62255 DILITHOLOGIC (PRISTINE ANORTHOSITE AND IMPACT MELT) BRECCIA, PARTLY GLASS-COATED 1239 g

INTRODUCTION: 62255 consists of ~65% ferroan anorthosite and 35% dark, finely crystalline melt (Fig. 1). Two sides are coated with black vesicular glass (Fig. 1) apparently distinct from the crystalline melt phase. The anorthosite is chemically pristine but enriched in some volatiles. The sample is blocky, and moderately coherent but fractured.

62255 was collected at the south rim of Buster Crater and its orientation is known. It was apparently perched. Patina and zap pits are present on most faces.

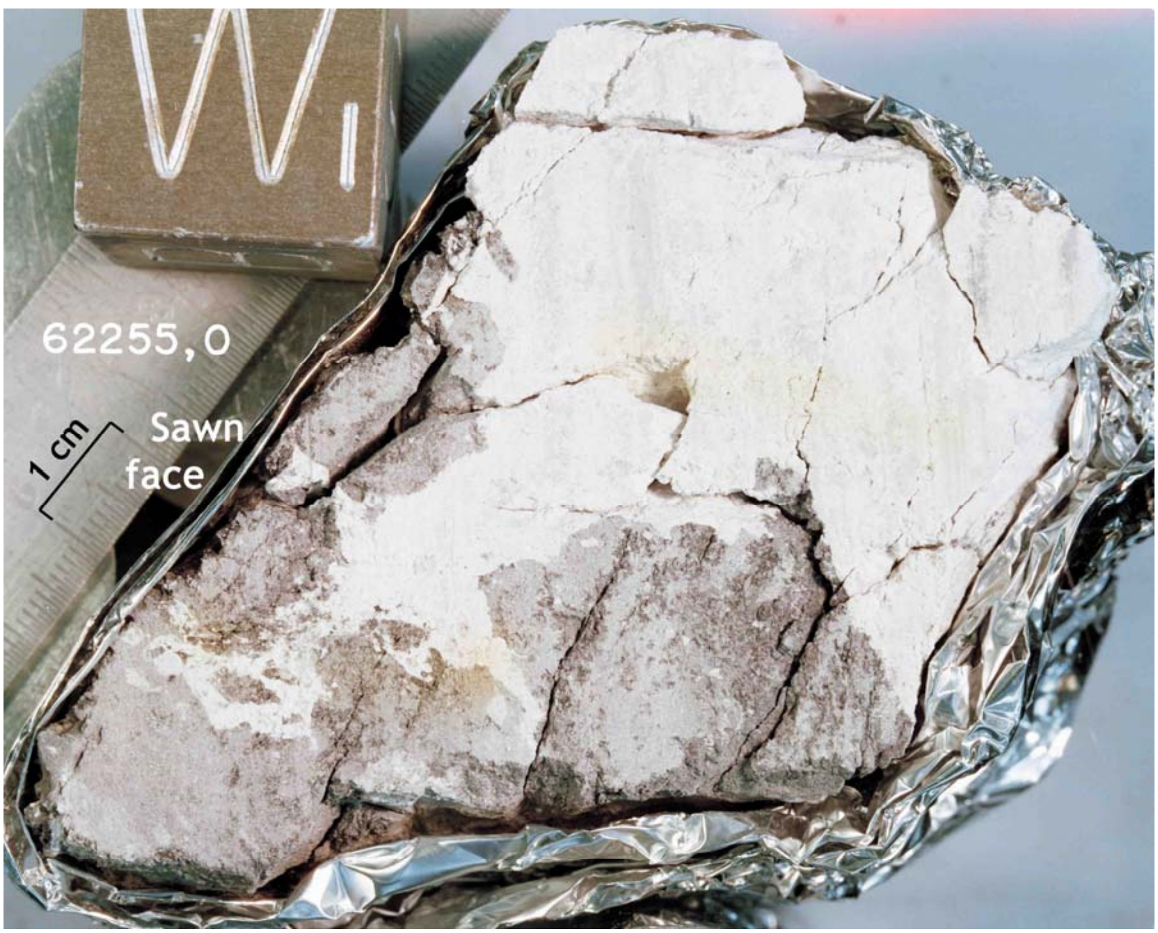

FIGURE 1a. S-75-33052.

FIGURE 1b. S-72-38309.

PETROLOGY: Little petrographic work on 62255 has been published. Schaal et al. (1976) report on studies of microcraters in the anorthosite and provide some information on the anorthosite itself. Ryder and Norman (1978) provide a brief petrographic description of the anorthosite with mineral compositions and Meyer (1979) tabulates data for minor elements in plagioclase from ion microprobe studies.

The anorthosite (Fig. 2) is cataclastic and consists of plagioclase (An_{92-97}) with minor amounts of two pyroxenes ($En_{50-45}Wo_{4-8}$) (Ryder and Norman, 1979; Schaal et al., 1976). Low-calcium pyroxene occurs mainly as discrete grains (rarely up to 2 mm), but some plagioclases contain numerous tiny pyroxene grains. Some of the pyroxenes contain exsolution lamellae. Plagioclase grains are up to 4 mm in diameter and relict grain boundaries are visible in places. Ilmenite and troilite are rare. The minor element data for plagioclase from Meyer (1979) are presented in Table 1.

Schaal et al. (1976) note that glass in microcraters on the anorthosite consists entirely of plagioclase and even next to a pyroxene grain is not enriched in Mg, Fe, or Ca. In contrast, Brownlee et al. (1975) did note a slight enrichment of Mg and Fe in glass craters as compared with the underlying feldspar grain. This enrichment might be meteoritic.

The melt phase has a finely crystalline, “salt and pepper” texture which varies greatly. It contains 1-2% metal fragments. The contacts with the white are sharp but the relationship is unknown—the melt is not present in thin sections. The macroscopic features are consistent with the melt being a basaltic-textured impact melt.

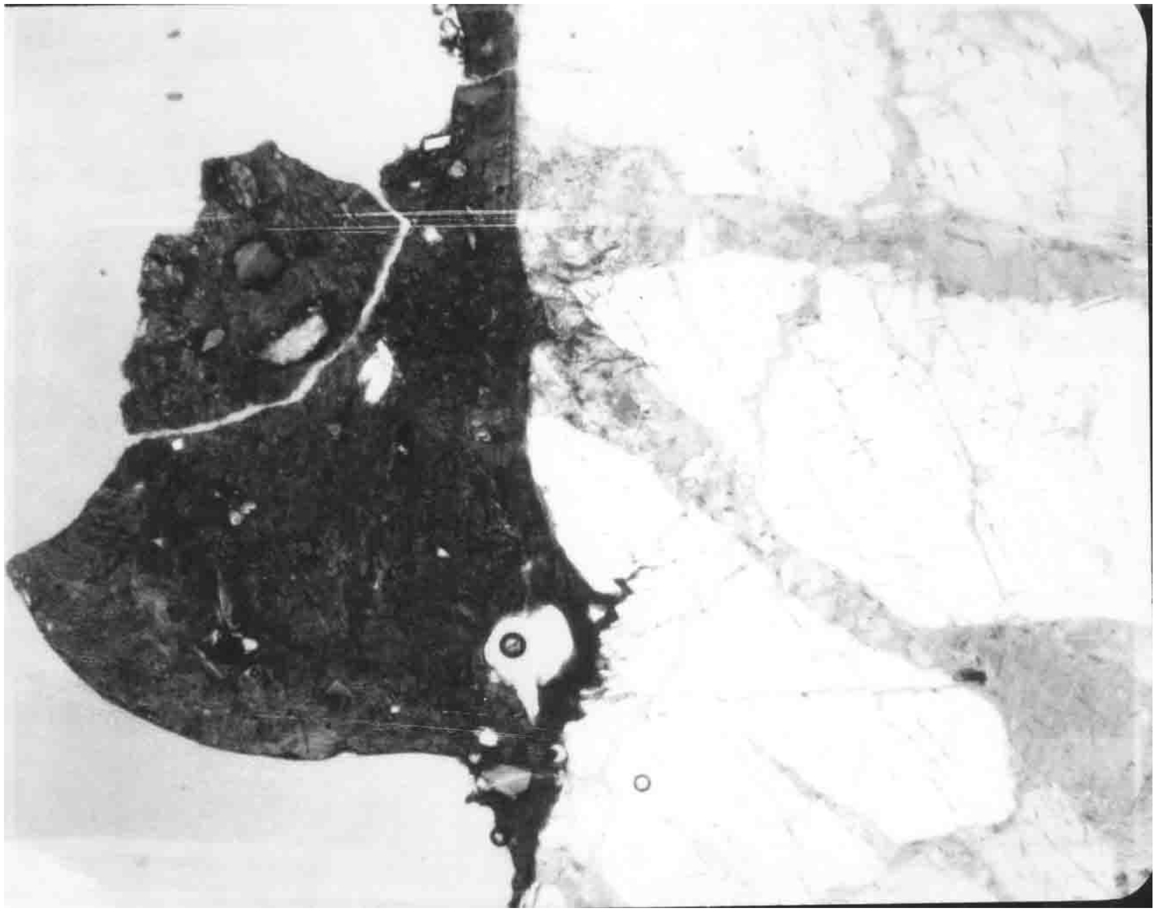

FIGURE 2. 62255,44, glass coat (left) and anorthosite (right), partly xpl.
Width 3 mm.

TABLE 1. Ion microprobe data for minor elements (ppm)
in plagioclase (Meyer, 1979).

	Li	Mg	Ti	Sr	Ba
grain a)	2.6	500			
grain b)	2.3	534	214	181	22

In thin section, the glass coat (Fig. 2) is vesicular and contains anorthosite fragments and tiny metal blebs. It is brown and partly crystallized into spherulites of plagioclase. The contact with the anorthosite is generally sharp but in a few places the anorthosite is melted and in others tiny apophyses (200-300 μm) of glass intrude the anorthosite.

CHEMISTRY: All published chemical data are for the anorthosite. S.R. Taylor et al. (1974) present major and trace element analyses and Taylor and Bence (1975) diagram rare-earth abundances for the anorthosite and a plagioclase separate from it. Cripe and Moore (1974) and Moore and Lewis (1977) present S, and C and N data respectively. Hertogen et al. (1977) tabulate and discuss meteoritic siderophile and volatile element abundances. Ca and K data are presented by Jessberger et al. (1977) but the chip is described as pyroxene-rich.

The data are summarized in Table 2 and Figure 3. The siderophiles demonstrate that the ferroan anorthosite is free of meteoritic contamination but abundances of Tl (etc.) (not tabulated) demonstrate an enrichment in volatiles.

TABLE 2. Summary chemistry of 62255 pristine anorthosite.

SiO_2	44.1
TiO_2	
Al_2O_3	35.3
Cr_2O_3	0.002
FeO	0.20
MnO	
MgO	0.37
CaO	19.1
Na_2O	0.49
K_2O	0.09
P_2O_5	
Sr	
La	0.46
Lu	
Rb	0.025
Sc	
Ni	1.6
Co	
Ir ppb	0.016
Au ppb	0.062
C	20
N	9
S	90
Zn	0.31
Cu	<1

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

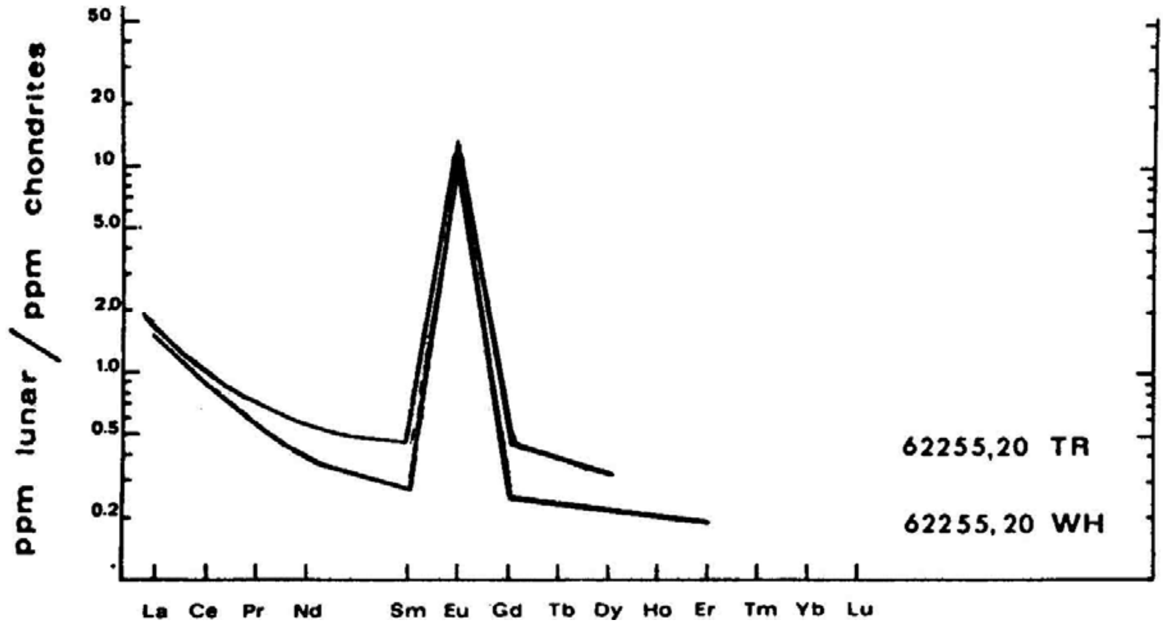

FIGURE 3. Rare earth data for 62255, from Taylor and Bence (1975).
TR = whole rock anorthosite.
WH = plagioclase separate from anorthosite;

GEOCHRONOLOGY: Jessberger et al. (1977) found no plateau in ^{39}Ar-^{40}Ar studies and state that the sample is not datable. Thus the total K-Ar "age" of 3.66 ± .08 b.y. is unreliable.

RARE GASES AND EXPOSURE AGES: Jessberger et al. (1977) list an argon exposure age of 3 ± 1 m.y., Lightner and Marti (1974a) state that the exposure age is 2 m.y., and Drozd et al. (1977) quote (Marti, 1975, pers. comm.) an age of 1.9 m.y. The method for the study which gave the latter two ages is ^{81}Kr-Kr (Marti, 1980, pers. comm.).

Lightner and Marti (1974a) present xenon isotopic data for an interior chip of anorthosite. The spallation component is small because the sample has both low incompatible element abundances and a short exposure age. As expected, no fissionogenic xenon was found. Trapped xenon is isotopically similar to terrestrial xenon but Lightner and Marti (1974a) argue that it is not terrestrial in origin. However, as discussed by Hertogen et al. (1977), contamination is possible, as Niemeyer and Leich (1976) found that terrestrial xenon could be strongly adsorbed on surfaces. Hertogen et al. (1977) suggest that the lunar volatile enrichment might somehow make the surface conducive to later xenon adsorption.

MICROCRATERS AND SURFACES: Schaal et al. (1976) report physical and chemical characteristics of microcraters on the anorthosite and Brownlee et al. (1975) report chemical data for such craters.

Padawer et al. (1974) determined the abundances of C and Fl with depth in exterior and interior chips of the anorthosite, but the abundances derived from both are considered to be contamination from Teflon packaging and other sources.

PHYSICAL PROPERTIES: Housley et al. (1976) show a FMR (ferromagnetic resonance) derivative spectrum and a corresponding absorption spectrum for an anorthosite chip. The FMR is very weak.

PROCESSING AND SUBDIVISIONS: Several large chips were taken from the sample and subdivided prior to sawing of the rock in October, 1975. The single saw-cut produced four large pieces— ,0 (694 g); ,64 (53 g); ,80 (251 g); and ,81 (101 g) in addition to many smaller pieces (Fig. 4).

FIGURE 4. Sawn subdivisions of 62255. S-75-33040.