67936 FINE-GRAINED BASALTIC IMPACT MELT, GLASS VEINS 61.8 g

INTRODUCTION: 67936 consists mainly of a medium-gray, fine-grained, subophitic impact melt with thick glass veins and a few white clasts (Fig. 1). It is coherent and slabby. It was chipped from Outhouse Rock (see 67915, Fig. 1) to sample a shatter cone, as were 67935 and 67937. Its orientation is unknown and zap pits are absent.

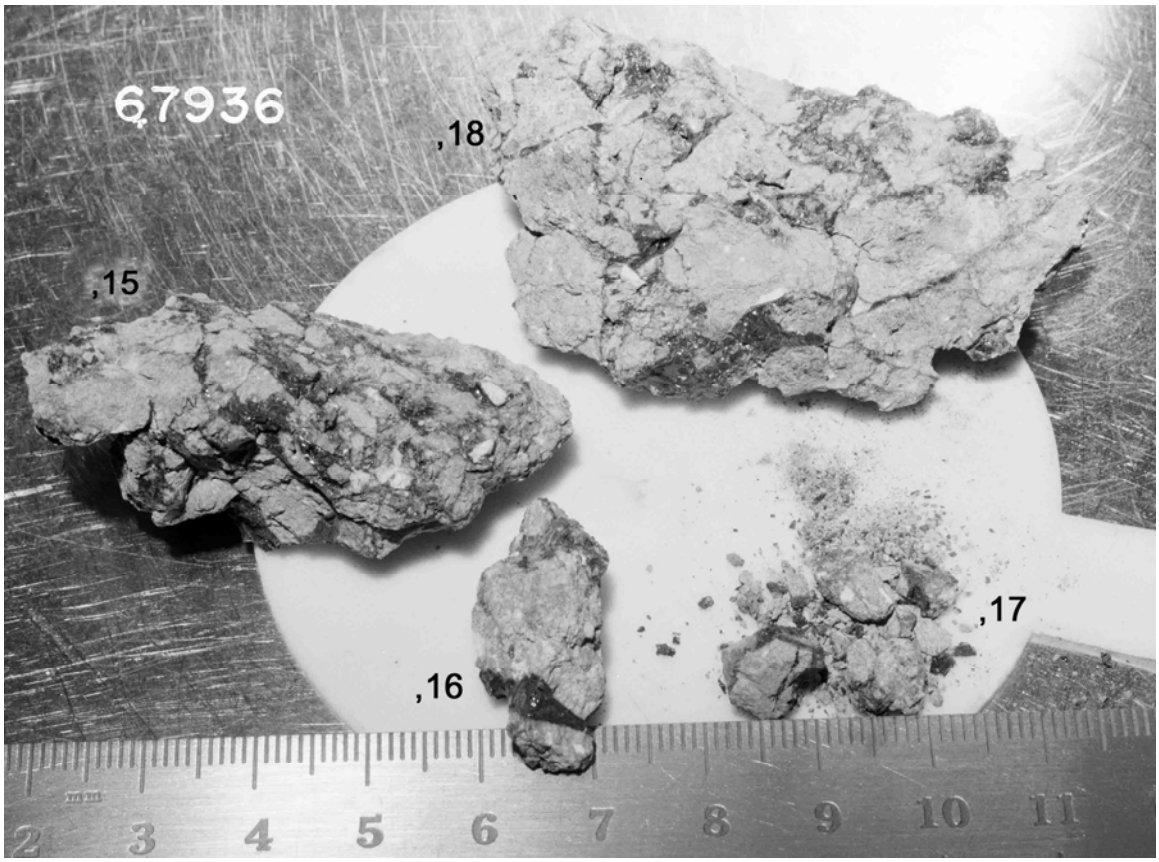

FIGURE 1. S-72-53501.

PETROLOGY: Roedder and Weiblen (1977a) describe, analyze, and discuss the origin of the glass veins, and also report a defocussed beam analysis and some mineral chemical data purportedly from the host rock.

67936 is mainly a basaltic impact melt with a fine-grained subophitic to inter-granular texture (Fig. 2). Plagioclase laths less than 100 μm long have interstitial mafic and opaque minerals. Minor residual glass (or silica or K-feldspar?) is present. In places there are clasts of plagioclase-rich breccia which have a fine-grained mortar of melt but

are mainly clastic plagioclase. A defocussed beam analysis of "breccia matrix" by Roedder and Weiblen (1977a) is reproduced in Table 1. However, our inspection of the material analyzed shows that it was in fact a plagioclase-rich breccia clast, not the general basaltic matrix of 67936. The analyses of olivine (Fo_{80}) and plagioclase (An_{94}) reported for the matrix by Roedder and Weiblen (1977a) also apply to the breccia clast, not the basalt.

The glass veins (discussed in detail by Roedder and Weiblen, 1977a) are anastomosing masses of banded gray glass (Fig. 2). The glass contains abundant metal spheres and a few mineral clasts. The mineral clasts include plagioclase, olivine (Fo_{77}),chromite, and pleonaste spinel. The larger metal spheres (~7 μm) contain ~7% Ni, 5% S and are composite; the smaller spheres (<0.1 μm) have ~3% Ni and lack sulfur (Roedder and Weiblen, 1977a). An average analysis of the clear glass is given in Table 1. Roedder and Weiblen (1977a) note that the Al_2O_3 content is much lower than the host breccia, but in fact the value of 25.13% is in accord with the mode of the basaltic impact melt which has ~70% plagioclase; hence the glass could be a shock melt of the basaltic impact melt.

CHEMISTRY: Clark and Keith (1973) report K (K_2O 0.193%), U (0.91 ppm) and Th (3.12 ppm) abundances for ,18, a large piece of the bulk rock.

RARE GASES AND EXPOSURE AGES: Roedder and Weiblen (1977a) report rare gas data (by C. Alexander) for both glass veins and matrix. The veins have less Kr, He, and Xe than the matrix, and both veins and matrix have 2-3 orders of magnitude less rare gases than typical regolith. The $^{40}Ar/^{36}Ar$ ratio of 220 (soils are ~1.0) shows that virtually all the Ar is radiogenic. These data all show that there is no solar wind gas in the glass veins.

Yokoyama et al. (1974) note that the cosmogenic radionuclide data of Clark and Keith (1973) indicate that 67936 is unsaturated in ^{26}Al.

TABLE 1. Microprobe analyses of glass veins and breccia clast in 67936 (from Roedder and Weiblen. 1977a).

Wt%	*Glass	Breccia clast
SiO_2	46.1	46.4
TiO_2	0.20	<0.05
Al_2O_3	25.1	31.5
Cr_2O_3	-	<0.05
FeO	5.74	2.77
MnO	0.02	<0.05
MgO	7.08	2.11
CaO	15.28	16.7
Na_2O	0.21	0.39
K_2O	0.03	<0.05
P_2O_5	<0.05	<0.05

* Average of 4 clear glass areas.

PROCESSING AND SUBDIVISIONS: 67936 has been substantially subdivided. The main pieces are shown in Figure 1. An undocumented chip (,1) was made into thin sections ,2; ,13; ,14; ,22; ,23 and ,24 and two small chips of matrix and glass were made into thin sections ,20 (from ,3) and ,21 (from ,4).

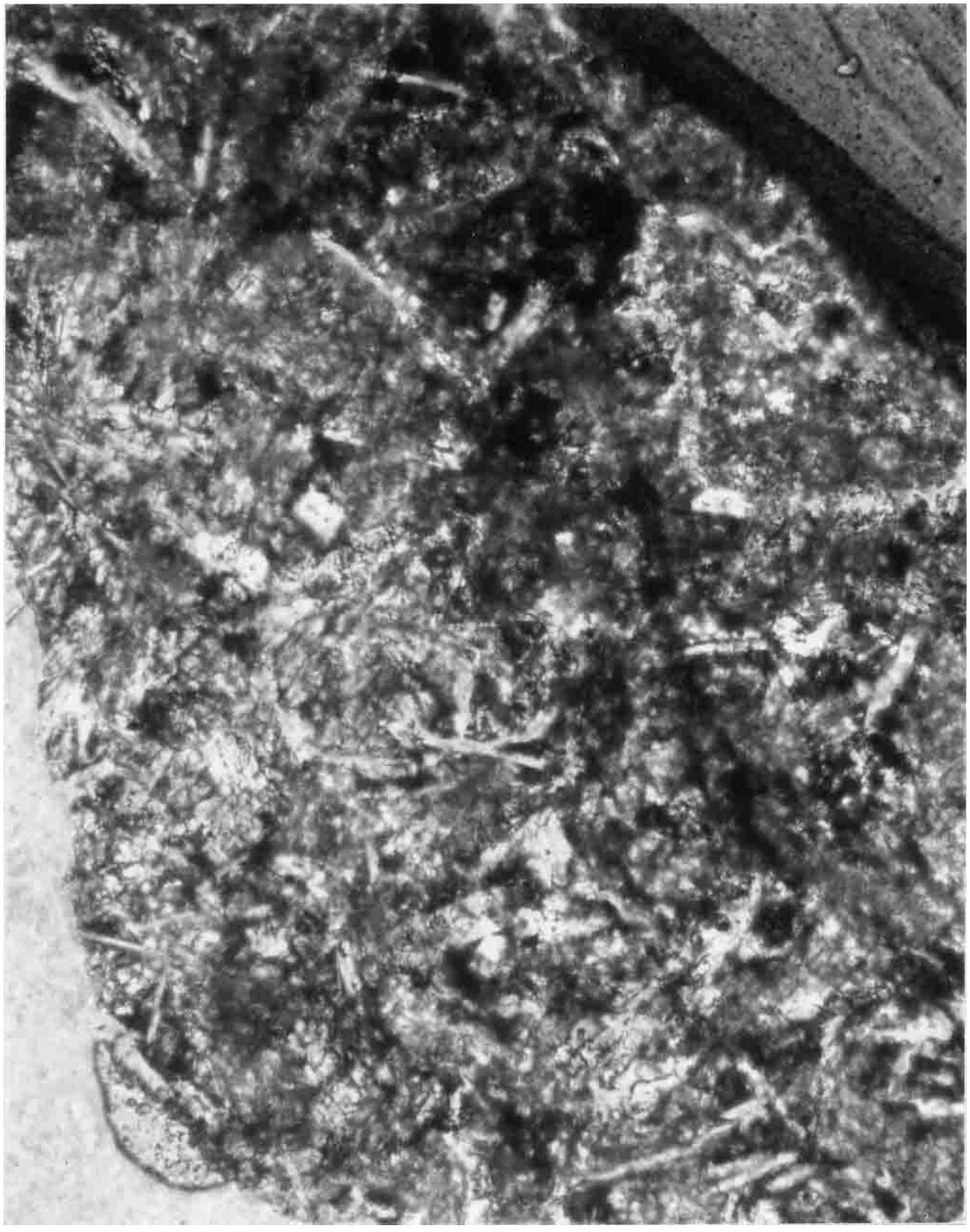

FIGURE 2. 67936,20. Basaltic melt, glass vein in upper right corner, ppl. Width 0.5 mm.