

73155**Impact Melt Breccia
St. 2A (LRV-4), 79.3 g****INTRODUCTION**

73155 was scooped up on the landslide or avalanche from the South Massif, 600 m NE of Nansen Crater. It lay on the surface, only slightly impressed into the regolith. The sample is rather heterogeneous, with a medium dark gray (N4) color. It consists of about 85% fine-

grained matrix that appears to correspond with fine-grained impact melt in the thin sections, and the remainder mainly lithic clasts. Unpublished analyses show that the melt matrix has a typical Apollo 17 low-K Fra Mauro composition, similar to those poikilitic melt rocks commonly inferred to be the Serenitatis melt.

A prominent clast-type is a crushed igneous gabbro, and coarse granoblastic impactite is also common.

73155 is blocky and subrounded (Fig. 1), and tough; it has a few penetrative fractures. It was described as metaclastic in LSIC 17 (1973). It has many zap pits on several sides and a few on all of the others. It has less than 1% cavities, mostly as irregular slits, with some vugs up to 2 mm across. The clast abundances are difficult to estimate because of the zapping of all the surfaces and indistinct borders of many clasts. One prominent zap pit was targeted for sampling. The matrix was described in LSIC 17 (1973) as very fine-grained, with a salt-and-pepper texture. One large clast (12 x 7 mm) was fine-grained yellowish-gray and equigranular. The lithic clasts appear to be dominantly fine-grained with a variety of colors (mainly varieties of gray) and shapes. Mineral clasts larger than 0.5 mm compose only 2 or 3% of the rock.



a



b

Figure 1: Sample 73155, pre-splitting. Scale bars 1 centimeter. a) S-73-23887B b) S-73-23888B

PETROGRAPHY

The thin sections, made from one chip, indicate that the fine-grained groundmass of 73155 is a clast-rich impact melt (Fig. 2a). The melt fraction has a rather equigranular and regular grain-size (less than 20 microns). It consists of plagioclase, mafic minerals, Ti-oxides, metal, and other minor phases. The melt penetrates and separates some of the larger clasts. The clast population is varied. In the thin sections the dominant clast is an unusual lithology that consists of schlieren made of plagioclase and pyroxene in subequal amounts; clinopyroxene is more common than pigeonite (Ryder 1992b). The clinopyroxene is distinctly riddled with inclusions of sulfide and

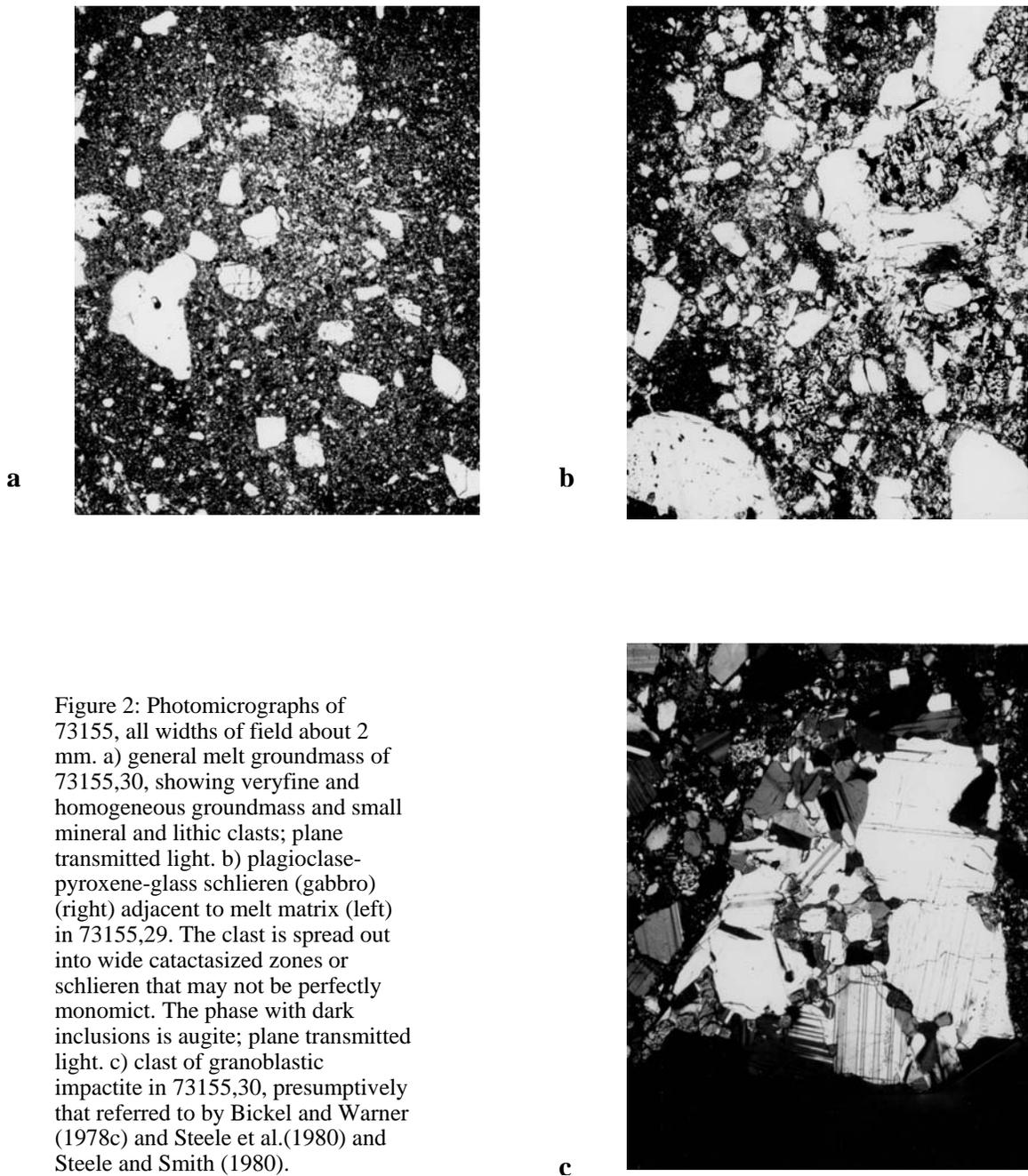


Figure 2: Photomicrographs of 73155, all widths of field about 2 mm. a) general melt groundmass of 73155,30, showing veryfine and homogeneous groundmass and small mineral and lithic clasts; plane transmitted light. b) plagioclase-pyroxene-glass schlieren (gabbro) (right) adjacent to melt matrix (left) in 73155,29. The clast is spread out into wide catactasized zones or schlieren that may not be perfectly monomict. The phase with dark inclusions is augite; plane transmitted light. c) clast of granoblastic impactite in 73155,30, presumptively that referred to by Bickel and Warner (1978c) and Steele et al.(1980) and Steele and Smith (1980).

silicic glass with potash feldspar. The pigeonite contains exsolved lamellae of clinopyroxene. The pyroxenes are fairly evolved and zoned (Fig. 3) with some reaction at their edges. The plagioclase includes sodic compositions (An_{82}) as well as anorthite. Other phases present include ilmenite and silica, and both colorless and brown glass (Fig. 2b). The schlieren is partly mixed with matrix and possibly with granoblastic impactite.

The only other published references to 73155 are to granoblastic impactite; such material does occur in the thin section, and either is part of the lithology with the fayalitic olivine(?) or is intimately mixed with it in the sections. Such granoblastic impactite in thin section 73155,30 was referred to by Bickel and Warner (1978c) (without description) and by Steele and Smith (1980) and Steele et al. (1980). The latter analyzed trace elements in plagioclase with the ion probe; the revised data (in Steele et al., 1980) lists plagioclase with 13 ppm Li, 6.8 mol % Na, 330 ppm Mg, 965 ppm K, 260 ppm Ti, 250 ppm Sr, and 125 ppm Ba. These abundances are generally quite distinct from those of plagioclases in ferroan anorthosites, and similar to those in some other feldspathic impactites. The clast analyzed is presumptively that shown in Fig. 2c.

CHEMISTRY

Major and trace element analyses, as yet unpublished (Ryder), show that the melt groundmass has a composition similar to that of the generally accepted Serenitatis melt sheet such as represented by the Station 6 boulders. Analysis of a small chip of the igneous gabbro shows that it is an evolved gabbro with high K₂₀ (0.87 wt%) but with low abundances of other incompatible elements. The rare earth elements have a fairly flat chondrite-normalized pattern (about 25x chondrites) with a small positive Eu anomaly.

PROCESSING

Processing in 1974 was targeted first to sample a prominent zap pit. Chipping created two pieces, but was stopped because one of the visible fractures started to widen drastically. Chip ,2 (0.30 g) was stored. Chip ,1 (0.67 g) had the zap pit, which was made into potted butts ,26 and ,27. They have apparently not been studied. The remainder was made into 4 serial thin sections, ,28 to ,31, leaving a large potted butt (0.61 g). Some further processing in 1992 produced small chips for chemical and petrographic studies.

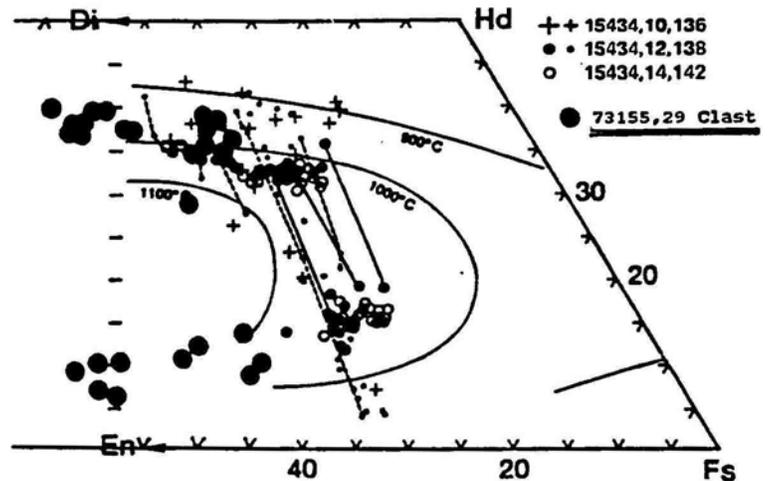


Figure 3: Compositions of pyroxenes in gabbro schlieren in 73155,29, with pyroxenes from evolved Apollo 15 rocks for comparison. (Ryder, 1992b).