

## 14063

Sample 14063 is one of the hand-size grab samples collected during the second EVA at station Cl in the White Rocks area. Its exact lunar location and orientation are unknown and there are no lunar surface photographs in which this sample is identified. It was returned along with 14064 and 14065 in bag 16N in ALSRC 1006.

### PHYSICAL CHARACTERISTICS

Mass	Dimensions
135.55 g	6.0 x 4.0 cm

This sample is shaped like a slightly flattened sphere, broken across one edge. It is a light gray fragmental rock with 20-25% clasts. It is moderately friable.

### SURFACE FEATURES

Pits cover 25% of the surface and are < 0.1 to 2 mm in size. Glass lining the pits is dark brown and bubbly. The matrix is very white feldspar-rich so it is difficult to explain why the zap pit linings are dark.

Cavities present are clast molds ranging in size from 0.2 to 8 mm and occur over 15% of the surface area on one side.

One fracture set with planar and irregular fracture surfaces is present with random orientation.

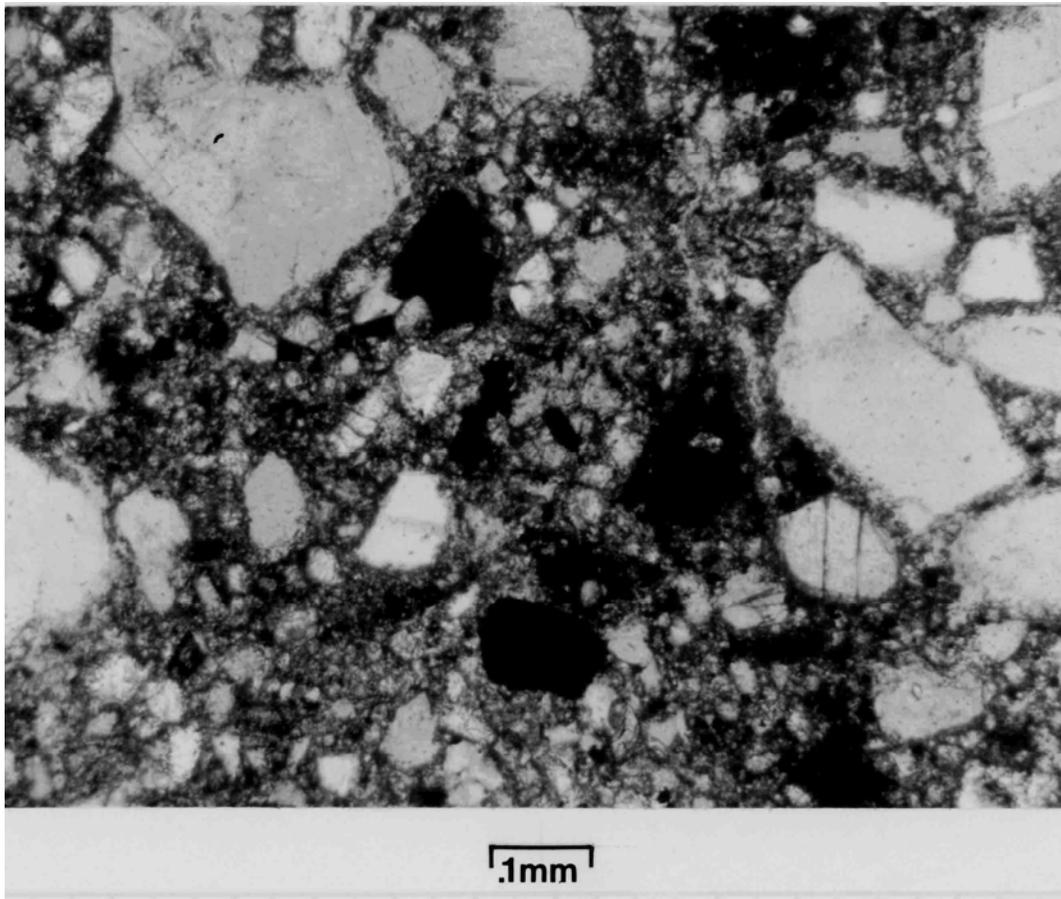
### PETROGRAPHIC DESCRIPTION

Sample 14063 is a fine grained, light gray, inhomogeneous, fragmental rock composed of 20-25% clasts and 75-80% matrix grains. Fifty percent of the fragments greater than 0.1 mm in size are mineral fragments and 50% are lithic fragments. A trace of glass is present.

Thin section 14063,59 shows one large glass clast that is highly fractured and has undergone partial devitrification. Scattered throughout the section are shards of glass, most showing some small degree of devitrification. Occasional, almost totally devitrified masses are seen. The only clasts present are glass-rich breccias with remainder being mineral fragments and one anorthositic-type rock with minor pyroxene. There is approximately 1% "glass" in the matrix. Mineral fragments include transparent to cloudy, anhedral to subhedral plagioclase and pyroxene (to 0.9 mm); opaques such as ilmenite present as clasts and in lithic fragments (to 10  $\mu$ m); iron metal present as clasts and blebs within lithic fragments (< 10  $\mu$ m); and minor troilite; reddish-brown pyroxene (less than 0.1 mm), yellow-green equant crystals of olivine (to 0.2 mm). The lithic fragments seen in thin section consist of shocked crystalline rocks containing small mounts of glass, glass-rich microbreccia, nearly holocrystalline microbreccia, and feldspar granulitic rocks.



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14063,56

## DISCUSSION

Sample 14063 is one of the so-called "White Rocks". It has been described as friable with dark clasts (F<sub>3</sub>) by Wilshire and Jackson (1972), placed Warner's (1972) group 3, Chao et al. (1972) list it as an annealed, or slightly annealed, feldspathic Fra Mauro breccia, and Quaide and Wrigley (1972) formed a new group for it, calling it a "white rock breccia". Von Engelhardt et al. (1972) and Simonds et al. (1977) place it in a category intermediate between their glass-rich and crystalline matrix breccias, calling it glass-poor with a fragmental matrix, and a light matrix breccia (LMB), respectively. It was also studied by Anderson et al. (1972).

Meyer et al. (1974) believe that there may be a KREEP component in 14063.

Ridley (1975) points out that a group of crystalline clasts in sample 14063 are aluminous mare basalts with higher concentrations of TiO<sub>2</sub>, Na<sub>2</sub>O, Mg, Fe, and less FeO than other aluminous mare basalts.

One thin section of 14063 was obtained by the Imbrium Consortium during their preliminary work, and Marvin (1976) describes the white rocks as containing gray to dark gray aphanitic clasts. In section 14063,17, clasts are less common than in 14064, and are described as comprising less than 5% of the section (Ryder and Bower, 1976). Ryder and Bower (1976) studied the series of clasts in the Apollo 14 white rocks (14063, 14064, and 14082/83) which show poikilitic texture and KREEP composition. These are interpreted to form as the result of crystallization of silicate melts rather than from metamorphism of breccias. (Most of their data come from sample 14064, however).

Steele and Smith (1976) found sample 14063,14 to contain at least four distinct lithologies. Contributing mineralogic or rock types were identified as: 1) dunite with minor chromite, very high Mg ilmenite (MgO > 8.2 wt %), and bronzite; 2) spinel troctolite with olivine (Fo<sub>79</sub>) and Mg-Al spinel; 3) high-Ti, mare-like basalt with high-Mg ilmenite and coarse (exsolved?) pyroxene; 4) low-KREEP noritic breccia; 5) anorthosite (?); 6) very Ni-rich (40 wt %) Fe metal. They also identified a mare basalt component as well as other rock types similar to those previously recognized. They believe that the Ni-rich metal possibly formed in equilibrium with olivine early in lunar history. They believe 14063 to be a possible sample of pre-Imbrium regolith bases on the absence of Ti-rich spinel and troilite, the rarity of metal, and the lack of metamorphism sufficient to have devitrified glass or recrystallized dark-matrix clasts.