### 14055

Regolith Breccia

111 grams

*Figure 1: Photos of 14055, showing two sides. Sample is about 4 cm round. NASA S71-29572 and 29565.*

*Figure 2: Map of Apollo 14 showing location of 14055.*

*Figure 3: 14055 is not a Fra Mauro breccia, but rather a vitric matrix breccia made from the A14 soil.*

#### Transcript from station E

LMP  This is a big crater. It’s 40, 50 meters across. It has a fairly sharp crater in the south edge of it, which is –

CC  Okay, that looks like it may be the one by E.

LMP  - 20, 30 feet across. Yes, I think that’s it Fredo. And it’s – no, it’s at least 50 or 60 feet deep.

CDR  Why don’t we just grab a couple from right here.

LMP  Yes, Okay.

CDR  That baby came apart. Very soft.

LMP  Yes, it’s falling apart as you pick it up, very crumbly, isn’t it?

CDR  Very, ver soft rock – rim of that crater, plus another one very close to us with crystals in it, now, going into bag

LMP  15-N.

#### Introduction

From the transcript, it is clear that the astronauts put two friable samples in bag 15N, but when it was opened in the LRL there were seven fragments with a lot of "residue". 14055 and 14058 are more coherent than the other fragments (figure 1). They are also blocky, subangular to subrounded rocks lightly covered with glass-lined zap pits. The samples are friable, fine-grained clastic rocks with 5 to 15 % of subrounded light-colored clasts in a medium-gray matrix.
14055 originally had a thin layer of brown glass on one side, which has since mostly rubbed off.

Simon et al. (1989) and Drozd et al. (1976) reported a high percentage of agglutinates in 14055, while Simonds et al. (1977) found a lot of fine-grained matrix material (figure 3). The sample Drozd et al. studied may have included the glass splash on the outer surface.

Unusual fragments of ropy glass are seen in thin sections (figures 5 and 8).

**Chemistry**
The chemical composition of 14055 is remarkably similar to that of the Apollo 14 regolith (as measured on 14163) – see table.

**Other Studies**
Drozd et al. (1975) determined Kr and Xe concentration and isotopic ratios. Hart et al. (1972) studied the solar flare tracks. Horz et al. (1972) studied the micrometeorite craters.
Processing
14055 was returned in ALSRC 1006, which was sealed. It was originally designated as a “posterity” sample – to be studied later.

There were no surface photos taken at station E. Twedell et al. (1978) made maps of the surface of 14055 (figure 9). There are 14 thin sections.
**Table 1. Chemical composition of 14055.**

| Element | Reference | Weight  | SiO$_2$ % | TiO$_2$ | Al$_2$O$_3$ | FeO | MnO | MgO | CaO | Na$_2$O | K$_2$O | Sc ppm | V | Cr | Co | Ni | Cu | Zn | Ga | Ge ppb | As | Se | Rb | Sr | Y | Zr | Nb | Mo | Ru | Rh | Pd ppb | Ag ppb | Cd ppb | In ppb | Sn ppb | Sb ppb | Te ppb | Cs ppm | Ba | La | Ce | Pr | Nd | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu | Hf | Ta | W ppb | Re ppb | Os ppb | Ir ppb | Pt ppb | Au ppb | Th ppm | U ppm |
|---------|-----------|---------|-----------|---------|------------|------|------|------|------|------|------|------|------|----|----|----|----|----|----|----|-------|----|----|----|----|----|----|----|----|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|
|         | Simon89   | 154 mg  | 47.3      | 1.6    | 17.8       | 10.5 | 0.135 | 9.6  | 11.4 | 0.7  | 0.55 | 21.7 | 45  | 1368 | 33  | 350 | 390 | 30  | 21.8 | 47 | 1280 | 32 | 32  | 19  | 120 | 730 | 19  | 31  | 2.7 | 46  | 6  | 36  | 0.63 | 22.1 | 2.9 | 20.6 | 3  | 3.1 | 12  | 6.2 | 5  | 2.4 | 3.2 | 21.2 | 3 | 20.6 | 3 | 3.5 | |
|         | Lau80     |         |           |        |            |      |        |      |      |      |      |      |     |     |     |    |     |     |     |      |   |      |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

**References for 14055**


Twedell D., Feight S., Carlson I. and Meyer C. (1978) *Lithologic maps of selected Apollo 14 breccia samples*. Curators Office. JSC 13842


