69955 CATACLASTIC ANORTHOSITE 75.9 g

INTRODUCTION: 69955 is a cataclastic anorthosite that has been heavily shocked (Fig. 1). Much of the plagioclase is translucent and appears glassy. At least a portion of the rock is probably chemically pristine.

69955 was collected from the bottom side of the same boulder that yielded 69935 (see 69935, Fig. 2) on the lower slope of Stone Mountain. Its lunar orientation is unknown, and zap pits are absent from all surfaces.

FIGURE 1. S-72-40124.

PETROLOGY: 69955 is a nearly monomict, cataclastic anorthosite veined by a small amount of dark, vesicular glass (Fig. 2). The anorthosite has been extensively recrystallized and some maskelynite is present. Mafic minerals are rare and occur as interstitial grains and as inclusions within plagioclase. The plagioclases are up to ~5 mm across. Meyer (1979) reports ion probe analyses of minor elements in plagioclase (Table 1), and Misra and Taylor (1975) provide compositional data for metal grains in a dark glass vein (Fig. 3).

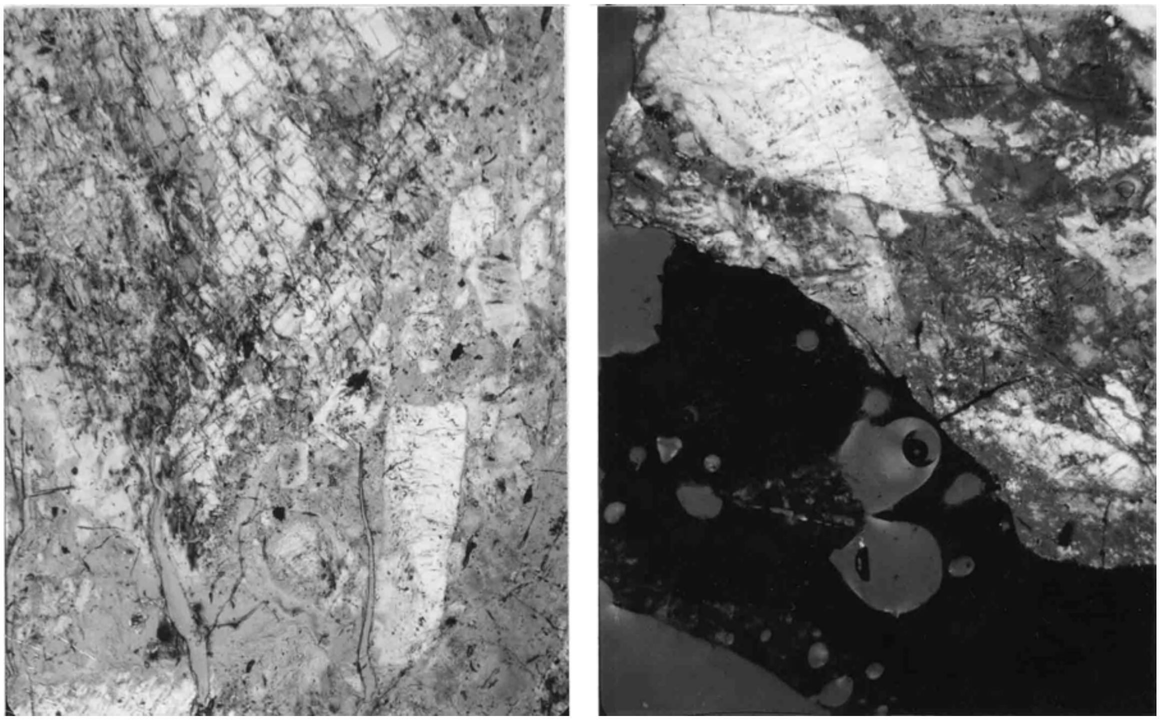

FIGURE 2. a) 69955,27. Cataclastic anorthosite, partly xpl. Width 2 mm.
b) 69955,28. Cataclastic anorthosite and glass coat, partly xpl. Width 2 mm.

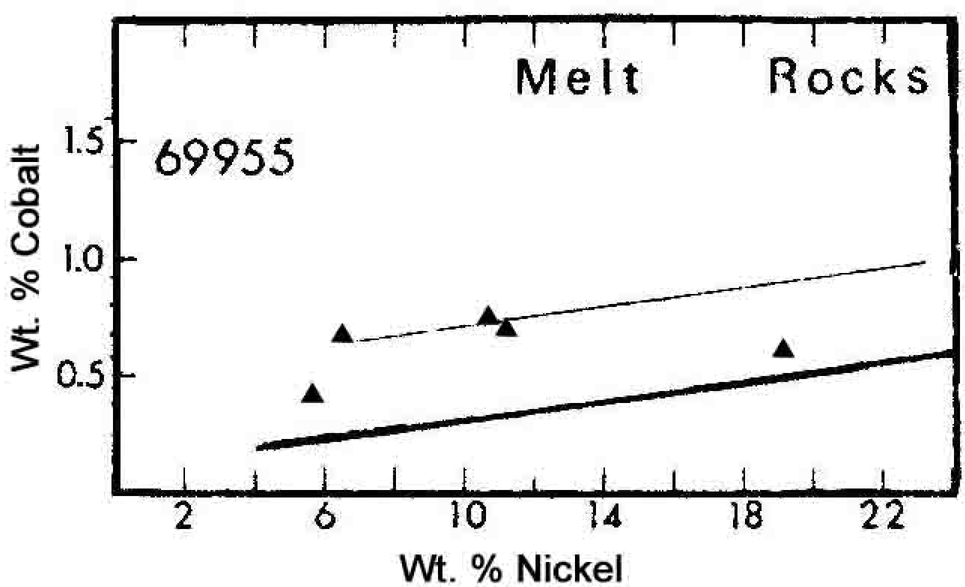

FIGURE 3. Metals; from Misra and Taylor (1975).

CHEMISTRY: Major and trace element analyses of the anorthosite are provided by Rose et al. (1973) and Laul and Schmitt (1973). Krahenbuhl et al. (1973) give meteoritic siderophile and volatile element abundances, and Rancitelli et al. (1973a, b) report whole rock abundances of natural and cosmogenic radionuclides.

The bulk analyses (Table 2) indicate that 69955 is a ferroan anorthosite with low levels of incompatible elements (Fig. 4). Some portions of the rock are probably meteorite-free as indicated by the low Co and REE contents of one split (Laul and Schmitt, 1973). The entire anorthosite is not chemically pristine, however, as data by Rose et al. (1973) and Krahenbuhl et al. (1973) show a detectable amount of meteoritic siderophiles. Hertogen et al.(1977) assign the siderophiles in 69955 to meteoritic group 1L which they interpret to represent Imbrium ejecta.

TABLE 1. Minor elements in 69955 plagioclase (ppm).

	Li	Mg	Ti	Sr	Ba
a)	1.0	750			12
b)	1.7	781	200	275	14

TABLE 2. Summary chemistry of 69955.

SiO_2	44.1	Sr	135
TiO_2	0.01	La	0.27
Al_2O_3	35.3	Lu	0.01
Cr_2O_3	0.005	Rb	0.4
FeO	0.42	Sc	0.8
MnO	0.01	Ni	9.8-43
MgO	0.23	Co	0.8
CaO	19.1	Ir ppb	0.289
Na_2O	0.41	Au ppb	0.307
K_2O	$\sim$0.01	C	
P_2O_5	0.01	N	
		S	
		Zn	0.37
		Cu	1.1

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

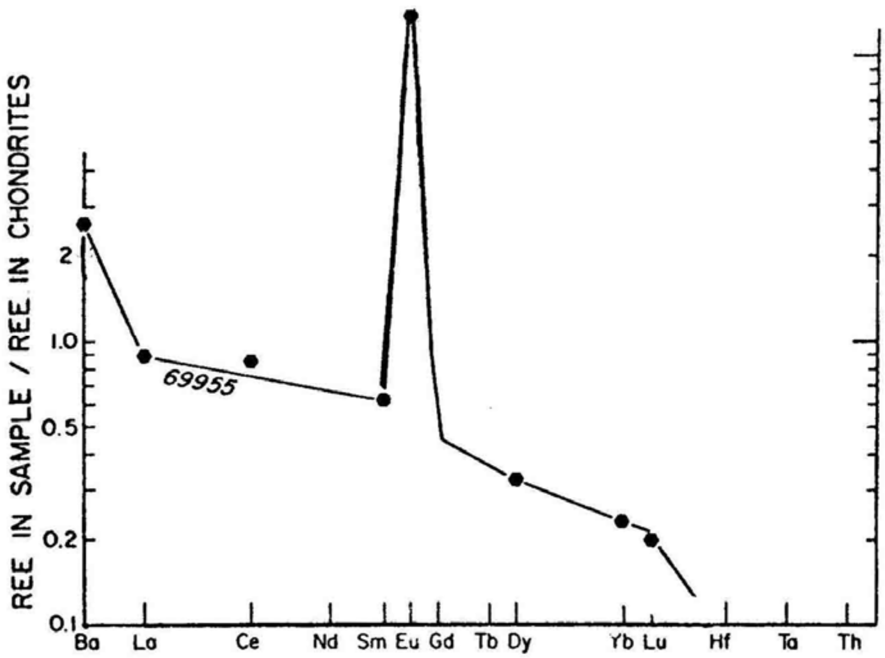

FIGURE 4. Rare earths; from Laul and Schmitt (1973).

<u>RARE GASES/EXPOSURE AGES</u>: Drozd et al. (1974) report Kr isotopic data and exposure ages of 4.23 ± 0.21 m.y. (^{81}Kr-Kr) and 2.13 ± 0.51 m.y. (^{21}Ne). These authors note that although both 69935 and 69955 came from the same boulder, their Kr exposure ages vary by a factor of 2. This is taken as further evidence for the complex exposure history of the boulder (see 69935). From the apparent differences in shielding between 69935 and 69955, Drozd et al. (1974) conclude that the 69935/55 boulder was buried in the lunar regolith for ~1-6 m.y. until it was excavated and inverted by the South Ray Crater event (Fig. 5), where it has remained in its present configuration since.

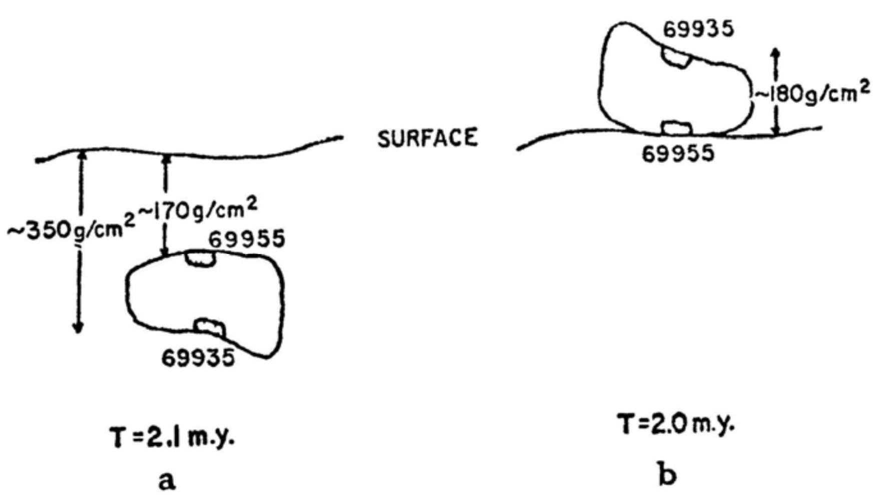

FIGURE 5. Schematic exposure history; from Drozd et al. (1974).

Pepin et al. (1974) discuss the results of Drozd et al. (1974) and calculate a subsurface residence time of 2.1 m.y. using an empirically-derived spallation Ne production rate profile.

^{22}Na and ^{26}Al data are given for the whole rock by Rancitelli et al. (1973a). From these data Yokoyama et al. (1974) conclude that 69955 is saturated in ^{26}Al activity. Fruchter et al. (1978) provide ^{26}Al and ^{53}Mn data for a surface chip. These data also indicate saturation in ^{26}Al and yield exposure ages of >3 m.y. (^{26}Al) and 5 ± 1 m.y. (^{53}Mn).

TRACKS: Yuhas (pers. comm., quoted in Drozd et al., 1974) finds no solar flare tracks in 69955, indicating that it has received no direct exposure to the sun since its latest excavation.

PROCESSING AND SUBDIVISIONS: In 1973, 69955 was extensively subdivided by chipping (Fig. 6). Thin sections were cut from ,9. The largest single piece remaining is ,17 (46.40 g) at JSC.

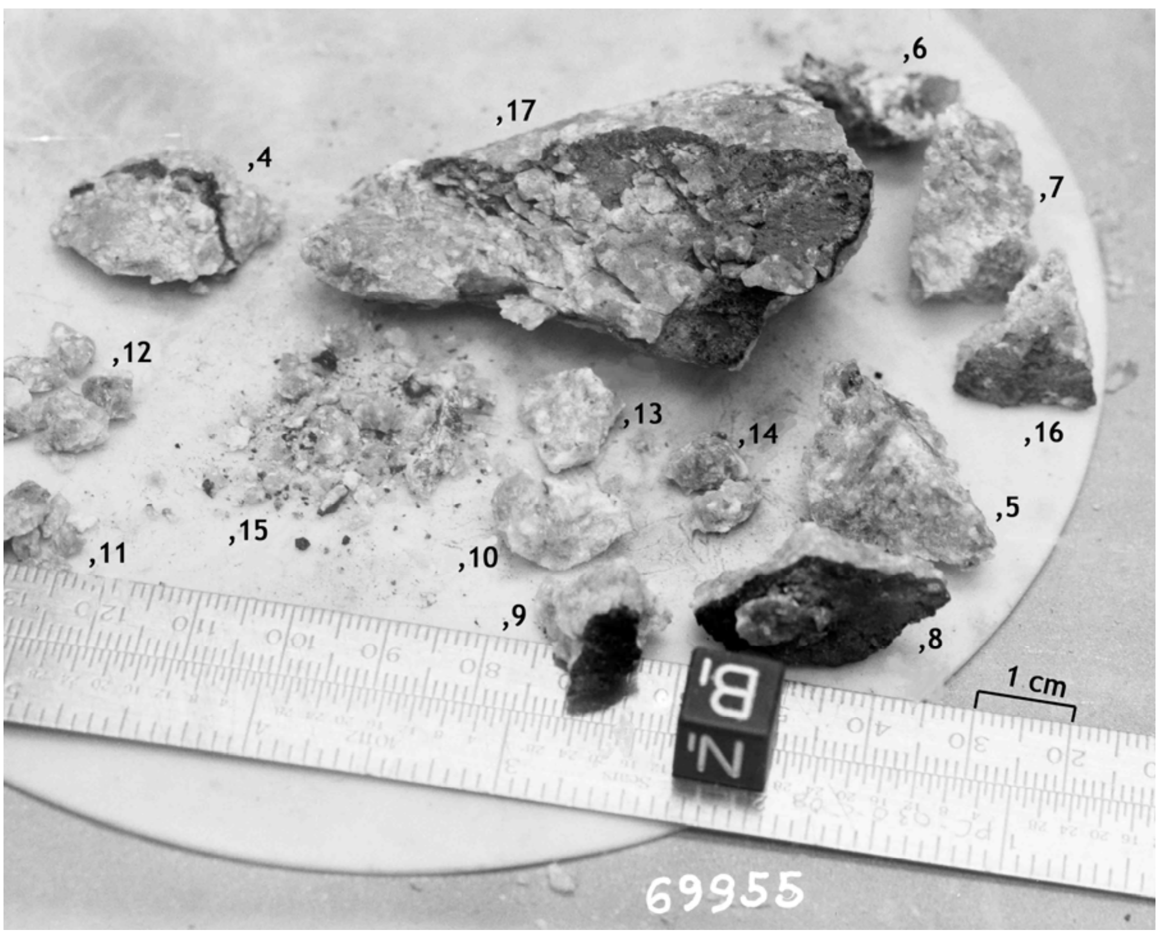

FIGURE 6. S-73-22188.