14312

Crystalline-matrix Breccia

299 grams

Figure 1: Photos of two sides of 14312 showing abundant micrometeorite craters. Sample is 8 cm across. S71-31403 and 23260.

Introduction

14312 was collected from atop "Turtle Rock" at the "North Boulder Field" (station H) about 100 meters northwest of the LM (Swann et al. 1977). It is a blocky, angular rock cut by irregular fractures parallel to the long axis of the rock. Glass-lined zap pits are moderately dense on all surfaces. The rock is a coherent breccia with a moderate percentage of angular dark clasts which tend to blend with the light matrix. A very few light clasts are present (Wilshire in Swann et al.)

Petrography

14312 was studied by the Imbrium Consortium led by John Wood. Ryder and Bower (1976) noted that it was composed of more matrix, and less clasts than other breccias from Apollo 14. Clasts in 14312 include, dark matrix breccias, Al-rich mare basalt, poikilitic impact melt, and individual minerals. McGee et al. (1977) and Simonds et al. (1977) also provided a description.

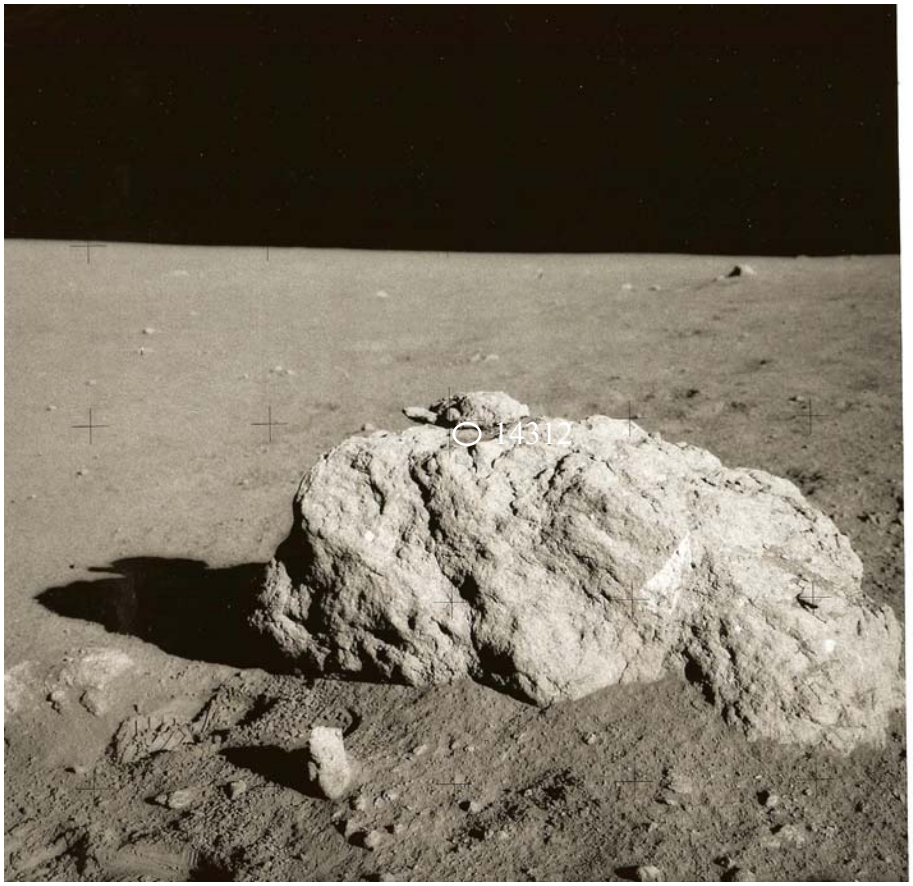


Figure 2: Photo of Turtle Rock in North Boulder Field (station H). AS14-68-9476

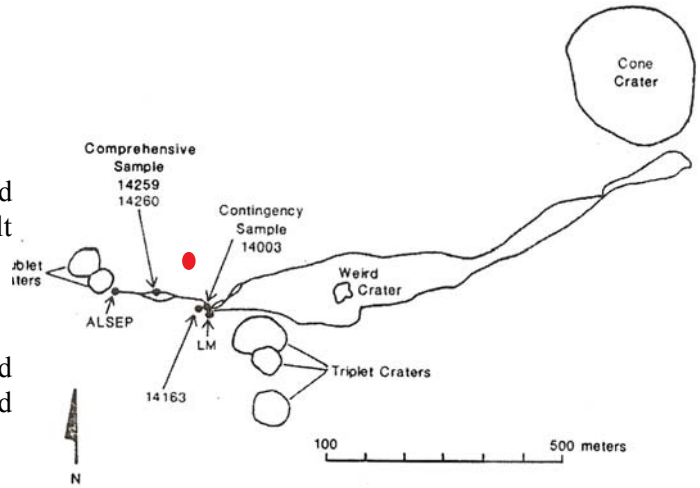


Figure 3: Location of station H about 100 meters northwest of LM where 14312 - 14320 were collected.

Significant Clasts

High-alumina mare basalt

Marvin in Ryder et al. (1976) illustrated photomicrographs of small fragments of mare basalt and reported the pyroxene composition (figure 8).

Poikilitic Impact Melt

Marvin in Ryder et al. (1976) found light-colored fragments of poikilitic norite (impact melt) and reported the pyroxene composition (figure 9).

Ferroan Anorthosite ,53 ,57

Warren et al. (1983) reported the composition of a very small clast of ferroan anorthosite and published a picture showing a granulated texture. It is almost all plagioclase.

Troctolitic Clast

McGee et al. (1977) show a photomicrograph of a coarsely-crystalline troctolite (figure 10).

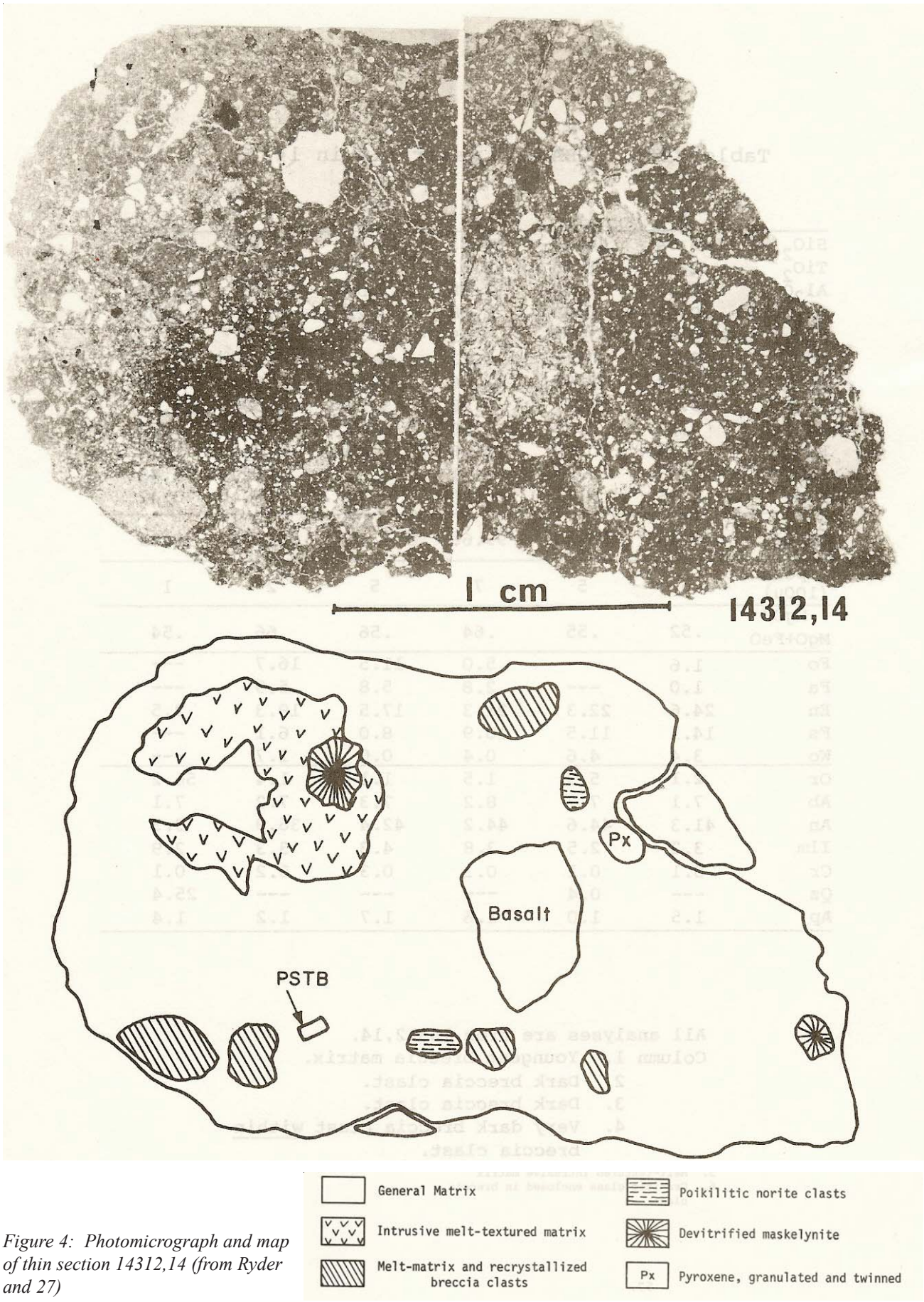


Figure 4: Photomicrograph and map of thin section 14312,14 (from Ryder and 27)

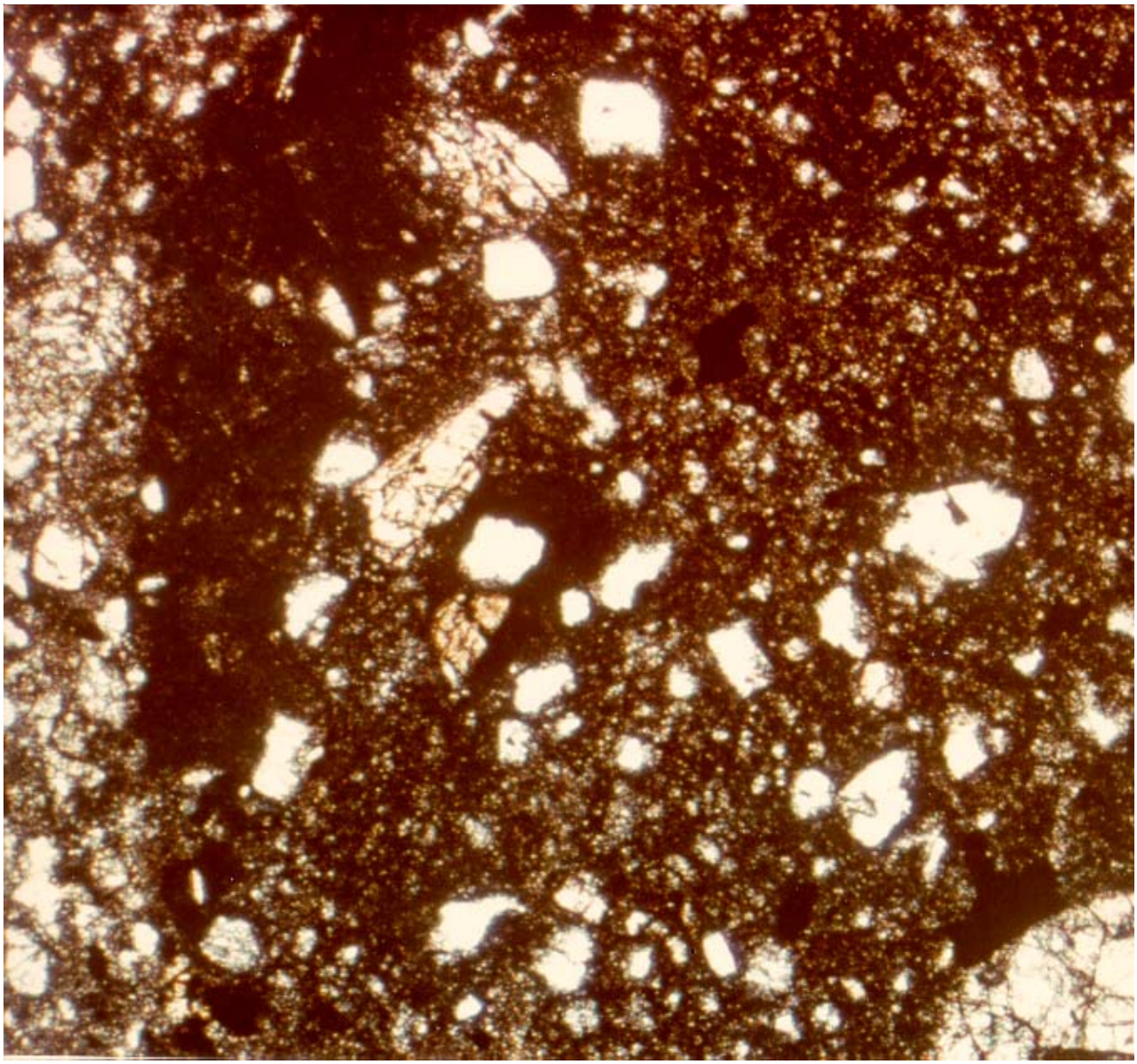


Figure 5: Photomicrograph of thin section of 14312. Scale is 2.5 mm. S76-20795.

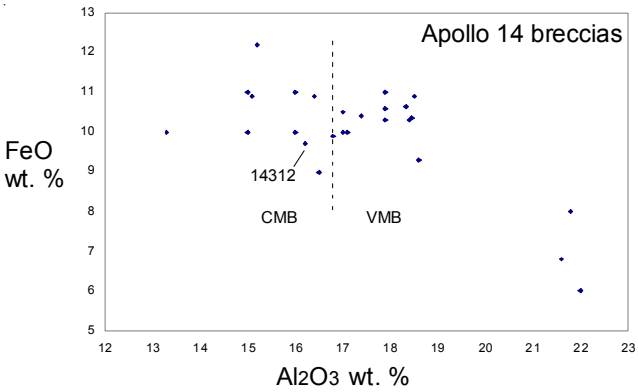


Figure 6: Compostion of Apollo 14 breccia samples with 14312 shown.

Transcript again

CDR Okay, we're approaching the LM now. Coming in at Fra Mauro Base.

CC Rodger, Al, and I guess from here, we can split up; and Ed can take the MET and proceed to the cluster of boulders he had reported earlier to the north of the LM; and you can proceed out to the ALSEP.

CDR I'd suggest – well, you can do it the way you want to – I guess you can do it without the MET, because there's nobody to – if anything fall off, we've lost all those goodies.

LMP I'll just take a couple of rock bags Fredo, my tongs and camera and go. As a matter of fact, Fredo, I'm just going to take a weigh bag and no sample bag; that way I can get more. The size of these rocks – the sample bags are too small, anyhow.

LMP Okay, Fredo, my plan: I'm out in the area of the boulder field I'm going to photograph many of the boulders, the rocks, the

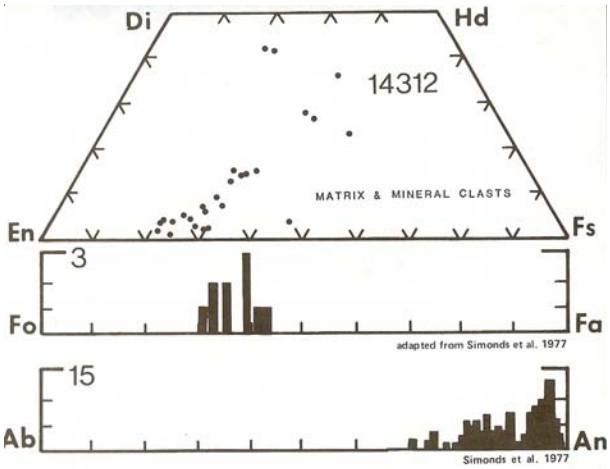


Figure 7: Compositi of pyroxene, olivine and plagioclase in 14312 (McGee et al. 1977).

Chemistry

The chemical composition has been determined by Marvin (1976) and Blanchard (1976).

Processing

14312 was returned in weigh bag 1038 which was opened in the Crew Reception Area before the sample was entered into the NNPL for description (figure 12). There are 16 thin sections.

broken ones, the big ones, and what have you – and then, grab as many as the different fragments as I can around these piles of broken boulders. Now that I'm here, I see a large number of inclusions – I can't tell whether they're crystals or not – I think they are. And I'll grab as many of these – and give you before and after shots as I can – of a whole weigh bag full of rocks.

Three minutes later

LMP Okay, Fredo, I'm heading back from the boulder field. I've samples two of the larger boulders in the area. Rocks broken from them and lying around on them; and I've taken a pan; and I have maybe a third of a weigh bag full of small rocks from these boulders.

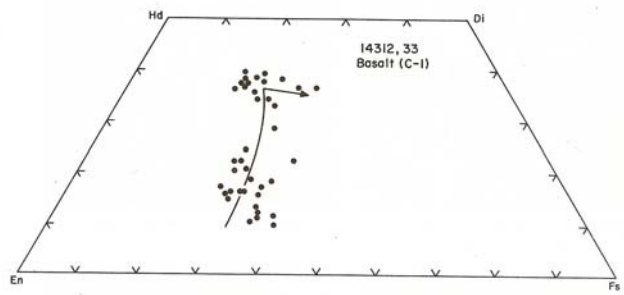


Figure 8: Composition of pyroxene in mare basalt clasts in 14312 (Ryder et al. 1976).

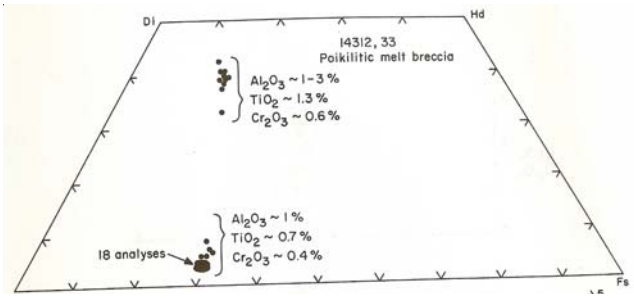


Figure 9: Composition of pyroxene in poikilitic impact melt clasts in 14312 (Ryder et al. 1976).

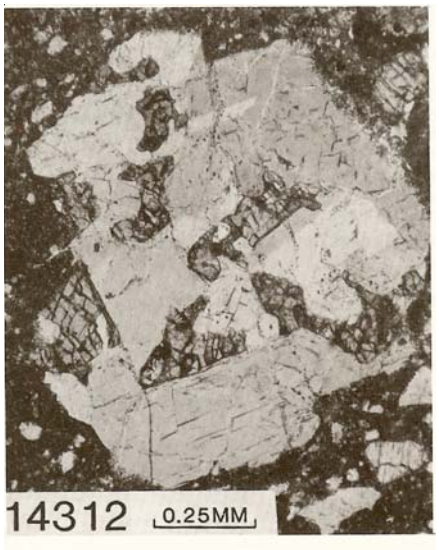


Figure 10: Troctolite clast in 14312 (mcGee et al. 1977).

Table 1. Chemical composition of 14312.

reference	Marvin in Imbrium Consortium II					Warren83		Marvin		McGee77	
weight	matrix					clast		granite clast		Blanchard	
SiO2 %	46.94	48.58	46.43	45.77	(a)	44.7	(b)	67.85	(a)	unpublished	
TiO2	1.66	1.28	2.01	2.34	(a)	0.27	(b)	1.57	(a)		
Al2O3	16.5	18.49	17.98	17.59	(a)	35.9	(b)	13.87	(a)		
FeO	9.61	7.23	9.65	10.73	(a)	0.21	(b)	1.33	(a)	10.5	(b)
MnO	0.13	0.11	0.13	0.14	(a)	0.005	(b)	0.05	(a)		
MgO	10.54	8.8	11.36	13.88	(a)	0.2	(b)	0.97	(a)		
CaO	10.6	11.57	9.98	9.17	(a)	19.3	(b)	1.2	(a)		
Na2O	0.82	0.89	0.96	0.88	(a)	0.5	(b)	0.82	(a)	0.77	(b)
K2O	0.34	0.89	0.26	0.19	(a)	0.05	(b)	9.27	(a)	0.56	(b)
P2O5	0.65	0.42	0.7	0.74	(a)			0.42	(a)		
S %											
sum											
Sc ppm						0.75	(b)			18.1	(b)
V											
Cr						70	(b)				
Co						1.44	(b)			31.3	(b)
Ni						3.1	(b)			280	(b)
Cu											
Zn						0.21	(b)			28	(b)
Ga						8.9	(b)				
Ge ppb						53	(b)				
As											
Se											
Rb											
Sr											
Y											
Zr						129	(b)				
Nb											
Mo											
Ru											
Rh											
Pd ppb											
Ag ppb											
Cd ppb						4.6	(b)				
In ppb											
Sn ppb											
Sb ppb											
Te ppb											
Cs ppm						0.12	(b)				
Ba						46	(b)				
La						0.48	(b)			67	(b)
Ce						1.2	(b)			182	(b)
Pr											
Nd						0.85	(b)				
Sm						0.16	(b)			30.4	(b)
Eu						0.8	(b)			2.19	(b)
Gd											
Tb						0.042	(b)			6.5	(b)
Dy						0.2	(b)				
Ho											
Er											
Tm											
Yb						0.103	(b)			22.5	(b)
Lu						0.018	(b)			5.25	(b)
Hf						0.11	(b)			25.3	(b)
Ta						0.023	(b)				
W ppb											
Re ppb											
Os ppb											
Ir ppb						0.076	(b)				
Pt ppb											
Au ppb						0.019	(b)				
Th ppm						0.62	(b)			13.9	(b)
U ppm						0.1	(b)				

technique: (a) broad beam e. probe, (b) INAA

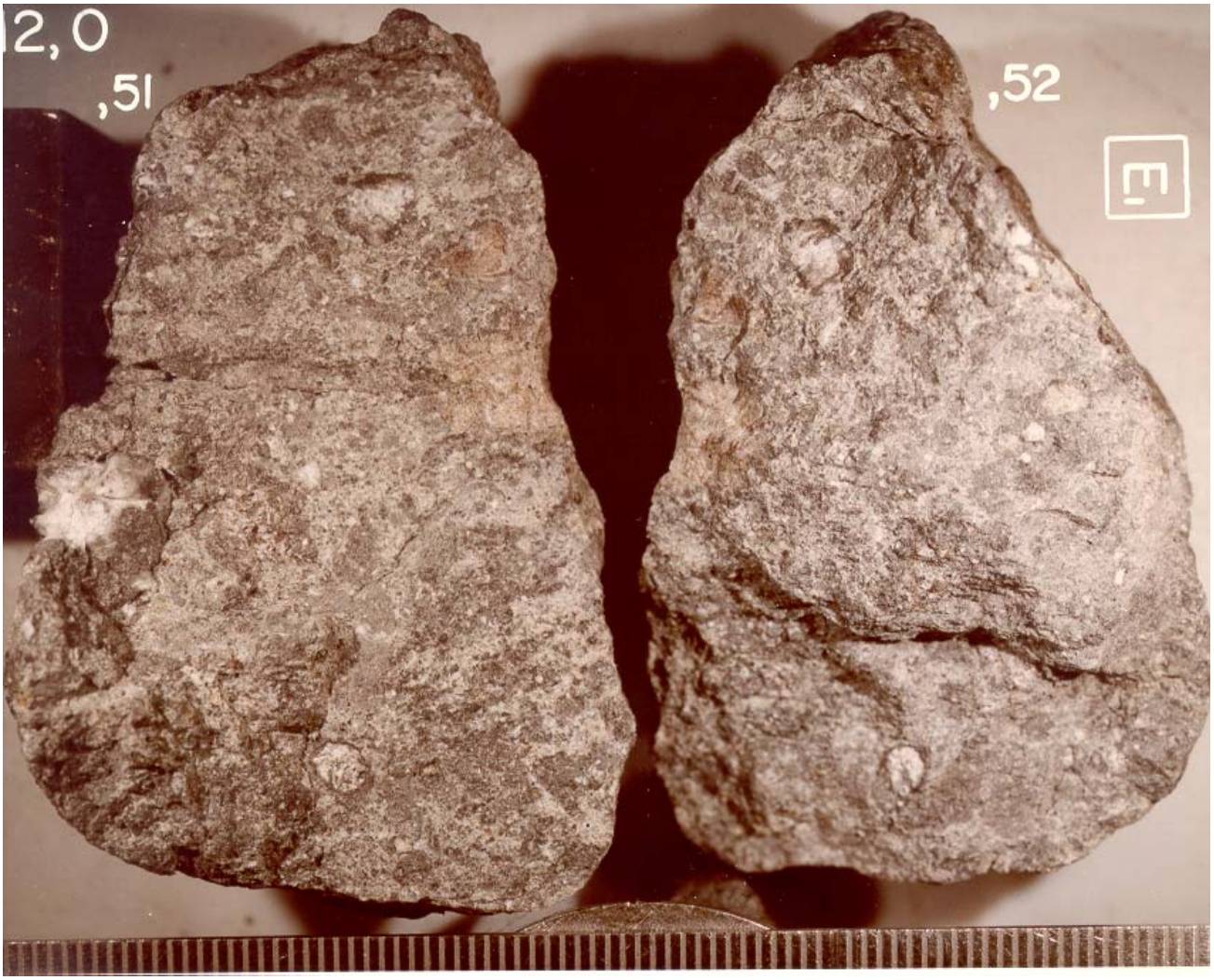
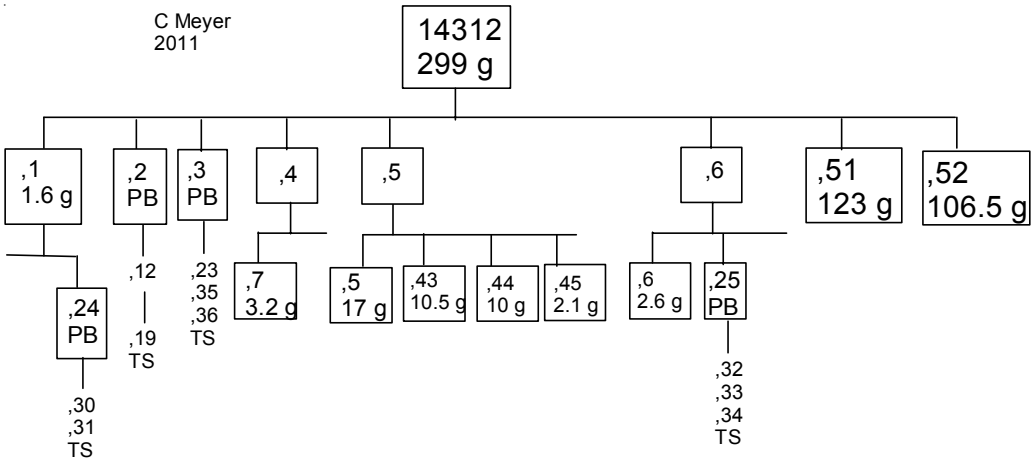


Figure 11: Broken interior surface of 14312. Scale at bottom is in mm. S81-26024.



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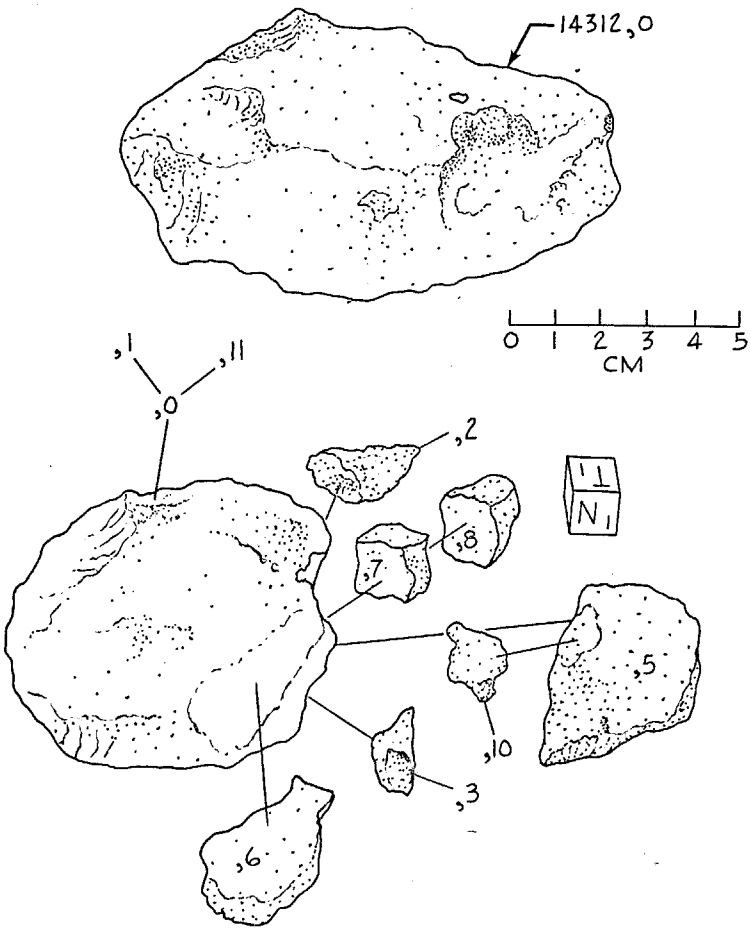

Figure 12: Initial unbagging of weigh bag 1038 in Crew Reception Area.

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