64475 DILITHOLOGIC (ANORTHOSITE AND BASALTIC IMPACT MELT) BRECCIA 1032 g

INTRODUCTION: 64475 consists of a white ferroan anorthosite, parts of which may be chemically pristine, and a dark, fine-grained, basaltic impact melt. In places the two lithologies are banded, in places are distinctly separated, and elsewhere are intimately mixed (Figs. 1 and 2). In the final stages of the formation of the rock, the white phase intruded the dark.

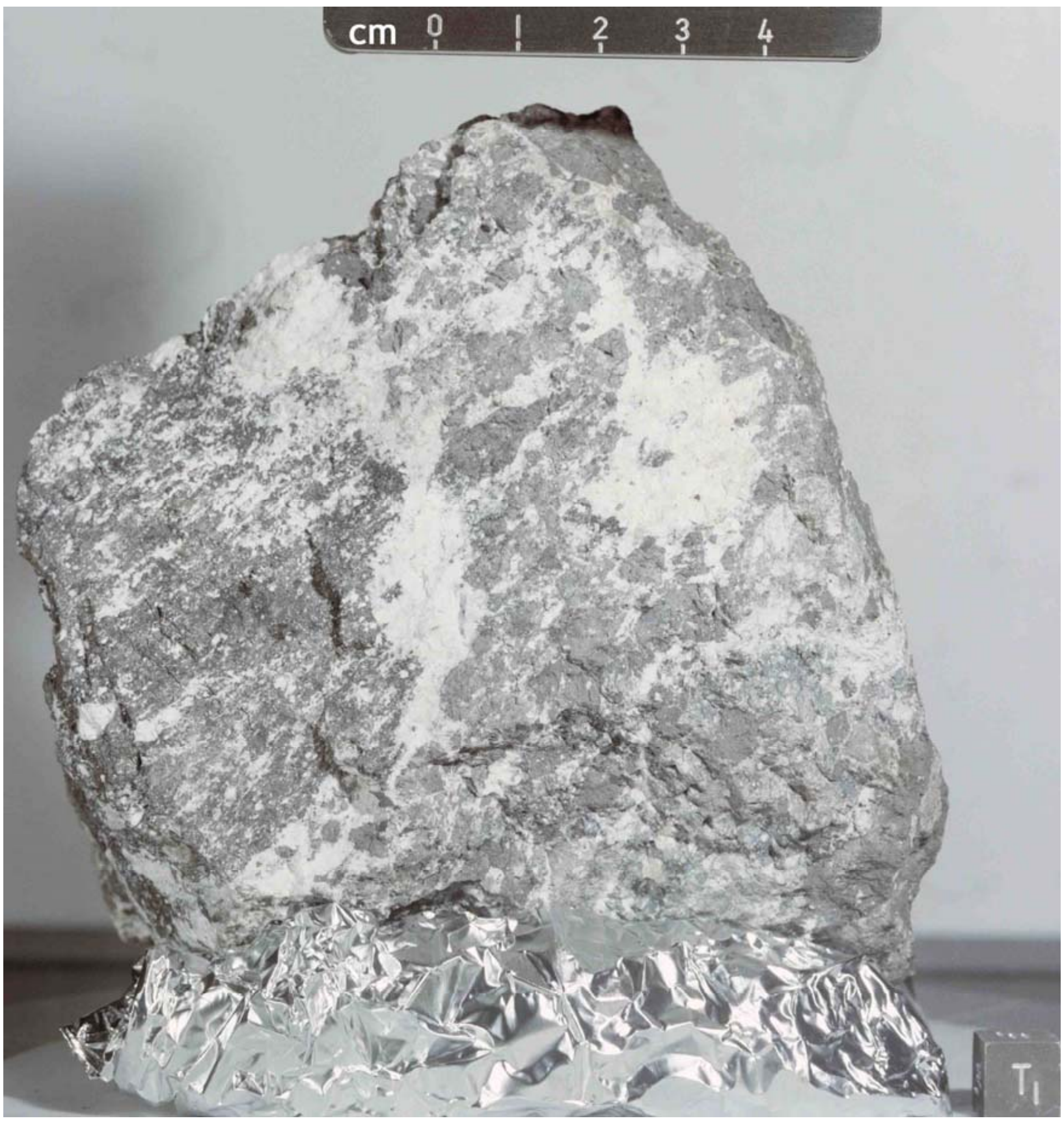

FIGURE 1. S-72-43093.

64475 was collected from the region of two subdued shallow craters on Stone Mountain and its orientation is known. The sample is blocky and coherent with few fractures. Zap pits and patina occur predominantly on the exposed surface with none on the buried side.

FIGURE 2. S-73-27286.

PETROLOGY: All phase compositions reported below are from G.J. Taylor and R.D. Warner (pers. comm.).

The white material is 85-95% plagioclase and cataclastic though some cumulate-like textures are preserved in places (Fig. 3). It appears to be essentially monomict and is non-porous despite brecciation. Microprobe analyses show plagioclase An_{95-96}, exsolved pyroxenes which are mainly low-calcium ($En_{64}Wo_2$; bulk grains ~En_{64},Wo_{4-5}) and minor olivine (Fo_{66-71}). Some pyroxenes are up to 1 mm in diameter, but most are much smaller; plagioclases were originally 3 mm or more in diameter. A few grains of Fe-metal are present, containing Ni ~7%, Co ~0.8% i.e. meteoritic compositions. However, metal is not present in the unbrecciated clasts and probably indicates contamination of parts of the anorthositic material.

The dark phase is fine-grained, mesostasis-rich basaltic impact melt containing plagioclase clasts (Fig. 3). Fe-metal is common and has ~5% Ni, 0.6% Co, typical of contaminated melts. Troilite and schreibersite are also present.

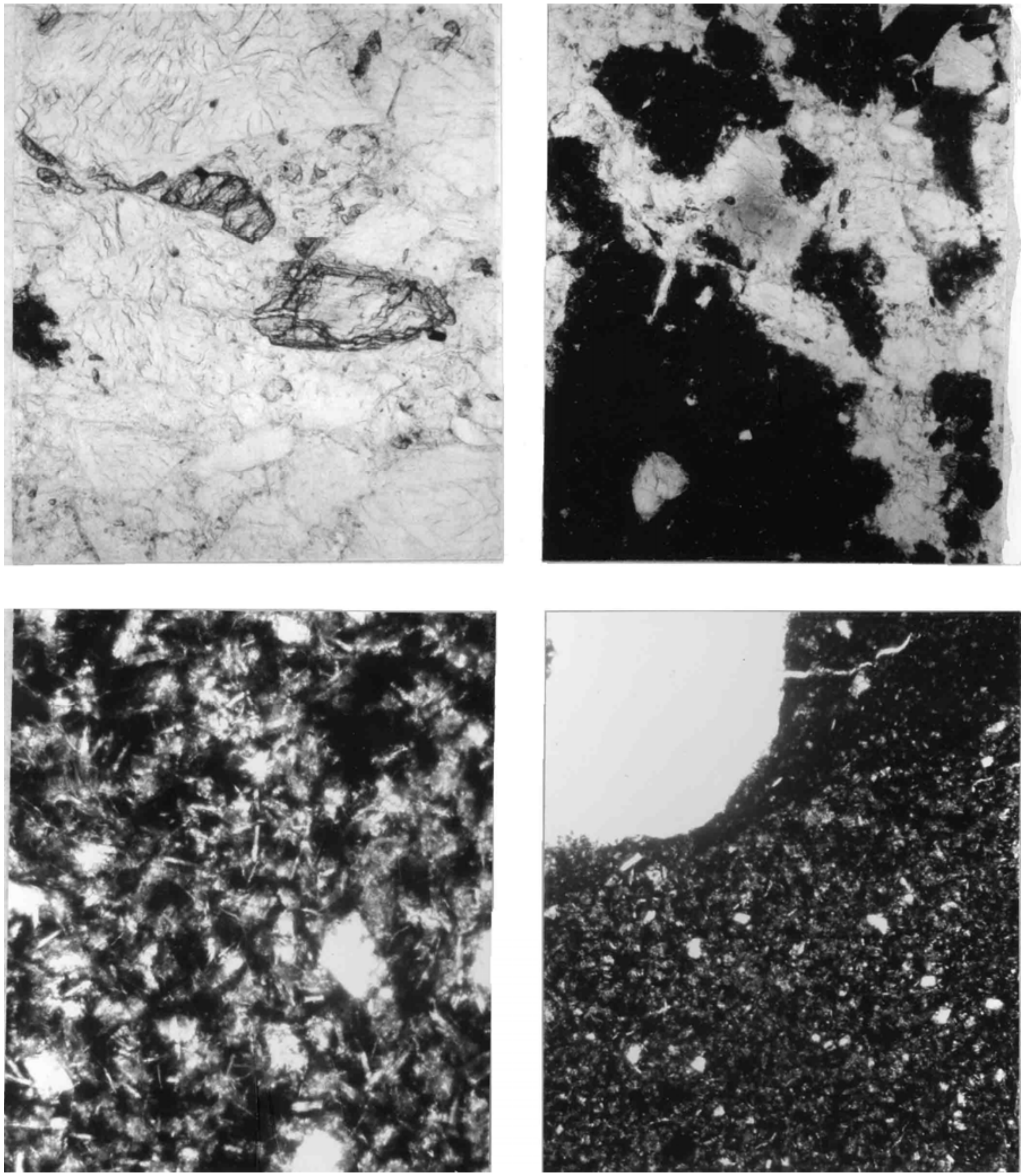

FIGURE 3. a) 64475,62, anorthosite, ppl. Width 1 mm.
b) 64475,62, basalt clasts in anorthosite, ppl. Width 2 mm.
c) 64475,58, basaltic impact melt, ppl. Width 0.5 mm.
d) 64475,58, basalt anorthosite contact, ppl. Width 2 mm.

The relations between the dark and light phases are complex. In most places the black fragments are angular and appear to be clasts carried in the white matrix (Fig. 3). In several places apophyses of white material clearly intrude the dark phases. However, in a few places the white material appears as rounded clasts within the black. The latter also shows textural variations which include margins apparently chilled against white material. As with some of the other “black and white” rocks, it appears that basaltic impact melt intruded the white phase and was later remobilized, with the basalt then acting as competent fragments in a fluidized, though not liquid, white phase.

CHEMISTRY: Mixed black and white chips were analyzed by Scoon (1974) for major elements and by Moore and Lewis (1976) for C and N abundances (Table 1), and reported without discussion.

TABLE 1. Summary chemistry of 64475, mixed black and white

SiO_2	44.8
TiO_2	0.54
Al_2O_3	28.3
Cr_2O_3	0.07
FeO	4.6
MnO	0.06
MgO	5.6
CaO	15.9
Na_2O	0.49
K_2O	0.12
P_2O_5	0.15
C	55
N	92

Oxides in wt%; C, N in ppm

RARE GASES AND EXPOSURE AGES: Bogard and Gibson (1975) report Re, Xe, Ar, and Ne isotopic data for two mixed black and white chips, one of which (,17) was mainly white, the other (,21) mainly dark. The samples contain appreciable amounts of solar wind gases. ^{21}Ne exposure ages of 1.0 m.y. (,17) and 1.3 m.y. (,21) and a ^{38}Ar exposure age of 1.6 m.y. (,17) are subject to ± 50% error but are consistent with South Ray rather than North Ray samples. Kr data (not reported) show dominantly atmospheric Kr.

Lambert et al. (1975) measured ^{210}Po activity on an external surface of a mixed chip (,16) which was in contact with lunar fines, providing information on ^{222}Rn.

PHYSICAL PROPERTIES: Stephenson et al. (1974) report natural remanent magnetization (NRM) intensities for two small blocks of mixed black and white material, summarized in Table 2.

The directions in 11A and 11B were close to those of the original chip. There is no statement in Stephenson et al. (1974) that 11A and 11B were macroscopically dissimilar. ,7 and ,11A were also subjected to alternating field demagnetization and thermal demagnetization, respectively. The NRM may not be thermoremanent in origin and paleointensity determination is unreliable. A paleointensity determination by anhysteretic remanent magnetization (ARM) methods was also unsuccessful.

PROCESSING AND SUBDIVISIONS: 64475 was sawn in 1973 to produce a large end piece (,1), a smaller end piece (,2) and a slab (,3). ,1 (740 g) is intact, while the other two pieces have been subdivided. The main subdivisions of the slab are shown in Figure 4.

TABLE 2. NRM intensities for 64475 chips.

Sample	Intensity (G $cm^3 g^{-1}$)
,7 bulk	73×10^{-6}
,11 bulk	88×10^{-6}
,11A	140×10^{-6}
,11B	59×10^{-6}
,11A + ,11B	91×10^{-6}

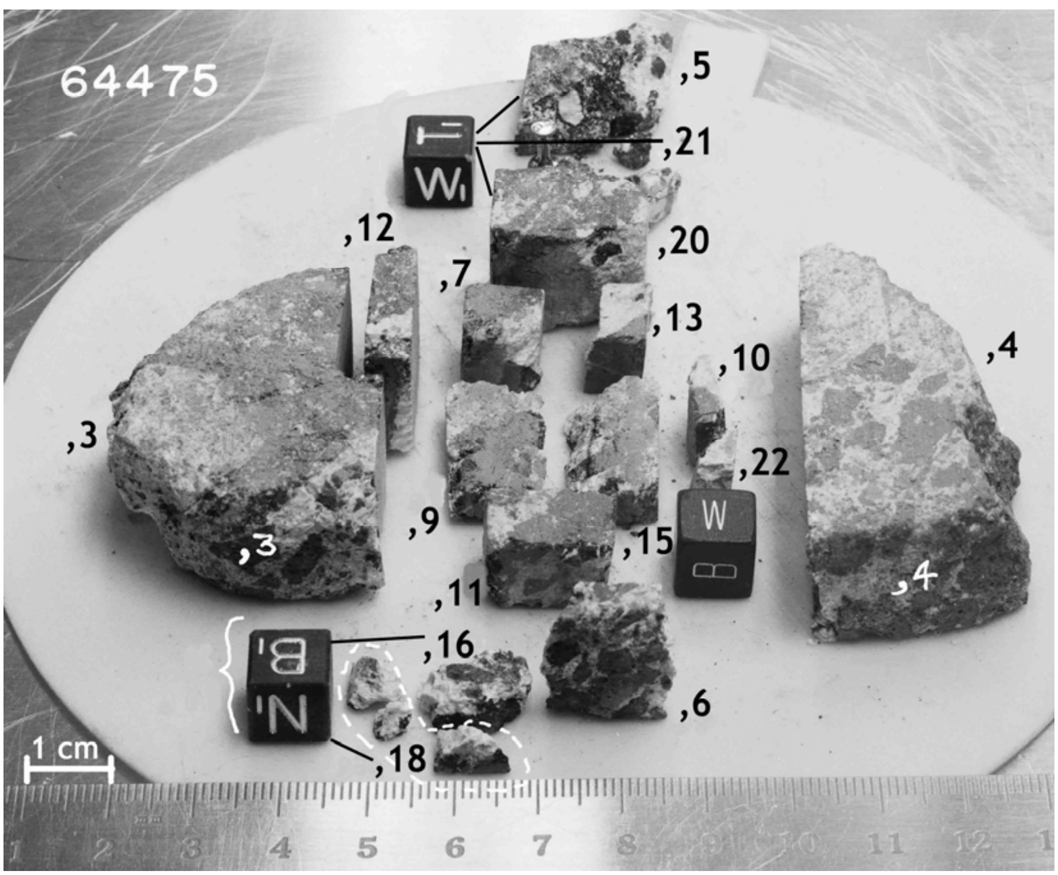

FIGURE 4. Slab subdivisions. S-73-27839.