65315 CATACLASTIC ANORTHOSITE, PRISTINE, PARTIALLY GLASS-COATED 300 g

INTRODUCTION: 65315 is a monomict, cataclastic, ferroan anorthosite that is chemically pristine. Macroscopically it is bluish white in color, and somewhat rounded (Fig. 1). A partial glass coating is in sharp contact with the anorthosite. The coating was once more extensive but was eroded away on the Moon.

This rock was collected on the lower slope of Stone Mountain; lunar orientation is not known. Zap pits are rare on the N surface, absent from other surfaces.

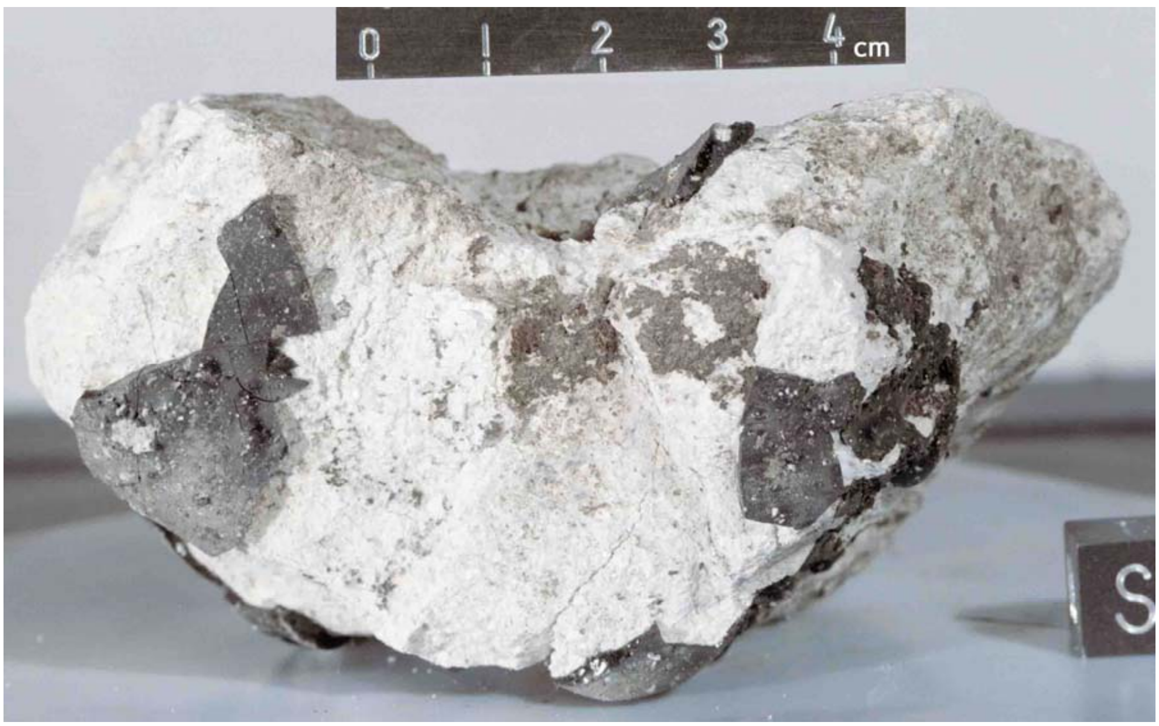

FIGURE 1. S-72-39417.

PETROLOGY: Dixon and Papike (1975) and the Apollo 16 Lunar Sample Information Catalog (1972) provide petrographic information. 65315 is a crushed, ferroan anorthosite with relict plagioclase grains (An_{97}) up to 4 mm long (Fig. 2). Pyroxene is the only mafic silicate present and is concentrated as small, discrete grains interstitial to the larger plagioclases. A few original plagioclase- pyroxene grain boundaries remain. The original pyroxene was apparently a pigeonite which has subsequently exsolved (Fig. 3). All grains exhibit undulose extinction. No shock melting or recrystallization was observed.

Mehta and Goldstein (1980) report the compositions of metal grains from the glass coat (Fig. 4).

Meyer (1979) reports minor elements in plagioclase as determined by ion microprobe (Table 1).

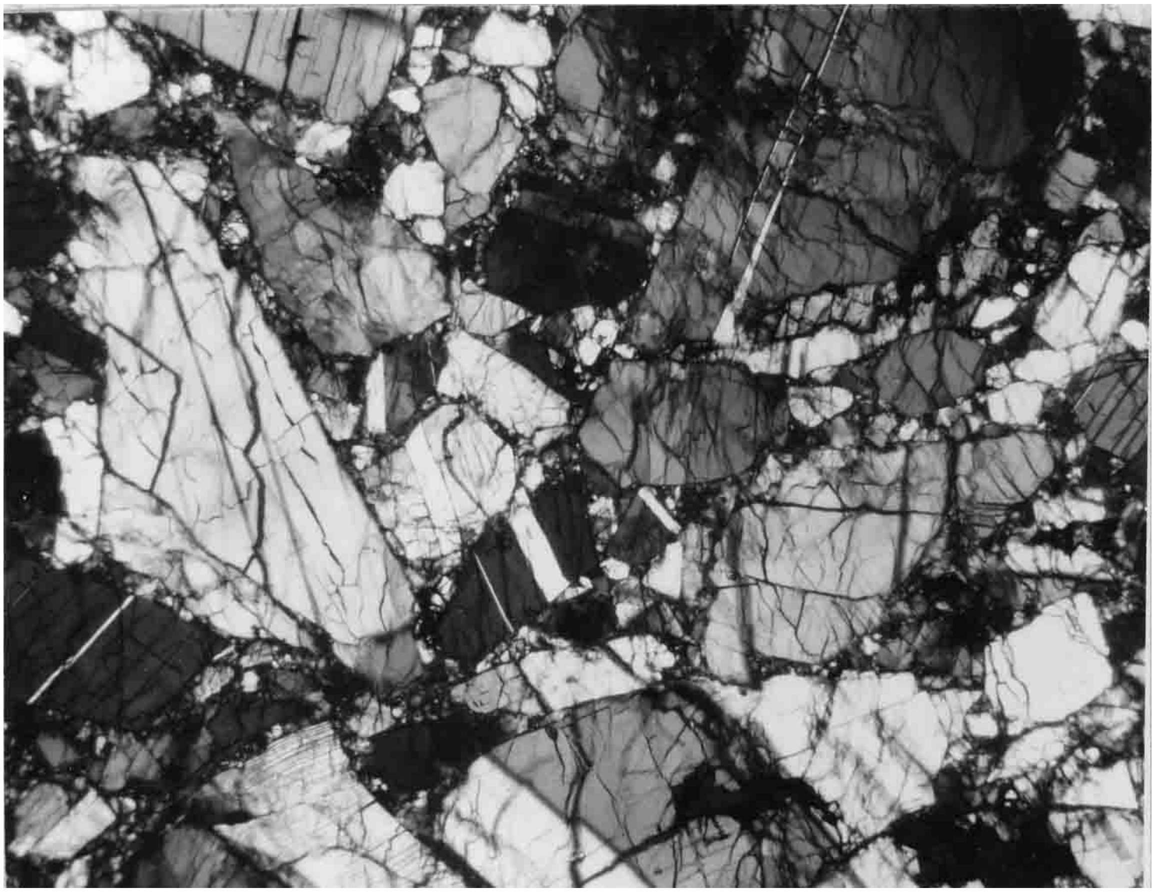

FIGURE 2. 65315,4. General view, xpl. Width 2 mm.

TABLE 1. Minor elements in plagioclase (ppm) (Meyer, 1979).

	Li	Mg	Ti	Sr	Ba
a)	2	600			10
b)	1.8	616	150	208	8

CHEMISTRY: Major, lithophile, siderophile, volatile and other trace element abundances are presented by Wanke et al. (1974). With nearly 35% Al_2O_3 (Table 2), 65315 is virtually pure plagioclase. Rare earth (Fig. 5) and siderophile (Table 2) elements are very low in abundance, indicating that 65315 is chemically pristine. Zn is unusually high at 93 ppm, but other volatiles are not similarly enriched (see data of Wanke et al., 1974).

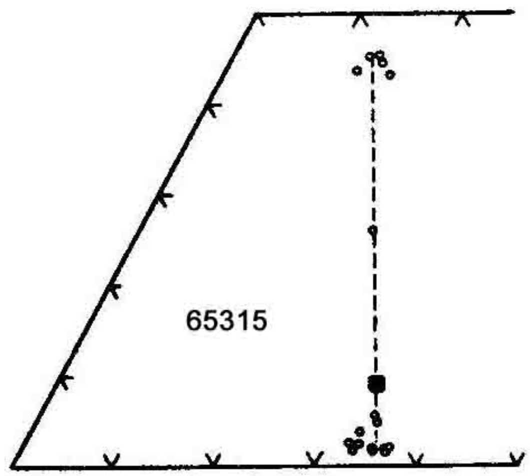

FIGURE 3. Pyroxene compositions;
from Dixon and Papike (1975).

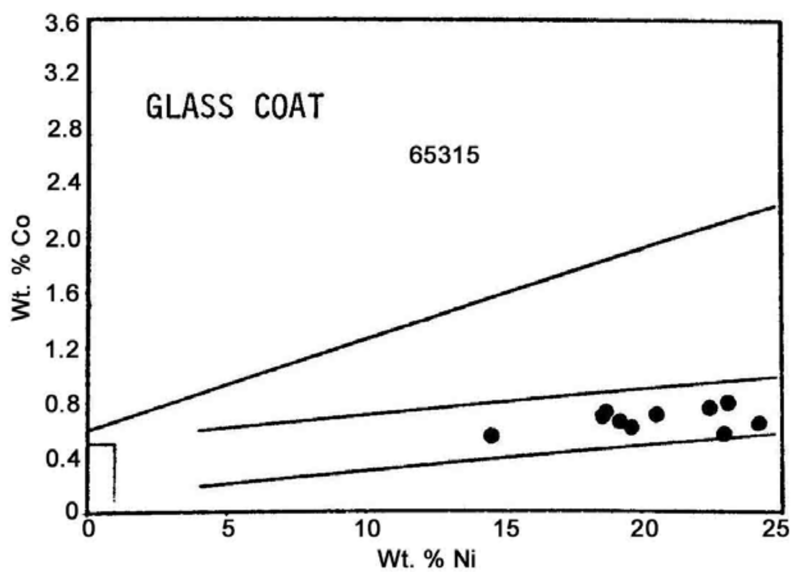

FIGURE 4. Metals; from Mehta and Goldstein (1981).

TABLE 2. Summary chemistry of anorthosite 65315.

SiO_2	44.3	Sr	167
TiO_2	0.012	La	0.12
Al_2O_3	34.87	Lu	0.004
Cr_2O_3	0.003	Rb	0.17
FeO	0.31	Sc	0.39
MnO	0.006	Ni	1.4
MgO	0.25	Co	0.58
CaO	19.07	Ir ppb	
Na_2O	0.304	Au ppb	1.0
K_2O	0.007	C	≤12
P_2O_5	0.001	N	
		S	
		Zn	93
		Cu	2.1

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

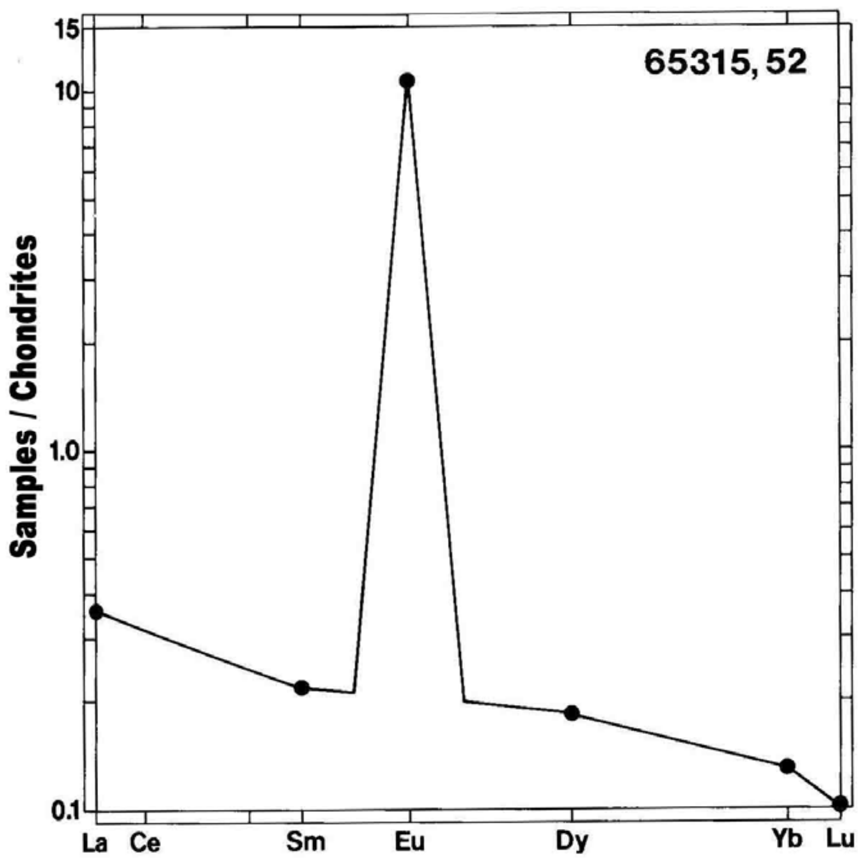

FIGURE 5. Rare earths; from Wanke et al. (1974).

GEOCHRONOLOGY: Stettler et al. (1974) did not obtain a good K-Ar plateau (Fig. 6). The low temperature releases point to a disturbance ~2 b.y. ago, whereas the higher temperature release may indicate a metamorphic event 3 - 4 b.y. ago and the presence of ancient (4.30 ± 0.26 b.y.), incompletely outgassed plagioclase in the rock (Stettler et al., 1974).

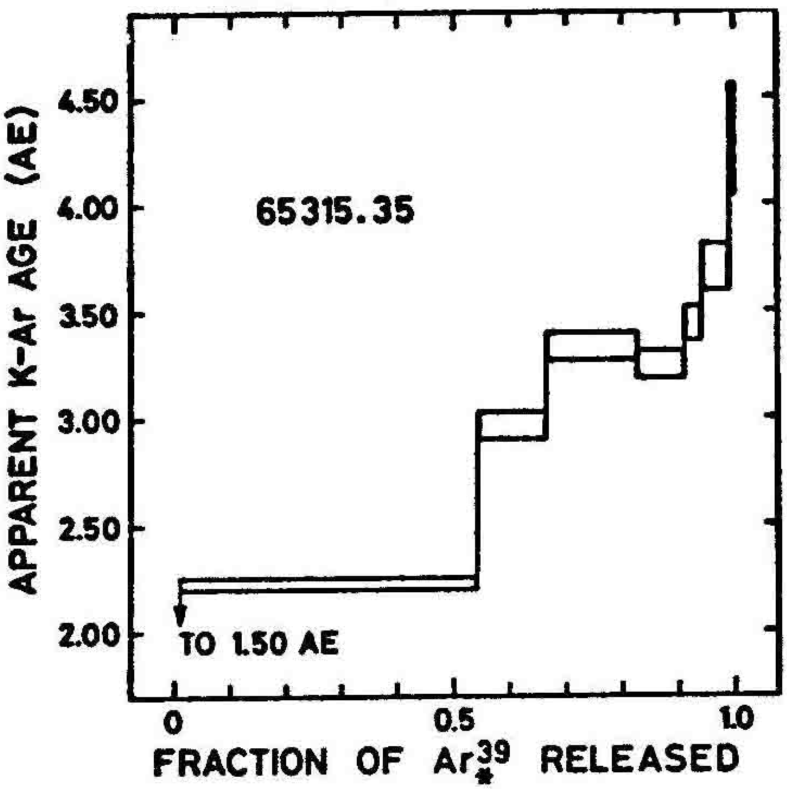

FIGURE 6. Ar release; from Stettler et al.(1974).

RARE GAS/EXPOSURE AGES: Various rare gas exposure ages cluster about 1.5 - 1.8 m.y., consistent with the excavation of 65315 by the South Ray cratering event (Table 3).

Kr and Xe isotopic data are provided by Eberhardt et al. (1975) and Eugster et al. (1975), respectively. The isotopic composition of the > 600°C fraction of Xe is consistent with a mixture of terrestrial atmospheric contamination and spallation Xe.

MICROCRATERS AND SURFACES: Nagel et al. (1976) and Hartung et al. (1978) studied the glass linings of zap pits on 65315. Compositional gradients in some linings indicate a mixture of meteoritic material with melted target (Fig. 7).

TABLE 3. Exposure ages of 65315.

System	Exposure Age (m.y.)	Reference
Ar	1.8	Stettler *et al.* (1974)
$^{38}Ar-^{37}Ar$	1.6	Eberhardt *et al.* (1975)
^{81}Kr - Kr	1.5 ± 0.7	Eberhardt *et al.* (1975)
^{21}Ne	1.5	Gopalan and Rao (1976)
Solar Cosmic Ray	7	Gopalan and Rao (1976)

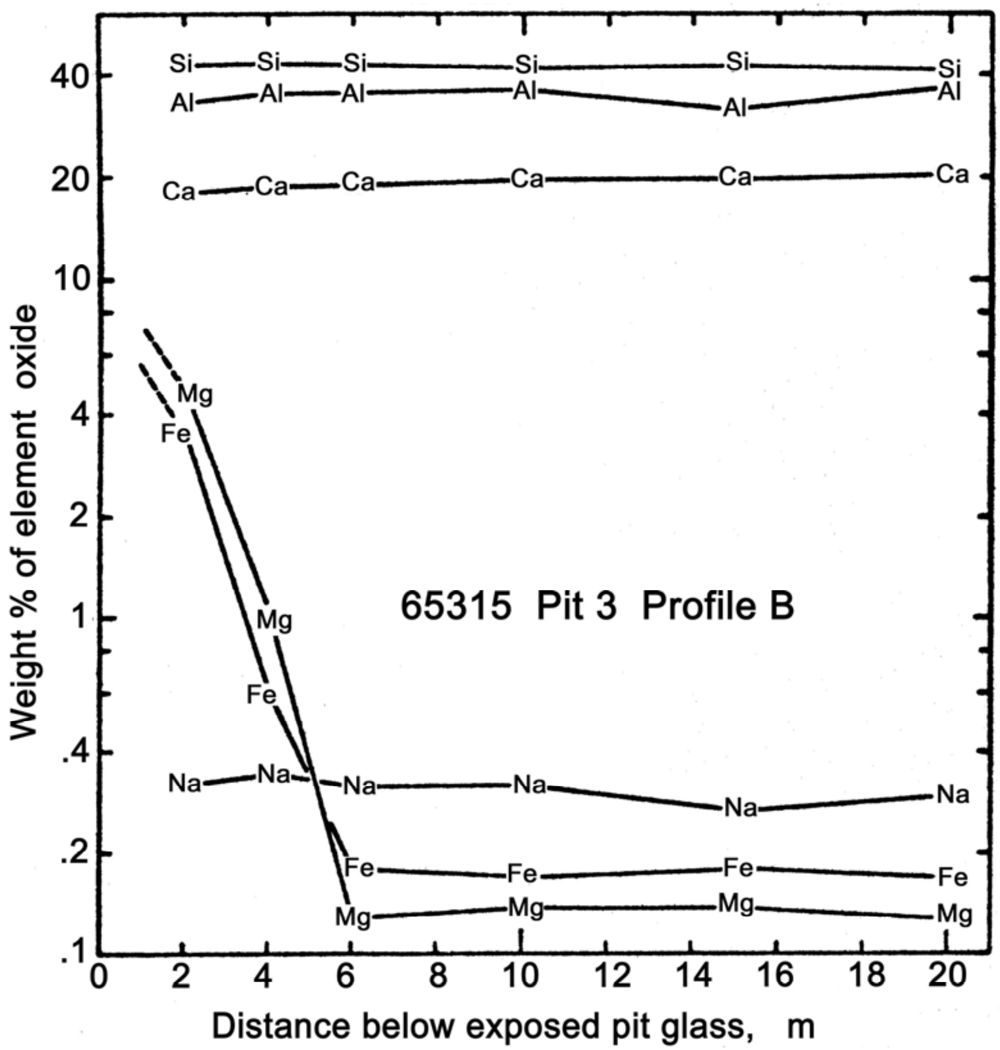

FIGURE 7. Compositional data for impact crater; from Hartung et al. (1978).

Fluorine data on an exterior and an interior surface are provided by Leich et al. (1974). Significant fluorine present on the exterior surface is most likely terrestrial contamination.

Filleux et al. (1977) find no solar wind-implanted carbon on the surface of a fresh interior chip.

PROCESSING AND SUBDIVISIONS: In 1972, several chips of anorthosite and glass were taken from various surfaces for allocation. In 1973, 65315 was slabbed and the slab and the W butt end further subdivided (Fig. 8). The largest single piece remaining is ,46 (167.14 g).

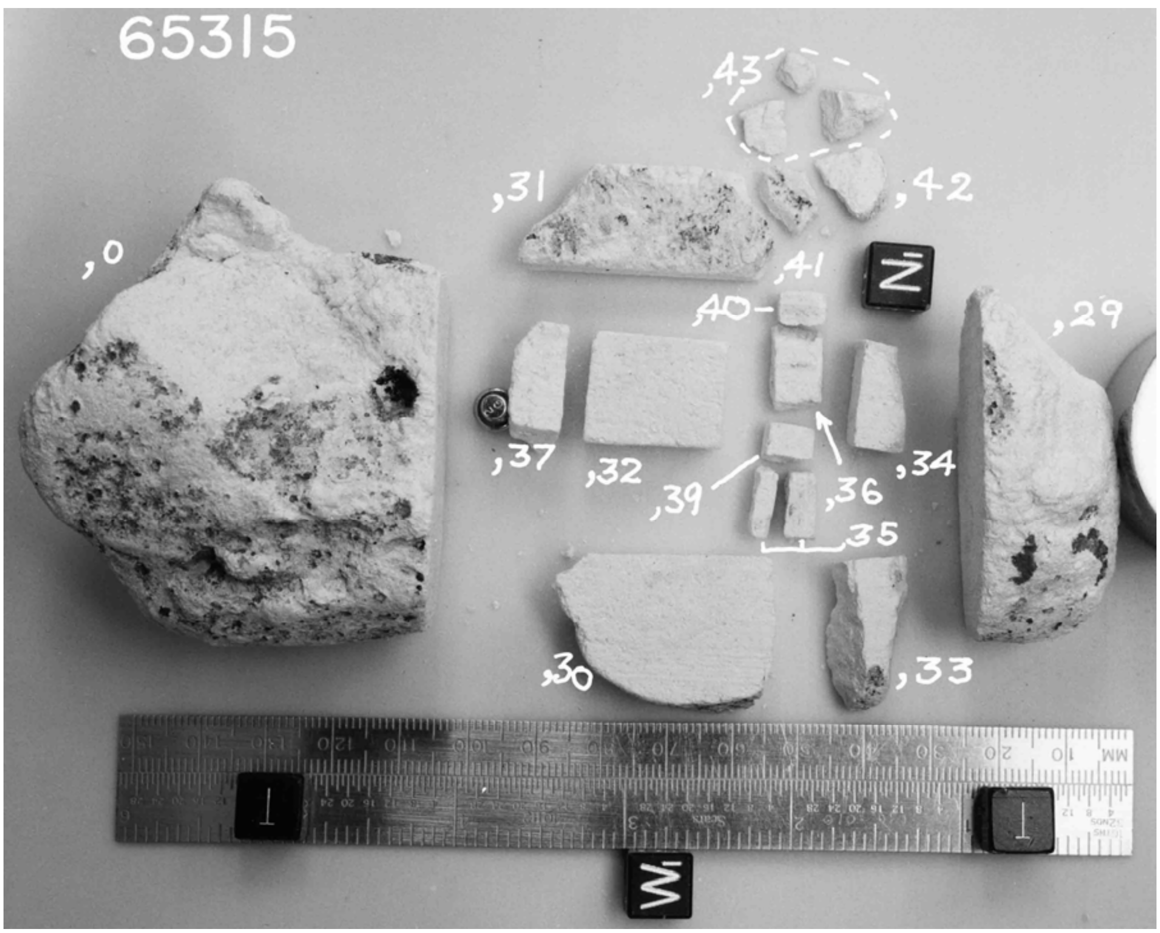

FIGURE 8. Sawing subdivisions. S-73-28308.