60255 REGOLITH BRECCIA 871 g

INTRODUCTION: 60255 is a tough, dark, glassy matrix breccia with abundant and varied clasts. A lineation of the clasts is apparent on sawn surfaces (Fig. 1). In many respects 60255 is very similar to local soils but with a fairly large and stable magnetic component. Splash glass coats part of the N and E surfaces.

This rock was probably collected 30-40 m southwest of the Lunar Module and was partially buried at the time of collection. The lunar orientation is known. Zap pits are rare to absent on all surfaces.


FIGURE 1. Saw cut face. S-79-34528.

PETROLOGY: Petrographic descriptions are given by Schaeffer and Hollister (1975), James et al. (1975), Schaeffer (1974) and the Apollo 16 Lunar Sample Information Catalog (1972). Many different lithic, mineral and glass clasts are welded together by a cryptocrystalline to glassy matrix. All of the clasts show minute fractures and internal deformation indicative of mild shock.

Granoblastic and basaltic textured fragments are the most abundant of the lithic clasts (Fig. 2). One of the basaltic textured impact melt clasts has homogeneous olivine ($Fo_{74}$), two zoned pyroxenes (augite and pigeonite)and plagioclase which is largely homogeneous ($An_{69}$) but with marked zoning (down to $An_{69}$) near contacts with mesostasis (Schaeffer and Hollister,1975; Schaeffer, 1974).

A coarse-grained "gabbroic textured" clast (Fig. 2) with ~90,% plagioclase and 10% poikilitic and exsolved pyroxene and olivine is sampled by several serial thin sections (,71-,76 and ,77-,82). The pyroxenes in this clast are ~$Wo_{3-8}En_{70-65}$ and $Wo_{30-35}En_{50-45}$, olivine is $Fo_{74}$ and plagioclase is $An_{92-95}$ (Schaeffer and Hollister, 1975; Schaeffer, 1974; Steele, unpublished). Fe-metal, troilite and ilmenite are accessory phases; mesostasis is absent.

Rare olivine vitrophyres are present in some sections (Fig. 2). No analyses are yet available. Clear, orange, yellow and brown glass beads and fragments are scattered throughout the rock. Some are partially crystalline. The presence of clean glass precludes any significant thermal event after the formation of this rock.

CHEMISTRY: Scoon (1974) reports major element data, Boynton et al. (1975) determined major and lithophile elements, Wasson et al. (1975) provide siderophile and volatile element analyses, and Clark and Keith (1973) give K, U, Th and cosmic-ray induced nuclides determined by gamma-ray spectroscopy.

All of these data indicate that 60255 is compositionally indistinguishable from the local mature soils. Major elements indicate an anorthositic norite composition (Table 1) and REEs in the rock fall within the range of the REEs in the local mature soils (Fig. 3). 60255 is also enriched in siderophiles and volatiles with absolute abundances and inter-element ratios equivalent to those of the local soils.

RARE GAS/EXPOSURE AGE: Clark and Keith (1973) provide data on cosmic-ray induced nuclides as determined by gamma-ray spectroscopy. Yokoyama et al.(1974) discuss $^{22}Na$-$^{26}Al$ chronology and conclude that 60255 is saturated $^{26}Al$. Bernatowicz et al. (1978) report Xe and Kr isotopic data. 60255 is rich in trapped solar wind and a cosmogenic component but may or may not contain excess fission Xe.

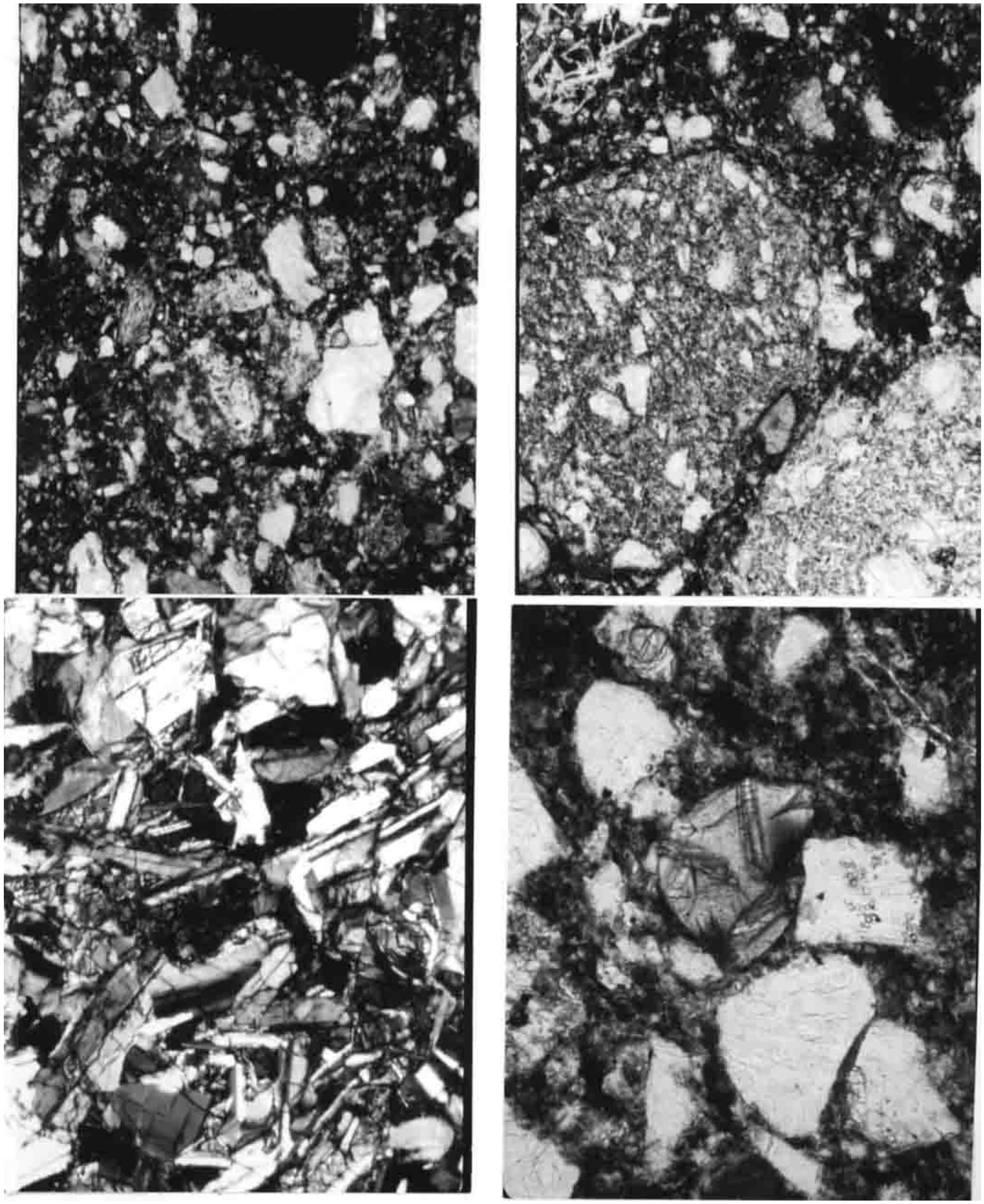

FIGURE 2.
a) 60255,81. General view, ppl. Width 2 mm.
b) 60255,81. Clasts, ppl. Width 2 mm.
c) 60255,81. Basaltic melt clast, xpl. Width 2 mm
d) 60255,75. Vitrophyre (center),. ppl. Width 0.5 mm.

TABLE 1. Summary chemistry of 60255.

| | | | |
|---|---|---|---|
| $SiO_2$ | 45.2 | Sr | |
| $TiO_2$ | 0.69 | La | 12.6 |
| $Al_2O_3$ | 26.1 | Lu | 0.70 |
| $Cr_2O_3$ | 0.11 | Rb | |
| FeO | 6.0 | Sc | 10.7 |
| MnO | 0.07 | Ni | 391 |
| MgO | 6.4 | Co | 35 |
| CaO | 16.3 | Ir ppb | 12.2 |
| $Na_2O$ | 0.49 | Au ppb | 5.6 |
| $K_2O$ | 0.13 | C | |
| $P_2O_5$ | 0.12 | N | |
| | | S | |
| | | Zn | 21.0 |
| | | Cu | |

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

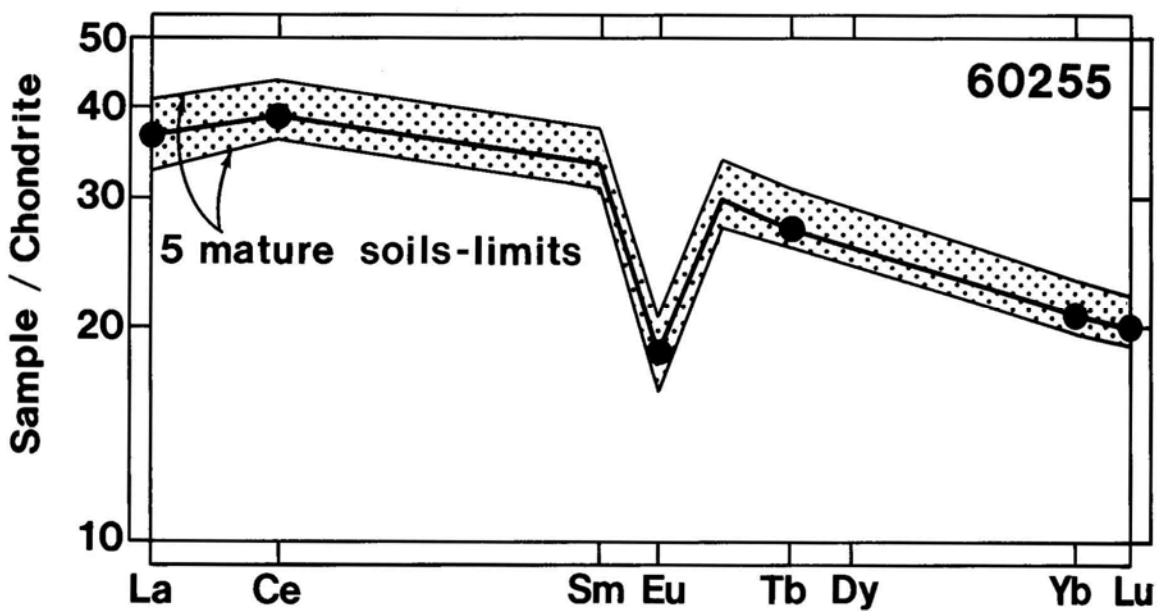


FIGURE 3. Rare earths; from Boynton et al. (1975).

<u>MICROCRATERS AND TRACKS</u>: MacDougall et al. (1973) observe solar flare tracks only in plagioclase grains and infer that the rock experienced a thermal event which erased the tracks from some but not all components. Estimated annealing temperature was 700-800°C. Uranium is concentrated in fine-grained areas but is heterogeneously distributed throughout the rock (MacDougall et al., 1973).

PHYSICAL PROPERTIES: Magnetic characteristics of 60255 were studied by Nagata et al. (1973) and Pearce et al. (1973) using standard alternating field (AF) and thermal demagnetization techniques. A fairly large component of NRM (11 x $10^{-6}$ emu/g) is present that is quite stable with respect to intensity and direction of AF-demagnetization between 100-400 Oe.rms (Fig. 4). This component is considered by Nagata et al.(1973) to be a genuine natural remanent magnetization acquired on the lunar surface.

Ferromagnetic metal accounts for 0.47 wt% of the rock and occurs as about equal amounts of pure iron and kamacite with ~ 6 wt% Ni (Nagata et al.,1973). Fine-grained metal (30-150 Å) in 60255 averages 41 Å as determined by magnetic granulometry (Schwerer and Nagata, 1976). Mossbauer-determined distributions of iron among the various mineral phases are reported by Schwerer et al. (1973) and Huffman et al. (1974).

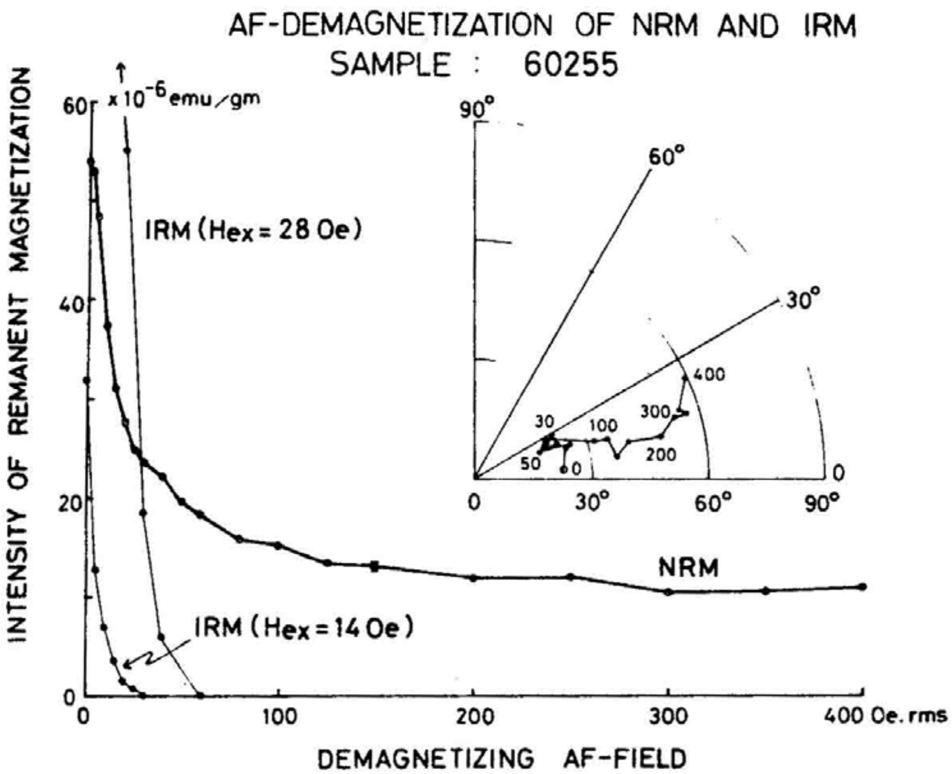


FIGURE 4. AF-demagnetization; from Nagata et al. (1973).

PROCESSING AND SUBDIVISIONS: In 1972, 60255 was slabbed and the slab subdivided (Fig. 5). Allocations were made from the slab and from other chips. Thin sections from ,23 and ,30 (adjacent pieces from the slab) contain the basaltic and "gabbroic" clasts described in PETROLOGY. The largest single piece of 60255 remaining is ,45 (672.9 g).

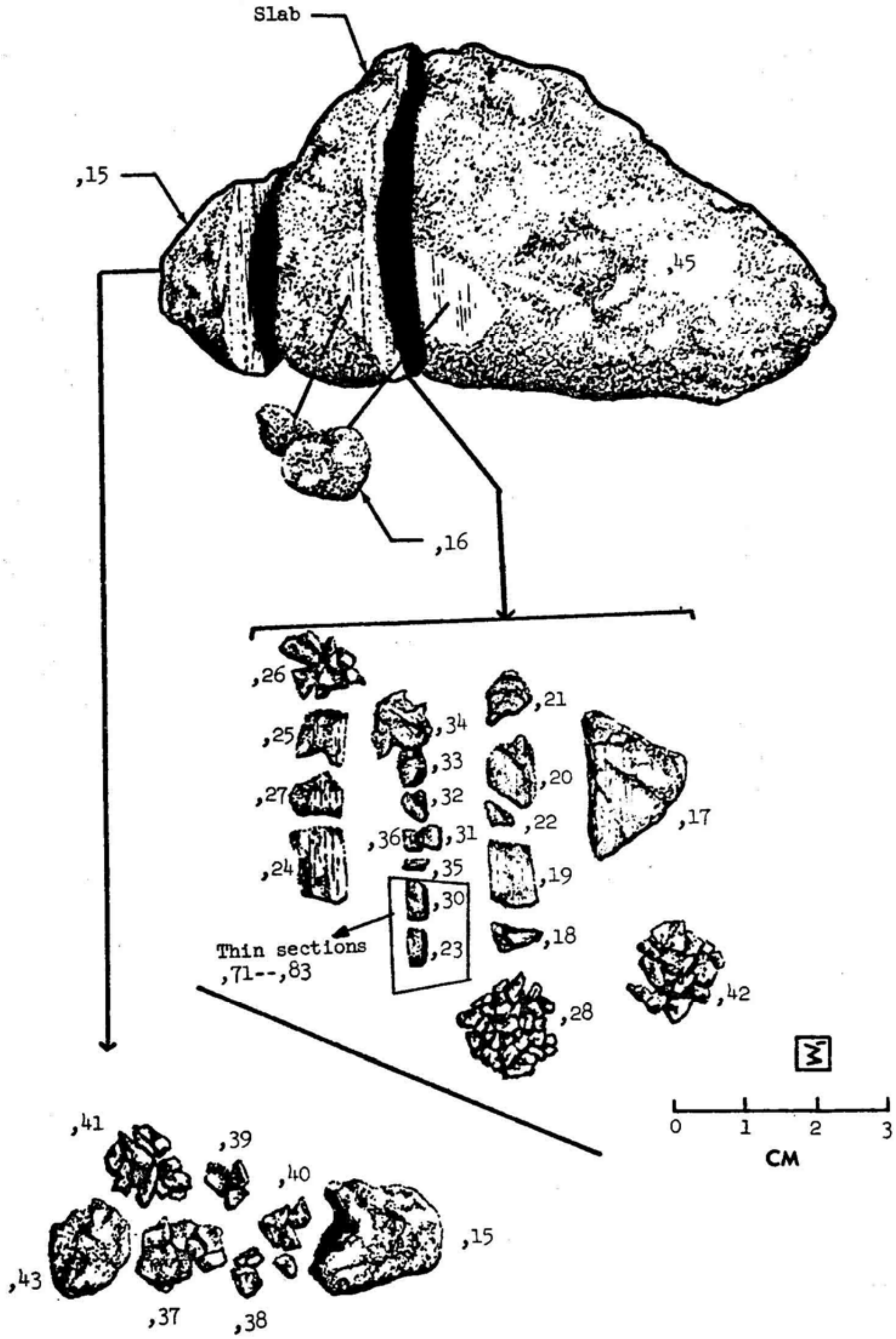


FIGURE 5. Cutting diagram.