

**60255**  
Dark matrix Breccia  
871 grams



*Figure 1: Photo of 60255. NASA S72-42666. Cube is 1 cm.*

**Introduction**

According to Simon et al. (1988), 60255 is a “young” regolith breccia. Fruland (1983) called it a “tough” regolith breccia. In any case, this sample is a coherent, dark-matrix soil breccia with abundant white clasts. It is partially coated with a frothy black glass (figure 1) and has few micrometeorite craters.

**Petrography**

McGee et al. (1979) describe 60255 as a fragmental matrix breccia, but reported differences in different thin sections (i.e. variable lithology). The matrix of 60255 contains glass and there are glass beads and fragments with various colors. 60255 has a low maturity  $Is/FeO = 17$  (McKay et al. 1986). Simon et al. (1988) give the mode.

Hunter and Taylor (1981) reported “rust” at the edges of iron grains.

**Mineralogical Mode for 60255**

(from Simon et al. 1988)

	20-90 micron	90-1000 micron
Matrix < 20 micron	53.9 %	
Mare basalt	0	1.4
KREEP basalt	0	0
Feldspathic basalt	0	0.4
Plutonic rock frag.	0.3	5
Granulite	0.1	0.1
Poik. rocks	0.4	4.4
Impact melts	0.1	4.8
Regolith brec.	0	3.9
Agglutinate	0	2.4
Plagioclase	7.8	2.3
Olivine	2.6	0.6
Pyroxene	2	0.5
Opaques	0.4	0
Glass	2.5	2.1



Figure 2 : Photo of sawn surface of 60255. NASA S79-34528. Scale is in cm/mm.

McGee et al. (1979) and Ryder and Norman (1980) reported on the mineralogy of various small clasts (figure 4). The majority appear to be “impact melt” breccias rather than fragments of pristine highland rocks. Mineral analyses are given in Simon et al. (1988) and McGee et al. (1979).

### **Significant Clasts**

#### ***Clast A***

Judith Schaeffer (1974) described a feldspathic basalt clast in thin section 60255,78. The plagioclase ( $An_{97}$ ) occurs as tabular or blocky subhedral to euhedral crystals. Olivine ( $Fo_{74}$ ) and pyroxene ( $En_{68}Wo_8Fs_{24}$ ) are interstitial.

#### ***Clast B***

Schaeffer (1974) also described a poikilitic feldspathic clast with >88% plagioclase in the same thin section.

According to Ryder and Norman (1980) this clast extends through several serial thin sections (perhaps including the clast that makes up half of figure 3).

#### ***Largest, 17***

There is a large white clast in the figure of the slab (,17) (figure 2).

#### ***Subophitic basalt***

According to McGee et al. (1979) there is a small clast (4.5 mm) with a subophitic texture in thin section 60255,71.

### **Chemistry**

The chemical composition of 60255 has been determined by Simon et al. (1988), Scoon (1974), Boynton et al (1975), Wasson et al. (1975) and Clark and Keith (1973). Ni, Ir and Au are high, indicating that 60255 was a lunar soil.

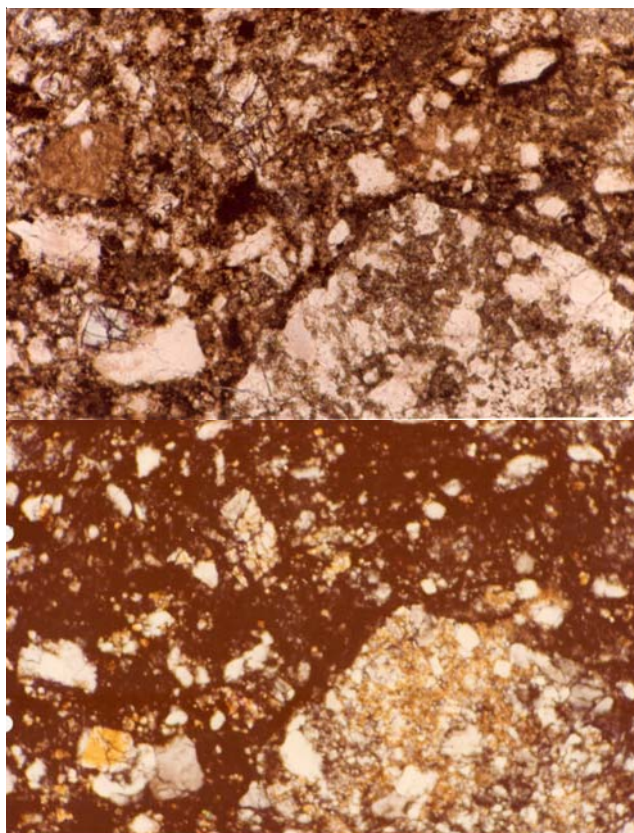


Figure 3: Photomicrographs of thin section 60255,81 (field of view 1.3 mm). Top is plane polarized, bottom is crossed polarized light. NASA S79-27444 and 445.

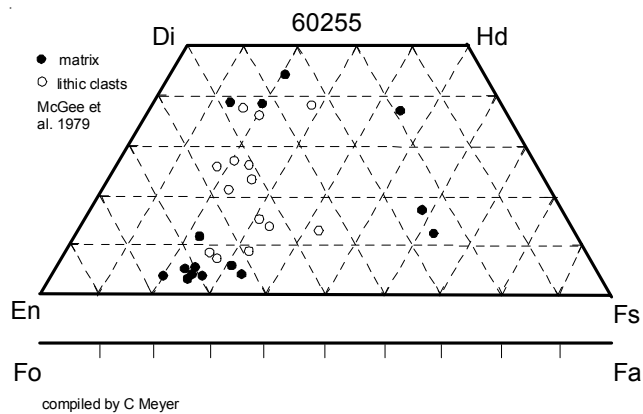


Figure 4: Composition of pyroxene in 60255.

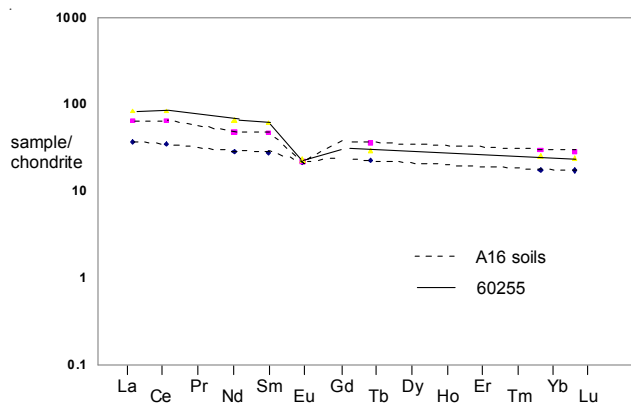


Figure 5: Normalized rare-earth-element diagram for 60255.

### **Cosmogenic isotopes and exposure ages**

Clark and Keith (1973) determined the cosmic-ray-induced activity of  $^{26}\text{Al} = 120$  dpm/kg.,  $^{22}\text{Na} = 39$  dpm/kg.,  $^{54}\text{Mn} = 20$  dpm/kg. and  $^{46}\text{Sc} = 2$  dpm/kg.

### **Other Studies**

The strength of a magnetic field on the moon was determined by Sugiura and Strangway (1980) using 60255, but it is not known when this breccia was formed. Nagata et al. (1973) and Brecher (1976) recognized that there was an orientation to the remnant magnetization in 60255. Schwerer et al (1973) and Huffman et al. (1974) determined the iron distribution in minerals using Mossbauer spectra of 60255.

McKay et al. (1986) determined the rare gas content and isotopic ratios. Fourcade and Clayton (1984) reported the nitrogen isotope release pattern. Bernatowitz et al. (1978) reported Xe and Kr isotopic

composition. 60255 is rich in solar and cosmic ray induced components.

MacDougall et al. (1973) studied solar flare tracks in plagioclase grains from 60255.

### **Processing**

A slab was cut from near one end of 60255 (figure 2). There are 25 thin sections.

**Table 1. Chemical composition of 60255.**

reference weight	McKay 86	Simon 88	Boynton75 422 mg	Clark73	Scoon 74	Wasson75
SiO <sub>2</sub> %					45.24	(d)
TiO <sub>2</sub>	0.61	(a) 0.84	(a) 0.68	(a)	0.69	(d)
Al <sub>2</sub> O <sub>3</sub>	26.4	(a) 27	(a) 26.07	(a)	26.11	(d)
FeO	5.32	(a) 6.09	(a) 6.05	(a)	5.85	(d)
MnO	0.07	(a) 0.087	(a) 0.076	(a)	0.06	(d)
MgO	6.6	(a) 7.1	(a) 9.3	(a)	6.39	(d)
CaO	15.6	(a) 15	(a) 17.4	(a)	15.14	(d)
Na <sub>2</sub> O	0.469	(a) 0.54	(a) 0.52	(a)	0.46	(d)
K <sub>2</sub> O		0.123	(a)	0.133	(c) 0.12	(d)
P <sub>2</sub> O <sub>5</sub>					0.12	(d)
S %					0.04	(d)
<i>sum</i>						
Sc ppm	9.5	(a) 10.4	(a) 10.7	(a)		
V	21	(a) 42	(a)			
Cr	739	(a) 770	(a) 790	(a)		
Co	33.3	(a) 25.1	(a) 35	(a)		
Ni	436	(a) 350	(a)		391	(b)
Cu						
Zn					21	(b)
Ga					5.23	(b)
Ge ppb					880	(b)
As						
Se						
Rb		8.3	(a)			
Sr	191	(a) 80	(a)			
Y						
Zr	170	(a) 180	(a)			
Nb						
Mo						
Ru						
Rh						
Pd ppb						
Ag ppb						
Cd ppb					61	(b)
In ppb						
Sn ppb						
Sb ppb						
Te ppb						
Cs ppm	0.17	(a) 0.26	(a)			
Ba	143	(a) 160	(a) 140	(a)		
La	12.4	(a) 15.1	(a) 12.6	(a)		
Ce	32	(a) 36.5	(a) 35	(a)		
Pr						
Nd	20	(a) 23.9	(a)			
Sm	5.72	(a) 6.88	(a)			
Eu	1.195	(a) 1.25	(a) 1.35	(a)		
Gd		8.5	(a)			
Tb	1.07	(a) 1.37	(a) 1.2	(a)		
Dy		9.3	(a)			
Ho		1.9	(a)			
Er						
Tm						
Yb	4.13	(a) 4.9	(a) 4.6	(a)		
Lu	0.58	(a) 0.65	(a) 0.7	(a)		
Hf	4.85	(a) 4.4	(a) 5.2	(a)		
Ta	0.56	(a) 0.57	(a) 0.7	(a)		
W ppb						
Re ppb						
Os ppb						
Ir ppb	13.6	(a) 7.2	(a)		12	(b)
Pt ppb						
Au ppb	8.3	(a) 1.3	(a)		5.6	(b)
Th ppm	2.3	(a) 2.04	(a) 5.2	(a) 2.4	(c)	
U ppm	0.55	(a) 0.76	(a)	0.63	(c)	

*technique: (a) INAA, (b) RNAA, (c) radiation counting, (d) wet chem.*

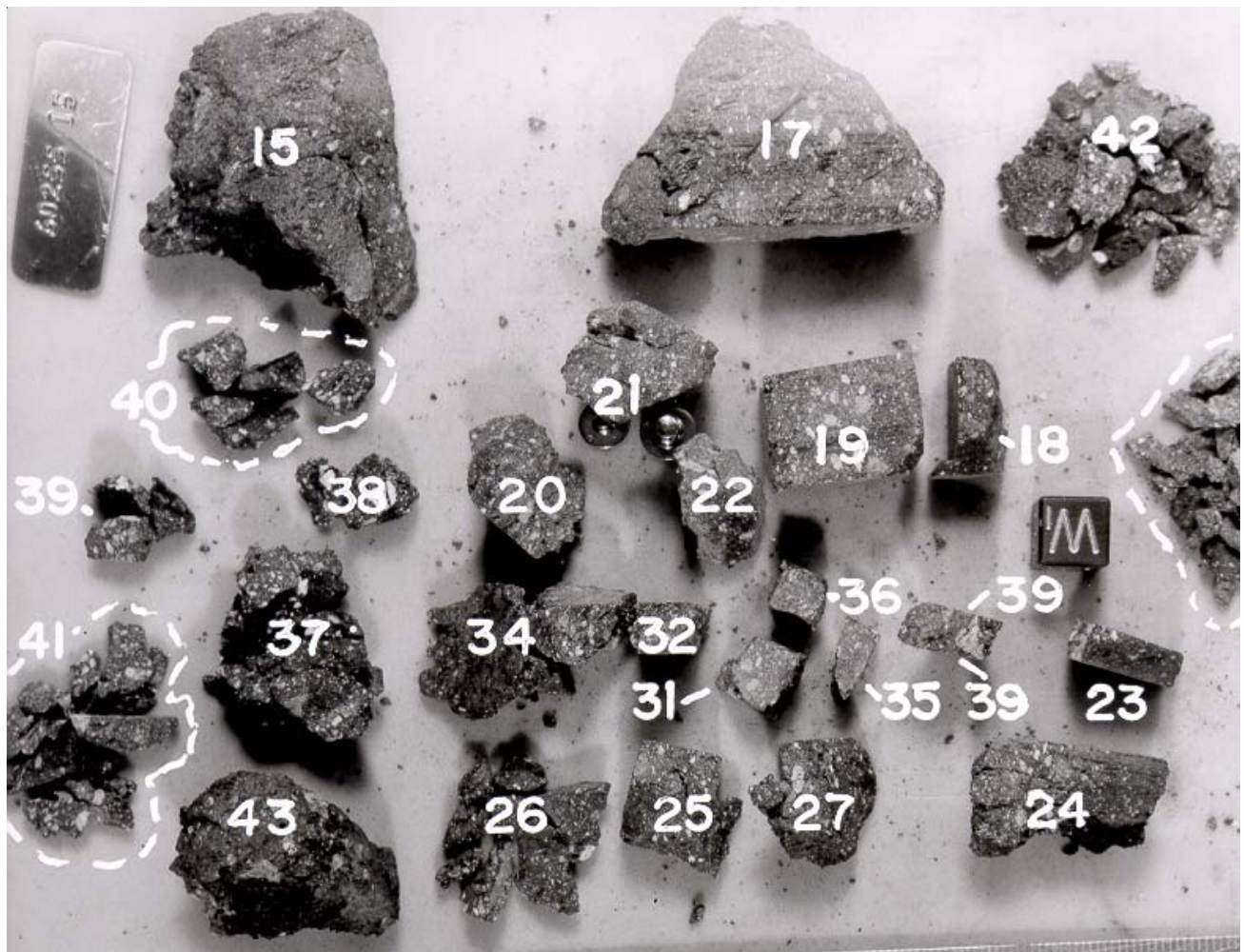
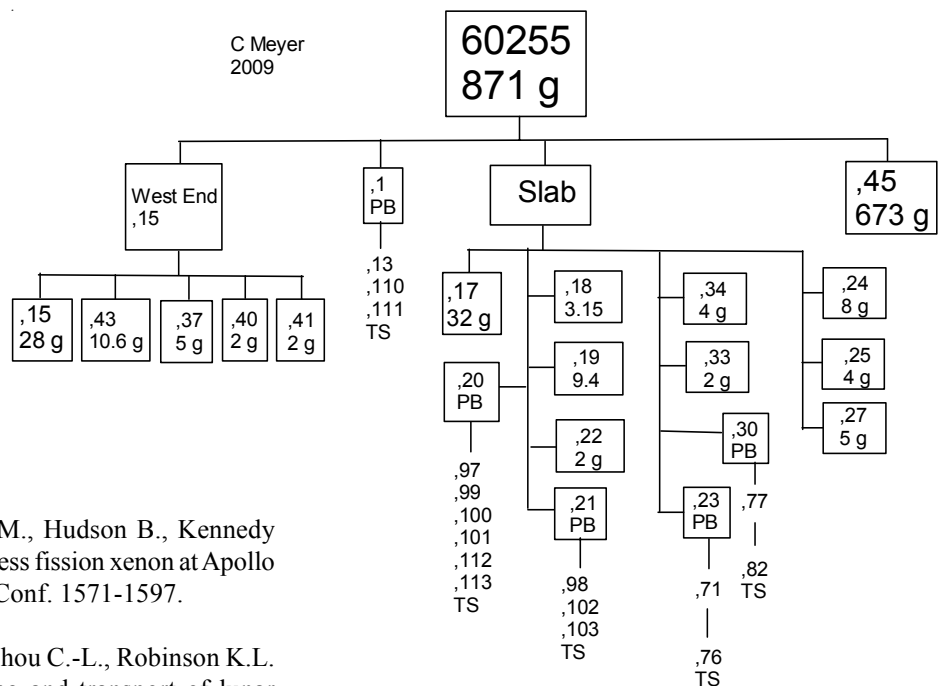


Figure 6: Photo showing subdivision of slab cut (,17) and end piece (,15) through 60255. NASA S73-21534.



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