67095 BASALTIC IMPACT MELT 340 g

INTRODUCTION: 67095 is a coherent, coarse-grained basaltic impact melt with a thick coat of frothy, clast-laden glass (Fig. 1). The large "norite" clasts referred to in the original Apollo 16 Sample Information Catalog (1972) are actually portions of the basalt showing through the glass coat.

This rock was collected within the southeast rim of North Ray Crater; lunar orientation is unknown. Zap pits are absent from all surfaces.

FIGURE 1. Smallest scale division in mm. S-77-24293.

PETROLOGY: This coarse-grained, basaltic impact melt rock is characterized by equant to lathy plagioclase (up to 1.5 mm long) ophitically enclosed by large (up to 10 mm) single crystals of olivine and pyroxene (Fig. 2). The plagioclase is normally zoned from An_{90-95}; olivine is Fo_{78-83}, clinopyroxene $Wo_{40}En_{47}$, and pigeonite $Wo_{14}En_{59}$ (Warren and Wasson, 1978). The mesostasis consists of dark brown glass, metal, troilite, ilmenite and other opaque oxides. The grain size is locally variable with clots of much finer-grained basalt scattered through the rock. Xenocrysts are rare, and are mostly plagioclase or plagioclase aggregates. A few very fine-grained, recrystallized breccia clasts (1-2 mm) are recognized by Warren and Wasson (1978). Zones of internal shearing have disrupted the original texture in places (Fig. 2), causing minor brecciation and recrystallization.

The dark glass coat is clear in thin section, with schlieren indicating flow parallel to the basalt/glass contact (Fig. 2). Partial crystallization of the coat to a fine-grained groundmass has occurred around local nuclei. Some melting of the host rock near the contact is apparent (Fig. 2).

CHEMISTRY: Major and trace element analyses of the bulk rock are reported by Laul et al. (1974), Palme et al. (1978) and Warren and Wasson (1978). Hertogen et al. (1977) give meteoritic siderophile and volatile element abundances for the glass coat and for the bulk rock. Rancitelli et al. (1973a,b) provide whole rock abundances of natural and cosmogenic radionuclides.

67095 is compositionally distinct from the local soils, being considerably less aluminous and with higher levels of REEs (Table 1, Fig. 3). Palme et al. (1978) note that the Na content of 67095 is somewhat high for a typical basaltic impact melt, and that the K/La ratio (K/La = 95) is also high compared to the average highlands (K/La ~70). Both the basalt and the glass coat contain meteoritic contamination (Table 1). Hertogen et al. (1977) assign the basalt to ancient meteoritic group 1L which they interpret to represent Imbrium ejecta. The glass coat is probably a young hybrid with siderophiles unrelated to a particular ancient meteoritic group (Hertogen et al., 1977).

RARE GASES/EXPOSURE AGES: Cosmogenic radionuclide data are given by Rancitelli et al. (1973b) and Fruchter et al. (1978). These data indicate that 67095 is undersaturated in ^{26}Al activity (Rancitelli et al., 1973b; Yokoyama et al., 1974).

A ^{26}Al exposure age of >2.5 m.y. and a ^{53}Mn age of >12 m.y. were calculated by Fruchter et al. (1978), who also conclude that 67095 had a simple exposure history.

Kr isotopic data yield an exposure age of 50.2 ± 1.8 m.y., consistent with the excavation of 67095 by the North Ray Crater event (Drozd et al., 1974). Xe isotopic data are provided by Hohenberg et al. (1978).

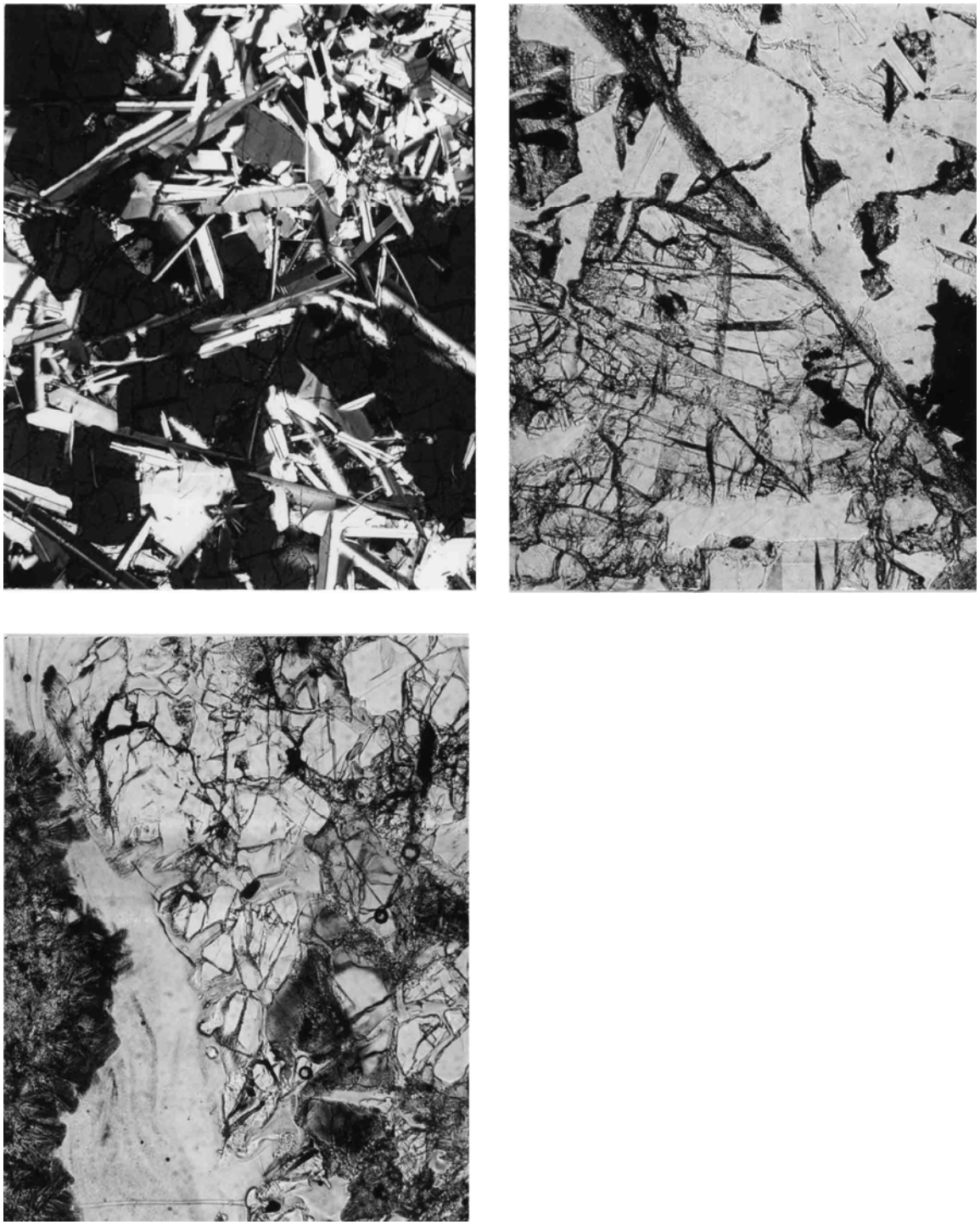

FIGURE 2.
a) 67095,45. General view, olivine crystal at extinction, xpl. Width 2 mm.
b) 67095,35. Zone of internal shearing, ppl. Width 1 mm.
c) 67095,36. Contact of basalt and glass coat, ppl. Width 1 mm.

PROCESSING AND SUBDIVISIONS: In 1973, 67095 was slabbed and the slab subdivided (Fig. 4). Allocations have been made from all portions of the rock. Many splits remain at JSC, the largest being the Wend piece ,1 (183.6 g).

TABLE 1. Summary chemistry of 67095 lithologies.

SiO_2	47.3	
TiO_2	0.71	
Al_2O_3	22.2	
Cr_2O_3	0.14	
FeO	5.6	
MnO	0.08	
MgO	11.0	
CaO	12.8	
Na_2O	0.609	
K_2O	0.268	
P_2O_5		
Sr	180	
La	23	
Lu	1.0	
Rb	7.94	6.42
Sc	9.6	
Ni	125	129
Co	11	
Ir ppb	3.37	5.81
Au ppb	3.34	2.02
C		
N		
S		
Zn	4.7	2.27
Cu		

Oxides in wt%; others in ppm except as noted.

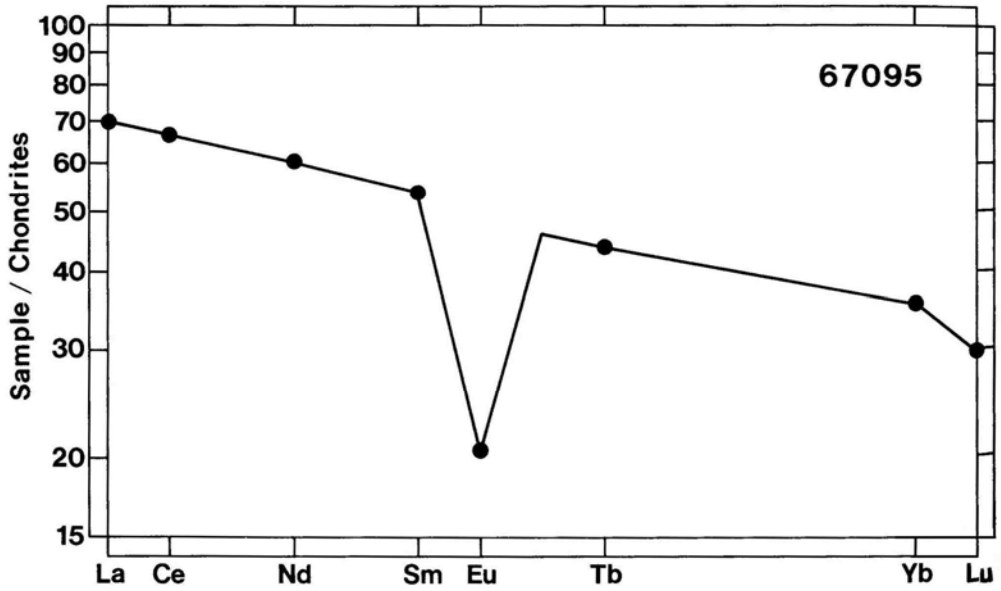

FIGURE 3. Rare earths, average of published analyses.

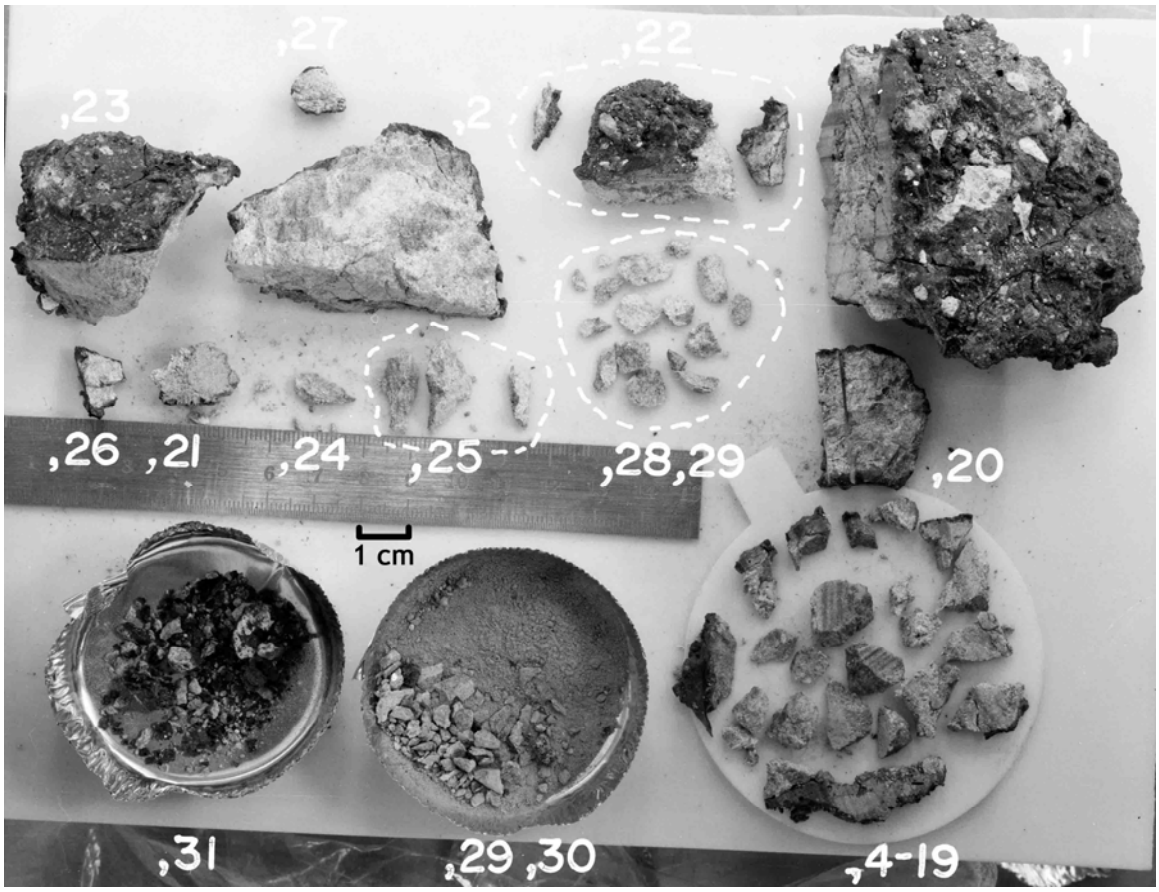

FIGURE 4. Major subdivisions of 67095. S-73-33245.