70007, 70004, 70001

70001 Nagle
70004 Watty
70007 Watty

DRILL STEM 70007

Sample History

Drill stem 70007 is the third section from the top of the Apollo 17 drill string and contains approximately 30.5 cm. of core. The top of this section of core is from 62.7 cm. below the lunar surface.

This core was only partly filled. A void of about 10 cm. at the top allowed slumping to disturb natural stratification down another 8 cm. according to the X-radiograph interpretation. The exact cause of the void cannot be determined, but it is thought to be related to a partly uncoupled joint between 70007 and 70008. The lower 2 cm. of 70008 was also void. The poor sorting and courseness of 70008 may have provided plug resistance during extraction on the moon, while the finer soil of 70007 allowed movement.

Before the drill stem was opened by milling, the soil was confined by inserting a hollow teflon plug and aluminum foil stay at the upper end. For this operation, the drill stem was oriented vertically. The plug was pushed in until moderate resistance was felt at 9.5 cm. below the tube opening.

The lower end of the tube was capped by a hollow teflon flight cap. It was necessary to replace this cap by an internal-fitting teflon tube plug. Although the soil in the flight cap was loosely packed, the solid tube plug penetrated the tube only about 5 or 6mm. of the required 26 mm. The 20 mm. or so of soil obstructing the proper placement of the plug was pushed into the tube by screw compression during mounting of the drill stem in the milling machine. It was felt that the soil was very loosely packed by the upper plug emplacement, and that more compaction was desirable for the rigors of milling. The soil in the lower end was also loosely packed due to the 26 mm. void created when the male end of 70006 was uncoupled from the lower end of 70007. The flight cap, being hollow, did not fill this void.

On August 1, 1975, drill stem 70007 was longitudinally split on a milling machine. After being affixed in a troughed dissection table, the upper half of the tube was lifted off and set aside. Soil remained in the upper split half along the lower 4 cm. and tapering up another 2.5 cm. This soil was tightly compacted by insertion of a tube plug. Reference scales were mounted so that the lower plug/soil interface was aligned with the 40 cm. mark and that the upper end of the tube was aligned with the zero cm. mark. The upper plug/soil interface then became established at 9.5 cm.

Dissection and Handling

Dissection of 70007 took place between 23 July and 6 October, 1975, according to the standard drill stem procedures outlined in Chapter 1, and data were analyzed as described on pp. 17-15 through 17-18. Location of all dissection splits is documented in Fig. 17-8. The uppermost dissection interval (9.5-10.5 cm.) was taken at twice standard width because soil from the affected area became mixed during extraction of a large metal shaving. Red light and lead-free samples were taken from 33.0-34.5 and 19.0-20.5 cm. after

LOCATION OF SAMPLES, DRILL STEM 70007

UNIT (Numeral) Thickness Samples in unit	Sample Interval (LCL Inventory)	INTERVAL SAMPLES Sample No.	Vial No.	Sample Wt.	COARSE FRACTION Sample No.	Vial No.	Sample Wt.	SPECIAL SAMPLES Sample No.	Vial No.	Sample Wt.	Sample Type	Sample Interval
63.1								,153	9-5749	3.500	Sweepings	
	10.0											
	10.5	,150	9-5746	3.440	,151	9-5747	0.431	,152	9-5748	0.288	BSRF	106-097
	11.0	,148	9-5744	1.900	,149	9-5745	0.240					
	11.5	,146	9-5742	1.619	,147	9-5743	0.260					
70007, VII	12.0	,144	9-5740	1.834	,145	9-5741	0.254					
6.0 cm. thick	12.5	,140	9-5736	1.776	,141	9-5737	0.133	,143	9-5739	0.455	BSRF	125-118
-,128 -,152	13.0	,138	9-5734	1.680	,139	9-5735	0.126	,142	9-5738	0.362	BSRF	134-127
	13.5	,136	9-5732	1.577	,137	9-5733	0.238					
	14.0	,134	9-5730	1.946	,135	9-5731	0.267					
	14.5	,132	9-5728	1.634	,133	9-5729	0.200					
69.1	15.0	,130	9-5726	1.756	,131	9-5727	0.203					
	15.5	,128	9-5724	1.857	,129	9-5725	0.200	,119	9-5715	0.037	SoBx	178-173
	16.0	,126	9-5722	1.650	,127	9-5723	0.364	,118	9-5714	0.269	BSRF	183-174
	16.5	,124	9-5720	1.767	,125	9-5721	0.332	,113	9-5709	0.222	SoBx	189-182
70007, VI	17.0	,122	9-5718	1.870	,123	9-5719	0.405	,112	9-5708	0.067	AnBx	187-183
6.0 cm. thick	17.5	,120	9-5716	1.673	,121	9-5717	0.322	,111	9-5707	0.094	SoBx	191-187
-,96 -,127	18.0	,116	9-5712	1.637	,117	9-5713	0.226	,110	9-5706	0.105	SoBx	191-185
	18.5	,114	9-5710	1.550	,115	9-5711	0.181	,107	9-5703	0.497	BSRF	196-188
	19.0	,108	9-5704	1.668	,109	9-5705	0.212	,106	9-5702	0.064	BSRF	200-196
								,105	9-5701	1.155	Lead-Free	205-190
		,102	9-5699	3.505	,103	9-5700	0.480	,104	87-1324	0.380	Red Light	205-190
	20.5							,101	9-5698	0.311	BSRF	210-203
75.1	21.0	,98	9-5695	2.198	,99	9-5696	0.130	,100	9-5697	0.005	Olivine	208-207
	21.5	,96	9-5693	1.855	,97	9-5694	0.173	,95	9-5692	0.065	SoBx	217-214
	22.0	,92	9-5689	1.773	,93	9-5690	0.085	,94	9-5691	1.140	BSRF	226-217
	22.5	,90	9-5687	1.488	,91	9-5688	0.162	,89	9-5686	0.006	SoBx	228-227
	23.0	,84	9-5681	1.710	,85	9-5682	0.222	,88	9-5685	0.040	VSGL	229-226
70007, V	23.5	,82	9-5679	1.798	,83	9-5680	0.203	,86	9-5683	0.066	SoBx	232-228
6.0 cm. thick	24.0	,80	9-5677	1.828	,81	9-5678	0.343	,87	9-5684	0.646	BSRF	238-228
-,60 -,95	24.5	,76	9-5673	1.789	,77	9-5674	0.164	,79	9-5676	0.185	PXGL	245-40
	25.0	,74	9-5671	1.233	,75	9-5672	0.161	,78	9-5675	3.152	BSRF	257-241
	25.5	,72	9-5669	1.385	,73	9-5670	0.072					
	26.0	,70	9-5667	1.900	,71	9-5668	0.372					
	26.5	,68	9-5665	1.750	,69	9-5666	0.118	,67	9-5664	0.316	SoBx	269-263
81.1	27.0	,64	9-5660	1.879	,65	9-5661	0.210	,66	9-5662	0.047	BSRF	267-265
	27.5	,60	9-5656	2.278	,61	9-5657	0.221	,63	9-5659	0.083	AnBx	274-269
70007, IV 2.5 cm. thick	28.0	,58	9-5654	1.960	,59	9-5655	0.232	,62	9-5658	0.043	AnBx	276-272
-,50 -,59	28.5	,56	9-5652	1.887	,57	9-5653	0.377					
	29.0	,54	9-5650	2.149	,55	9-5651	0.310					
	29.5	,52	9-5648	2.051	,53	9-5649	0.275					
83.6	30.0	,50	9-5646	2.030	,51	9-5647	0.226					
	30.5	,48	9-5644	2.062	,49	9-5645	0.073					
	31.0	,46	9-5642	2.067	,47	9-5643	0.085					
	31.5	,44	9-5640	2.053	,45	9-5641	0.087					
70007, III	32.0	,42	9-5638	2.107	,43	9-5639	0.068					
5.0 cm. thick	32.5	,40	9-5636	1.940	,41	9-5637	0.240					
-,32 -,49	33.0	,38	9-5634	2.538	,39	9-5635	0.168					
		,34	9-5631	4.353	,35	9-5632	0.560	,37	9-5633	1.346	Lead Free	345-330
88.6								,36	87-1077	0.300	Red Light	345-330
	34.5											
70007, II	35.0	,32	9-5629	2.101	,33	9-5630	0.104	,31	9-5628	0.096	SoBx	352-349
3.0 cm thick	35.5	,28	9-5625	2.000	,29	9-5626	0.175	,30	9-5627	0.085	BSRF	357-351
-,14 -,31	36.0	,26	9-5623	2.013	,27	9-5624	0.342					
	36.5	,24	9-5621	1.605	,25	9-5622	0.372	,23	9-5620	0.024	BSRF	368-365
91.6	37.0	,18	9-5615	1.635	,19	9-5616	0.133	,22	9-5619	1.556	BSRF	376-364
	37.5	,16	9-5613	1.336	,17	9-5614	0.062	,21	9-5618	0.384	BSRF	377-368
70007, I	38.0	,14	9-5611	2.100	,15	9-5612	0.273	,20	9-5617	0.107	AnBx	377-372
2.0 cm. thick	38.5	,12	9-5609	2.225	,13	9-5610	0.225					
-,4 -,13	39.0	,10	9-5607	2.139	,11	9-5608	0.175	,9	9-5606	0.141	SoBx	392-387
	39.5	,6	9-5603	1.853	,7	9-5604	0.120	,8	9-5605	0.155	RxBx	393-387
	40.0	,4	9-5601	2.098	,5	9-5602	0.050					

the outer millimeter of soil had been removed. Unusual or large particles were set aside as separate samples; their occurence is detailed in Fig.17-8, column 3.

Designation and Description of Stratigraphic Units

Distinctive aspects of the seven stratigraphic units recognized in 70007 are summarized in the Fig. 17-9; additional details are listed below. Grain size changes form the basis of nearly all the units, because the compositional variation is small. Units 2 (35.0-38.0 cm.), V (21.5-27.5 cm) and VI (15.5-21.5 cm) below the top of the drill stem are relatively coarse-grained; units III and IV (30.0-35.0 cm and 27.5-30.0 cm. respectively) are fine-grained, and units I (30.0-40.0 and VII (9.5-15.5 cm) are moderately coarse. A textural change, at 2.5 cm., is marked by a transverse fracture, and separates soils of differing cohesiveness. Between 9.5 and 21.5 cm., the surface is a nearly unfissured, continuous rind with pockets of relatively coarse, shiny particles. The overall appearance is speckled. At 21.5 cm., a transverse crack is the overlap formed by reconfinement.

Only minor compositional changes could be seen in the exposed coarse particles, none of which were larger than 2 mm in mean diameter. The matrix material is in the silt size range with a mean grain diameter estimated to be 5.5 phi units of about .02 mm.

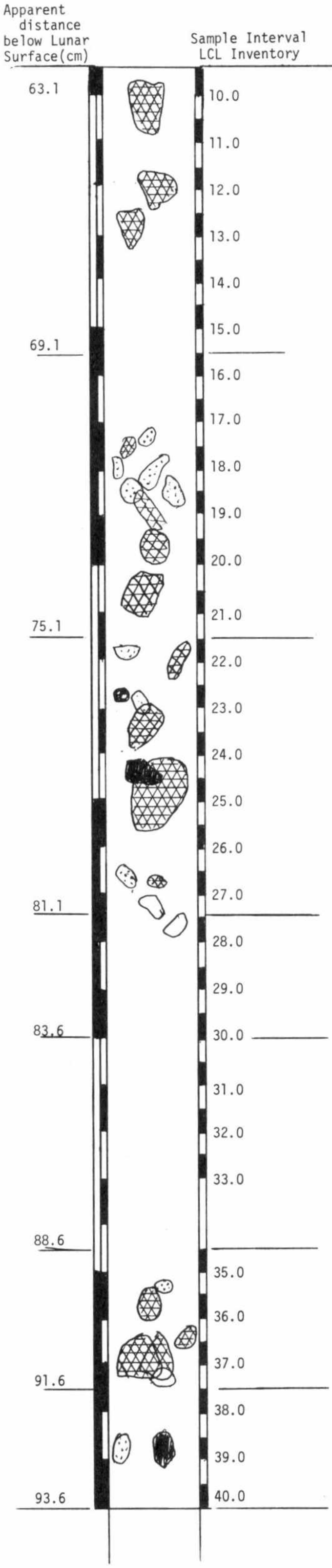
Detailed textural changes found during dissection were also recognized in the X-radiographs, although units were designated differently. X-ray units in 70007 include at least part of units 55-59. Top of unit 55 corresponds to the large rock fragments in unit II of dissection, and dissection units III and IV correspond fairly closely to X-ray units 56 and 57. Units V - VII are included in X-ray units 58 and 59, with base of unit V corresponding to the base of rock fragment 70007,78, which lies in the middle of dissection unit V. X-ray unit 59 is extremely coarse-grained throughout; compositional changes found during dissection enabled subdivision of the lower part of unit 59 into units V, VI, and VII.

Brief Description of Dissection Units

Unit I (38.0 - 40.0 cm below top of the core) is mostly fine-grained (approximately 91% matrix) but it is moderately poorly sorted, containing some 2-4mm rock fragments. Low to medium-grade breccias - soil breccia and recrystallized melt breccia - are the major coarse components, with anorthositic rock fragments and basalts present only in small quantities. Glass is most abundant at the top of the unit, where there are coincident peaks in vesicular and partially crystallized glass. The lowest 0.5 cm. contains an unusually low concentration of coarse fragments; vibration during the lunar return flight may have caused particles to migrate from this zone.

Unit II (35.0-38.0 cm) is bimodally coarse-grained with a consistently high frequency of particles coarser than 4 mm, a relative scarcity of particles in the 1-4mms range, especially at the bottom of the unit, and an abundance (75%)of matrix, finer than 1 mm. Basalt and soil breccia are most abundant

STRATIGRAPHIC SUMMARY, DRILL STEM 70007



UNIT (Numeral) Thickness Samples in unit	Characteristics	Sub-units
70007, VII 6.0 cm. thick -,128 -,152	Moderately crumbly, apparently mixed and slumped, gravelly silt-soil, 85% finer than 1mm, with a mixture of rock types. Shows as partially void in X-ray	Not subdivided
70007, VI 6.0 cm. thick -,96 -,127	Moderately crumbly, coarse sandy siltsoil, 83% finer than 1mm, composition generally polymict, with a concentration of vesicular glass at top of unit.	C. Concentration of vesicular glass B. Maximum breccia A. Maximum basalt and melt breccia
70007, V 6.0 cm. thick -,60 -,95	Moderately crumbly gravelly silt-soil, texturally immature with abundant very coarse basalt at top of unit, anorthosite breccia and soil breccia at base.	B. Very coarse-grained, maximum basalt A. Fine grained, maximum breccia
70007, IV 2.5 cm. thick -,50 -,59	Moderately fine sandy siltsoil, 87% finer than 1mm, polymict with both basalt and soil breccia in coarse fraction.	not subdivided
70007, III 5.0 cm. thick -,32 -,49	Cohesive, fine sandy siltsoil, 94% finer than 1mm, polymict with a mixture of fragment types.	not subdivided
70007, II 3.0 cm. thick -,14 -,31	Moderately cohesive silty and gravelly sandsoil, with 75 % finer than 1mm; very abundant basalt in coarse fraction.	not subdivided
70007, I 2.0 cm. thick -,4 -,13	Cohesive siltsoil, with 91% finer than 1mm, breccia fragments are predominant in coarse fraction, may be disturbed due to sampling.	not subdivided

in the coarse fraction throughout the unit, but there are other components in varying amounts. Vesicular glass decreases downward from the top of the unit, and anorthosite breccia increases downward. Medium grade recrystallized breccia is relatively uncommon, and is represented by large particles only.

Unit III (30.0-35.0 cm) is the finest-grained unit in the core, containing 94% matrix, and constant, low amounts of particles coarser than 2 mm. Although sorting is fair to good, there is a great fluctuation in abundance of 1-2 mm particles, which become moderately common in some intervals. Soil breccia and vesicular glass are the only coarser fragments present, with soil breccias most abundant at the base and vesicular glass most abundant at the top of the units.

Unit IV (27.5-30.0 cm) is fine-grained, but slightly coarser (87% matrix) than unit III, and is weakly bimodal, with a maximum of coarse particles near the middle of the units. Mineralogy of the coarse fraction differs notably from unit III; basalt rock fragments are most abundant, with medium grade anorthosite breccia, partially crystallized glass and recrystallized breccia present, but in lesser quantities toward the bottom. Soil breccia and vesicular glass fragments are common only at the top of the unit.

Unit V (21.5-27.5 cm) is coarse-grained and distinctly bimodal with a high abundance of material coarser than 4 mm, low to moderate abundances of 1-4mm ranges, and 72% matrix. A mixture of rock types is found in this unit, with peaks in soil breccia, anorthosite breccia, recrystallized breccia, partially crystallized glass, and basalt rock fragments at various places through the unit. Vesicular glass is less common than in surrounding units, but there is an occurrence of orange glass at the top of Unit V.

Unit VI (15.5-21.5 cm) A transverse fracture and textural change marks the base of unit VI (15.5-21.5 cm). Unit VI is finer than Unit V, with 83% matrix, and is unimodal with respect to the coarse fraction, as the 1-2mm fraction is relatively abundant, the coarser than 2 mm fraction variable,but notably less common than in Unit V. Most rock types, including basalt rock fragments, soil breccia, anorthosite breccia occur in moderate abundance throughout the unit, but there is a significant amount of recrystallized melt breccia at the very bottom of the unit, and a sharp and strong maximum in vesicular glass at the top of the unit.

Unit VII (9.5-15.5 cm) is 85% matrix, and is moderately coarse-grained with a variable mix of size frequencies. The X-radiograph showed this unit to be extensively slumped, and the variability in size frequencies may be attributed to disturbance and re-compaction during preparation. A large agglutinate occurs at the bottom of the unit; otherwise the soil contains a mixture of basalt, medium grade partially crystalline glass, anorthosite breccia, and low grade soil breccia fragments, but vesicular glass fragments are not common.

LIST OF PHOTOS

S-73-15044	Premilling, top
S-75-29960	Predissection, overall
S-75-29953 thru S-75-29959	Predissection, stereo series
S-75-32561	Prepeeling, overall
S-75-32562 thru S-75-32570	Prepeeling, stereo series
S-75-32551	Peel & Preimpregnation, overall
S-75-32552 thru S-75-32560	Peel & Preimpregnation, stereo series
S-75-31642	Voids created by extraction of 78 & 87

Photo Number	Sample Number	Photo Number	Sample Number
S-75-30823	70007,5	S-75-31645	70007,75
829	,7,8,9	671	,77-79
823	11	688	81
827	13	665	83
826	15	663	85-89
825	17	667	91
824	19-23	666	93-95
822	25	669	97
31657	27	32222	99-101
655	29-31	223	103,106,107
659	33	225	109-113
661	35	224	115
660	39	227	117-119
662	41	226	121
664	43	229	123
670	45	228	125
652	47	231	127
654	49	230	129
658	51	232	131
656	53	233	133
643	55	238	135
644	57	239	137
647	59	241	139
651	59	240	141-143
650	61-63	236	145
653	65-67	237	147
649	69	235	149
648	71	234	151-152
646	73		

Although the section at the top of 70007 is slumped and there appears to be partial void, the coarse grain size and occurrence of mixed rock types dominated by low grade breccias resembles the bottom of 70008, and gives evidence for stratigraphic continuity between the two cores. Because the total void in the upper three sections of the Apollo 17 drill string is approximately equal to the amount of drill string exposed on the surface after drilling, it appears that the section is continuous and not slumped, with no material missing from the section at the top of 70007. The void apparently was formed by the movement of a coherent slug of material upward in 70008 and 70009.

A minimum of three phases of accumulation are represented in 70007. The coarse, polymict material at the base of the core differs from soil in overlying units, and represents a separate event. More studies of composition and history are needed to determine if the fine-grained interval represented in units II and III; is gardened from the top of Unit I, or represents a separate event (s). The coarse material in the upper half of the core appears to be continuous with the thick deposit in 70009 and 70008.

DRILL STEM 70004

Section 70004 is the sixth section below the top of the Apollo 17 drill string, and contains 39.2 cm. of soil column. After extraction of the drill string from the hole, the string was separated on the lunar surface into three segments. Drill stem 70004 was the top stem of the deepest segment, and its upper end was covered by flight cap F. A negligible amount of soil was reported to have been lost in separation. The opening of the upper end to the tube, in January, 1973, revealed that the core was essentially completely filled (photo S-73-15047), confirming the lunar surface observation that little soil was lost in uncoupling and handling. P.E.T. and cold storage samples totalling nearly 7 gm. were extracted from the top of the core, and the remaining soil was confined with a hollow teflon plug. Based on a length of 39.9 cm. and a weight of 238.8 gm., seven grams is equivalent to about twelve millimeters of soil column extracted for P.E.T. studies. X-radiographs were prepared according to standard procedure and described in P.E.T. The drill stem was longitudinally split on the LCL drill stem milling machine, on 8 October, 1975. The sample was transferred to the dissection cabinet on 11 October 1975, and dissection was completed by 30 April 1976. Peeling and impregnation was completed by 18 May 1976, all activities being accomplished according to standard procedures described in the beginning of this catalogue.

In preparation for milling, the hollow tube plug at the upper end of the stem was pushed further into the tube, resulting in a small amount of compaction. After the core was affixed in the dissection table, the upper half of the split tube was lifted off and set aside. Reference scales were mounted so that the upper end of the tem was aligned with the zero cm. mark, and the lower soil/plug interface with the 40 cm. mark. The upper soil/plug interface then became established at the 2 cm. mark. From these figures it can be calculated that compaction by mechanical compression amounted to a maximum of seven millimeters.

PREDISSECTION DESCRIPTION

From X-radiographs of drill stem 70004, ten units were interpreted on the basis of size distributions and inferred compositions. (Fig.17-2) Examination of the exposed surface of the core brought out no color or tonal differences. Consequently, no layering could be identified based on that parameter. The overall color was between 10YR 3/1 and 5Y 3/1 on Munsell's color chart. Variations in the gross surface texture (development of a rind of compacted soil) give some indication of changes in physical properties of the underlying soil. Unfortunately, many other factors may affect the preservation of this rind and confuse interpretation. After dissection, it was clear that the smeared rind was very thin along the fine-grained portions of the core and did not fracture at unit boundaries as well as it did in the coarser sections.

SAMPLING

Except for P.E.T. samples, the core was dissected in standard 0.5 cm. increments, as explained in chapter 1. Redlight and lead-free samples were taken at 4.5-6 cm. and 33-34.5 cm., and redlight samples accompanied by lead-free samples at 12-12.5 and 25-25.5 cm. Many large rock fragments were extracted and documented separately: their occurrence is listed in Fig. 17-9.

STRATIGRAPHIC SUMMARY

Soil in drill stem 70004 was found to be much coarser-grained than reported in descriptions of the X-radiographs, but most of the coarse fraction occurs as soil breccia, which shows up poorly or not at all in X-radiography. The most important factor by which 70004 differs from previously dissected cores which lie higher in the drill string is the general scarcity of all rocks but soil breccia. Crystalline basalts and medium to high grade breccias of the higher sections are almost totally lacking in the coarse fraction of 70004.

Drill stem 70004 contains three textural sequences, each of which is further subdivided into units on minor textural or compositional grounds,(Fig.17-10). The upper sequence is fine to moderately fine with a varied lithology among the coarse fragments. It ranges from the top of the stem to a depth of 7.5 cm. and is subdivided into units VIII and IX. It may extend into 70005, the drill stem above in the drill string. The middle sequence is thick (26.5cm), very coarse, and almost all fragments are SOBX. Many large particles are freshly fractured, suggesting drilling action breakage. Units III,IV,V,VI, and VII are included in this larger unit. The lower sequence is similar to the upper sequence except that the content of ANBX is noticeably greater and the glass content lesser. Its six centimeters of thickness is subdivided into units I and II. Stem 70003, the one below in the drill string, may contain a continuation of this sequence. The rock fragments in drill stem 70004 are predominantly SOBX with small amounts of VSGL, ANBX, and traces of PXGL, RXBX, and BSRF.

<u>Unit I</u> (38.0-40.0) is unimodal, fine-grained, fairly well sorted, with 93% matrix finer than 1mm, a moderate amount of 1-2 mm fragments and a few

fragments coarser than 2mm. Lithology is varied, yet dominated by SOBX. More BSRF occurs in this than in other units. Vesicular glass (VSGL) is notable only at the top of the unit.

Unit II is relatively fine-grained, and is unimodal, with few particles coarser than 4mm, but moderate abundances of 1-2 and 2-4mm fines and 83% matrix. The increase in 2-4mm particles corresponds to an increased dominance of SOBX. The upper part of the unit is relatively rich in ANBX in association with BSFR.

Units I and II together form a larger unit which may extend into drill stem 70003.

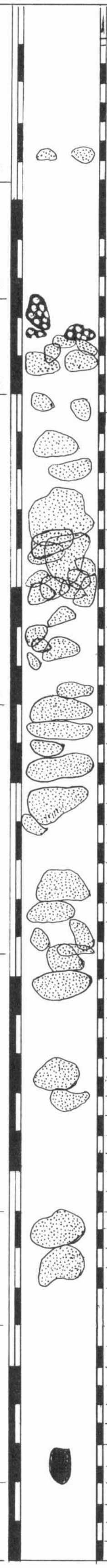
Unit III (31.0-34.0) is coarse-grained silt soil, with a considerable soil breccia fragments greater than 4mm; there is only 62% matrix, and fair amounts of 1-2 and 2-4mm material. Nearly all fragments are soil breccia.

Unit IV (24.5-31.0 cm) is slightly finer than unit III because the abundance of coarse fragments decreases by 50%. There is a rise in the 2-4mm frequencies and 1-2mm frequencies, but there is some variability, attributed to sampling size bias due to the very large particles. Soil breccia is extremely abundant, and ANBX and some other types are present in very small quantities.

Unit V (8.0-24.0) is very coarse-grained, with a large number of soil breccia fragments greater than 4mm in size which appear to be pieces of a rock or rocks larger than the drill stem diameter. Frequencies in the other coarse size ranges are also high and matrix is only 46%. SOBX makes up over 99% of the coarser fraction.

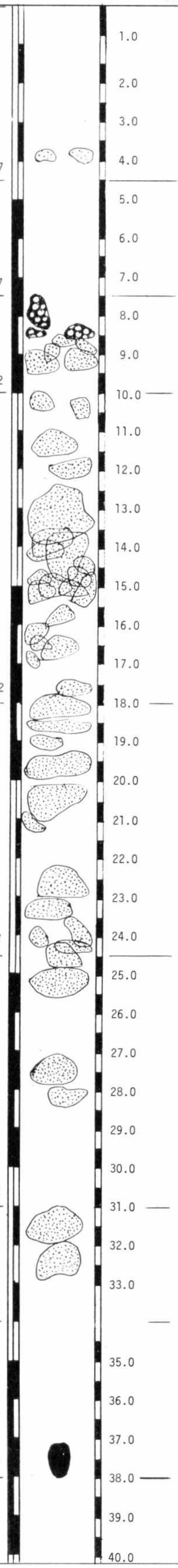
Unit VI (10.0-18.0) is 55% matrix. Frequencies of the greater than 4mm size range decrease slightly on the average. The average frequencies in the 1-2mm and 2-4mm size ranges remain high. The variability is high, again due to sampling size bias. The coarseness, on the other hand, is fairly constant. Aside from the overwhelming abundance of SOBX, small amounts of PXGL are found, especially near the top of the unit. RXBX also occurs with some regularity, primarily in the bottom half. The upper centimeter contains many medium grade SOBX fragments in the smaller size ranges. Medium grade SOBX is a more coherent type of SOBX, darker in matrix, apparently due to a higher glass content, with inclusions of chalky white anorthositic clasts and an occasional bleb of orange soil. The upper contact is marked by a distinct tonal shift to lighter material in Unit VII, as seen after peeling. The medium grade SOBX fragments transcend this boundary and continue in higher units. The main concentration is at this boundary, however.

Unit VII (7.5-10.0) is 75% matrix. Size range frequencies increase downwards in stages. At 8.0 cm, the 1-2mm's show a sharp increase, the 2-4's at 8.5 cm. While the greater than 4mm's do not show a sharp increase, they are concentrated towards the bottom of the unit. The bottom centimeter contains a large number of medium grade SOBX fragments in the smaller size ranges, along with the low grade counterpart. The top of this unit is marked by a relatively vague tonal shift and somewhat large amounts of VSGL,



Unit thickness Samples	Apparent distance below Lunar Surface (cm)	Sample Interval (LCL Inventory)	Interval Samples: Sample No.	Vial No.	Sample Wt.	Coarse Fraction: Sample No.	Vial No.	Sample Wt.	Special Samples: Sample No.	Vial No.	Sample Wt.	Sample Type	Sample Interval
		0.8											
70004. IX		1.5	,3	8-2304	3.076	,4	8-2317	0.918					
3.7 cm thick		2.0	,5	8-2325	2,970								
,3-,5		2.5	,25	9-5751	1.604	,26	9-5752	0.191					
,25-,36		3.0	,27	9-5753	1.607	,28	9-5754	0.261					
		3.5	,29	9-5755	2.126	,30	9-5756	0.292					
		4.0	,31	9-5757	1.349	,32	9-5758	0.295	,35	9-5761	0.136	SoBx	043-038
	176.7	4.5	,33	9-5759	2.000	,34	9-5760	0.240	,36	9-5762	0.215	SoBx	043-038
70004. VIII			,39	9-5764	4.543	,40	9-5765	0.450	,37 ,38	9-5763 87-2449	1.076 0.380	Lead free Red Light	060-045 060-045
3.0 cm thick		6.0											
,37-,46		6.5	,41	9-5766	1.956	,42	9-5767	0.366	,51	9-5776	0.381	VSGL	085-074
		7.0	,43	9-5768	2.200	,44	9-5769	0.090	,52	9-5777	0.035	VSGL	086-084
	179.7	7.5	,45	9-5770	2.063	,46	9-5771	0.122	,55	9-5780	0.065	VSGL	087-083
70007. VII		8.0	,47	9-5772	2.050	,48	9-5773	0.250	,56	9-5781	0.007	SoBx	087-086
2.5 cm thick		8.5	,49	9-5774	1.890	,50	9-5775	0.131	,59	9-5784	0.048	SoBx	092-087
,47-,64		9.0	,53	9-5778	1.762	,54	9-5779	0.362	,60	9-5785	0.196	SoBx	095-087
		9.5	,57	9-5782	1.640	,58	9-5783	0.314	,61	9-5786	0.400	SoBx	098-092
	182.2	10.0	,63	9-5788	1.605	,64	9-5789	0.633	,62	9-5787	0.307	SoBx	096-089
		10.5	,65	9-5790	1.806	,66	9-5791	0.536	,69	9-5794	0.212	SoBx	109-103
		11.0	,67	9-5792	1.690	,68	9-5793	0.475	,70	9-5795	0.076	SoBx	110-104
		11.5	,71	9-5796	1.812	,72	9-5797	0.720	,73	9-5798	0.633	SoBx	117-110
		12.0	,74	9-5799	1.260	,75	9-5800	0.644	,79	9-5903	0.488	SoBx	124-118
		12.5	,77	9-5901	1.226	,78	9-5902	0.402	,76	87-2038	0.320	Red Light	125-120
70004. VI		13.0	,80	9-5904	1.282	,81	9-5905	0.222	,89	9-5913	3.358	SoBx	140-124
8.0 cm thick		13.5	,82	9-5906	0.761	,83	9-5907	0.251	,86	9-5910	0.340	SoBx	144-138
,65-,118		14.0	,84	9-5908	1.282	,85	9-5909	0.435	,92	9-5916	0.594	SoBx	148-137
		14.5	,87	9-5911	1.217	,88	9-5912	0.464	,93	9-5917	0.326	SoBx	145-137
		15.0	,90	9-5914	1.519	,91	9-5915	0.335	,94	9-5918	0.135	SoBx	148-142
		15.5	,97	9-5921	1.318	,98	9-5922	0.440	,95	9-5919	0.494	SoBx	150-144
		16.0	,102	9-5926	1.273	,103	9-5927	0.619	,96	9-5920	0.132	SoBx	149-145
		16.5	,106	9-5930	1.210	,107	9-5931	0.574	,99	9-5923	0.426	SoBx	155-149
		17.0	,109	9-5933	1.362	,110	9-5934	0.946	,100	9-5924	0.241	SoBx	155-149
		17.5	,111	9-5935	1.220	,112	9-5936	0.868	,101	9-5925	0.118	SoBx	155-150
	190.2	18.0	,114	9-5938	1.003	,115	9-5939	0.414	,104	9-5928	0.319	SoBx	155-149
		18.5	,119	9-5943	0.787	,120	9-5944	0.231	,105	9-5929	0.112	SoBx	153-147
		19.0	,122	9-5946	0.972	,123	9-5947	0.090	,108	9-5932	0.420	SoBx	165-158
		19.5	,125	9-5949	0.953	,126	9-5950	0.303	,113	9-5937	0.030	PXGL	173-171
70004. V		20.0	,128	9-5952	0.834	,129	9-5953	0.505	,116	9-5940	0.402	SoBx	170-163
6.5 cm thick		20.5	,131	9-5955	1.332	,132	9-5956	0.743	,117	9-5941	0.156	SoBx	175-170
,119-,154		21.0	,134	9-5958	0.628	,135	9-5959	0.790	,118	9-5942	0.140	SoBx	180-173
		21.5	,137	9-5961	1.270	,138	9-5962	0.666	,121	9-5945	0.314	SoBx	180-176
		22.0	,139	9-5963	1.074	,140	9-5964	0.586	,124	9-5948	1.652	SoBx	186-179
		22.5	,141	9-5965	1.402	,142	9-5966	0.956	,127	9-5951	1.768	SoBx	193-186
		23.0	,144	9-5968	1.172	,145	9-5969	0.724	,130	9-5954	0.312	SoBx	197-193
		23.5	,146	9-5970	1.225	,147	9-5971	0.845	,133	9-5957	1.252	SoBx	201-193
	196.7	24.0	,150	9-5974	0.893	,151	9-5975	0.378	,136	9-5960	1.302	SoBx	214-203
		24.5	,153	9-5977	1.067	,154	9-5978	0.650	,143	9-5967	0.579	SoBx	219-211
		25.0	,158	9-5982	1.290	,159	9-5983	0.473	,148	9-5972	0.402	SoBx	230-223
		25.5	,160	9-5984	1.359	,162	9-5985	0.574	,161	87-5232	0.310	Red Light	255-250
		26.0	,164	9-5987	1.632	,165	9-5988	0.600	,149	9-5973	0.566	SoBx	235-230
70004. IV		26.5	,166	9-5989	1.725	,167	9-5990	0.468	,152	9-5976	0.368	SoBx	240-235
6.5 cm thick		27.0	,168	9-5991	1.857	,169	9-5992	0.530	,155	9-5979	0.140	SoBx	236-230
,155-,187		27.5	,170	9-5993	1.796	,171	9-5994	0.587	,156	9-5980	0.160	SoBx	237-232
		28.0	,172	9-5995	1.460	,173	9-5996	0.868	,157	9-5981	0.608	SoBx	244-237
		28.5	,174	9-5997	1.059	,175	9-5998	0.790	,163	9-5986	0.500	SoBx	253-246
		29.0	,176	9-5999	1.320	,177	9-6000	0.476	,178	9-1019	0.723	SoBx	289-281
		29.5	,179	9-1025	1.650	,180	9-1027	0.628					
		30.0	,181	9-1073	1.768	,182	9-1079	0.510	,183	9-1087	0.188	SoBx	298-293
	203.2	30.5	,184	9-1095	1.478	,185	9-1103	0.483					
		31.0	,186	9-1105	1.966	,187	9-1112	0.707					
		31.5	,188	9-1115	1.320	,189	9-1117	0.300	,192	9-1139	1.440	SoBx	320-310
70004. III		32.0	,190	9-1124	1.265	,191	9-1138	0.232					
3.0 cm thick		32.5	,193	9-1149	1.305	,194	9-1151	0.200	,197	9-1161	2.082	SoBx	330-320
,188-,201		33.0	,195	9-1152	1.225	,196	9-1158	0.103					
	206.2		,198	9-1162	3.800	,201	9-1164	1.573	,199 ,200	9-1163 87=5353	1.327 0.340	Lead free Red light	345-330 345-330
		34.5											
		35.0	,202	9-1165	2.100	,203	9-1170	0.304					
70004. II		35.5	,204	9-1171	1.886	,205	9-1173	0.300					
4.0 cm thick		36.0	,206	9-1176	2.008	,207	9-1177	0.366					
,202-,216		36.5	,208	9-1178	1.984	,209	9-1179	0.357					
		37.0	,210	9-1180	2.098	,211	9-1182	0.504					
		37.5	,212	9-1184	1.760	,213	9-1186	0.244					
	210.2	38.0	,214	9-1188	1.953	,215	9-1189	0.340	,216	9-1192	0.442	RxBx	380-71
70004. I		38.5	,217	9-1195	2.175	,218	9-1196	0.085					
2.0 cm thick		39.0	,219	9-1197	1.930	,220	9-1198	0.290					
,217-,224		39.5	,221	9-1199	1.977	,222	9-1200	0.116					
			,223	9-1304	2.076	,224	9-1330	0.151					
			,225	9-1333	0.180	,226	9-1337	2.872	Sweepings samples				

STRATIGRAPHIC SUMMARY, DRILL STEM 70004



Apparent distance below Lunar Surface (cm)	UNIT(Numeral) Thickness Samples in unit		
173 – 176.7	70004, IX 3.7 cm thick. ,3 - ,5 ,25 - ,36	Moderately crumbly, relatively dark, moderately fine, 85% matrix, with mixture of rock types including VSGL, RxBx and BSRF.	Not subdivided.
179.7	70004, VIII 3.0 cm thick. ,37 - ,46	Moderately crumbly relatively light; fine-grained, 92% matrix, with SoBx prevalent, VSGL plentiful.	Not subdivided.
187.2	70004, VII 2.5 cm thick. ,47 - ,64	Moderately crumblv, relatively dark, fairly course (75% matrix), gravelly and sandy siltsoil intermixed soil breccia and vesicular glass.	B Very coarse, prevalent vesicular glass. A Very coarse, prevalent soil breccia C Increase in partially xtalline glass plus medium-grade SoBx.
190.2	70004, VI 8.0 cm thick ,65 - ,118	Coarsely crumbly, darker than overlying unit, a very coarse gravelly sand soil, 55% matrix, with prevalent very coarse soil breccia.	B Coarse-grained, typical of unit. A Coarse-grained, with small amounts of melt breccia.
196.7	70004, V 6.5 cm thick ,119 - ,154	Coarsely crumbly, light-colored, very course gravelly sand soil, 46% matrix remainder is soil breccia.	Not subdivided.
203.2	70004, IV 6.5 cm thick. ,155 - ,187	Finely crumbly, light-colored moderately coarse (70% matrix) gravelly siltsoil with abundant soil breccia.	Not subdivided.
206.2	70004, III 3.0 cm thick ,188 - ,201	Finely crumbly, relatively light. Colored gravelly siltsoil, 62% matrix, with notable influx of soil breccia.	Not subdivided.
210.2	70004, II	Moderately cohesive, light-colored, sandy siltsoil, with abundant soil breccia; some AnBx and basalt RF's.	B Increase in AnBx and basalt. A Characteristic of unit as a whole.
	70004, I 2.0 cm thick ,217 - ,224	Moderately cohesive light, fine-grained with 93% matrix, prevalent SoBx; more basalt than in other units, and abundant vesicular glass at top.	Not subdivided.

overshadowing even the abundant SOBX. It is believed that this unit represents a mixing or gardening zone.

Units III through VII make up a larger unit characterized by its coarseness and overwhelming abundance of SOBX.

Unit VIII (4.5-7.5) is much finer than underlying units, with the only occurence of particles greater than 4mm in size in the 6.0-6.5 cm interval. The other sizes are at moderate to low levels and presence of 92% matrix makes this interval moderately sorted. SOBX is the most common constituent at about 70%, but VSGL is plentiful. In association with the VSGL is an occasional AGGL. A few medium grade SOBX's are found. The top of the unit is marked by another vague tonal shift.

Unit IX (0.8-4.5) is 85% matrix. A few large particles at the bottom of the unit increase the overall coarseness. One large SOBX fragment is orange-stained. Large VSGL, RXBX, and BSRF fragments occur throughout this diverse unit. SOBX is common but not dominant.

Units VIII and IX form a larger, generally fine-grained, lithologically diverse unit which may extend into drill stem 70005.

70001

The sample numbered 70001 was generated on 22 December, 1972, when the drill string was disassembled into individual subsamples. After photography of the open end (NASA Photos S-73-15051 and 15052) and description of the material therein, the core was bagged and X-rayed on 22 December, according to standard procedures described in Chapter 2 of this catalog. On 3 January, 1973, splits 3 and 5 were removed for early allocation and time-critical deep freeze storage, and on 16-17 January, the bit was dissected. The following information details the results of the dissection.

Dissection and Sampling Procedure

Soil was excavated in approximately 1/2 cm. intervals; each interval contained approximately 2 gms. of material. The lowest half cm. equivalent, 5.5-4.7 cm. from bottom Fig17-12)was first extracted for allocation and scientific study. Because of shifting during transport, both ends of the bit were decompacted and less cohesive than the moddle of the core, and hence, this sample was removed according to weight rather than thickness of the interval. The next 0.7 cm. from 4.7 - 4.0 cm., a bulk sample of 3.431 gm. was placed in deep freeze storage to preserve temperature-critical properties. Succeeding intervals were dissected in 0.5 cm. increments, with each increment passed through a 125 micron sieve. The finer-than 125 micron fraction was combined to make up the biomedical prime samples. The coarser fraction, remaining in the sieve, was further sized and scrutinized. Fragments larger than 1 mm. were picked out and described, and the fraction between .25 and 1 mm. described under the binocular microscope. Because each size fraction was weighed, it is possible to roughly assess size distribution; this information will be presented under "texture" and "composition."

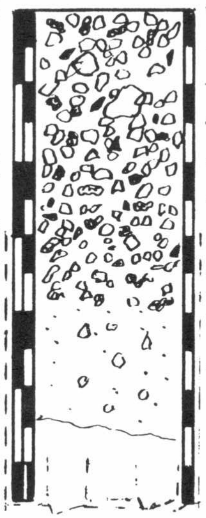
Physical Properties

Color of all samples from the drill bit was found to be a medium neutral drab, 5 Y 5/1 on the Munsell Chart of colors.

Textural information was gained both from examination of X-radiographs, direct observation of the bulk sample during dissection, and as a result of sieving samples for biomedical allocation. Grain size results are presented in Table 17-5.

Generally, soils from the bit appear to be very sparingly to sparingly rock fragmental siltsoils, evidently unimodal in composition. The upper half cm. and the lowest 2.0 cm. were extremely crumbly and loose, probably because of de-densification through handling. The remainder of the core was compact and moderately resistant to crumbling. When disturbed by the spatula, soils from this interval fractured into 0.5 to 2.0 mm. equant, even-sized, somewhat blocky (rather than prismatic, rounded, or jaggedly crumb-like) fragments and there was nearly 50% single-grain disaggregation. Sorting is moderately poor to poor, and size distribution appears to be unimodal, as opposed to the strong bimodality of the upper coarse interval

Fig. 17-12



APOLLO 17 DRILL BIT (70001) SAMPLE LOCATION INFORMATION

SIEVED FINES			1.0 - 0.125mm FRACTION			COARSER THAN 1mm FRACTION		
Sample No.	Container No.	Sample Wt.	Sample No.	Container No.	Sample Wt.	Sample No.	Container No.	Sample Wt.
35	8-2654	1.580	36	8-2663	0.525	37	8-2665	0.111
32	*3	0.951	33	8-2652	0.307	34	8-2653	0.168
29	*2	1.941	30	8-2643	0.669	31	8-2645	0.331
26	*2	3.030	27	8-2635	1.070	28	8-2638	0.139
23	*2	1.878	24	8-2617	0.692	25	8-2632	0.134
20	*2	2.068	21	8-2611	0.710	22	8-2613	0.093
17	*2	1.257	18	8-2604	0.432	19	8-2610	0.139
14	*2	1.006	15	8-2586	0.341	16	8-2600	0.051
5	8-2573	3.431	(Bulk sample,placed in deep freeze)					
3	8-2562	2.662 *1				4	8-2562	0.167

Attrition: 70001,6 0.497
70001,40 0.148

*1 Weight listed is original weight; approximately 0.950 gms removed from this sample in allocations 70001,7-13, 70001,42.

*2 This sample combined into 70008,38, bioprime sample, total of 12.005 gms.

*3 0.866 gm of fines allocated in bioprime sample, remaining 0.085 gms of fines retained in Container #8-2649 as Sample 70001,39.

of 70007-70009. Rock fragments coarser than 1 mm. comprise slightly less than 5% of the total in the lower part of the bit(Table 17-5) then increase abruptly to slightly less than 10% near the top. Although the .125 to 1 mm. fraction comprises 24 ± 2% of the total, the bulk of all subsamples from the bit are finer than .125 mm. (66 - 72%). Most rock fragments are angular to subangular, and are sparingly distributed through the core; nowhere was there packing of rock fragments.

Two tentative units can be separated texturally at 1.5 cm. from the top of the bit. Rock fragments larger than 1 mm. comprise less than 5% of the lower unit, and abruptly increase to approximately 10% (by weight) in the upper. Similarly, rock fragments appear to be more abundant near the top of the bit, as seen in X-radiograph, although the thick walls of the bit obscure details (Fig. 17-3).

TABLE 5. GRAIN-SIZE TRENDS, APOLLO 17 DRILL BIT

DEPTH FROM TOP OF BIT	% FINER THAN .125MM	% .125-MM	% COARSER THAN 1MM
0 - 0.5 cm.	71%	24%	5%
0.5- 1 cm.	67%	22%	12%
1 - 1.5 cm.	66%	23%	11%
1.5- 2 cm.	71%	25%	3%
2 - 2.5 cm.	69%	26%	5%
2.5- 3 cm.	72%	24%	3%
3 - 3.5 cm.	69%	24%	8%
3.5- 4 cm.	72%	24%	4%

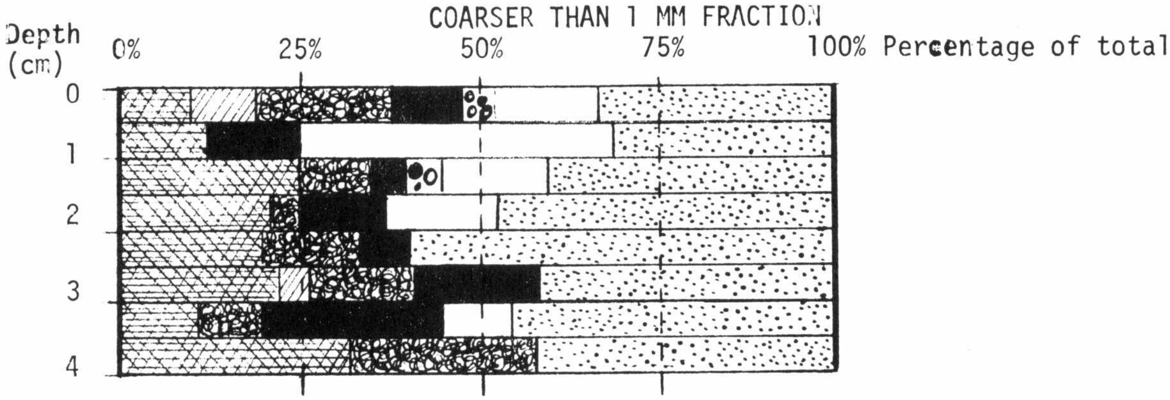
Composition

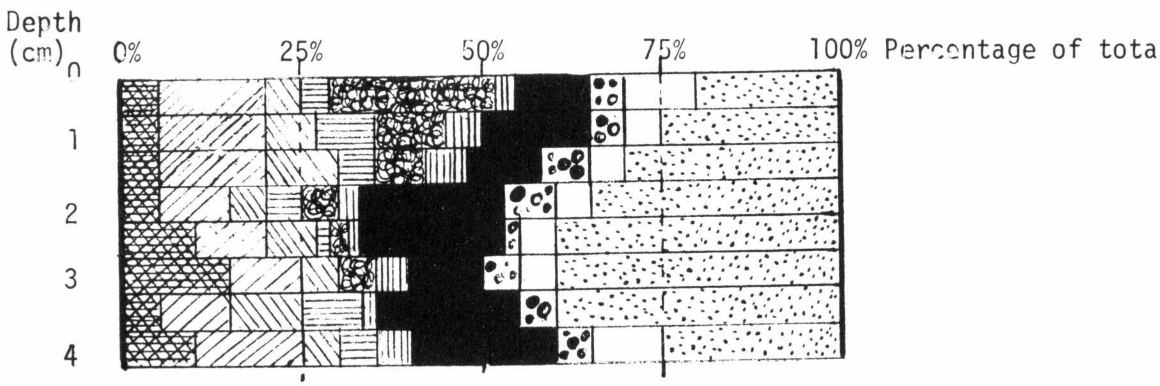
The crystalline component of the coarser fractions of the drill bit is dominated by basaltic fragments(Table17-6)with crystalline anorthosite being of very minor importance Fig.17-13. Basaltic fragments are medium to coarse grained, moderately to strongly crushed and internally pulverized, and most are too small to show vesiculation. Crystalline anorthosite fragments are distinguished from breccias in being only moderately crushed internally, and have a distinctive olivine component. In the .125 to 1 mm. fraction are many individual grains of clear to whitish plagioclase, reddish pyroxene, yellowish olivine, and dark opaques with cleavage faces; all of which are probably derived from basalt rock fragments. Both the basaltic and anorthositic components are probably of relatively local origin, with overall proportions (19% Basalt, 2% Anorthosite) reflecting the local basaltic subfloor source and the relatively distant anorthositic massif source. The subordinate abundance of crystallines (only 21% of the coarse fraction, and an average of approximately 30% of the .125 - 1 mm. fraction) indicates that this lower part of the core was subjected to extensive reworking or derived more from a glassy and brecciated source.

The glassy component is also relatively scarce, taking up approximately 25% of the sample. Dark to black, frothy to vesicular glass is slightly more abundant than the chips and splintery fragments of dark to blackish opaque

Fig. 17-13 COMPOSITION TRENDS, APOLLO 17 DRILL BIT

COARSER THAN 1 MM FRACTION





EXPLANATION

CRYSTALLINE ROCK FRAGMENTS

basalt

plagioclase or anorthosite

reddish pyroxenes

misc. including olivine, dark fgms. w/cleavage faces other uncommon crystalline fragments.

GLASS FRAGMENTS

frothy to vesicular

green, amber, or orange glass

dark to black devitrified

dark to black glass spheres

BRECCIA FRAGMENTS

anorthositic breccia, powdery to chalky appearance

soil-matrix breccia or lithified soil

Table XVII - 6

Compositional Trends, Apollo 17 Drill Bit

COARSER THAN 1 MM

	CRYSTALLINE ROCKS		GLASS FRAGMENTS			BRECCIAS		
Depth:	Basalt	Anorthosite	Vesicular	Devitrified	Beads	Anorthosite	Soil	Total Particles Counted
0-0.5cm	10%	10%	19%	10%	5%	14%	33%	21
0.5-1cm	12.5%	---	---	12.5%	--	44%	31%	16
1-1.5cm	25%	---	10%	5%	5%	15%	40%	20
1.502cm	21%	---	5%	11%	--	16%	47%	19
2-2.5cm	20%	---	13%	7%	--	---	60%	15
2.5-3cm	23%	5%	14%	18%	--	---	41%	22
3-3.5cm	10%	---	10%	25%	--	10%	45%	20
3.5-4cm	32%	---	26%	---	--	---	42%	19
SUM:	19.1%	2.0%	12.%	11.2%	1.3%	11.8%	42.1%	152

.125 - 1 MM FRACTION

		CRYSTALLINES			GLASS FRAGMENTS				BRECCIAS	
Depth:	Basalt	Plag.	Pyrox.	Other*1	Vesicular	Other*2	Devit.	Beads	Anorthosite	Soil
0-0.5cm	5%	15%	5%	3%	20%	2%	10%	5%	10%	25%
0.5-1cm	5%	15%	7%	7%	10%	6%	15%	5%	5%	25%
1-1.5cm	5%	15%	10%	5%	7%	6%	10%	7%	5%	30%
1.5-2cm	5%	10%	5%	5%	5%	3%	20%	7%	5%	35%
2-2.5cm	10%	10%	7%	2%	---	1%	20%	2%	5%	40%
2.5-3cm	15%	10%	5%	Tr.	5%	5%	10%	5%	5%	40%
3-3.5cm	5%	10%	10%	8%	---	2%	20%	5%	--	40%
3.5-4cm	15%	15%	5%	5%	---	5%	20%	5%	10%	25%

*1 Includes olivine, dark opaques with cleavage faces evident, probably spinels.

*2 Includes orange and green glass, fresh-appearing dark chips and shards.

devitrified glass. Green, orange, or dark globules are present in the coarse fraction only in the top 1.5 cm. of the core, but comprise approximately 5% of the sample in the .125 - 1 mm. fraction. Large glass beads and small vesicular fragments are present only in the upper 1.5 cm. of the bit; otherwise no compositional trends are evident in the glass fraction of the bit (Fig. 17-9).

Breccias, in contrast, are much more abundant, making up over half of the sample studied. Most breccia fragments have the appearance of lithified soil, or appear as hardened and glassy soil that contains angular, crystalline or glassy rock fragments. A smaller percentage of breccia fragments (Fig. 17-9) is present in the .125 to 1 mm. fraction than in the coarse fraction, but abundance trends are parallel in both fractions. Anorthosite breccia, consisting of crushed anorthosite with a chalky appearance, is a minor component in both the coarser and finer than 1 mm. fractions, but is most abundant near the top of the bit.

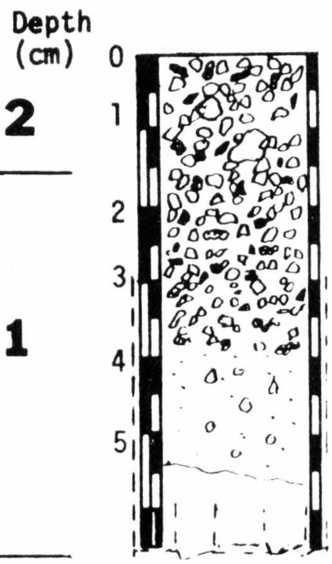
Stratigraphy

Compositional trends, including an upward decrease in basalt and soil breccias, and an upward increase in crystalline anorthosite, vesicular glass, glass beads, and anorthosite breccias, roughly correspond to grain size trends noted earlier, but are more transitional. Trends tend to be internally consistent, allowing for separation of the bit into 2 units (Fig. 17-10) but with equal evidence for transitional and abrupt boundaries, there can be no exact placement of the contact between units. The separation point is placed at 1.5 cm. below the top of the bit, at the greatest change in grain size, between samples 70001,26 - ,28 and 70001,29 - ,31, but it must be emphasized that THERE IS NO SHARP CONTACT BETWEEN UNITS.

Greater abundance of crystalline rock fragments and soil breccia in the lower unit suggests that this bed was derived from a relatively local subfloor source, and finer grain size suggest more reworking.

In contrast, the massifs apparently contributed more material for the upper unit, especially the anorthosite and anorthosite breccia. The impact to bring in this relatively distant material was evidently more energetic as evidenced by the presence of largest grains and more melt material such as frothy, vesicular glass and glass beads.

Transitional nature of these units could be a result of mixing on the lunar surface, or it could be an artifact of handling.



UNIT	CHARACTERISTICS
2	Coarsest grains were relatively abundant, and ranged in size up to 7 mm. Vesicular glass, large dark glass beads, crystalline anorthosite fragments with olivine, and anorthosite breccias are especially abundant.
1	Coarsest grains were relatively sparse and generally less than 3 mm diameter. Basalt rock fragments and soil breccia fragments at maximum abundance.

Fig. 17-14 Stratigraphic Summary, Apollo 17 Drill Bit (Sample 70001).

Drive Tube 70012 (L52)

This core was hand driven to a hard layer at 28 cm depth 0.5 m inside the plus-Y footpad of the LM. The site lies on regolith developed on basaltic subfloor, near the center of the valley, approximately 750 m equidistant between the large (300 to 400 m) craters Camelot and Sherlock. The sample was collected in a relatively flat area with common, but subdued, 10 to 30 cm-diameter craters. Most of the surface appeared fine grained with particles near the limit of resolution of the surface photographs, but 1 to 2 percent of the surface was covered with particles as much as 3 or 4 cm in diameter. Similar material is in the core. Although this core was not disturbed by footprints (AS17-147-22517), the top 1 or 2 cm were probably depleted in fine soil by the LM descent propulsion engine. When the buddy secondary life-support system (BSLSS) bag was opened in the LRL, the bottom cap of the core was off and lying nearby, and soil was spilling from the bottom. A total of 47 g of slumped material were excavated from the base of the core to provide a fresh vertical face, which was then supported by a plug of aluminum foil. The upper follower was in place, and the X-radiograph indicated no serious cracking or slumping in the remainder of the core(Fig. 17-15