - -

06 23 32 29 LMP Here, let me take this down and we'll get down in (11)(SAMP RAKE 67610-76)  
this little hollow - and we'll use that (tong) for  
the gnomon - how's that for the rake sample?

- - -

06 23 33 03 LMP Then we'll get a down-sun - - (11)(SAMP RAKE 67610-76)(PHO 106 17338)

06 23 33 05 CDR And a cross-sun here. (11)(SAMP RAKE 67610-76)(PHO 116 18641-42)

- - -

06 23 33 24 LMP John, have I still got my SCB on my back? (11)

06 23 33 29 CDR Yep. (11)

06 23 33 35 CDR Come right down this way. (11)

06 23 33 40 LMP Okay, John's getting about 2 rakes, he's doing 2 rakes and he's got about 15 pebbles. (11)(SAMP RAKE 67610-76)  
(SAMP RAKE 67610-76)

06 23 33 52 CDR There's not any there. (11)

06 23 33 54 LMP That's a pretty good full sample. There you go, look at that. That's a bag full now. The third one was really fruitful. (11)(SAMP RAKE 67610-76)

06 23 34 09 CDR Okay, turn it. There you go. I could see vesicles in one of them. (11)(SAMP RAKE 67610-76)

06 23 34 17 LMP Yes, I could too. That's in 421. (11)(SAMP RAKE 67610-76)

- - -

06 23 34 41 LMP And getting a soil. (11)(SAMP RAKE SOIL 67600-05)(PHO 106 17338; 116 18641-43)

- - -

06 23 35 09 LMP 422 for the soil sample. (11)(SAMP RAKE SOIL 67600-05)

06 23 35 13 LMP That's enough, John. That's a hundred grams. (11)(SAMP RAKE SOIL 67600-05)

- - -

06 23 35 29 LMP Okay, get an after of that please, while I pick this bag up. (11)(SAMP RAKE SOIL 67600-05)(PHO 116 18643)

06 23 35 30 CDR It's a large number. (11)(SAMP RAKE SOIL 67600-05)

- - -

06 23 35 46 CDR Okay, Charlie, let's go back to the Rover. Put your bag on there and head out for the big rock, because you got a bag on your back, and we'll use it. (11)

06 23 35 59 LMP Okay. (11)

06 23 36 07 LMP Look at the size of that biggie. (11)

06 23 36 11 CDR It is a biggie, isn't it. It may be further away (11)  
than we think.

06 23 36 17 LMP No, it's not very far. It's just right beyond you. (11)

- - -

06 23 36 23 LMP I got the shovel. The rakes best choice. And I got (11)  
some bags - -

06 23 36 30 CDR You got enough bags, I'll leave mine here. (11)

06 23 36 33 LMP Well, I've only got about ten or so. (11)

06 23 36 37 CDR Okay, that's how many I got. (11)

06 23 36 39 LMP Okay, bring yours too. (11)

06 23 36 43 CDR A rake and a shovel, right? (11)

06 23 36 44 LMP No, not the shovel. (11)

06 23 36 45 CDR Just the rake? (11)

06 23 36 46 LMP Yes, the rake is the best way. (11)

06 23 36 48 CDR That's what I got. (11)

06 23 36 53 LMP We'll stop about half way down here and do another (11)(SAMP RAKE 67710-76)(PHO 106 17339-40; 116 18644-46)  
rake, how's that?

06 23 36 57 CDR Good idea, Charlie. (11)(SAMP RAKE 67710-76)

- - -

06 23 37 13 CDR That's about half way, maybe. Okay, let me just dob (11)(SAMP RAKE 67710-76)  
this down here somewhere. I think we can get a  
permanently shadowed under that big rock. Look at  
that fillet on this side, Charlie.

06 23 37 31 LMP Okay, well we need the shovel for that. (11)(SAMP RAKE 67710-76)

06 23 37 33 CDR Well, it's here. (11)(SAMP RAKE 67710-76)

06 23 37 35 LMP Okay, yes, we can reach in there. (11)(SAMP RAKE 67710-76)

06 23 37 52 LMP Wait a minute, wait, wait wait. Don't know why I'm (11)(SAMP RAKE 67710-76)  
taking that down-sun now that the chart isn't there. (PHO 106 17339)

06 23 38 22 LMP He's getting a couple of whitish frags and then (11)(SAMP RAKE 67710-76)  
dust-covered gray-looking frags. I think you got a  
bag full there, John.

06 23 38 34 CDR Yep, three scoops and a bag full. It's all salted (11)(SAMP RAKE 67710-76)  
with that one white rock here.

06 23 38 53 LMP That's in 423. (11)(SAMP RAKE 67710-76)

06 23 38 59 CDR Hang onto this. That's going in Charlie's SCB. (11)

06 23 39 09 LMP Get an after of that, John, and I'll get the soil (11)(SAMP RAKE 67710-76)(PHO 116 18646)  
sample. (SAMP RAKE SOIL 67700-08)(PHO 106 17339-40; 116 18644-46)

06 23 39 14 CDR There's the after. (11)(SAMP RAKE 67710-76)(PHO 116 18646)

06 23 39 15 LMP It's hard under there, you know it? (11)(SAMP RAKE SOIL 67700-08)

06 23 39 22 CDR Yes, that's why the rake wouldn't go down. (11)(SAMP RAKE SOIL 67700-08)

06 23 39 27 CDR I'm not going anywhere. Hit it again. (11)(SAMP RAKE SOIL 67700-08)

06 23 39 32 LMP Tony, there must be a big rock right under here. (11)(SAMP RAKE SOIL 67700-08)

06 23 39 37 LMP I can't get the rake in. (11)(SAMP RAKE SOIL 67700-08)

06 23 39 40 CDR Look at that, Charlie. (11)(SAMP RAKE SOIL 67700-08)

06 23 39 41 LMP I know, it's all white under there isn't it? (11)(SAMP RAKE SOIL 67700-08)

06 23 39 47 LMP Down about a centimeter or less, it's all white. (11)(SAMP RAKE SOIL 67700-08)

06 23 39 59 LMP I think it might be a rock surface, and we're just (11)(SAMP RAKE SOIL 67700-08)  
in its - one of those friable ones, the fractured  
ones, and we're just chipping off - here, John, I  
can get a soil sample from where you kicked it up  
with your foot.

06 23 40 23 LMP Okay, you want another one? (11)(SAMP RAKE SOIL 67700-08)

06 23 40 34 CDR That soil sample is going in bag - (11)(SAMP RAKE SOIL 67700-08)

06 23 40 41 LMP 388, Tony. (11)(SAMP RAKE SOIL 67700-08)

06 23 40 42 CC Okay, 388. And we better press on for the big boulder. (11)

06 23 40 47 LMP Okay, we're headed that way. You get the tongs, John? (11)

06 23 40 54 CDR Yes. (11)

06 23 40 55 LMP I'll carry the rake. My guess is that most of these rocks around here are extremely shocked. (11)

06 23 41 14 LMP All these in this area look the same. (11)

06 23 41 21 CDR In the sunlight, Houston, this white rock has sort of a greenish hue to it, this white rock breccia. Which is what all this is we're walking on right now is this white rock breccia that Charlie chipped out of - and I guess this is probably the second layer up. I would reckon - if we could see to the bottom, we could say for sure if this big black rock is right out of the bottom. But my guess from the old photograph, it probably is. (11)

06 23 42 00 CDR See this rock right here, Charlie. (11)

06 23 42 03 LMP Look at the size of that rock. (11)

06 23 42 10 LMP The closer I get to it, the bigger it is. (11)

06 23 42 13 CDR Yes, but look at the permanent shadowed part, Charlie. (11)

06 23 42 14 LMP On this side over here? (11)

06 23 42 15 CDR Yes. No, right here on this one. See that shadow? That must be permanent. (11)

06 23 42 20 LMP No, I bet you it's not. The Sun's going down over there, John. (11)

06 23 42 25 CDR Yes, you're right. (11)

06 23 42 26 LMP If you come back here in two weeks, it'll be dark. Well, maybe a week and you'll have Sun over there. Okay Tony, this is a very blocky area here. (11)

06 23 42 43 CDR And look at those - look at the shape of that (11)  
 rascal.

06 23 42 50 LMP Yes. We don't see any glass, though, particularly. (11)

06 23 42 57 CDR No, I guess I'd have to call this a black matrix - (11)  
 looks like the matrix has reversed itself now, it's  
 all black matrix.

06 23 43 11 LMP Well, Tony, that's your House Rock right there. (11)

06 23 43 15 CDR Don't get too near the edge of that thing, it falls (11)  
 off. Look over at your right, it falls off pretty  
 good.

06 23 43 21 LMP I'm just going to take a little stereo here. (11)(PHO 106 17341-44)

06 23 43 30 CDR We had to come down a pretty good slope to get to (11)  
 this rock, so we may have to leave early to get  
 back.

06 23 44 02 LMP Look at that. See it's glass coated and this is (11)  
 just fractured off. We could pull that off. Big  
 chunks of that will come right off.

06 23 44 15 LMP It's got a bluish tint to it, doesn't it? (11)

06 23 44 19 CDR It does. (11)

06 23 44 20 LMP It doesn't look like real basalt. (11)

06 23 44 24 CDR Look at that shatter cone right there, Charlie. (11)  
 I'll be darned.

06 23 44 28 LMP It is. Yeah. (11)

06 23 44 29 CDR I'm sure. (11)

- - -

06 23 44 33 LMP Put your tongs up there and I'll get a closeup. (11)(PHO 106 17345-46)

06 23 44 39 CDR Well, that settles that. (11)

06 23 44 41 LMP Move it down a little bit. (11)

06 23 44 42 CDR That settles that, doesn't it, Houston? (11)

06 23 44 45 LMP Okay, here's the chunk of it. The black rock looks - some of it's glass-coated, Tony, and man, that is a shatter cone. (11)(SAMP 67930,35-37)(PHO 106 17345-46; 116 18647-49,52-53)

06 23 45 00 CDR Charlie, let's get a piece of it. (11)(SAMP 67930,35-37)

06 23 45 01 LMP Okay, here you go. I got a piece. Give me a bag. On the next one how about stepping back and as I point to it, I'll pull off another piece; and we'll put a couple of pieces in here. (11)(SAMP 67930,35-37)

06 23 45 18 CDR Okay. (11)(SAMP 67930,35-37)

06 23 45 20 LMP That's going in bag 389. (11)(SAMP 67930,35-37)

06 23 45 23 LMP Okay, let's just take a picture of that. So you'll know where it came from. (11)(SAMP 67930,35-37)(PHO 116 18649-53)

06 23 45 31 LMP It's pretty badly shattered, Tony, so I don't know whether it's going to stay together or not. (11)(SAMP 67930,35-37)

06 23 45 38 CDR Hit it, Charlie, I'll get the picture. That's right near the shatter cone. (11)(SAMP 67930,35-37)(PHO 116 18649-53)

06 23 45 49 CDR I might suspect as much. Now don't worry about that. (11)(SAMP 67930,35-37)

06 23 45 57 LMP Okay let's pour a little sample back (?) (11)(SAMP 67930,35-37)

06 23 45 58 CDR Scoot back and I'll get an after. (11)(SAMP 67930,35-37)(PHO 116 18649-53)

06 23 46 11 LMP Okay 5 samples in 389 Tony. (11)(SAMP 67930,35-37)

06 23 46 15 LMP That's black. There's a faint - - look at that veinlet running through - - right there, John. - a breccia. Man, that's a big rock. Here's this white stuff, here's a rock John, that is not a breccia. It's a clast in a black rock. (11)(SAMP 67910, 15)(PHO 116 18652-53)

06 23 46 46 CDR Better put that in your bag. (11)(SAMP 67915)

06 23 46 47 LMP Okay. (11)(SAMP 67915)

06 23 46 48 CDR Put it back where you got it for a second and let me - - get a picture of it. Now, let's fit it in. No, just move away, they can fit it in. Okay, that how it was more or less? (11)(SAMP 67915)(PHO 116 18652-53)

06 23 47 02 LMP Yeah, more or less. (11)(SAMP 67915)

06 23 47 03 CDR Okay, now get it. (11)(SAMP 67915)

06 23 47 06 LMP Let's get an after. (11)(SAMP 67915)

06 23 47 10 CDR Yeah, that has a clast of that rock in in it too. (11)(SAMP 67915)

06 23 47 11 LMP I wish we could partially stick that in a bag. (11)(SAMP 67915)

06 23 47 15 CDR We could stick it in your bag. (11)(SAMP 67915)

06 23 47 16 LMP Oh, okay. I mean one of these cause it might break up. Okay, that's 424. (11)(SAMP 67915)

06 23 47 23 CDR No, it isn't going to break up. (11)(SAMP 67915)

06 23 47 24 LMP That's unbagged, and it's grapefruit size, and it was a white matrix. It's not as nearly shocked, and it's a large clast about a 3 meter clast out of this big black rock. Part of it. (11)(SAMP 67915)

06 23 47 41 CDR 3 meter? (11)(SAMP 67915)

06 23 47 42 LMP No, this clast is about 3 meters. (11)(SAMP 67915)

06 23 47 45 CDR Centimeters, Charlie. (11)(SAMP 67915)

06 23 47 47 LMP Well, it goes from here all the way up to there. (11)(SAMP 67915)

06 23 47 51 CDR Oh, that's the one you're talking about. (11)(SAMP 67915)

06 23 47 52 LMP Yeah. (11)(SAMP 67915)

06 23 47 53 CDR Did you get a stereo of that - did you get a flight line of that? (11)(SAMP 67915)(PHO 106 17341-44)

06 23 47 55 LMP Yeah. (11)(SAMP 67915)(PHO 106 17341-44)

06 23 47 58 LMP I got a pan of it. Okay, John, I'm going to whack off another - could you get a picture of this, with the hammer in? Let me get some of the unshocked white stuff. (11)(SAMP 67915)(PHO 106 17341-44)  
(SAMP 67950,55-57)(PHO 116 18653)

06 23 48 12 CDR Wait a second. (11)(SAMP 67950,55-57)(PHO 116 18653)

06 23 48 16 LMP Got it? (11)(SAMP 67950,55-57)(PHO 116 18653)

06 23 48 19 CDR Yeah. (11)(SAMP 67950,55-57)(PHO 116 18653)

06 23 48 27 CDR Hard isn't it. (11)(SAMP 67950,55-57)

06 23 48 28 LMP Yeah, it's hard, but I'm going to get a piece. (11)(SAMP 67950,55-57)

06 23 48 33 CDR I got it, Charlie. (11)(SAMP 67950,55-57)

06 23 48 34 LMP Okay, here's a good piece right up here. (11)(SAMP 67950,55-57)

06 23 48 44 CDR Bag open? (11)(SAMP 67950,55-57)

06 23 48 46 LMP Okay, I've got it. Of the white clast with - it's not nearly as shocked, is going in 425. (11)(SAMP 67950,55-57)

06 23 49 01 LMP Okay, here's another piece right there, John. (11)(SAMP 67950,55-57)

06 23 49 02 CDR Huh? (11)(SAMP 67950,55-57)

06 23 49 04 LMP Here's another big piece right over here. (11)(SAMP 67950,55-57)

06 23 49 07 CC Did you all see a permanently shadowed sample around there? (11)(SAMP SOIL 67940-48)(PHO 116 18653)

06 23 49 13 CDR No, we don't. (11)(SAMP SOIL 67940-48)

06 23 49 16 CC Our best guess is that it should be on the south side - - if there's any. (11)(SAMP SOIL 67940-48)

06 23 49 24 CDR Well we were over on the south side and we didn't see any. (11)(SAMP SOIL 67940-48)

06 23 49 29 CDR The hole unfortunately is a - sort of an \*\*\* east-west split there, Charlie. (11)(SAMP SOIL 67940-48)

06 23 49 36 LMP I know, it is an east-west split. Tony, we got an east-west split here, and we can get the rake in. (11)(SAMP SOIL 67940-48)

06 23 49 46 CC Why don't you go ahead and take a soil out of that. (11)(SAMP SOIL 67940-48)

06 23 49 48 LMP Here John. Okay. Put that in mine. (11)

06 23 49 55 CC You're going to have to leave after this sample. (11)

06 23 50 01 LMP Okay, I was gonna say it's probably a long hike back (11)  
up that hill.

06 23 50 09 CDR In there or not, Charlie? (11)(SAMP SOIL 67940-48)

06 23 50 11 LMP Yeah, I can get in here. Right up next to this rock (11)(SAMP SOIL 67940-48)  
right here would be a good point. I got it.

06 23 50 26 CDR Get the bag square, - okay. (11)(SAMP SOIL 67940-48)

06 23 50 33 LMP Wait a minute, I'll give you a little bit more. (11)(SAMP SOIL 67940-48)

06 23 50 46 CDR It's not a classic east-west split Houston, but it's (11)(SAMP SOIL 67940-48)  
one.

06 23 50 51 CDR Bag 390. (11)(SAMP SOIL 67940-48)

06 23 50 52 CC Okay, bag 390. And we need a reference soil. (11)(SAMP 67960)(PHO 106 17347-48)

06 23 50 56 CDR We'll need the tongs for a second. (11)

06 23 51 05 CDR Don't go down there 5 meters and I don't want - - (11)

06 23 51 07 LMP I'm not. (11)

- - -

06 23 51 16 LMP There you go. (11)

06 23 51 19 CDR Okay. (11)

06 23 51 23 LMP I guess you ought to stick the tongs in, and we (11)(SAMP 67960)(PHO 106 17347-48)  
ought to document this.

06 23 51 27 CDR Okay. (11)(SAMP 67960)

06 23 51 29 LMP We'll do a partial and then I'll do a cross-sun of (11)(SAMP 67960)(PHO 106 17347-48)  
it.

06 23 51 34 CDR We're going to do a reference sample. Let's get (11)(SAMP 67960)  
that huge mass right there.

06 23 51 36 LMP Okay. (11)(SAMP 67960)

06 23 51 39 CDR The tongs are not going to go in this ground,  
Charlie. (11)(SAMP 67960)

06 23 51 41 LMP I know it. It's a big rock down there. Why don't  
you just hold it there, and I'll take the picture. (11)(SAMP 67960)(PHO 106 17347-48)

06 23 51 47 CDR Okay. (11)(SAMP 67960)

06 23 51 48 LMP Click, click, okay. (11)(SAMP 67960)(PHO 106 17347-48)

06 23 52 00 CDR Got it, you got it. (11)(SAMP 67960)

06 23 52 10 LMP Okay, Tony, this soil here is very hard, and the  
rake really won't go into it. Bending the tines  
like we use to in training. (11)(SAMP 67960)

06 23 52 20 CC If you can see anything around there that's kind of (11)  
loose and not in an east-west split, kind of scoop  
some of that up, if you can't, we'll just have to  
leave it.

06 23 52 34 CDR There's nothing loose. (11)

06 23 52 35 LMP Okay, there's about 25 grams. (11)(SAMP 67960)

- - -

06 23 52 46 LMP Okay, got it. (11)(SAMP 67960)

- - -

06 23 53 07 LMP There's a real frothy rock right there, John. Want (11)(SAMP 67970,75)  
to throw that in?

- - -

06 23 53 23 CDR Can you hold this, Charlie? (11)

06 23 53 28 LMP What, the tongs? (11)

06 23 53 31 CDR Yeah. Just for a second. (11)

06 23 53 32 LMP Yeah. (11)

06 23 53 33 CDR Going to do that bag better. (11)

06 23 53 38 LMP Man, that rock had cracked off just in the right - (11)  
 this large block is a very - the house size one,  
 it's about 20 or 30 - 20 meters long, by maybe 10  
 meters high, and it's a large breccia, got a grab (SAMP 67970,75)  
 sample going in 393 (392?), white matrix with glass  
 on it.

06 23 54 05 CDR Don't backup anymore, Charlie. (11)

06 23 54 06 LMP Lost my balance. It's got some fractures in it that (11)(SAMP 67970,75)  
 run north.

- - -

06 23 54 18 LMP Here you go, John. Here's your tongs. Would you (11)(PHO 105 17349-55)  
 pick up my bag and let me move down to get a little  
 bit in stereo and I'll be right with you.

06 23 54 25 CDR Okay, let's go on back. (11)

06 23 54 26 LMP I am. I'll be right with you. (11)

06 23 54 35 CC Did you see anything that you were pretty confident (11)  
 was igneous?

- - -

06 23 54 45 LMP Yeah, this rock we - (11)

06 23 54 51 CDR An igneous rock. (11)

06 23 54 53 LMP Yeah, if we would have brought the padded bags, this (11)  
 right here is an igneous rock.

06 23 54 56 CDR The whole place looks igneous, Houston. (11)

06 23 55 01 LMP These large clasts in it are igneous. (11)

06 23 55 02 CC For the padded bags, we wanted lying-on-the-surface (11)  
 stuff.

06 23 55 08 CDR Is that what you're talking about volcanic? (11)

06 23 55 13 LMP I'll take the bags. Can you get them out with the (11)  
 tongs?

06 23 55 19 CDR Well, you're going to have to hold that until I get (11)  
the tongs unloose.

06 23 55 22 LMP Wait a minute. (11)

06 23 55 23 CDR Hold the bag. (11)

06 23 55 24 LMP I'm trying to. (11)

06 23 55 30 CDR I can't believe it. (11)

06 23 55 31 LMP We've got it. I can't either. Let's go. (11)

- - -

06 23 55 50 LMP Sorry. Sorry we had to get down in here, but that (11)  
was a unique sample we thought.

06 23 55 57 CDR Okay, this big black rock, this big black and white (11)  
rock right here, that we're just traversing by is  
also the same kind of rock. Yeah, and look at the  
size of it.

06 23 56 08 LMP They're all the same. There's two rock types here, (11)  
Tony. That white matrix one, and then the one with  
the black.

06 23 56 13 CDR And there are places where the black and the white (11)  
are about 50-50 down here too.

06 23 56 23 CDR There are very few of those. (11)

06 23 56 26 LMP And it has the same character of the rocks up close (11)  
that I would think that South Ray rocks had, when  
you look on the rim of that crater.

06 23 56 47 CDR Can we put those two rock bags under your seat or do (11)  
you have too much stuff in there now?

- - -

06 23 57 02 LMP Sure. (11)

06 23 57 11 CC If you see a fist-size igneous rock near the Rover (11)(SAMP 67235)(PHO 116 18654-57)  
we'll use the padded bags here, if not we'll just  
forget them - for now.

06 23 57 16 LMP Okay. (11)  
 - - -

06 23 57 32 LMP I bet you all of this stuff up here is really shocked. Does that make any difference to you? And therefore it's not going to be too hard. (11)(SAMP 67235)

06 23 57 44 CC All right, if you find a good dense one that you think has a good hard surface on it we'll go ahead and take it. (11)(SAMP 67235)  
 - - -

06 23 58 05 LMP We'll pick one up and give it a try anyway. (11)(SAMP 67235)

06 23 58 09 CDR I'm going to get one right here. (11)(SAMP 67235)  
 - - -

06 23 59 30 CDR It'd be too big for a padded bag. (11)(SAMP 67235)

06 23 59 31 LMP No, it'll go in. (11)(SAMP 67235)

06 23 59 39 LMP Well, let's give it a go. (11)(SAMP 67235)  
 - - -

07 00 00 36 LMP Why don't you put it in number 6 there John. Now, let's see if I can find another one here. (11)(SAMP 67235)

07 00 00 51 CDR Okay, but get a smaller one Charlie. (11)(SAMP 67215)(PHO 106 17355-56)

07 00 01 17 CC We'd like to switch out the mag in the DAC. (11)(PHO DAC)

07 00 01 31 LMP I'll tell you this regolith is about an inch deep here in most places. There's just lots of rocks under this stuff. (11)(SAMP 67215)

07 00 01 50 LMP You can barely get the shovel in anywhere. Okay we got two rocks for your padded bags but I'm not sure they are going to do you any good they are so dust covered. (11)(SAMP 67215)

07 00 02 09 LMP I hit one with the shovel here that I've got in my hand that you just saw me pick up and it didn't break anyway so at least it's that hard. (11)(SAMP 67215)

- - -  
 07 00 02 35 LMP Okay what mag - just give me a magazine - (11)(PHO DAC)  
 07 00 02 49 CDR T or U okay. It's T. (11)(PHO DAC)  
 - - -  
 07 00 02 56 LMP I'll put the mag on. (11)(PHO DAC)  
 - - -  
 07 00 04 12 CC And we want the DAC at f:4 and 12 frames per second. (11)(PHO DAC)  
 07 00 04 16 LMP It's set and it's on f:4 now. (11)(PHO DAC)  
 07 00 04 31 CDR Okay, Charlie, here's bag 6. (11)(SAMP 67215)  
 07 00 04 35 LMP Okay, John. Both padded bags are in there. (11)(SAMP 67215,35)  
 07 00 04 39 CDR The velcro came off both those bags and we weren't (11)(SAMP 67215,35)  
 able to put them tight like they're supposed to be.  
 07 00 04 46 CC They go under your seat, John. (11)(SAMP 67215,35)  
 07 00 05 01 CDR We put them in an SCB. (11)(SAMP 67215,35)  
 - - -  
 07 00 05 15 CC Fine, let's just leave them in the SCB. (11)(SAMP 67215,35)  
 07 00 05 33 LMP Okay. They're right on the top in number 6 and (11)(SAMP 67215,35)  
 there're no rocks on top of them.  
 - - -  
 07 00 07 20 LMP Okay, what's my mag count? (11)  
 07 00 07 24 CDR It's 122, Charlie. (11)  
 - - -  
 07 00 07 35 CDR Mine is 102. (11)  
 07 00 07 53 LMP Good grab sample. (11)(SAMP 67016, 20, 25)(PHO 116 18658-60)

07 00 07 55 CDR I thought you'd like that one. (11)(SAMP 67016, 20, 25)

- - -

07 00 08 05 LMP Okay, frame count for polarimetry we've done and I think we've got enough pans. Did Stone, Kiva, North Ray. (11)

- - -

07 00 09 07 LMP Okay, Tony, one final comment here, again, no impression of - to me, anyway, of layering or bedrock - just loose rocks in the walls and they're splayed out in ray patterns. (11)

07 00 09 25 CDR Man, that's some hole. (11)

07 00 09 26 LMP And there's about 1, 2, 3, 4, 5, 6, 7, 8, 9 rays coming out of there intermixed red and - white and black rocks in each of the rays and that's in about - maybe a half of the crater. (11)

07 00 09 45 CC Station 13 - - now will be right down your tracks about a half a kilometer and we'd like you to stop in the midst of those big boulders you described on the way up. (11)

- - -

07 00 10 05 LMP DAC's running? (11-13)(PHO DAC)

07 00 10 13 LMP There are your tracks. See them back over there? (11-13)

07 00 10 16 CDR Looks to me like we just go around the circle here, Charlie. (11-13)

07 00 10 22 CDR Okay, Station 13, right down the same way we came. (11-13)

07 00 10 30 LMP We can't see old Orion from here. This is going to be something going down this hill. (11-13)

07 00 10 38 CDR Are you sure we - I'm not sure we came up that hill. (11-13)

07 00 10 45 LMP Yeah, we did. There are the tracks. (11-13)

07 00 10 53 LMP Look at that slope! This is at least a 15-degree (11-13)  
slope we're going down and that Rover came right up  
it and you never even knew it.

- - -

07 00 11 17 LMP I shoulda had the camera pointing forward. Hey, (11-13)  
Tony, that was at - make it 179 at 4.4, that little  
steep slope there. Whoever said this was the Cayley  
Plain?

07 00 11 43 CDR I went down the rim of the crater here. We just set (11-13)  
a new world speed record, Houston. 17 kilometers an  
hour on the Moon.

- - -

07 00 12 23 LMP Going back across-sun, the tracks, we just barely (11-13)  
penetrated the regolith maybe 1/8 of an inch or so.  
Whatever it is, it's going to be real firm here.

- - -

07 00 13 03 CC Station 13 has a rake soil, then, documented samples (11-13)  
till you run out of time.

07 00 13 12 CDR Okay, we'll go up on this ridge here, Charlie, cause (11-13)  
that's where the big blocks were.

07 00 13 18 LMP Yeah. That big one we thought was the rim and it (11-13)  
was -

07 00 13 21 CDR Yeah. What we're up on now is a sort of a pre-rim (11-13)  
rim of this impact crater. And it's 600 meters from  
the rim.

07 00 13 45 LMP Okay, Tony, I'm panning your camera around at (11-13)(PHO DAC)  
various places here on the 16 to get right and left.

07 00 13 51 CC It's probably out of film now. (11-13)(PHO DAC)

07 00 13 56 LMP Already? (11-13)(PHO DAC)

07 00 13 58 CC No, we're just going to turn it off now. (11-13)(PHO DAC)

07 00 14 05 CDR It's half full, Charlie. (11-13)(PHO DAC)

07 00 14 08 LMP Okay, turning it off. (11-13)(PHO DAC)

07 00 14 39 LMP Tony, we just topped a - there's a big rock over there but this other one is down at the bottom of this hill here, John, we came by. We just topped another rise, and we're looking to the southeast across the - back towards the Kant Plateau. It's an undulating surface. (11-13)

07 00 15 14 CDR Here's the big rocks down here, Charlie. (11-13)

07 00 15 15 LMP That's them, yeah. But it's undulating til it hits the scarp of - I think I'd call it the Kant Plateau - that's the scarp on the map that you can map around - like a little reentrant on the map back to the east. We can see back up that way and all the way up on to the top of the plateau. (11-13)

- - -

07 00 16 00 CDR See that big rock over there? Maybe that's a permanently shadowed one. Try it? (11-13)

07 00 16 04 LMP I don't think so, but we can go look. You know, following our tracks back, we might find it, the CSVC. (11-13)

- - -

07 00 16 23 LMP On down this ridge, we're going down about - at least a 5-degree slope. We have one real filleted rock that we're just passing now at 3.8 at 183, and then we have another rock down here that's the same size, about 3 meters across that has hardly any fillet. And that's the one we're going to stop by. (11-13)

07 00 16 49 LMP Is that what you meant John for permanently shadowed? (11-13)

07 00 16 51 CDR Yeah. (11-13)

- - -

07 00 17 19 LMP If we park north we'll be in good shape for them. (11-13)

07 00 17 22 CDR Let's do that. (11-13)

07 00 17 23 LMP Okay, be able to see that biggy. That rock right there looks like that great big one we sampled up on the rim, John. (11-13)

07 00 17 31 CDR Sure does. (11-13)

07 00 17 33 LMP That's good. I just don't think it's going to be permanently shadowed through. (11-13)

07 00 17 37 CDR I don't either. (11-13)

- - -

07 00 18 16 LMP We're at 358 184 6.5 3.8 50. (13)

- - -

07 00 18 56 LMP I'm going to start a pan. (13)(PHO 106 17386-407)

07 00 19 07 CC Okay, the plan here is a rake soil first together, and after you've done that we'd like John to take an LPM and Charlie you can go sample. (13)

07 00 19 20 LMP Okay, let me get a pan first. (13)(PHO 106 17386-407)

- - -

07 00 21 51 LMP This area here is on a slope - about a 5-degree slope away from North Ray, and this big block that you'll see in a moment is downslope, filleted, predominantly downslope here. The surrounding terrain is covered with - not covered but 10 percent with cobbles. It's very subdued on the meter-sized craters, in fact, it's a very smooth plain, but on a slope. The rock types here appear to be same as we sampled up on top. We'll get you a rake soil out in front of this big boulder over here. (13)

07 00 22 55 LMP Both of us got bags on our backs so why don't we just take these little bags. (13)

07 00 23 00 CDR Okay. (13)

07 00 23 08 CDR Let me get tongs for a gnomon. (13)

07 00 23 18 CC Okay, Charlie, if you could grab the bottom of the (13)  
gnomon and the sheaf there, we could use that for a  
color and photometric scale. We won't have the  
level, but at least we'll get part of it.

07 00 23 36 CDR It would be good if there wasn't so much igneous (13)  
soil on it. When I have it we'll put it out there.

- - -

07 00 23 58 LMP Hey, John. See those 4 or 5 little rocks right (13)(SAMP RAKE 63520-98)(PHO 106 17408-09; 116 18661-67)  
there?

07 00 24 00 CDR Yes. (13)(SAMP RAKE 63520-98)

07 00 24 01 LMP Stick her down right there and let me. (13)(SAMP RAKE 63520-98)

- - -

07 00 24 28 LMP There's the down-sun and we'll - up the slope (13)(SAMP RAKE 63520-98)(PHO 106 17408)  
adroitly like a gazelle. Back to Station 13, Tony,  
it sure looks good.

- - -

07 00 25 00 CDR Get a bag for me, Charlie. (13)(SAMP RAKE 63520-98)

07 00 25 01 LMP Okay. (13)(SAMP RAKE 63520-98)

07 00 25 12 LMP Okay, there's some glass in there, a black chip. In (13)(SAMP RAKE 63520-98)  
one rake we got about 10 little, and the regolith  
here seems to be a little bit more loosely compacted  
then up on the top.

07 00 25 35 CDR I can't get my gnomon in. (13)(SAMP RAKE 63520-98)

07 00 25 45 LMP Not very productive though, on the small chips. (13)(SAMP RAKE 63520-98)

- - -

07 00 26 30 CDR Okay, there's about 20 small rocks going into to bag (13)(SAMP RAKE 63520-98)  
343.

07 00 26 34 LMP That's three scoop fulls Tony. (13)(SAMP RAKE 63520-98)

07 00 26 46 LMP Okay and a soil. (13)(SAMP 63500-09,15)(PHO 106 17408-09; 116 18661-67)

07 00 26 51 CDR Let me get another bag from you Charlie. (13)(SAMP 63500-09,15)

- - -

07 00 27 18 CDR Okay, that looks like 2 scoopfuls going into bag 346. (13)(SAMP 63500-09,15)

07 00 27 26 LMP Sack it. (13)(SAMP 63500-09,15)

07 00 27 31 CDR Ah, isn't that beautiful. If it gets out of there we'll call it Houdini. (13)(SAMP 63500-09,15)

07 00 27 44 LMP Houston, the big eye's looking right at the big rock. (13)  
What do you think of that beauty?

07 00 27 45 CC That's exactly what we're looking at - - while John's doing the LPM we'd like you to hammer on that rock a bit. (13)

07 00 27 53 LMP I'm going to hammer. I'll hammer chips from corners. (13)

07 00 28 00 CC And if you get a chance and it looks like some soil right on the south side, kind of underneath - might be permanently shadowed you might take some of those and just put it in the bag. (13)(SAMP SOIL 63320-24)(PHO 106 17413)

07 00 28 11 LMP All righty. (13)

07 00 28 27 CDR I didn't park too good to do the LPM. If I go 45 feet from here I'm going to be in the middle of a crater. Is that okay? (13)

07 00 28 37 CC No pick a fairly level - just go a different direction. (13)

07 00 28 44 CDR Okay, you don't mind if I go out behind the Rover, for example. (13)

07 00 28 47 CC No, that's fine. (13)

07 00 28 50 CDR Instead of at right angles to it. (13)

07 00 28 53 LMP John, where are those bags that still got the bracket on it - is it under your seat here? (13)

07 00 29 00 LMP The bags that had the brackets on them? (13)

07 00 29 01 CDR Oh I think they were bounced out. (13)

07 00 29 05 LMP No, yeah - here you go. (13)

- - -

07 00 29 16 CDR Okay, well I think I'll go out as far - I'll go out (13)  
east-southeast.

07 00 29 31 CDR It's off to our starboard bow or something. (13)

- - -

07 00 30 12 LMP Okay, I'm going to get on the sunlit side so I'll (13)  
know what I'm whacking on here. That might be a  
permanently shadowed soil right in there. I think (SAMP SOIL 63320-24)  
it is, as a matter of fact. It'll pass.

07 00 30 33 CC Let's get one of those. (13)(SAMP SOIL 63320-24)

07 00 30 38 LMP Okay, I'll do it. Phew! Hey, what's the setting (13)(SAMP SOIL 63320-24)(PHO 106 17410-12)  
for in there - 250 at 5.6? Would that look into  
there?

07 00 30 52 CC Let's try that. (13)(SAMP SOIL 63320-24)

07 00 30 53 LMP Yes sir, baby, that is a perfect shadowed soil (13)(SAMP SOIL 63320-24)  
sample.

07 00 31 08 LMP It is really perfect! John, you couldn't (13)(SAMP SOIL 63320-24)  
have picked a better rock!

- - -

07 00 31 52 LMP I don't know how long that rock's been there, but (13)(SAMP SOIL 63320-24)  
that dirt has been shadowed ever since it's been  
here.

07 00 32 01 LMP That's why - I got it from about a meter up under (13)(SAMP SOIL 63320-24)  
there, Tony.

07 00 32 13 LMP And I'm sorry, but it's going to have to go in a (13)(SAMP SOIL 63320-24)  
little ol' plastic bag here.

07 00 32 20 LMP And it's number 426. (13)(SAMP SOIL 63320-24)

07 00 32 21 CC Any chance getting soil underneath that now for the control? (13)(SAMP SOIL 63340-44)(PHO 106 17413)

07 00 32 30 LMP Underneath the shadowed, you mean? (13)(SAMP SOIL 63340-44)

07 00 32 33 CC Underneath where you just touched, just dig deeper. (13)(SAMP SOIL 63340-44)

07 00 32 40 LMP Yeah, let me tip my visor down, that thing is bright! Get out of the sun. Yeah, I can get that for you. That's about 100 grams, Tony, maybe 200.

- - -

07 00 33 46 CDR Get a picture of it. (13)(SAMP SOIL 63340-44)

- - -

07 00 34 21 CDR Can I help you Charlie? Let me put that in the bag. (13)(SAMP SOIL 63340-44)

07 00 34 24 LMP I got it. (13)(SAMP SOIL 63340-44)

- - -

07 00 34 35 CC Okay, that'll be good on the soil sample. And we'd like to spend the rest of the time, and there isn't much of it, hammering on that rock. (13)

07 00 34 46 LMP Okay, there's about 50 grams in the control. (13)(SAMP SOIL 63340-44)

07 00 35 50 CDR It's going into the bag 427. (13)(SAMP SOIL 63340-44)

07 00 35 00 CDR Boy, it just might be permanently shadowed Houston, because it's downslope. (13)(SAMP SOIL 63340-44)

07 00 35 14 LMP I reached in there about 2 to 3 feet it looked like to me. (13)(SAMP SOIL 63340-44)

07 00 35 20 CDR That there is one of those gopher holes. (13)(SAMP SOIL 63340-44)

- - -

07 00 35 37 CDR One thing about this rock - - this is the one that I noticed when we were coming up the way that had some of these holes in it - look like vesicles. (13)

07 00 35 45 LMP Yep, they sure do, big ones - biggies! (13)

07 00 35 48 LMP Now I'm out of film, I think. (13)(PHO 106 17417)

07 00 35 50 CDR Couldn't be zap holes. (13)

07 00 35 54 CC Okay, Charlie, we'd like magazine Foxtrot on your camera. (13)

07 00 36 00 LMP Okay. (13)

- - -

07 00 36 08 CDR Okay, let me take a picture for you, Charlie. Where at and how much? (13)

07 00 36 09 LMP No, that's okay. Look at this. Tony, this is a black matrix with some excellent crystals in it and also that are milky in color. Don't see any cleavage though, or striations - about a centimeter across, and it has a matrix of that white rock like up on the rim - not a matrix but some clasts of that. (13)

07 00 36 50 LMP Tony, say again the mag? (13)

07 00 36 54 CC You'll need magazine Foxtrot. (13)

07 00 37 03 CDR I'll take the LPM readings. Okay, 161 711 117, 160 711 120, 160 712 117. (13)

- - -

07 00 37 53 CC Okay, Charlie, just get a couple of samples there and you should be about ready to go, then, when John gets that reeled up. (13)

07 00 38 02 LMP That's what I'm going to do. (13)

07 00 38 16 LMP Okay, I got a handful of chips there. (13)(SAMP 63335,50,55)

07 00 38 33 CDR See here - Charlie, when you get under the dirt, it's all white. (13)

07 00 38 38 LMP I know, hey, 428, Tony. (13)(SAMP 63335)(PHO 106 17413-17; 116 18670-71; 117 18727-30)

- - -

07 00 40 23 LMP Okay, Tony, I got three chips off of the rock scattered over about a 2-meter area. One of them is too big to go in the bags, but the other - the one is right now going in 429. (13) (SAMP 63350,55)(PHO 106 17413-16)

- - -

07 00 40 49 LMP Get this other rock. (13)(SAMP 60017)(PHO 106 17417; 116 18670-71; 117 18727-30)

- - -

07 00 41 17 LMP And, Tony, this rock here looks like the same - it's the same character as the ones up on the rim. (13)(SAMP 60017)

07 00 41 34 LMP That great, huge black one that we sampled except that we don't - that one up there didn't have any of these holes in it. I can't really say what these holes are here. They just look - they're vugs - let's just call them vugs. What caused them I don't know. (13)(SAMP 60017)

07 00 42 00 CDR Yeah, they look more vuggy to me although they're round. (13)

07 00 42 03 LMP They look like drill holes is what they look like. (13)

- - -

07 00 42 11 LMP Here, put those up for me. (13)(SAMP 63335,50,55; 60017)

07 00 42 19 CDR Okay, they look like the holes that you get in rocks where you have a venting of gas that comes up through there like along - (13)

- - -

07 00 42 31 LMP Vesicle pipe. (13)

07 00 42 33 CDR Yeah, vesicle pipe that's it. (13)

- - -

07 00 43 21 CC Charlie, you've got about 4 minutes on the DAC - - at 12 frames per second and you can either use it that way or one frame per second, either way you want, on the way back, which ever looks best to you. (13)(PHO DAC)

07 00 43 35 CDR Why don't we go at one frame a second all the way back to the Rover? (13)(PHO DAC)  
 ---

07 00 44 01 CC And, we like your frames before you load up. (13)  
 ---

07 00 44 11 LMP Okay, I'm 6 on magazine Foxtrot. (13)

07 00 44 17 CDR I'm at 112. (13)  
 ---

07 00 44 28 CDR Make that 114, Houston. (13)

07 00 44 33 LMP That Smoky mountain is a steep-sided mountain, Tony. (13)  
 I got a good view of Ravine here, and it's steep sided on the Smoky mountain side, but very undulating on the other side - on the Cayley side. And you can see Cat crater, and it doesn't look very blocky, so I guess it's probably, it's sharper than the rest, but there're still no blocks around it.

07 00 45 34 CC Charlie, if you haven't gotten on yet we'd like to change that to 12 frames. Evidently your DAC is about out of electrical power. (13)(PHO DAC)

07 00 45 42 LMP Okay, it's going at 12. (13)(PHO DAC)

07 00 45 50 LMP I'll start it when we get started, but it's on 12. (13)(PHO DAC)

07 00 45 56 LMP F:4. (13)(PHO DAC)  
 ---

07 00 46 11 LMP Hope we picked up the right rocks. I think there are two predominant type rocks here, the aphanitic black looking ones that really appear to be crystalline to me, and not necessarily lava-like. (13)

07 00 46 33 CDR Okay, we're on our way, Houston. (13-10')

07 00 46 36 CDR And we're going to follow our tracks. (13-10')

07 00 46 41 CC Station 10 makes a triangle with ALSEP and the old (13-10')  
 Station 10. We'll call it Station 10 prime, and  
 it's about 50 meters to the northwest of the old 10.  
 - - -

07 00 47 20 LMP Okay, I'll take the same set of pictures coming (13-10')(PHO 117 18730-800; 116 18672-80)  
 back, Tony.  
 - - -

07 00 47 31 LMP That we took going out to get the different sun (13-10')(PHO 117 18730-800; 116 18672-80)  
 angles. This taking pictures from the Rover here is  
 really good. The camera's just in the right  
 position, Tony, so I hope they will come out. Okay,  
 off to the right, we're at 3.7 186, off to our right  
 we have some more of the rounded rocks, whitish in  
 character.

07 00 48 04 CDR So far on this trip my personal estimation of (13-10')  
 Charlie's slope estimates is you can take them and  
 double them, everyone of them.  
 - - -

07 00 48 35 LMP Houston, this is the roughest terrain to be plains I (13-10')  
 ever saw.  
 - - -

07 00 48 56 LMP Tony, looking back now at 2 o'clock, and we're (13-10')  
 heading 140 188 3.6, you can see End crater right on  
 the flank of Palmetto, and you can see the rim of  
 Dot. Palmetto is one of the highest features  
 around, and its rim is really raised. I can see  
 some large blocks on the north side of it that I  
 couldn't see before. And I would estimate 2 meters  
 or so in size.

07 00 49 52 LMP Off to the right toward that - which we described (13-10')  
 going out, now I can see 4 or 5 2-meter size  
 boulders, whitish in color, with no fillets around  
 them.

07 00 50 12 LMP I guess we would be off the ejecta blanket here, (13-10')  
 wouldn't you say, John?

07 00 50 15 CDR Yeah. (13-10')

07 00 50 16 LMP This is probably right in between the North and South Ray ejecta because there is hardly any pebbles; it's almost a completely smooth surface, maybe 2 percent, Tony, with cobbles up to 5 centimeters. An occasional 20-centimeter block. (13-10')

07 00 50 46 CC As that Sun gets higher, it must be about like looking at that zero phase everywhere. (13-10')

07 00 50 53 CDR Naw, the visibility gets pretty good at high sun angle. It's still bad going out of the Sun and into the Sun. But it's pretty good the way we're going right now. Want to take a picture into Palmetto, Charlie? (13-10')

07 00 51 08 LMP If we can get in there, I'd like to. Yeah, go up by Dot. (13-10')

07 00 51 11 CDR Okay. (13-10')

07 00 51 12 LMP That's going to be a pretty steep slope though. (13-10')

07 00 51 15 CDR Well, I'll tell you what. We'll go up there and do a 360 pan. How would that be? (13-10')(PHO 117 18766-71)

07 00 51 19 LMP Okay. I'll do just 1-frame setting. It'll be a little off on exposure but - we'll see what it looks like. (13-10')(PHO 117 18766-71)

07 00 51 31 CDR Developed a new technique for panning, Houston, 360 degrees on the Rover. Clicking away. That ought to make stereo for you. (13-10')(PHO 117 18766-71)

07 00 51 45 LMP We look like we're in a - old - secondary area now, Tony, at 191 at 3.1 - (13-10')

07 00 51 54 CDR I think this is a South-Ray ray. (13-10')

07 00 51 55 LMP You do? (13-10')

07 00 51 56 CDR Yeah. (13-10')

07 00 51 57 LMP Yeah, you're probably right. (13-10')

07 00 51 59 CDR A big hunk of South Ray. Right? Same rocks and (13-10')  
everything. And we're traversing it right now.  
It's a big rough - big old blanket full of South Ray  
material.

07 00 52 10 LMP Look at those big rocks up on the - off to the west (13-10')  
there, John, up on the - you probably can't see  
them, but they're about 10 - stand out starkly  
against - - the skyline on the far ridge.

07 00 52 23 CDR Yeah. (13-10')

07 00 52 25 CDR Yeah, there's one of those black rocks like we (13-10')  
got out of South Ray. That's a couple of meters,  
black rock. Houston, now we've talked about that  
one when we passed by the first time. That's the  
same rock that we saw on the rim. That's the same  
class of rock, I would think, that was that Big  
House rock.

- - -

07 00 53 35 CDR Are we up on the rim of Palmetto? (13-10')

07 00 53 37 LMP No, we got a long way to go yet. (13-10')

07 00 53 39 LMP See there is Dot. (13-10')

07 00 53 40 CDR Oh, yeah. (13-10')

07 00 53 42 LMP Dot's the white spot up on the top there. (13-10')

07 00 53 47 LMP I've seen the same characteristics in South Ray (13-10')  
rocks, as North Ray rocks, being the black and the  
white. The streaks up the side of the craters are  
basically the same. The North Ray, you got to guess  
at it a little bit more, and that might be totally  
what my guess is. It could be wrong, but I kinda  
think they're at least similar rock.

- - -

07 00 55 05 LMP Yeah, I think you - I think we could make it up over (13-10')  
there, John, if you broke right here, but, I guess  
you want to follow the old track. We were pretty  
close to the rim there for one time.

07 00 55 13 CDR Yeah, we'll get there. (13-10')

07 00 55 14 LMP We know this way works. (13-10')

- - -

07 00 55 28 LMP But, Tony, if we sample one of these very fresh (13-10')  
craters with the indurated regolith that to me look  
like they're maybe the freshest thing around. Can  
you all date that with the - just from the regolith  
that is - the glassy shards or whatever is in there?

- - -

07 00 56 15 LMP There's a lot of them around the rim and I'd like to (13-10')  
at least pick up some of that and see what you all  
could do with it.

07 00 56 22 CC That sounds like a good idea. We've got a definite (13-10')  
maybe from the back room there.

07 00 56 30 LMP Okay, and, Tony, we're looking into End crater, and (13-10')  
it's a blocky crater. There're blocks inside of it,  
and there're some on the rim, half meter size. And  
maybe 10 centimeters, naw let's make it -

07 00 56 41 CC Right, and you're asking about a stop. We don't (13-10')  
want to stop. We want to go on to 10 prime.

07 00 56 52 LMP Naw, we weren't talking about a stop. I was just (13-10')  
describing End crater there. It is a blocky rim  
crater.

07 00 57 00 LMP As we suspected. (13-10')

- - -

07 00 57 12 CDR We're doing 14 clicks. (13-10')

- - -

07 00 57 40 LMP When we hit a bump, Tony, and bounce down, that rear (13-10')  
wheel that lost the fender, showers dirt all over  
the front of us, and that's what gets the LCRU and  
the camera so dirty.

- - -

07 00 58 32 LMP It takes just about any terrain. It's really a (13-10')  
remarkable machine.

07 00 58 37 CDR Sure is climbing a slope right now, Charlie. We're (13-10')  
only doing - got at V-max and we're only doing 8  
clicks. So you know this has got to be steep.

- - -

07 00 59 11 LMP Okay, Tony, we're at - just passing End crater, and (13-10')  
the rocks appear to be the same as we sampled, in  
texture, they're maybe not as shocked, as the ones  
up on the rim. I could grab you one in about a  
minute.

07 00 59 40 CC No we better press on. (13-10')

07 00 59 42 LMP Lets go over and look at the rim, John, here. (13-10')

07 00 59 48 CC Incidentally we were able to track you in the Rover (13-10')  
on the way out with the PSE and they're able to see  
you now on the way back with the active seismic  
geophones. We'd like to be sure that you are in the  
same tracks you were going out.

07 01 00 05 CDR That's true. (13-10')

07 01 00 07 LMP And we're at 192 at 1.9. Hook a right please, get (13-10')(PHO 117 18764)  
this old picture.

07 01 00 29 LMP Hey, Tony, we're going to drive over to the rim of (13-10')  
Palmetto, which is a pretty good site.

07 01 00 36 LMP And we see some blocks on the inner rim, but nothing (13-10')  
that really appears to be outcrop, and it's really a  
deep crater, Tony. It's -

07 01 00 53 CDR Don't see the bottom. (13-10')

07 01 00 54 LMP We can't see the bottom and we're right on the rim. (13-10')  
It must be 100 meters or so deep.

07 01 01 01 CDR Pictures of it, Charlie? (13-10')

07 01 01 02 LMP No I didn't get it, I thought we were going to do a (13-10')  
(360).

07 01 01 05 CDR Okay, here we go. (13-10')

07 01 01 07 LMP Okay, starting now, click - click - click - click - (13-10')(PHO 117 18766-71)  
click - click. Okay that's about a 4 shoter, it  
might not be completely overlapped, but I think it  
will be good enough.

07 01 01 31 LMP Okay, we're heading out, Tony. (13-10')

07 01 01 35 LMP And the rim here is cobbly, I wouldn't say it's (13-10')  
blocky, but it's cobbly.

07 01 01 43 CDR I think we've been averaging 11 kilometers, Houston. (13-10')

07 01 01 51 LMP Look at that view back towards South Ray, isn't that (13-10')  
spectacular?

07 01 01 57 CC Looking ahead at the tracks, could you tell when you (13-10')  
picked up the softer regolith? On the tracks that  
you came out?

07 01 02 06 LMP They've all looked the same, haven't they to you, (13-10')  
John?

- - -

07 01 02 17 CC Right, you - mentioned up on North Ray that you only (13-10')  
went in - an eighth of an inch or so.

07 01 02 26 CDR The regolith does change character right past the (13-10')  
LM. And it's a lot less blocky, you know? I think  
this ray right here -

- - -

07 01 02 30 LMP I think this is probably ray, yeah. It's probably (13-10')  
either that or it came out of Palmetto.

07 01 02 48 CDR This would have been a good choice for a rocky (13-10')  
traverse. See over there in the west, that far rim  
over there, don't you see something looks like -  
down in that ledge down there.

07 01 03 07 LMP Yes there are 2 spots over there that might be (13-10')  
outcrop, Tony. There's a -

07 01 03 14 CDR Oh, that's probably a secondary or something that's probably a big rock clot from North Ray. (13-10')

07 01 03 22 CDR Yeah, that's what it is. (13-10')

07 01 03 23 CDR It's hit in there - (13-10')

07 01 03 25 LMP Yeah, there's one farther around though on the southwest rim, John, that sticks out like it's eroded away from underneath it. (13-10')

07 01 03 35 LMP That has a hint of bedrock, but it's - and that's about on the southwest rim - about 20 percent down from the upper rim of Palmetto, Tony. (13-10')

07 01 03 50 LMP But it's just one little isolated block and I don't really think it means much. Still can't see the LM, we're on the - (13-10')

07 01 04 02 CDR See South Ray though, get a picture. (13-10')

07 01 04 04 LMP I'm getting them as fast as I can pull the trigger. We thought we'd be able to see the rim from here, Tony, but we're - you can't do it - I mean the LM, but you can't do it. This thing says 194 or 1.4. I bet you that's right. We came farther east. (13-10')(PHO 117 18777)

07 01 04 40 CDR Yeah, we're way east. (13-10')

07 01 04 43 LMP Yeah, okay, Tony, between Gator and Palmetto. (13-10')

- - -

07 01 04 57 LMP Between Gator and Palmetto, we almost hit a great big rock, but old Percy here avoided it. Look at that. 194, John, takes us right out our tracks. Between Gator and Palmetto Tony, there's a swale, a depression that runs east-west, that is apparently more cratered than - and a lot fresher crater there, than what we been driving on between Palmetto and North Ray. (13-10')

- - -

07 01 07 07 CDR How many gammas did you say that LSM was, Tony, 300 and some? (13-10')

07 01 07 12 CC 313. (13-10')

07 01 07 16 CDR How many times higher than that - that's ten times (13-10')  
higher than what the Apollo 12 guys got isn't it?

07 01 07 26 CC No, it's not that much greater, it's about 100 more (13-10')  
than they got on Apollo 14.

07 01 07 35 CDR That's what I thought. Well the magnetic field of (13-10')  
the Moon in places is a lot more than anybody ever  
believed it would be.

07 01 07 44 CC That's right. From lunar orbit it only looks like - (13-10')  
from high lunar orbit, it only looks like 2 or 3  
gamma at most.

07 01 07 53 LMP John, that looks like an endogenic crater right over (13-10')  
there to me.

07 01 07 56 CDR Which one? (13-10')

07 01 07 57 LMP Off at 2 o'clock. It has no rim to it - (13-10')

07 01 08 03 CDR Looks like a sink hole type. (13-10')

07 01 08 04 LMP Looks like a sink hole, big doodle bug hole. And (13-10')  
that's, Tony, at our 2 o'clock and we're presently  
at 0.9 at 198.

07 01 08 13 CC We know exactly which one you're talking about. (13-10')

07 01 08 15 LMP It's only about 100 meters or so from us. (13-10')

07 01 08 17 CC Is it on top of a little dome? (13-10')

07 01 08 24 LMP Yeah we are. (13-10')

- - -

07 01 08 50 LMP Tony, this crater is about, I'd say at least 200 (13-10')  
meters across, has no rim, and no blocks associated  
with it, except for rays.

07 01 09 11 LMP Do we do a 360? (13-10')

- - -

07 01 09 32 LMP Make it about 115 270, little bit further right, (13-10')  
John, that's good; now you can go back.

07 01 09 42 LMP Got it - I've got it. Okay? There - now there is a (13-10')(PHO 117 18789)  
fresh crater with glass right in the bottom of that  
little fresh crater right back there. Meter size.

07 01 09 54 CDR 198 at 0.7 is the crater that Charlie's talking (13-10')  
about.

07 01 10 12 CDR And that's not on the map either. It doesn't even (13-10')  
show up. I guess my opinion of this place is that  
on our traverse maps the rimless features, the very  
low subdued rimless craters, they just don't even  
show up, and they're just not there hardly.

07 01 10 36 CDR And unless they've got a raised rim, they don't (13-10')  
measure it, they don't show up in photography  
apparently.

07 01 10 44 LMP Tony, that sink hole, or whatever it was - subdued (13-10')  
crater we passed back there, is really deep, I'm  
surprised - I really don't have a map right here  
with me but it was probably 40 meters deep or so.

07 01 11 05 CC Right, we've got it on the map here. (13-10')

07 01 11 06 LMP We couldn't see the bottom of it. (13-10')

- - -

07 01 11 22 LMP NAV is 196 at .5, we ought to see the old beauty (13-10')  
when we top the rise here. John just ran over a  
basketball size rock with the right wheel and just -  
there she is John.

07 01 11 46 LMP We're about on top of a ridge maybe 30 meters above (13-10')(PHO 117 18794)  
and that NAV system has us pointed right at the  
Lunar Module. Look at that.

07 01 12 01 LMP Okay, it's 0.4. We're about 20 meters up, 30 meters (13-10')  
up above it, Tony.

07 01 12 15 CC Okay. If you can recognize an edge of the ray, in the neighborhood of 50 meters, north of the ALSEP area, that would be a good place to pick Station 10 prime. Our photo shows the edge of the ray in there. (13-10')

07 01 12 30 CDR This would be a good place to look for it from Charlie, right up here. (13-10')

- - -

07 01 12 36 CDR Pick the edge of a ray, 50 meters or so north of an ALSEP site - of the ALSEP. Tony you can hardly tell where one - they're not as distinct - the gradational pattern is just too gradual. (13-10')

07 01 12 57 CC Just pick a place 50 meters north and we'll call that 10 prime. (13-10')

07 01 13 17 LMP Tony, we must be out of battery power because this camera - this DAC stopped running - - with about 50 percent of the mag left. (13-10')(PHO DAC)

- - -

07 01 13 33 LMP Okay, John let me get a picture of that. That is beautiful. Another picture? Okay. Back a little bit. I can't believe that big hole there, I can't believe it right behind us. (13-10')(PHO 117 18797-98)

07 01 13 58 LMP Hook a right, John, let me get another picture while we're running. You know that might be an end of a ray right there, see that, it's almost a blockless feature. (13-10')(PHO 117 18799)

07 01 14 18 LMP That might just be due to the downslope though. Don't run into our hole. (13-10')

- - -

07 01 14 32 CDR Where do you want to park this thing Houston, 50 meters from the AL - - (13-10')

- - -

07 01 14 42 LMP The northwest. (13-10')

07 01 14 44 LMP Just up over this little ridge here. (13-10')

07 01 14 46 CDR Right by that big rock. (13-10')

07 01 14 50 CC Okay, we're looking for in the sampling here, those vesicular basalts that you both described in the area. And also we - - (13-10')

07 01 15 04 LMP That might be one right over there, John, it's the bluish - (13-10')

07 01 15 17 CC - - and to make a triangle with the other double core and the deep core. (13-10')

- - -

07 01 15 40 LMP We're stopped and we're just about directly north of the ALSEP. (10')

- - -

07 01 16 20 LMP We're 180, 188, 11.1, .1, 30. (10')

- - -

07 01 17 18 LMP Okay, and I'm starting out with frame count 80, magazine Foxtrot. You want me to get a pan, Tony? (10')

07 01 17 25 CC Yeah, pan will be good. And after that we'll go on with rake soil at this site. (10')(PHO 117 18801-23)

- - -

07 01 19 42 LMP Okay, just a minute. I'm halfway through a pan here. Take me just a second. (10')(PHO 117 18801-23)

- - -

07 01 20 35 LMP Tony, a double core here too? (10')

- - -

07 01 20 44 CC Yes, we would like a double core. The rake soil is first priority and then the double core. (10')

- - -  
 07 01 22 03 LMP Dropped a gnomon right where I wanted to sample. (10')(SAMP RAKE 60610-79)(PHO 117 18824-25; 116 18681-84)  
 The big eye is looking the wrong way. Boy, I just  
 can't see anything when I get this camera in my  
 shadow.  
 07 01 22 24 CDR That's a good place, Charlie. (10')(SAMP RAKE 60610-79)  
 07 01 22 29 LMP There's the down-sun, at 4, f:8, cross-sun. (10')(SAMP RAKE 60610-79)(PHO 117 18824)  
 - - -  
 07 01 23 00 LMP Look at that regolith. We've got some glass-coated (10')(SAMP RAKE 60610-79)  
 frags here, Tony - - in the rake. I don't see  
 anything that looks like -  
 07 01 23 19 CDR Get another. (10')(SAMP RAKE 60610-79)  
 07 01 23 20 LMP Okay, that was about half a bag full. One scoop. (10')(SAMP RAKE 60610-79)  
 07 01 23 30 CDR Bag's full. (10')(SAMP RAKE 60610-79)  
 07 01 23 33 LMP Okay, Tony, out of that scoop we lost the two (10')(SAMP RAKE 60610-79)  
 biggest rocks. I poured too fast.  
 - - -  
 07 01 24 10 CDR Okay, that's in bag number 347. (10')(SAMP RAKE 60610-79)  
 07 01 24 20 LMP Okay, get an after, John. (10')(SAMP RAKE 60610-79)(PHO 116 18683-84)  
 07 01 24 23 CDR Yeah I'll get it. (10')(SAMP RAKE 60610-79)(PHO 116 18683-84)  
 07 01 24 25 LMP Okay. After. Old after. (10')(SAMP RAKE 60610-79)(PHO 116 18683-84)  
 07 01 24 38 CC Right, we're going to want a rake soil, over in the (10')  
 area of the old Station 10, also. So it's up to you  
 whether it's easiest to go get it now or to get the  
 double core now. After you're through with this  
 one.  
 07 01 24 51 CDR Let's get the soil, Charlie. (10')(SAMP RAKE SOIL 60600-04)(PHO 117 18824-25;  
 116 18681-84)

07 01 24 52 LMP We'll get the soil. I think it would be easier to go get it John because I've got to do the double core - (10')(SAMP RAKE SOIL 60600-04)  
 - - -

07 01 25 14 LMP Yep. Okay, there's a scoop. (10')(SAMP RAKE SOIL 60600-04)

07 01 25 21 CDR Okay, and that's going into bag 348. (10')(SAMP RAKE SOIL 60600-04)

07 01 25 38 LMP That's just right over the ridge there, about 50 meters isn't it? (10')  
 - - -

07 01 25 43 LMP At old Station 10. (10')  
 - - -

07 01 25 52 LMP Okay, get an after of that John, and scoop. How about swapping, I'll bag and you rest. (10')(SAMP RAKE SOIL 60600-04)(PHO 116 18684)

07 01 26 01 LMP Okay, I'll get the gnomon. (10')

07 01 26 04 CDR Why don't you let me get the gnomon, I'll drop it over there, cause I can get down a lot easier. (10')

07 01 26 06 LMP Okay, go ahead. (10')  
 - - -

07 01 26 29 CDR Look at these neat little craters, you just run right through them. There's a lot of tracks around there, Charlie. That must be the old Station 10 right there. (10'-10)

07 01 26 47 LMP It's right over here, it is, yeah. This is where we took the double. Do you want it where we had the double core, Tony? (10'-10)

07 01 26 55 CC The double core will be at this rake site, but while you've got the rake on there - - we might as well get the rake at the old double core. (10'-10)

07 01 27 05 LMP This is the old double core site, we'll rake here. (10)(SAMP RAKE 60510-35)(PHO 117 18826-27; 116 18685-88)

07 01 27 13 CC That's exactly what we want. (10)(SAMP RAKE 60510-35)

07 01 27 17 LMP Okay, we're within three meters of it. (10)(SAMP RAKE 60510-35)

07 01 27 23 LMP Yeah. I think any of these places is a good place (10)(SAMP RAKE 60510-35)  
around here. Man that's a beautiful vehicle.  
Down-sun. (PHO 117 18826)

07 01 27 44 CDR Okay, you locating it, Charlie? (10)(SAMP RAKE 60510-35)(PHO 117 18827)

07 01 27 53 LMP Yeah. Okay, we're sacking it 349. (10)(SAMP RAKE 60510-35)(PHO 117 18827)

07 01 28 20 LMP John's got 2 scoops - 2 rakes full. Not nearly as (10)(SAMP RAKE 60510-35)  
productive over here.

07 01 28 29 CC Okay, you're probably on a different part of the (10)(SAMP RAKE 60510-35)  
ray, then. That's good.

07 01 28 39 LMP Two scoops and we got 3 little frags. One of them (10)(SAMP RAKE 60510-35)  
just dropped out.

07 01 28 44 CDR Three is all we got? (10)(SAMP RAKE 60510-35)

07 01 28 46 LMP Two, 1 of them dropped out. (10)(SAMP RAKE 60510-35)

- - -

07 01 29 03 CDR Here's a couple more. (10)(SAMP RAKE 60510-35)

07 01 29 16 CDR Okay, let me get 1 more, Charlie. (10)(SAMP RAKE 60510-35)

07 01 29 36 LMP He had about 20 pounds of soil, Tony, and he came up (10)(SAMP RAKE 60510-35)  
with 1 little frag. And we just dropped it.

07 01 29 45 LMP That's enough. (10)(SAMP RAKE 60510-35)

07 01 29 47 CC Yeah, let's just call that our rake sample. (10)(SAMP RAKE 60510-35)

07 01 29 48 LMP Okay, we got about 4 frags in 349. Hey we need a (10)(SAMP RAKE 60510-35)  
soil sample, John.

07 01 30 26 CDR Okay, let me get 1 more scoopful. (10)(SAMP RAKE SOIL 60500-04)(PHO 117 18826-27; 116 18685-88)

07 01 30 42 CDR Get a little after here. (10)(SAMP RAKE SOIL 60500-04)(PHO 116 18687-88)

07 01 30 51 LMP Hold that one and put it in my bag while I zee this (10)  
one up. Okay, I think we got about 10 bags left and  
that's it.

07 01 31 13 CC Okay, was that bag 350, we didn't get a number. (10)(SAMP RAKE SOIL 60500-04)

07 01 31 22 LMP Yeah, 350, Tony. It was. (10)

07 01 31 30 LMP What are you supposed to be doing while I do the (10)  
double core?

07 01 31 32 CDR I'm supposed to be sampling. (10)

07 01 31 34 CC Right. Be looking around for exotics -- especially (10)  
things like that vesicular basalt you described.

07 01 31 45 LMP That's why I'm whacking on this one. (10)(SAMP 60018)(PHO 117 18827; 116 18689-93)

07 01 31 50 LMP That is a hard rock, right there, John. (10)(SAMP 60018)

- - -

07 01 32 13 LMP I got it with the rake. Why don't you take that and (10)(SAMP 60018)  
put it in my sack and I'll go over and get the  
double core?

07 01 32 23 CDR Why don't you carry this one over there and throw it (10)(SAMP 60018)  
in the big bag.

07 01 32 26 LMP Okay, I'll do it. Okay, Tony, I just whacked off (10)(SAMP 60018)  
one at - I thought was basaltic looking but it turns  
out it's glassy with the white matrix in it.

- - -

07 01 33 15 LMP Hey, come - here's another one of those glass balls. (10)(SAMP 60130,35)(PHO 116 18694-96)

07 01 33 22 CDR Yeah, that's a big one. (10)(SAMP 60130,35)

- - -

07 01 34 46 CDR That son of a gun, must be solid. (10)(SAMP 60130,35)

07 01 34 51 CDR Houston, this glass ball that've got doesn't have (10)(SAMP 60130,35)  
any give to it.

07 01 35 02 CDR Going into bag 380. (430) (10)(SAMP 60130,35)

07 01 35 10 LMP Okay, double core's assembled. (10)(SAMP CORE 60013-14)(PHO 116 18697-700)

07 01 35 14 CDR Impact? Well it's smooth on one side and has impact pits on the other. (10)(SAMP 60130,35)

- - -

07 01 36 25 CDR Okay, I'm gonna take these two big rocks and put them in the big rock bag, Charlie. (10)(SAMP 67016; 61016)

07 01 36 29 LMP Okay, "Muley's" got to go in there too. (10)(SAMP 61016)

07 01 36 52 LMP Okay, Tony, I pushed it all in - almost three-quarters of the way on the bottom core. (10)(SAMP CORE 60013-14)

- - -

07 01 37 02 LMP John, could you - - take a picture of that for me? I don't have my camera. (10)(SAMP CORE 60013-14)(PHO 116 18697-700)

07 01 37 13 CC And John, while you're looking around there, our number one priority is a vesicular basalt. (10)

07 01 37 21 LMP Yeah, I understand. (10)

07 01 37 23 CDR I bet we ain't going to find one. (10)

- - -

07 01 38 02 LMP Okay, John, how about spinning and taking one more picture of that in the ground. Could you? (10)(SAMP CORE 60013-14)(PHO 116 18698)

07 01 38 11 CDR May as well, what's the setting? (10)(SAMP CORE 60013-14)(PHO 116 18698)

07 01 38 15 LMP About f:11 or so. (10)(SAMP CORE 60013-14)(PHO 116 18698)

- - -

07 01 38 49 CDR I could correctly identify this rock as out of North Ray - no, I can't. It sure looks like that rock that we saw. (10)

07 01 39 10 LMP Hey, Tony, at the bottom of the core it looks whitish, and it's pretty coarse grained - it's not real fine. It's sort of like a crumbly, shocked rock. (10)(SAMP CORE 60013-14)

07 01 39 48 CDR I'm looking, but I'm not seeing any vesicular (10)  
basalt.

07 01 39 52 CC Okay, after you get this core packed up, why don't (10)  
you drive on back to the LM, to the normal closeout  
position, and we'll let you sample around there -  
see if you can find one around there. You described  
something in a crater behind the LM.

07 01 40 53 LMP Okay, the bottom was 32, Tony. Top is 27. (10)(SAMP CORE 60013-14)

07 01 42 07 CC Sounds to me like you fellows are going to have your (10)  
rock quota.

07 01 42 17 LMP I think we'll do alright. (10)

07 01 42 20 CDR I just picked up another breccia, but it was (10)(SAMP 60019)(PHO 116 18701-04)  
interesting because - it had some very dark clasts  
in it, and it was primarily a white matrix.

07 01 42 38 CDR The clasts were very dark. (10)(SAMP 60019)

07 01 42 47 CDR You want this to go in your bag, Charlie? (10)(SAMP 60019)

07 01 42 49 LMP Yeah, why don't you - - stick it in mine. I think (10)(SAMP 60019)  
we have plenty of room in mine.

- - -

07 01 43 38 LMP Okay. How much time do we have here, Tony? (10)

07 01 43 42 CC You have plenty of time here, but we'd like you to (10)  
drive on back to the LM.

07 01 43 51 LMP Okay, I'm going to run over, Tony, and look around (10-LM)  
and see if I can find what you want.

- - -

07 01 45 49 CDR I just got a spectacular white rock. But it's kinda (10)(SAMP 60210,15)(PHO 116 18705-07)  
dust coated. It's so fine grained, that I can't see  
any crystalline structure associated with it. It's  
sorta covered with zap, you can see plenty of zap  
pits. That's going in bag 13.

07 01 46 17 CC Okay, was that bag 113? (10)(SAMP 60210,15)

07 01 46 22 CDR Thirteen. (10)(SAMP 60210,15)

07 01 47 29 LMP Hey, Tony, I just picked up one that is in bag 15, (LM)(SAMP 60230,35)(PHO 117 18828-29)  
that has a black matrix, bluish black matrix with  
lath-like either clasts or phenocryst in it. And  
it's right behind the LM here. I don't know whether  
that's what we're looking for or not.

07 01 47 51 LMP There are a lot of the rocks that I call vesicular (LM)(SAMP 60230,35)  
basalts around here, but I don't know whether what  
I really call was correct or not. That might have  
led you all astray.

07 01 48 09 LMP That might have been just the glass coating on the (LM)(SAMP 60230,35)  
rock.

07 01 48 12 CC We've got about 10 more minutes of sampling, so why (LM)  
don't you just pick up what looks interesting to you  
there and then we'll start closing out.

- - -

07 01 48 34 LMP I got my hands full of bags and rocks. (LM)

07 01 49 28 LMP Okay, Tony, I've picked up a rock here that has an (LM)(SAMP 60250,55)(PHO 117 18830-32)  
aphanitic matrix with perhaps 30 percent of it -  
whitish millimeter size clasts or phenocrysts and it  
doesn't look glassy to me.

07 01 49 49 LMP It's about half of a grapefruit size. (LM)(SAMP 60250,55)

- - -

07 01 50 57 LMP Okay, and it's going in bag 17. (LM)(SAMP 60250,55)

07 01 51 05 CDR I don't think we need the gnomon any more Charlie. (LM)

07 01 51 07 LMP No, we sure don't, John. (LM)

- - -

07 01 51 29 LMP Would you say my SCB's about full, John? (LM)

07 01 51 32 CDR Definitely. (LM)

07 01 51 33 LMP Okay, let me get yours off your back right now so I (LM)  
 can go use it to sample with.  
 - - -

07 01 55 23 CC And Charlie, you can continue sampling for about 5 (LM)  
 more minutes and then we'll have to load up.

07 01 55 31 LMP Okay. That's about 3 samples. I'll be out of bags (LM)  
 then anyway.  
 - - -

07 01 56 01 LMP Tony, I'll say one thing that the character of the (LM)  
 regolith has really changed between here and Stone  
 mountain and -  
 - - -

07 01 56 25 LMP There's a grab sample in 18. (LM)(SAMP 60270,75)(PHO 117 18833-35)

07 01 56 33 LMP Well, it is partially documented I should say, not a (LM)(SAMP 60270,75)  
 grab sample.  
 - - -

07 01 56 44 LMP There's a neat rock. Right there. Doesn't look (LM)(SAMP NOT RETURNED)  
 like a breccia.  
 - - -

07 01 57 03 CC Okay, Charlie, after this rock we'd like you to (LM)(SAMP NOT RETURNED)  
 start closing out.

07 01 57 10 LMP Bag number 19, Tony. (dropped?) (LM)(SAMP NOT RETURNED)

07 01 57 31 LMP And, Tony the last one I pick up is an igneous rock, (LM)(SAMP 60310,15)(PHO 117 18836-38)  
 no breccia.

07 01 57 38 LMP And it's got lath crystals in it and a black matrix (LM)(SAMP 60310,15)  
 but it is not basaltic.

07 01 58 01 LMP Well, it was going in bag 19, it's not anymore. (LM)(SAMP 60310,15)  
 - - -

07 01 58 05 LMP In bag number 20, Tony. (LM)(SAMP 60310,15)  
 - - -

07 01 58 21 CDR Okay. Okay, I guess we're through with those (LM)  
 samples.  
 - - -

07 01 59 28 LMP Okay, Tony, the core tubes are going in bag number (LM)(SAMP CORE 60013-14)  
 7.

07 01 59 47 LMP And it's hardly got any rocks in it. (LM)  
 - - -

07 02 01 00 CC And John you might try to keep a hold of the sample (LM)  
 bags for when you go out and park the Rover. We may  
 have to pick up a rock and put it on the LPM.

07 02 01 20 CDR I'll take my camera with me too. (LM)

07 02 01 22 CDR Charlie's camera one. You got any pictures left? (LM)

07 02 01 28 LMP Yeah, have you? (LM)

07 02 01 29 CDR Nope. (LM)

07 02 01 30 LMP You out completely? (LM)

07 02 03 31 CDR No, no I'm on frame 150 I guess I've got enough to (LM)  
 cover it.  
 - - -

07 02 05 50 LMP Okay. All the film that we brought out, except the (LM)  
 two mags - the mag on the DAC and the 2 mags on the  
 camera - magazine F and magazine Echo are still on  
 the cameras. John's seat bag is empty of film.  
 - - -

07 02 14 20 CDR Okay, Charlie, I put the big rock bag on the ladder (LM)  
 hook.  
 - - -

07 02 14 35 LMP Did you get the big rock out of the footpad? (LM)(SAMP 61016)

07 02 14 38 CDR Yeah. (LM)(SAMP 61016)

07 02 14 39 LMP Did you get ol' "Muley" out of there? (LM)(SAMP 61016)

- - -

07 02 15 07 LMP Okay. This bag is pretty full. We got 2 full rock (LM)  
bags and one that is partially full, John. We got -  
4 and 6 are full, and 7 has got 2 core tubes.

- - -

07 02 15 35 CDR Are those core tubes? - they got anything in them? (LM)

07 02 15 37 LMP Yeah. (LM)

07 02 15 47 LMP Let me get one more picture of you dirty. (LM)

07 02 16 01 LMP Okay, Tony, got the magazine from the - (LM)

07 02 16 11 LMP Got the DACs, all the mags. (LM)(PHO DAC)

07 02 16 20 LMP Only thing we don't have in the ETB that I see is (LM)  
the CRE, and that's going in right now.

07 02 16 30 LMP Hey, John, you're taking a camera with a magazine (LM)  
out with you?

07 02 16 37 CDR Yes sir. (LM)

07 02 16 50 CDR I got one more rock here that I was looking at out (LM)(SAMP 60016)(PHO 113 18298,302-303)  
of the window of the Lunar Module, I got plenty of  
pictures of it for you.

07 02 16 58 LMP Put it in the big rock bag - it'll go in that ETB - (LM)(SAMP 60016)

07 02 17 04 CDR It's not all that big. (LM)(SAMP 60016)

07 02 17 25 LMP Okay, I'm going to put magazine Foxtrot into the (LM)  
ETB, and it's got 130 frames exposed.

- - -

07 02 17 43 CC Charlie, you should have a 70 Hasselblad and 3 DAC (LM)  
magazines - - actually there will be 6 in there  
right now, one's still on John's camera.  
- - -

07 02 19 03 LMP We got 1, 2, 3, 4, 5, 6, Hasselblads, 3 DACs, a SWC (LM)  
and a CRE, the maps, and various other things.  
- - -

07 02 19 35 LMP Your mags go in there, John, and that's it. (LM)  
- - -

07 02 23 18 LMP Hey, Tony, I'm going to be taking SCBs up onto the (LM)  
porch.  
- - -

07 02 25 30 LMP Okay, 1 bag is up, Tony. (LM)

07 02 25 32 CC Okay, was there - did you see the number on that? (LM)  
Don't go back to look - -

07 02 25 40 LMP I'm sorry, I didn't. 6 or 7, we got 6 and 4 down (LM)  
here.

07 02 25 46 CC Okay, it must have been 7. (LM)  
- - -

07 02 26 14 CC And Charlie, I understand you got the "Muley" rock (LM)(SAMP 61016)  
and put it in the big rock bag.  
- - -

07 02 26 20 LMP John did. Rog. (LM)(SAMP 61016)

07 02 27 09 CDR Okay, Houston, I'm parked on a slope of about 10 (LM)  
degrees, or 5 or 6 or 7 degrees, towards the Lunar  
Module, - and I'm about a 100 yards directly aft of  
the Lunar Module.

07 02 27 44 CC Okay, it's heading 165. (LM)

07 02 27 49 CDR Yep, heading is 165. (LM)  
 - - -

07 02 28 23 CDR Bearing is 243, which can't be right. Distance is (LM)  
 11.4, range 210.  
 - - -

07 02 29 54 LMP I got two bags up and I'm going to have to wait and (LM)  
 let John take in the rest.  
 - - -

07 02 32 05 CC Okay, Charlie, why don't you go on out where John is (LM)(SAMP 60330,35)(PHO 116 18712-13,20-21)  
 and see if you can find an igneous or a hard breccia  
 to put on top of that LPM. Use his camera to  
 document it.

07 02 32 18 LMP I don't have a camera though now, Tony. (LM)  
 - - -

07 02 34 03 LMP Where's your camera John? (LM)

07 02 34 05 CDR Right here, Charlie. (LM)

07 02 34 22 LMP Okay, a hard breccia or igneous rock. (LM)(SAMP 60330,35)  
 - - -

07 02 35 20 LMP Do you want this rock brought back, Tony - that is (LM)(SAMP 60330,35)  
 that I'm going to - LPM.

07 02 35 25 CC Rog. We'd like you to document it before you touch (LM)(SAMP 60330,35)(PHO 116 18710-11)  
 it and when you get the LPM first measurement, we'll  
 put it on the LPM, take a picture of it on the LPM,  
 and then we'll get an LPM measurement of it, and  
 then we'll pack it and bring it back.

07 02 35 46 LMP Okay. It's a pretty good one, but it's too big to (LM)(SAMP 60330,35)  
 sack, unfortunately \*\*\* - -

07 02 35 51 CC Do you have a smaller one around that we can get in (LM)(SAMP 60330,35)  
 the sack?

07 02 35 57 LMP Yeah, let me look. (LM)(SAMP 60330,35)  
 - - -

07 02 36 16 LMP How about one a half-an-orange size, Tony? (LM)(SAMP 60330,35)

07 02 36 21 CC That would be great. Really great. (LM)(SAMP 60330,35)

07 02 36 27 LMP Okay. I'm going to get a close - a couple of  
 cross-sun stereos is all. Is that all right? (LM)(SAMP 60330,35)(PHO 116 18712-13)

07 02 36 32 CC That's fine. We've got the location on TV. (LM)(SAMP 60330,35)  
 - - -

07 02 36 56 LMP Okay, Tony. It's an igneous rock, not a breccia. (LM)(SAMP 60330,35)

07 02 37 04 LMP And it's got that sugary texture to it. (LM)(SAMP 60330,35)  
 - - -

07 02 37 39 LMP Yeah. Okay, Tony. That's frame count 156 and 157 - (LM)(SAMP 60330,35)

07 02 37 46 LMP - - 155 and 156 for the - that rock. (LM)(SAMP 60330,35)(PHO 116 18712-13)

07 02 37 53 LMP I'm not sure we got - we got a bag left, John? (LM)(SAMP 60330,35)

07 02 37 56 CDR Yeah, I put a bag under the seat. (LM)(SAMP 60330,35)

07 02 41 01 CDR Do you want a picture of that - you want a picture  
 of it, don't you, Houston? (LM)(SAMP 60330,35)(PHO 116 18720-21)

07 02 41 04 CC Yeah, it'd be a good idea. (LM)(SAMP 60330,35)  
 - - -

07 02 41 40 LMP Well, I hope we got all the rocks, Tony, that are  
 here. (LM)

07 02 41 45 CDR We got all the rock types that look different from  
 any other rock type. (LM)  
 - - -

07 02 43 32 CC - - and when you put the rock on, we'd like a couple (LM)(SAMP 60330,35)(PHO 116 18720-21)  
of cross-suns of it - -

07 02 43 35 CDR Okay. We'll start with a rock. (LM)(SAMP 60330,35)  
- - -

07 02 43 42 LMP Here's the rock. I'll get the camera for you. And (LM)(SAMP 60330,35)  
I guess I'll go on back and take the brush. Okay?  
- - -

07 02 46 39 CC Did you get a picture of it while you were out there?(LM)(SAMP 60330,35)(PHO 116 18720-21)

07 02 46 44 CDR Yeah, two - a stereopair. (LM)  
- - -

07 02 47 16 CDR I just got a picture of one of the great moments in (LM)(PHO 116 18723-24)  
history, Houston.

07 02 47 21 CC How's that? (LM)(PHO 116 18723-24)

07 02 47 23 CDR Charlie looking down into a crater that's 10 feet - (LM)(PHO 116 18723-24)  
10 feet -

07 02 47 37 CDR - - 10 feet to the rear footpad, and 25 foot deep - (LM)(PHO 116 18723-24)  
- - -

07 02 49 03 CC And, John, when you bag that, we'll need a bag (LM)(SAMP 60330,35)  
number.

07 02 49 15 CDR Charlie, this is a pretty good rock. (LM)(SAMP 60330,35)

07 02 49 16 LMP It is, isn't it? (LM)(SAMP 60330,35)

07 02 49 18 CDR It's got a spectacular little zap pit in it. It's (LM)(SAMP 60330,35)  
lined and it's all silvery and glassy. Fred Horz  
will appreciate this rock.

07 02 49 30 CC We'll appreciate them all. (LM)(SAMP 60330,35)

07 02 49 33 LMP You can see those sugary-textured ones. (LM)(SAMP 60330,35)

07 02 49 38 CDR Okay, Charlie, bag 331. (LM)(SAMP 60330,35)  
- - -

07 02 51 27 LMP That's right. There. Okay. Yeah, I'll put the (LM)  
rock - you take the camera off - I'll put the rock  
in the - in this SCB over here.  
- - -

07 02 51 46 CDR Okay, Houston. I'm up to frame count 168 on (LM)  
magazine E.  
- - -

07 02 52 24 CDR Just shot 169 of the old Rover sitting there. Boy, (LM)(PHO 117 18852-53)  
that's a good machine.

\* \* \* \* PRE LIFTOFF \* \* \* \*

07 03 43 30 LMP Okay. We've got some weights for you, if you're ready to copy. (PRE LIFTOFF)

07 03 43 37 LMP Okay. The BSLSS rock bag, the big rocks will weigh 40 pounds; bag 7, SCB number 7 is 33; SCB number 4 is 25; SCB number 6 is 20. I get a total out of that of about 118. Over. (PRE LIFTOFF)

- - -

07 03 49 52 CC Hey, fellows, you have 245 pounds of rocks. That's not including the weights or the SRCs. (PRE LIFTOFF)

07 03 50 05 CDR Okay, has some got to go back? (PRE LIFTOFF)

07 03 50 09 CC No, I think we're going to be able to find a way. (PRE LIFTOFF)

- - -

07 03 50 29 CC We'll probably have to throw away that big one. (PRE LIFTOFF)

07 03 50 43 LMP Well, we don't want to throw away any - any that don't need to be thrown away. That's for sure. (PRE LIFTOFF)

- - -

07 04 05 59 CC Okay, Orion. We're go with the rocks you've got. (PRE LIFTOFF)

07 04 06 07 CDR Outstanding! Thank you very much. (PRE LIFTOFF)

- - -

07 06 06 55 LMP Jim, pass on to the backroom that that "Muley" rock weighs 40 pounds. (PRE LIFTOFF)(SAMP 61016)

- - -

07 06 54 07 CC Orion, this is Houston. For your information, your total EVA time was 20 hours 14 minutes and 55 seconds. Over. (PRE LIFTOFF)

\* \* \* \* TRANSEARTH COAST \* \* \* \*

- 08 11 35 42 LMP Hey, Tony. I was sitting here today thinking about (TRANSEARTH COAST)  
those rocks we got, and the thing that really  
strikes me is that there was - I really don't think  
we got any volcanic rocks to speak of. Maybe some  
of those little black clasts were volcanics, but  
otherwise - I don't think we got any. There wasn't  
any there. There was one other point that could  
have been - those ones we were calling shocks could  
have been a tuff breccia, since they were so  
friable. But - that might prove to be the case; but  
to us, they looked shocked due to the other features  
that we saw that - applied a shocked metamorphism.  
Over.
- 08 11 36 37 CC Right. From your description, we had thought there (TRANSEARTH COAST)  
was a good chance that you might have gotten a tuff  
breccia there. I think, also, the fact that a lot  
of the breccias were one-rock breccias would mean  
that you may have your basalts or gabbroic  
anorthosites or whatever, and that they're just  
broken up. If they're one-rock breccias or two-rock  
breccias, it still has most of the information of  
the rocks we're looking for. It's not like a - if  
you remember, it's not like a soil breccia, where  
everything is lost. So we're very happy with what  
you found. Also did anyone brief you on the newest  
on the x-ray results?
- 08 11 37 17 LMP No. Go ahead. (TRANSEARTH COAST)
- 08 11 37 18 CC Okay. You remember the first look I gave - the (TRANSEARTH COAST)  
first look that I reported to you indicated that the  
aluminum-to-silicon ratio was sort of intermediate.  
Well, they've gone back; and with the newer data and  
a better analysis, it turns out that Descartes has  
one of the highest ratios on the Moon. The only  
place we've seen like it right now is on the east  
side of Smythii. We don't really have a good  
comparison yet with the east of Crisium. But  
anyway, it indicates that if any place has  
anorthosites, you've found them.

- 08 11 37 56 LMP I tell you, Tony, some of those rocks that we picked (TRANSEARTH COAST)  
up - I was leaning, with the color and the  
crystalline structure that we had - I didn't want to  
call it that, but they were certainly crystalline  
rocks; and there was no question in my mind. They  
had a sugary texture - the whitish ones. That big -  
one on the - rim of North Ray, there, with the  
shatter cone that had - a bluish tint to it in the  
crystalline structure. Though, it might have been  
just the - I say crystalline structure, or it might  
have been an aphanitic matrix; but y'all are gonna  
sort all of that out when you get bagged ones. I  
tell you, it really wasn't what - I thought we were  
going to find up there. I imagined a lot of  
volcanics; and frankly, if these shocked rocks turn  
out to be tuff breccias, that will be the only  
volcanics we found.
- 08 11 39 02 CC Right. Understand. I think - - the fact that you (TRANSEARTH COAST)  
recovered from the picture we had given you before  
you went and went ahead and found out what was there  
and sampled it so well - I think that's - a good  
indication that the training was good and you guys  
are really on the ball.
- 08 11 39 26 LMP Well, we tried hard, anyway, Tony; and I think we (TRANSEARTH COAST)  
got - a piece of every rock that was up there. I  
really do. They were - and that's, I think, because  
we were lucky, and the rocks were identifiable.
- 08 11 39 46 CC You know, the - - difference between a rock being (TRANSEARTH COAST)  
identifiable and not being identifiable is the level  
of training. That just says you guys were well  
trained.
- 08 11 39 58 LMP Well, you guys tried to beat it into us long enough, (TRANSEARTH COAST)  
I'll tell you that. Hope we did a good job.
- 08 11 40 08 CC I just got a set of questions that the geology team (TRANSEARTH COAST)  
- - would like to send up to you sometime. Maybe  
sometime during the transearth coast, we'll have a  
chance. I haven't really read through them, so I  
don't know what they're all about yet.

- - -

08 11 42 23 LMP And, Tony, the only - on the rocks, back to one other little point, there. You know, we called the whitish rocks tuff breccias - I mean, shocked rocks. But - at least, I'm personally convinced that there are at least two endogenic craters that we passed, and - the big one on the way to North Ray and the big one coming back from stop 8. And so, that might have been a source of a tuff - if that's what they turn out to be.

- - -

08 11 43 12 CC Right. I understand. I just think it was outstanding, maybe serendipity, that we probably - your landing there at Descartes probably sampled the most differentiated place we could find on the front side of the Moon. I think that's really outstanding.

08 11 43 34 LMP That's the feeling I got when we started seeing those rocks. That basalt that I called under the engine bell there, I think, might end up to be that blackish-bluish rock that we sampled up at North Ray, and so - but we'll see. We couldn't get any of what I call real basalt in rocks. Maybe some of the clasts will be, though.

08 11 44 24 CC Yeah, I sure could. It reminded me of a dune area.

08 11 44 30 CDR Yeah. That's what it sort of looked like, sort of a dunes plains.

- - -

08 11 45 06 LMP Tony, that crater at - the endogenic one that we described coming back from North Ray and going out, it - I was guessing 80 meters, John said about 50, but it was really deep; and I'm surprised that we didn't - I sure had no feel for that before we started.

- - -

09 21 16 48 CC Apollo 16, Houston. Whenever you're ready for the geology, we'll press on with that.

- - -

- 09 21 18 06 CC The next question we'll get when we get the rocks back, but I think - well, maybe the best way to do this is to describe a theory that's coming up as a result of the rocks - that you saw there. A possibility is that an older theory that was discarded a few years ago may be the right one, that the Cayley is an outer fluidized ejecta from Imbrium. Fra Mauro would be an inner ring, and then Imbrium sculpture would be outside of that, and then the Cayley would be sort of slosh that filled up all the valleys farther on out. But answers to some of these questions will help the geologists define that. Something that might help them define that. And a lot of it is that they're just - can't wait for the rocks to get back. But anyway, at Station 11, you described some rocks you thought to be tuff. Looking back at Station 5 and 6, after seeing these at 11, do you think you might have seen the same kind of rock there? What we're thinking about is where you described - the square crystals and the needlelike crystals in clasts. And also, in the same question, were these crystals by themselves or were these - I mean, were the clasts single crystals or were the crystals in clasts? (TRANSEARTH COAST)
- 09 21 19 38 LMP Recalling Station 11, - the rocks - that big rock in particular was a two-rock breccia, - I feel. And - within the bluish-black matrix, which made up one clast - one of the rock types - there were needlelike crystals in that. And the white matrix also had crystals in it. (TRANSEARTH COAST)
- 09 21 20 19 CC Okay. And how - did those rocks compare to what you saw at Station 5 and 6? (TRANSEARTH COAST)
- 09 21 20 40 CDR Tony, I'm afraid I'm not gonna do any better with the answer to these questions than I do on an average field geology trip where you got 10 stations. (TRANSEARTH COAST)
- 09 21 20 49 CC Understand. (TRANSEARTH COAST)
- 09 21 20 50 CDR And the rocks - you know, the rocks that we're picking up at 5 and 6 - that was a long time before Station 11 and - (TRANSEARTH COAST)

- 09 21 21 01 CDR And I can't remember what the dang rocks looked like, to be honest with you. (TRANSEARTH COAST)
- 09 21 21 34 CC Okay. I'll try to stick here to questions that were impressions, and we're going to get the rocks back anyway. I don't really think there's any point in pressing with questions where we'll get the answers in a few days. Outbound on EVA 3, you noted 1- to 5-meter craters. And then, 10-meter craters going north and you called them secondaries. We're wondering what evidence there was - if any, that they came from North Ray. Do you think you saw any secondaries from North Ray? And if so, where would they be? And could you compare them to the size and character of the South Ray secondaries? (TRANSEARTH COAST)
- 09 21 22 21 LMP There was out around Palmetto. There were a couple of craters, if I recall - I don't know exactly whether it was Palmetto or not, but as you're going out that way, there were some craters with some blocks in them. And that's the reason I called it secondary. They were not as fresh - in fact, craters going toward North Ray were a lot more subdued than the craters going down to Stone mountain. The North Ray had - something had - either they're older or something, but they were a lot more subdued and there was less blocks around. But we did have one or two that had some blocks in them, and that's why I called them secondaries. (TRANSEARTH COAST)
- 09 21 23 13 CC Okay. Were the blocks as angular as the ones you described from South Ray? (TRANSEARTH COAST)
- 09 21 23 23 LMP In general, our impressions were no. (TRANSEARTH COAST)
- 09 21 23 26 CC Okay. As you were coming off of - and going up into North Ray area, could you give a guess at the relative proportions of - and the size and shapes of the white and the dark rocks? (TRANSEARTH COAST)
- 09 21 23 51 CC In other words, was there a change - radially outward from North Ray? (TRANSEARTH COAST)
- 09 21 24 04 CDR Yeah, this is just an impression, Tony. But I'd say that the dark rock was less prevalent as you went outbound, generally speaking - as you went away from the crater. (TRANSEARTH COAST)

- 09 21 24 22 CDR I could be 100 percent wrong on that. But we sure (TRANSEARTH COAST)  
drove over a lot of - in the regolith there in  
particular. The upper layer in regolith, which  
contained these - I mean the upper layer in the  
ejecta blanket contained a lot of boulders with just  
their heads sticking through, and those were the  
ones I was looking at because I was trying to go  
around them. And I don't ever remember seeing a  
dark breccia-like rock in those boulders.
- 09 21 25 01 CC Okay, sounds good. And that very large rock you (TRANSEARTH COAST)  
sampled up there, Charlie, you mentioned there was  
white and dark rock in the one rock. Could you  
describe the contact? Was one contained in the  
other, or did the contact meander through the whole  
rock?
- 09 21 25 18 LMP Just sort of meandered through, Tony. It was a - (TRANSEARTH COAST)  
again I'll say a two-rock breccia, where it was a  
white and the black. And the clasts were very  
large, up to a meter size. I think the predominant  
rock was black. At least, the overall color gave  
you a black, but when you looked closely, you could  
see white clasts in it. So the - and the contact  
just meandered. I think we've got a couple of  
closeups of how the contact just meandered through.  
It was sort of an angular clast in this  
predominantly blackish matrix.
- 09 21 26 03 CC Okay. The white rock, that was in this big boulder (TRANSEARTH COAST)  
- was it like the white rock that you sampled to the  
southwest of where you parked the Rover?
- 09 21 26 14 LMP Yes, it was all - yes, uh-huh. (TRANSEARTH COAST)
- 09 21 26 17 CC Okay. Incidentally, that shatter cone that you saw (TRANSEARTH COAST)  
on the big boulder - did it - did the surface on the  
cone go right through the clasts, or did the clasts  
poke out kind of like nodules on the cone?
- 09 21 26 35 LMP Well, they - no, it didn't. The shatter cone - was (TRANSEARTH COAST)  
fortunately, or unfortunately, depending on your  
point of view, in the black matrix. And it was - a  
crystalline rock where the shatter cone occurred.

- 09 21 26 50 CC Okay. Understand. Okay. Now that you've seen both (TRANSEARTH COAST)  
North and South Ray ejecta blocks, could you say - a  
little bit about the ray material in the area from  
the LM to Flag? Do you feel that all that material  
is characteristic of the bigger ray blocks that you  
identified near either North Ray or South Ray?
- 09 21 27 27 CDR I guess my impression might be that - at some (TRANSEARTH COAST)  
places, we had some of each but most of it was from  
South Ray. And around the LM, once we got going  
toward North Ray, that material around the LM, by  
gosh, the breccia - and I collected several of them  
at that last station - in hand specimens - some of  
them were like the material we got out of South Ray,  
clear of South Ray blanket, but several of them were  
from North Ray. At least, that was my impression.
- 09 21 28 14 CC Okay. Understand. We always had the feeling - - (TRANSEARTH COAST)
- 09 21 28 17 CDR I'd say the most of them - from South Ray. (TRANSEARTH COAST)
- 09 21 28 19 CC Okay. We seem to have the feeling that the rocks (TRANSEARTH COAST)  
you were describing in the LM area were just somehow  
just a little bit different than what you were  
picking up either down South or up North. I guess  
we'll get that all straight when the rocks get home.
- 09 21 28 36 LMP Tony, I think - that the breccias were different. (TRANSEARTH COAST)  
Maybe I'm going way on a limb when I say this, but -  
we've been collecting little fragments that have  
been floating around the cockpit here and looking at  
them, and they're crystalline - crystalline  
fragments that - with little white powdery exterior  
on part of it, and it - chalky appearance. And to  
me, this - was characteristic of - some of the rocks  
around the Cayley, which - now I'm really leading to  
a tuff breccia - but the matrix being the ash with  
these crystalline frags, and the crystalline frags  
looked just like - the crystalline rocks around  
North Ray. At least, the black ones - at least, the  
couple I found here floating around. Now that's not  
to say that the fragments are - there are some  
fragments from whitish rocks, but they were a little  
bit - more difficult to see in this white matrix of  
what looks like tuff now, because it's very powdery.

09 21 30 03 CC Okay. Understand. I wonder if you could describe - (TRANSEARTH COAST)  
those vesicles in that rock at Station 13.

09 21 30 15 LMP Well, they looked like - I call them drill holes. (TRANSEARTH COAST)  
Let's see if John has a different word for it.

09 21 30 37 CDR They look like those pipes that you see in rocks. (TRANSEARTH COAST)  
Like Charlie says, they just look like drill holes.

09 21 30 49 CDR And they were about a couple of - up to 2 to 3 (TRANSEARTH COAST)  
centimeters across in diameter, and perfectly  
circular. It appeared to me to be.

09 21 31 04 CC And how deep did they go? Could you tell - I mean, (TRANSEARTH COAST)  
did they go straight in, or did they seem to meander  
around?

09 21 31 12 CDR They seemed to go straight in, and I couldn't tell (TRANSEARTH COAST)  
how deep they were, because they only go in a - they  
disappear from sight. I didn't try reaching into  
any of them.

09 21 31 22 LMP Tony, there wasn't anything in them. You could just (TRANSEARTH COAST)  
look in - and they looked clean, and - just like  
somebody drilled out the rock.

09 21 31 34 CC How about the orientation? Were they all (TRANSEARTH COAST)  
perpendicular to the surface, or did they all have a  
preferred orientation?

09 21 31 49 LMP I got the impression that they were parallel - to (TRANSEARTH COAST)  
the surface. As you stood and faced the rock, you  
could see these little holes sticking out at you -  
with most of them parallel to the regolith.

09 21 32 13 CC Okay. How about when you went around on the other (TRANSEARTH COAST)  
side? Did they poke out at you there, or were the -  
what I'm trying to get a feeling is - did it  
indicate a top and bottom in the rock, or did it  
just poke out all over the rock?

09 21 32 33 LMP I'm - we only remember seeing them on one side, (TRANSEARTH COAST)  
Tony. And that was the south side or the east side  
of the rock. The rock was facing - the side we saw  
them on was away from North Ray.

09 21 33 51 CC Okay. Charlie, during the LM closeout time, you (TRANSEARTH COAST)  
started to make a remark about the change in  
character between the regolith - between the LM area  
and Stone mountain, and somehow we got interrupted  
there and you didn't finish your statement. I  
wonder if you could finish what you were going to  
say - if you happen to remember? Can you  
characterize the difference in regolith between the  
LM area and Stone mountain?

- - -

09 21 35 22 LMP Tony, we're just sitting here trying to recall, and (TRANSEARTH COAST)  
- right now the only impression is that you tended  
to sink in more up on Stone mountain, which could be  
downslope movement of particles, and - it was - just  
very loosely consolidated up there. Everywhere  
you'd step, you'd sink in a couple of inches. And  
on the slopes around the LM, it was the same way.  
And even, in fact, where we landed. Up around the  
ALSEP site, it was very loosely consolidated, and as  
you walked - your foot would leave quite an imprint.  
And once we had pretty well turned over the surface  
around the LM and up on Stone, it would look like  
freshly raked ground - to me. North Ray, wasn't like  
that at all. It was very thin regolith and as we  
commented, we had a tough time raking because it was  
so rocky right up - within a couple of centimeters,  
at the top of the regolith. Over.

09 21 36 47 CC Okay. Understand. I think your downslope movement (TRANSEARTH COAST)  
there on Stone was - probably right. Although that  
wouldn't explain why it was harder at 5 and 6 than  
at 4. Well, anyway. Next question here - on that  
half-orange-sized rock that you put on the LPM, (SAMP 60335)  
wonder if you could estimate how common that type  
rock was around.

09 21 37 22 LMP Well, John picked up one just like it up on - it was (TRANSEARTH COAST)  
a grab sample up on Stone mountain. And it was one  
of the crystalline rocks with that sugary  
crystalline texture to it. Huh? Yeah. And it was  
one of those whitish rocks that was a little dusty.  
I think it's fairly common. We'll just have to see  
when we get the samples back, but it was my  
impression it was one of the three predominant rock  
types there.

09 21 37 56 CC Okay. Understand. And the soil at Station 8 - was (TRANSEARTH COAST)  
it white underneath the top surface like you  
described up at Station 4 and a lot of other  
stations?

09 21 38 27 CDR We kicked some of that, and I can't remember whether (TRANSEARTH COAST)  
it was or not at Station 8.

09 21 38 37 CDR I think it - anyway, we sampled the soil sample (TRANSEARTH COAST)  
there, and it's in the box somewhere. But - I  
certainly can't remember whether it was - white  
underneath or not.

09 21 38 51 CC Okay. Understand. And just subjectively, could you (TRANSEARTH COAST)  
compare - now that you've been up fairly close to  
Smoky and on Stone - could you compare the two  
structures?

09 21 39 09 CDR They looked the same to us. (TRANSEARTH COAST)

09 21 39 15 CDR Okay, I wouldn't be surprised but what they aren't (TRANSEARTH COAST)  
the same. When Ken and I and Charlie looked at it  
in this real low sun angle, I guess that's - as far  
as geometric form, it certainly looked - it was the  
hummocky material from the Descartes region is the  
way it looked. Right across Smoky - right through  
that whole region, it looked like a single unit, and  
- I guess that would be my interpretation of it at  
this point. But it's pure speculation, but I would  
guess that tonight. I wouldn't be surprised but  
that we don't find a lot of these rock types on one  
region very close to another region being about the  
same.

- - -

09 21 40 09 LMP Tony - I was just going - - to add to that I had the (TRANSEARTH COAST)  
same impression. Looking at - the South Ray, with  
the black and white streaks up the wall - up on the  
interior of the crater, and also at Baby Ray, being  
very stark in contract. And then in North Ray,  
having that same impression but more subdued. And  
the rock appearing to be very similar - I think  
there's a good lateral - and you guys can demolish  
this when you analyze the rocks, but right now my  
impression is that - the two craters penetrated very

similar - or two very similar rock units. The white and the bluish black.

- 09 21 41 11 CC Okay. Understand. The reason for a lot of these (TRANSEARTH COAST) questions - and we know the answers are in the rock boxes and bags there and we'll all get when you get home. But there's a lot of interest since - the model that we have of the whole area is being changed because of the high aluminum-to-silicon ratios and because of all of your rock descriptions there. There's a lot of push here to reformulate a new model. The press is kind of pushing, and you'll probably get some questions this afternoon in your press conference. I was wondering if there's anything you wanted to ask the geology team about - this new model, since I don't think you've ever been briefed on it.
- 09 21 42 09 LMP No, I'd sure never heard it was slosh from the (TRANSEARTH COAST) Imbrium at the Cayley.
- 09 21 42 14 CDR I'd say it's premature to be making those kind of (TRANSEARTH COAST) statements, Tony. And I would like to wait until we get all that data in and take a look at it. It's just too soon to be - on hearsay - and not having the real evidence and not having - all the data analyzed. It's too soon to be making any major conclusions about the region. I can't see how you could do that.
- 09 21 42 38 CC I sure agree with you, John. But, you know, (TRANSEARTH COAST) everybody's - excited and trying to press with it. But, anyway, I thought you might want - to hear a little bit about that, if you're going to be asked on it this afternoon. Now, of course, that isn't to say anyone's saying that Kant Plateau or Descartes Highlands are slosh. It's just the Cayley part. Anyway, that's all we have here, if you just want to press on there.
- 09 21 43 11 CDR No, I just don't see how you can come to that (TRANSEARTH COAST) conclusion this quick without any evidence, Tony. It'd be nice to do that, but I - I would not press for that sort of thing this early in the game. And I wouldn't answer questions to anybody to amount to anything on that kind of stuff because that's too speculative.

09 21 43 31 CDR In other words, it ain't good science. (TRANSEARTH COAST)

09 21 43 35 CC Yeah, John. I think you're right on, and I hope they heard you in the backroom, because - I think I said the same thing this morning. (TRANSEARTH COAST)

- - -

10 03 26 56 CC Question number 3 in three parts. Were you surprised at the rocks and other formations at the Cayley site? (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 27 10 LMP I think we were. The original impression had been mostly volcanics to look for, and I don't think we found the highest percentage of volcanics as we had originally anticipated. So the rocks that we found were unique, that we had never seen before in any of the lunar samples, we feel, and so it was a surprise. (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 27 39 CC Do you think your geological training properly prepared you to describe them? (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 27 50 CDR I think so, under the circumstances. You see, most of the rocks - were dust covered apparently by the two impacts, North Ray and South Ray. It had just thrown a big blanket of dust out across there, and we saw very few rocks that were clean until we cut into them. And you don't want to take too much time to stop and whack off a piece of rock, because it's pretty hard to do in a pressure suit. So we were just describing them more by shape and softness and friability and things like that. And that really doesn't take a lot of training, but I think we've had adequate training to do this kind of a job. (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 28 40 CC Did you see anything specifically volcanic? (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 28 50 LMP As far as craters go, Hank, we think we saw two that had the shape we called endogenic that had the shape of very subdued old cinder cones or something of that nature. In other words, they - look more like, well, sink holes, really, with the surrounding topography. They had no rim on them; and, to us, it looked like it might have been a source for some - volcanic activity way, way back. (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 29 27 CC Question 4: Several times at North Ray you mentioned, "Don't get too close to the edge." Did you think that if you had fallen in, you wouldn't have been able to get out? (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 29 39 CDR That's affirmative. (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 29 43 LMP You bet. (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 29 44 CDR If we had fallen in, we would not have been able to get out. That's correct. (TRANSEARTH COAST)(PRESS CONFERENCE)

- - -

10 03 31 37 CC Question 7 for Ken: Your observations of the landing site. Did you see the Lunar Module or the Rover, and did you see any differences between Cayley and Descartes? (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 31 51 CMP Okay. That's two distinct questions. First thing, did I see it? We never pointed the sextant at the landing site according to the Flight Plan because of the alterations we had. And there were two occasions, once when I thought I caught a glint of light, which I could not recognize as the LM but which came from the location where I think the LM probably was sitting. And that was very close to the position on my map that you folks read up to me. And once, as Rover was starting up on Stone mountain, I just happened to be looking as they went by, and I think you were on the shift, Hank, and told me that they were hitting Stone mountain, and I looked over there, and about that time I got another little flash of light, which is about all, with the 10-power optics we have, that I think you could expect to see. At no time could you see something you could identify. (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 32 46 CC The second part of that question was: Did you see any differences between Cayley and Descartes? (TRANSEARTH COAST)(PRESS CONFERENCE)

10 03 32 54 CMP Yes, I think there's a distinctly different morphology involved in these two units. Our preflight training is a little different in impression than what I think I saw; and, again, we have, like I say, a 10-power resolution. I think the real answer of what this material is, is going to lay in analyzing the data postflight. We have some good film records, and I think - when you put that together with the rocks we picked up, we'll have a pretty powerful story that'll explain a lot of things we don't know now. But I think that there are sections of material we called Descartes, particularly the material that makes up Stone and Smoky, and that stuff runs all the way south down to the old Descartes crater for which the region is named. And that does look texturally entirely different from the Cayley formation.

(TRANSEARTH COAST)(PRESS CONFERENCE)

- - -

10 03 44 15 CDR Well, let me just say one thing, Hank, and that is - Mr. Descartes said it. He said, "There's nothing so far removed from us as to be beyond our reach, or so hidden that we cannot discover it." And you all know Descartes was a French mathematician and philosopher for whom the region was named. And I guess, really, the story of our mission so far is we've been out testing his theory. My personal assessment of where we are right now, as soon as we get the rocks back in the LRL, we'll be making headway toward proving he was right.

(TRANSEARTH COAST)(PRESS CONFERENCE)

\* \* \* SEPARATE COMMUNICATIONS BETWEEN COMMAND MODULE PILOT AND MISSION CONTROL \* \* \* \*

05 00 13 39 CMP I have the landing site in the binoculars now. I (ORBIT)  
can look down into South Ray, and it really is a  
jumbled thing. I can see one bright layer, then a  
dark layer, then a bright layer, and then a dark  
layer on the west side. And on the south, it looks  
like some of the same. And I can't see into the  
shadows very well to the north. I've got Double  
Spot in the binoculars; and let's see if I can see  
anything in that area.

05 00 14 40 CC Can you see the LM? (ORBIT)

05 00 14 48 CMP Well, I was hoping I could say yes, but I don't (ORBIT)  
think I do. It looks like there is one little  
ridgeline that goes around a - it'd be that first  
crater that they come up to. It's Flag or Spook.  
I've got the Cinco craters and - those terraces that  
we talked about that were over in Stone mountain  
don't stand out very well from here. Looks to me  
like you've got a lot of the same lineations that  
we've seen in the other places - looks like some  
slumping further around than where they're going to  
be going up. I don't think they'll be able to  
recognize terraces as such.

05 00 15 49 CMP The northwest - I mean northeast - correction - side (ORBIT)  
of that extension of Stone mountain has what I would  
have called slumping if it were on the inside of a  
crater.

05 02 09 40 CMP Boy, I'll tell you. That little sun-angle change - (ORBIT)  
old North and South Ray really stand out now. You  
couldn't miss those for anything.

- - -

05 02 10 49 CMP Okay. With the binocs on the area now, I'm looking (ORBIT)  
down into North Ray crater and South Ray and the  
interior structures of those two don't look quite  
the same. There's a lot more light and dark  
material in the South Ray; but that may be caused by  
the fact that it's just a - it really has been a  
fresher-appearing crater all around. The areas -  
trying to see if I can see any shadows or anything -  
there's a bright spot down there, but I think that's  
just a Double Spot itself. I don't see anything

with the binocs that I could say I could see - I can't stabilize them quite that well. Coming down the traverse route from - where they're going across Survey Ridge - I don't think Survey is going to be easy to spot. And when you get down - there is one definite terrace - looks like Stone Mountain is formed with one, two, three terraces, but they are much larger than the kind of things that we were drawing on the map. The rest of that is very fine subtle lineations. The area around North Ray, particularly up along the area that they were going on the EVA - I can see it now, and it almost looks like that little pile of material that runs up to the south of their track and I'll give you some coordinates on that. I'm looking at my chart A - let's see, 9 Charlie - yes, let's look at chart 9 Charlie. And - this is a pretty lousy picture, but if you'll remember at a point about CY by 79, if you'll draw a line there and then draw a line down to about CU and 81, that represents a ridge, which shows up in the photographs. And looking down on it vertically, that looks like sort of a flow of material that runs up over the lip of North Ray and down into it. And it shows some craters on it, but it almost looks like a flow that runs up and down into North Ray rather than being some of the other kinds of things we've talked about. And I didn't have much time, I'll try to concentrate on that on the next rev.

05 04 09 20 CC Ken, for your information, John and Charlie are at Flag now. (ORBIT)

- - -

05 04 10 13 CMP Okay, I'm going to concentrate on North Ray as I distinctly believe that the area that the traverse is drawn on that goes up on the North Ray comes up on material that looks like it has flowed around and is part of the basic furrowed Descartes unit that's mapped back further to the east. And it looks to me like it runs down around the crater and straight into it. (ORBIT)

05 04 11 04 CMP I can see evidence of stratigraphy in North Ray, and (ORBIT)  
lots of it in South Ray. And as we come across -  
the general topography down there looks about the  
same all the way across the board.

05 06 10 38 CC And Ken, the guys are back inside. I don't know (ORBIT)  
whether you heard me a while ago or not, but EVA 1  
was a total success. They had a 7 hour and 11  
minute EVA.

- - -

05 06 11 02 CMP Did they have any surprises in the things they saw (ORBIT)  
or that they didn't expect?

05 06 11 30 CC I guess the big thing, Ken, was they found all (ORBIT)  
breccia. They found only one rock that possibly  
might be igneous.

- - -

05 06 11 46 CMP Well, that ought to call for a session with the - (ORBIT)  
yeah, yeah. Well it's back to the drawing boards  
or wherever geologists go.

05 07 57 13 CC Okay, Ken, this is just sort of a general question (ORBIT)  
about the terraces in Stone mountain and if you get  
a chance, why, look down around the south end of  
that EVA-2 traverse, down around Station 5, and just  
might look in the area and see if you can give any  
hints on how definite those terraces are. They're  
going to try to establish at Station 5 on the first  
terrace. And if you think it looks definite enough,  
why, that's a no-sweat operation or how easy it  
looks to determine between first, second terrace,  
and so forth.

05 07 57 58 CMP Okay. I kind of looked for that and let me take (ORBIT)  
another look specifically at that. It appeared to  
me that - probably on the ground you wouldn't know  
you're on the first terrace. But let me take  
another look at that - I'll check it out this time.  
And again we're only trying to guess what it would  
look like if you - indeed were that far down.

- - -

05 08 06 14 CMP I'll tell you, the old landing site stands out now. (ORBIT)  
 You couldn't miss that for anything. And it wasn't  
 that obvious at the lower sun. Unfortunately, I'm a  
 little too far south to be able to give you a good  
 answer on those terraces, but I'll give a hack at  
 it.

- - -

05 08 08 04 CMP Yes. I think that they will be able to recognize (ORBIT)  
 that they're on the first terrace.

05 08 08 15 CMP Oh, I don't know, over by Cinco they're not that (ORBIT)  
 obvious. They are further around to the west, but  
 I'm not sure they'll recognize the first terrace.  
 They might recognize Cinco.

- - -

05 08 09 51 CMP You'd swear that you ought to be able to see the LM (ORBIT)  
 with these binoculars. I think if you knew where to  
 look exactly, you might be able to see it. But you  
 couldn't hold anything in your hand any more  
 sensitive. I'll tell you, the Cinco craters stand  
 out very nicely and the crest crater is very obvious  
 from up here. But it looks like the path you've  
 drawn that goes from Station 5 to 6 and 4 - that  
 path looks to me like it runs down sort of a tongue  
 of material. That you can drive up it - and that  
 those white lines we've got drawn on chart 9 Charlie  
 - really aren't obvious at all. When you get over  
 around more in the South Ray side you start to see  
 these things, but it's just not at all obvious that  
 they're going to see anything - down that path.

- - -

05 08 11 10 CC Okay. Now I heard earlier that you could see Double (ORBIT)  
 Spot with binocs. Does that sound right, Ken?

05 08 11 18 CMP That's affirmative. (ORBIT)

05 08 11 27 CC Okay. And I'm sure that they passed on to you that (ORBIT)  
 the LM should be 200 meters northwest of Double  
 Spot.

05 08 11 35 CMP Yeah. I just - every time I've gone over, I've been (ORBIT)  
looking for something that I thought was probably  
more worthwhile than just the gee whiz of my saying  
I saw the LM.

05 08 11 52 CMP I really wish we'd gotten into North Ray - maybe (ORBIT)  
they'll still get a chance, because it looks to me  
like a - that's a pretty interesting path up there.  
Interesting from the fact that it looks like it's  
constructional - the ridge that runs up to North Ray  
crater.

- - -

05 11 51 54 CC Hey, Ken. How did we make out in our discussion on (ORBIT)  
North Ray low altitude there as far as being able to  
see the white albedo or not? Or, were you too far  
to the south?

05 11 52 10 CMP It depends which rev you want to talk about. I (ORBIT)  
looked at her on the first day, right after DOI,  
there was two craters, but no rays. When I went  
back and looked at him on landing morning, there's a  
slight ray. But North Ray still doesn't stand out  
as being the bright guy that South Ray does.

- - -

05 12 11 06 CMP Couldn't pass up a chance to watch the landing site (ORBIT)  
one more time, and so I took a quick break from chow  
and went and watched it. And had a couple of  
questions in mind and only got two of them answered.  
One of them is that counting the layers in North and  
South Ray and South Ray looks different than North  
in that South Ray shows three distinct light and  
dark sequences. I suspect they're slumps, but  
there's at least three bands. North Ray doesn't  
have any of that sort of thing. It's obvious from  
this altitude. I took another look for their  
terraces and the whole area - the thing that we  
thought looked so distinctly different in the  
photographs - looked like Stone mountain and Smoky  
mountain were two different things and something  
came in the middle of it and - it doesn't look that  
way to me at all today. It looks to me like it's  
really all - almost all part of the same material.

And I've drawn another little mark on my map. It's just about where you folks said you thought the LM was, except a little farther over to the north. It turns out that there's one little bright speckle there that doesn't look like craters. I don't see anything except the speckle.

05 12 12 41 CC Okay, I'm looking there. Now, go straight north of (ORBIT)  
the LM and a little to the west, there's three small  
craters there that are covered with what looks like  
a ray, now. Where are you talking from that?

05 12 13 48 CMP You were looking in the right area. And, let me see (ORBIT)  
what I can give you for coordinates on that.

05 12 14 21 CMP How about CB 5 and 80? (ORBIT)

05 12 14 34 CMP Okay, and you know I'm not overhead long enough to (ORBIT)  
be sure that that's what I'm looking at, but it  
looked to me like it had a different kind of  
glint to it.

06 00 02 22 CMP I guess you probably didn't get my comment about the (ORBIT)  
glint over on Stone mountain?

06 00 02 31 CC Negative. (ORBIT)

06 00 02 38 CMP I had just gotten in a position as I passed overhead (ORBIT)  
the - area, and I was taking a look - over towards  
the terraces and see how they look today, and - when  
I looked over towards the terraces, it was kind of  
strange because I was looking out - and I'd say  
maybe you can see - at this sun angle looks like  
there might be a terrace out there. And you can see  
Crest (?) crater very plainly. And the Cincos, I  
have to be on top of the landing site to see it, and  
by the time I got around to that, I was downstream a  
ways; but I got a flash of light right at the base  
of Stone mountain; just a glint, like a piece of  
metal flashed in the sunlight. And I'll bet you  
anything I got a reflection off the Rover if at  
about that time they were right at the base of  
Stone.

06 00 04 12 CC That's about where they were, Ken. (ORBIT)

- - -

06 00 07 15 CMP One other thing I wanted to tell you about the - in (ORBIT)  
the Descartes area. You remember the little  
cone-shaped thing that we looked at on the plotter?

06 00 07 30 CMP Just to the north and mostly to the west of Canoe? (ORBIT)

06 00 07 40 CMP I've looked for it on four revs now, and I've (ORBIT)  
identified the feature that it looked like it was,  
and it doesn't look like that at all. It's just a  
little soft mound with a crater in it, and it  
doesn't look any different than all the other  
craters when you look at it from here.

06 00 08 00 CC Well, that's interesting, but disappointing. (ORBIT)

06 00 08 07 CMP Yeah, I was, too. And, actually, that's about the (ORBIT)  
same score for the one that's out here by Lassell.

06 00 08 34 CC Well, in the photograph for that one there (ORBIT)  
northwest of North Ray, it sure does look like it  
had a lot darker material around it.

06 00 08 45 CMP Yeah, I know it does, and I haven't had a chance to (ORBIT)  
look at it straight down, from an oblique, it sure  
looks the same as all the rest of the things around  
there.

- - -

06 00 31 27 CMP I think I told you yesterday that it appears to me (ORBIT)  
that the interior of North and South Ray are  
significantly different.

06 00 31 47 CMP South Ray shows a great deal of dark and light (ORBIT)  
splotches and North Ray just doesn't show that real  
dramatic difference.

06 01 53 51 CMP And I got North and South Ray again and - (ORBIT)

06 01 53 57 CC John and Charlie are at Station 5 now, Ken. (ORBIT)

- - -

06 01 54 20 CMP I can see one, two, three distinct layers and it (ORBIT)  
looks like several streams of material that go from  
the interior of South Ray - one of them points out,  
goes in South Ray and over the lip and down the

outside. And it points over towards Baby Ray. All those things we said we could see, all those lineaments and things that we looked at back in the furrow of Descartes just don't show.

06 01 54 58 CMP My first impression at the lower sun was that the material of Stone and Smoky were the same and that the Descartes furrowed material was also part of the same thing. As the sun angle comes up, it starts to change its character a little bit, and and it's looking more like the plotter photos. (ORBIT)

06 03 52 21 CMP Boy, as the sun angle comes up now, the features in the landing area are really fading out. (ORBIT)

06 03 52 55 CMP There's more evidence of terracing and banding in Smoky mountain than there is in Cone, it looks like. (ORBIT)

06 03 53 13 CMP On this sun angle, I can see one, two - say again. (ORBIT)

06 03 53 18 CC I was just curious to how close they were going to get those bands on their trip to North Ray. (ORBIT)

06 03 53 27 CMP Yeah. Well, the other thing is that they were going to go down to Ravine, and it looks to me like the material at Ravine is about the same material that's around North Ray. If they get there and come up the way they're scheduled to, it looks like they're going to be on the same unit that they would have gotten down at Ravine. (ORBIT)

- - -

06 03 54 12 CMP It sure looks like North Ray was blasted into a piece of Smoky mountain - what it really looks like. And that the Smoky mountain and the stuff out to the east of there is really probably all from the same stuff. (ORBIT)

06 05 50 56 CMP In this higher sun, it sure appears that the bright things that run down into - come out of the Descartes bright spot and run north, seem to be centered around - that's Dollond - I guess that's Dollond B or a - whatever that thing is. I tried to trace the boundaries and all this material that's in what we call the furrowed Descartes that runs up and it becomes part of Smoky mountain. That material (ORBIT)

looks just exactly like most of that stuff on the back side, except it may be a little bit darker, and I think that's the sun angle. That whole area has that same characteristic to me.

06 05 52 12 CC You remember that northwest-southeast trending we saw in the vicinity of North Ray that looked like it was some offsets in those grabens? Can you see any of that in there? (ORBIT)

06 05 52 27 CMP I'm not sure about that. But it does appear to me as if the floor that the LM has landed on is indeed a different unit that sticks in, and it's more part of this Cayley material that's farther out to the west. And it does go back just about the way we had drawn the boundaries. Say again your question? (ORBIT)

06 05 52 53 CC I just remember on a plotter, we looked at what appeared to be some graben that came across Smoky mountain and down to the southeast of it and going back up the northwest. And they were all offset like there may have been some faulting in that area. (ORBIT)

06 05 53 12 CMP Okay. Well, I'm not sure what that all is, Hank. That same texture that has many patterns and linear lines and they make a kind of a hash, but that same thing appears all over the surface when you look at it in detail. I think I can probably take a picture of most any one of these places down here and analyze it in depth and come up with a very similar picture. And especially the things on the back side look exactly like that Descartes area. It's just that Descartes area is a very small place. And you see so much on the back side that covers that same kind of thing. (ORBIT)

\* \* \* \* END OF TRANSCRIPT \* \* \* \*

TABLE I. APOLLO 16 SAMPLE LISTING CROSS-REFERENCED TO APOLLO ELAPSED TIMES

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
60001	CORE BIT	05 01 25 36 05 04 59 41
60002-07	CORE STEMS	05 01 25 36 05 04 59 41
60009	CORE 54 LOWER	06 04 57 47
60010	CORE 45 UPPER	06 04 57 47
60013	CORE 32 LOWER	07 01 35 10 07 01 36 52 07 01 59 28
60014	CORE 27 UPPER	07 01 35 10 07 01 36 52 07 01 59 28
60015	ROCK - CRYSTALLINE	05 05 08 40 05 05 31 26 05 23 28 31
60016	ROCK - BRECCIA	07 02 16 50
60017	ROCK - BRECCIA	07 00 40 49
60018	ROCK - BRECCIA	07 01 31 45
60019	ROCK - BRECCIA	07 01 42 20
60020	FINES - SCB 3 RESIDUE	
60025	ROCK - ANORTHOSITE	05 23 13 08
60030	DOC BAG RESIDUE	05 02 37 02 05 03 04 23
60035	ROCK - ANORTHOSITE GABBRO	05 02 37 02 05 03 04 23
60040	FINES - SCB 5 RESIDUE	
60050-59	FINES & CHIPS	05 02 44 15 05 03 04 23
60070	DOC BAG RESIDUE	05 02 45 33 05 02 50 40 05 03 04 23
60075	ROCK - BRECCIA	05 02 45 33 05 02 50 40 05 03 04 23
60090	DOC BAG RESIDUE	05 01 53 19 05 04 09 40
60095	CHIP - GLASS	05 01 53 19 05 04 09 40

TABLE I. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
60110	DOC BAG RESIDUE	06 05 11 36
60115	ROCK - BRECCIA	06 05 11 36
60130	DOC BAG RESIDUE	07 01 33 15
60135	ROCK - CRYSTALLINE	07 01 33 15
60210	RESIDUE	07 01 45 49
60215	ROCK - ANORTHOSITIC CATACLASITE	07 01 45 49
60230	DOC BAG RESIDUE	07 01 47 29
60235	ROCK - CRYSTALLINE	07 01 47 29
60250	DOC BAG RESIDUE	07 01 49 28
60255	ROCK - BRECCIA	07 01 49 28
60270	DOC BAG RESIDUE	07 01 56 25
60275	ROCK - BRECCIA	07 01 56 25
60310	DOC BAG RESIDUE	07 01 57 31
60315	ROCK - CRYSTALLINE	07 01 57 31
60330	RESIDUE	07 02 32 05
60335	ROCK - BRECCIA	07 02 32 05 09 21 36 47
60500-04	FINES - RAKE SAMPLE	07 01 30 26
60510	DOC BAG RESIDUE - RAKE SAMPLE	07 01 27 05
60515-19	CHIPS - RAKE SAMPLE	07 01 27 05
60525-29	CHIPS - RAKE SAMPLE	07 01 27 05
60535	CHIP - BRECCIA - RAKE SAMPLE	07 01 27 05

TABLE 1. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
60600-04	FINES - RAKE SAMPLE	07 01 24 51
60610	DOC BAG RESIDUE - RAKE SAMPLE	07 01 22 03
60615-19	CHIPS - RAKE SAMPLE	07 01 22 03
60625-29	CHIPS - RAKE SAMPLE	07 01 22 03
60635-39	CHIPS - RAKE SAMPLE	07 01 22 03
60645-49	CHIPS - RAKE SAMPLE	07 01 22 03
60655-59	CHIPS - RAKE SAMPLE	07 01 22 03
60665-69	CHIPS - RAKE SAMPLE	07 01 22 03
60675-79	CHIPS - RAKE SAMPLE	07 01 22 03
61010	RESIDUE - SRC I	
61015	ROCK - BRECCIA	05 04 03 24
61016	ROCK - ANORTHOSITE - "BIG MULEY"	05 04 07 30 05 05 24 53 05 08 24 07 05 22 47 35 07 01 36 29 07 02 14 35 07 02 26 14 07 06 06 55
61017	CHIP	
61130	DOC BAG RESIDUE	05 03 45 28
61135	ROCK - BRECCIA	05 03 45 28
61140-44	FINES	05 03 39 25
61150	DOC BAG RESIDUE	05 03 36 00
61155-58	CHIPS	05 03 36 00
61160-64	FINES	05 03 42 31
61170	DOC BAG RESIDUE	05 03 40 45
61175	ROCK - BRECCIA	05 03 40 45

TABLE 1. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
61180-84	FINES	05 03 50 01
61190	DOC BAG RESIDUE	05 03 47 44
61195	ROCK - MICROBRECCIA	05 03 47 44
61220-26	FINES & CHIPS	05 03 54 21
61240-49, 55	FINES & CHIPS	05 03 50 59
61280-84	FINES	05 04 01 05
61290	CHIP?	05 03 55 47 05 04 01 11 05 08 23 45 05 08 29 41
61295	ROCK - BRECCIA	05 03 55 47 05 04 01 11 05 08 23 45 05 08 29 41
61500-05	FINES	05 03 34 15
61510	DOC BAG RESIDUE - RAKE SAMPLE	05 03 28 28
61515-19	CHIPS - RAKE SAMPLE	05 03 28 28
61525-29	CHIPS - RAKE SAMPLE	05 03 28 28
61535-39	CHIPS - RAKE SAMPLE	05 03 28 28
61545-49	CHIPS - RAKE SAMPLE	05 03 28 28
61555-59	CHIPS - RAKE SAMPLE	05 03 28 28
61565-69	CHIPS - RAKE SAMPLE	05 03 28 28
61575-77	CHIPS - RAKE SAMPLE	05 03 28 28
62230-38	FINES, CHIPS, & ROCK - BASALT	05 04 32 38
62240-49	FINES & CHIPS	05 04 36 20
62250	DOC BAG RESIDUE	05 04 37 08
62255	ROCK - BRECCIA	05 04 37 08

TABLE I. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
62270	DOC BAG RESIDUE	05 04 40 44 05 08 22 41 05 08 43 38
62275	ROCK - BRECCIA	05 04 40 44 05 08 22 41 05 08 43 38
62280-89	FINES & CHIPS	05 04 45 18
62290	DOC BAG RESIDUE	05 04 44 07
62295	ROCK - CRYSTALLINE	05 04 44 07
62305	CHIP WITH 62280-89	05 04 45 18
62315	CHIP WITH 62240-49	05 04 36 20
63010	RESIDUE FROM SCB 6	
63320-24	FINES	07 00 28 00
63335	ROCK - BRECCIA	07 00 38 16
63340-44	FINES	07 00 32 21
63350	UNKNOWN - BAG 429	07 00 38 16
63355	ROCK - BRECCIA	07 00 38 16
63500-09	FINES & CHIPS - RAKE SAMPLE	07 00 26 46
63515	CHIP - RAKE SAMPLE	07 00 26 46
63520	DOC BAG RESIDUE - RAKE SAMPLE	07 00 23 58
63525-29	CHIPS - RAKE SAMPLE	07 00 23 58
63535-39	CHIPS - RAKE SAMPLE	07 00 23 58
63545-49	CHIPS - RAKE SAMPLE	07 00 23 58
63555-59	CHIPS - RAKE SAMPLE	07 00 23 58
63565-69	CHIPS - RAKE SAMPLE	07 00 23 58

TABLE 1. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
63575-79	CHIPS - RAKE SAMPLE	07 00 23 58
63585-89	CHIPS - RAKE SAMPLE	07 00 23 58
63595-98	CHIPS - RAKE SAMPLE	07 00 23 58
64001	CORE 38	06 00 37 23
64002	CORE 43	06 00 37 23
64420-25	FINES & CHIP	06 00 35 31 06 00 37 43
64430	DOC BAG RESIDUE	06 00 17 19
64435	ROCK - BRECCIA	06 00 17 19
64450	UNKNOWN - DOC BAG RESIDUE?	06 00 29 08
64455	ROCK - ANORTHOSITE	06 00 29 08
64470	DOC BAG RESIDUE	06 00 25 57 06 00 32 15
64475-78	ROCKS & CHIPS - BRECCIAS	06 00 25 57 06 00 32 15
64500-09	FINES & CHIPS? - RAKE SAMPLE	06 00 23 22
64515-19	CHIPS - RAKE SAMPLE	06 00 23 22
64525	CHIP? - RAKE SAMPLE	06 00 23 22
64530	DOC BAG RESIDUE - RAKE SAMPLE	06 00 19 56
64535-39	ROCKS & CHIPS - RAKE SAMPLE	06 00 19 56
64540-49	CHIPS - RAKE SAMPLE	06 00 19 56
64555-59	CHIPS - RAKE SAMPLE	06 00 19 56
64565-69	CHIPS - RAKE SAMPLE	06 00 19 56
64575-79	CHIPS - RAKE SAMPLE	06 00 19 56

TABLE 1. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
64585-89	CHIPS - RAKE SAMPLE	06 00 19 56
64800-04	FINES - RAKE SAMPLE	06 00 45 09
64810-19	FINES & CHIPS - RAKE SAMPLE	06 00 50 56
64825-29	CHIPS - RAKE SAMPLE	06 00 50 56
64835-37	CHIPS - RAKE SAMPLE	06 00 50 56
65010	SCB I RESIDUE	
65015	ROCK - CRYSTALLINE	06 01 47 08
65016	GLASS SPHERE	06 01 18 18 06 05 35 13
65030	DOC BAG RESIDUE	06 01 30 34
65035	ROCK - BRECCIA	06 01 30 34
65050	DOC BAG RESIDUE	06 01 49 32
65055	ROCK - CRYSTALLINE	06 01 49 32
65056	ROCK - GLASS AGGLUTINATE	06 01 49 32
65070	DOC BAG RESIDUE	06 01 27 51
65075	ROCK - BRECCIA	06 01 27 51
65090	DOC BAG RESIDUE	06 01 44 35
65095	ROCK - BRECCIA	06 01 44 35
65310	DOC BAG RESIDUE - RAKE SAMPLE	06 01 32 33
65315	ROCK - BRECCIA	06 01 32 33
65325-29	CHIPS - RAKE SAMPLE	06 01 32 33
65335-39	CHIPS - RAKE SAMPLE	06 01 32 33

TABLE I. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
65345-49	CHIPS - RAKE SAMPLE	06 01 32 33
65355-59	CHIPS - RAKE SAMPLE	06 01 32 33
65365-66	CHIPS - RAKE SAMPLE	06 01 32 33
65500-04	FINES - RAKE SAMPLE	06 01 19 47
65510-19	FINES & CHIPS - RAKE SAMPLE	06 01 09 41
65525-29	CHIPS - RAKE SAMPLE	06 01 09 41
65535-39	CHIPS - RAKE SAMPLE	06 01 09 41
65545-49	CHIPS - RAKE SAMPLE	06 01 09 41
65555-59	CHIPS - RAKE SAMPLE	06 01 09 41
65565-69	CHIPS - RAKE SAMPLE	06 01 09 41
65575-79	CHIPS - RAKE SAMPLE	06 01 09 41
65585-88	CHIPS - RAKE SAMPLE	06 01 09 41
65700-04	FINES - RAKE SAMPLE	06 01 26 25
65710	UNKNOWN - RAKE SAMPLE	06 01 21 27
65715-19	CHIPS - RAKE SAMPLE	06 01 21 27
65725-29	CHIPS - RAKE SAMPLE	06 01 21 27
65735-39	CHIPS - RAKE SAMPLE	06 01 21 27
65745-49	CHIPS - RAKE SAMPLE	06 01 21 27
65755-59	CHIPS - RAKE SAMPLE	06 01 21 27
65765-69	CHIPS - RAKE SAMPLE	06 01 21 27
65775-79	CHIPS - RAKE SAMPLE	06 01 21 27

TABLE I. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
65785-89	CHIPS & ROCK - BRECCIA - RAKE SAMPLE	06 01 21 27
65795	CHIP - RAKE SAMPLE	06 01 21 27
65900-04	FINES - RAKE SAMPLE	06 01 39 04
65905-09	UNKNOWN - RAKE SAMPLE	06 01 39 04
65915-16	UNKNOWN - RAKE SAMPLE	06 01 39 04
65920	UNKNOWN - RAKE SAMPLE	06 01 34 29
65925-27	CHIPS - RAKE SAMPLE	06 01 34 29
66030-37	FINES, CHIPS, & ROCK - BRECCIA	06 02 10 59
66040-44	FINES	06 02 15 55
66050	DOC BAG RESIDUE	06 02 14 53
66055	ROCK - BRECCIA	06 02 14 53
66070	DOC BAG RESIDUE	06 02 19 46
66075	ROCK - BRECCIA	06 02 19 46
66080-86	FINES & CHIPS?	06 02 17 11
66090	DOC BAG RESIDUE	06 02 21 56
66095	ROCK - ANORTHOSITE	06 02 21 56
67010	RESIDUE	06 23 09 54
67015	ROCK - BRECCIA	06 23 09 54
67016	ROCK - BRECCIA	07 00 07 53 07 01 36 25
67020	RESIDUE	07 00 07 53?
67025	CHIP - ANORTHOSITE	07 00 07 53?

TABLE I. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
67030-35	FINES & ROCK - BRECCIA	06 22 52 30
67050	DOC BAG RESIDUE	06 23 02 56
67055	ROCK - BRECCIA	06 23 02 56
67070	DOC BAG RESIDUE	06 23 07 54 06 23 10 44
67075	ROCK - ANORTHOSITE	06 23 07 54 06 23 10 44
67090	DOC BAG RESIDUE	06 23 11 20
67095	ROCK - BRECCIA	06 23 11 20
67110	DOC BAG RESIDUE	06 23 15 44
67115	ROCK - BRECCIA	06 23 15 44
67215	ROCK - BRECCIA	07 00 00 51
67235	ROCK - BRECCIA	06 23 57 11
67410	DOC BAG RESIDUE	06 23 27 38
67415	ROCK - BRECCIA	06 23 27 38
67430	DOC BAG RESIDUE	06 23 17 11
67435	ROCK - BRECCIA	06 23 17 11
67450	DOC BAG RESIDUE	06 23 21 12
67455	ROCK - BRECCIA	06 23 21 12
67460-64	FINES	06 23 20 35
67475	ROCK - BRECCIA	06 23 26 00
67480-89	REFERENCE SOIL & CHIPS	06 23 28 48
67495	CHIP	06 23 28 48

TABLE 1. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
67510-19	FINES & CHIPS - RAKE SOIL	06 23 25 28 06 23 30 07
67525-29	CHIPS - RAKE SOIL	06 23 25 28 06 23 30 07
67535-39	CHIPS - RAKE SOIL	06 23 25 28 06 23 30 07
67545-49	CHIPS - RAKE SOIL	06 23 25 28 06 23 30 07
67555-59	CHIPS - RAKE SOIL	06 23 25 28 06 23 30 07
67565-69	CHIPS - RAKE SOIL	06 23 25 28 06 23 30 07
67575-76	CHIPS - RAKE SOIL	06 23 25 28 06 23 30 07
67600-05	FINES & CHIP - RAKE SOIL	06 23 34 41
67610	DOC BAG RESIDUE	06 23 31 35
67615-19	CHIPS - RAKE SAMPLE	06 23 31 35
67625-29	CHIPS - RAKE SAMPLE	06 23 31 35
67635-39	CHIPS - RAKE SAMPLE	06 23 31 35
67645-49	CHIPS - RAKE SAMPLE	06 23 31 35
67655-59	CHIPS - RAKE SAMPLE	06 23 31 35
67665-69	CHIPS - RAKE SAMPLE	06 23 31 35
67675-76	CHIPS - RAKE SAMPLE	06 23 31 35
67700-08	FINES & CHIPS - RAKE SOIL	06 23 39 09
67710-19	FINES & CHIPS - RAKE SAMPLE	06 23 36 53
67725-29	FINES & CHIPS - RAKE SAMPLE	06 23 36 53
67735-39	FINES & CHIPS - RAKE SAMPLE	06 23 36 53
67745-49	FINES & CHIPS - RAKE SAMPLE	06 23 36 53

TABLE 1. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
67755-59	FINES & CHIPS - RAKE SAMPLE	06 23 36 53	
67765-69	FINES & CHIPS - RAKE SAMPLE	06 23 36 53	
67775-76	FINES & CHIPS - RAKE SAMPLE	06 23 36 53	
67910	RESIDUE	06 23 46 15	
67915	ROCK - BRECCIA	06 23 46 15	
67930	UNSIEVED FINES	06 23 44 45	
67935-37	CHIPS	06 23 44 45	
67940-48	FINES & CHIPS	06 23 49 07	
67950	UNKNOWN - CHIP?	06 23 47 58	
67955-57	CHIPS	06 23 47 58	
67960	UNSIEVED FINES	06 23 50 52	
67970	DOC BAG RESIDUE	06 23 53 07	
67975	ROCK - BRECCIA	06 23 53 07	
68001	CORE 36	06 02 45 09 06 02 49 58	
68002	CORE 29	06 02 45 09 06 02 49 58	
68030	DOC BAG RESIDUE	06 02 56 13	
68035	CHIP	06 02 56 13	
68110	DOC BAG RESIDUE	06 03 09 34	
68115	ROCK - BRECCIA	06 03 09 34	
68120-24	FINES	06 03 10 11	
68410	UNKNOWN - RESIDUE?	06 03 15 32	

TABLE 1. CONTINUED

<u>LRL SAMPLE NO.</u>	<u>SAMPLE CLASS</u>	<u>APOLLO ELAPSED TIMES (AET)</u>
68415	ROCK - CRYSTALLINE	06 03 15 32
68416	ROCK - ALLIVATITE	06 03 15 32
68500-05	FINES - RAKE SOIL	06 02 53 50
68510	CHIP	06 02 47 05 06 02 52 05
68515-19	CHIPS & ROCK - BRECCIA - RAKE SAMPLE	06 02 47 05 06 02 52 05
68525-29	CHIPS - RAKE SAMPLE	06 02 47 05 06 02 52 05
68535-37	CHIPS - RAKE SAMPLE	06 02 47 05 06 02 52 05
68810	RESIDUE	06 03 27 36
68815	ROCK - BRECCIA	06 03 24 16
68820-25	FINES & CHIP? - FILLET SOIL SAMPLE	06 03 21 30
68840-48	FINES & CHIPS - REFERENCE SOIL	06 03 24 53
69001	CORE 34 - CSVC	06 04 08 38
69003-04	SURFACE SAMPLER 1 & 2	06 03 56 45
69920-24	FINES - SKIM SOIL	06 04 06 08
69930	DOC BAG RESIDUE	06 04 09 03
69935	ROCK - BRECCIA	06 04 09 03
69940-45	FINES & CHIP - SCOOP SOIL	06 04 07 52
69950	DOC BAG RESIDUE	06 04 13 47
69955	ROCK - ANORTHOSITE	06 04 13 47
69960-65	FINES & CHIP	06 04 14 52

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