

**61281**  
Soil  
258 grams

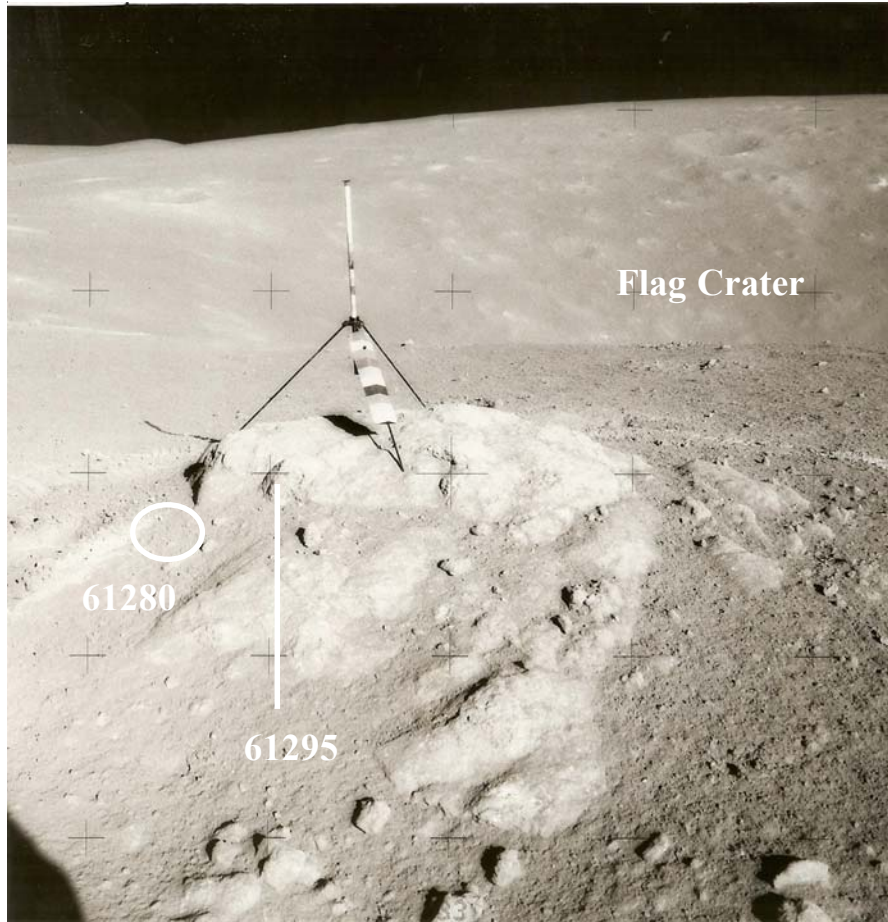


Figure 1: Location of 61281 on rim of Flag Crater AS16-109-17802.

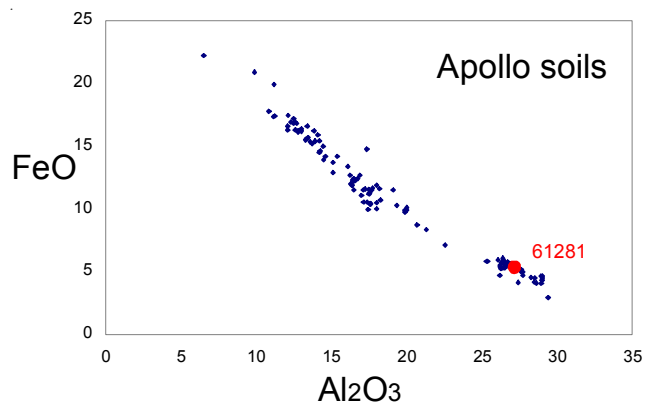


Figure 2: Chemical composition of 61281 compared with other Apollo soil samples.

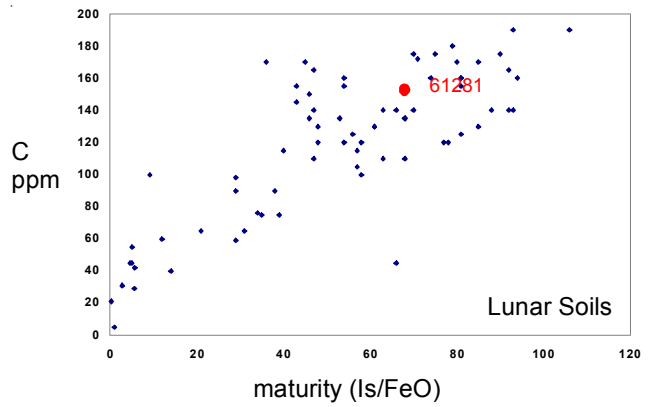


Figure 3: Carbon content and maturity of 61281 (Morris et al. and Moore et al. ).

## Introduction

Soil sample 61281 is closely related to 61295. It is a “fillet” sample next to the boulder on the rim of Flag Crater (figure 1).

## Petrography

The maturity index,  $I_s/FeO$ , for 61281 is 69 (Morris 1978). A mineralogic mode for 61281 has not been reported, but there is every expectation that it is similar to that of other Apollo 16 soils. Housley et al. (1973) found the grain size distribution to be similar to other soils.

Marvin (1972) described the 4 – 10 mm size particles from 61281.

## Chemistry

Rose et al. (1973) and Boynton et al. (1975) determined the chemical composition of 61281 (table 1, figures 2 and 4). This is also similar to other Apollo 16 soils.

Moore et al. (1973) determined 150 ppm carbon for 61281 (figure 3). Kerridge et al. (1975) and Moore and Lewis (1975) reported 71 ppm and 137 ppm nitrogen in 61281.

## Radiogenic age dating

Eldridge et al. (1973) determined the cosmic-ray-induced activity of 61281 as  $^{22}Na = 52$  dpm/kg, and  $^{26}Al = 192$  dpm/kg.

## Other Studies

Housley et al. (1973) studied the magnetic fraction and reported rust on metallic iron grains.

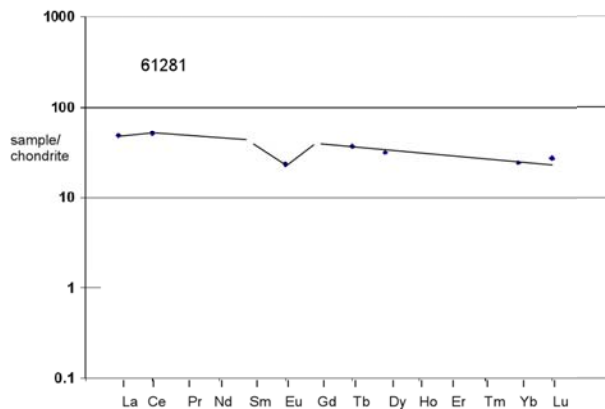


Figure 4: Normalized rare-earth-element diagram for 61281.

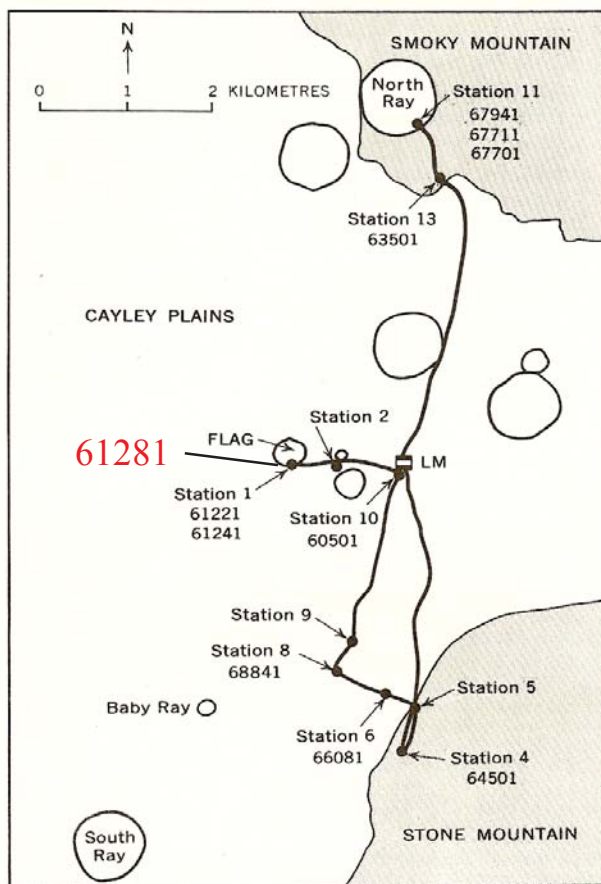


Figure 5: map of Apollo 16 showing location of Flag Crater.

**Table 1. Chemical composition of 61281.**

| reference weight | Rose73    | Boynton75 | Eldridge73 | ave. st. 1<br>Korotev81 |
|------------------|-----------|-----------|------------|-------------------------|
| SiO2 %           | 44.65 (a) |           |            | 45                      |
| TiO2             | 0.54 (a)  |           |            | 0.58                    |
| Al2O3            | 27.12 (a) |           |            | 26.6                    |
| FeO              | 5.07 (a)  | 5.4 (b)   |            | 5.4                     |
| MnO              | 0.06 (a)  | 0.075 (b) |            | 0.07                    |
| MgO              | 5.9 (a)   |           |            | 6                       |
| CaO              | 16 (a)    | 16.2 (b)  |            | 15.6                    |
| Na2O             | 0.45 (a)  | 0.54 (b)  |            | 0.495                   |
| K2O              | 0.13 (a)  |           | 0.112 (c)  | 0.112                   |
| P2O5             | 0.06 (a)  |           |            |                         |
| S %              |           |           |            |                         |
| sum              |           |           |            |                         |
| Sc ppm           | 11.5 (a)  | 9.3 (b)   |            | 9.2                     |
| V                | 27 (a)    |           |            | 20                      |
| Cr               | 684 (a)   | 690 (b)   |            | 720                     |
| Co               | 26 (a)    | 29 (b)    |            | 25.5                    |
| Ni               | 440 (a)   |           |            | 340                     |
| Cu               | 8.7 (a)   |           |            |                         |
| Zn               | 32 (a)    |           |            |                         |
| Ga               | 3.1 (a)   |           |            |                         |
| Ge ppb           |           |           |            |                         |
| As               |           |           |            |                         |
| Se               |           |           |            |                         |
| Rb               |           |           |            | 2.75                    |
| Sr               | 135 (a)   |           |            | 160                     |
| Y                | 3.3 (a)   |           |            | 38                      |
| Zr               | 167 (a)   |           |            | 161                     |
| Nb               | <10 (a)   |           |            |                         |
| Mo               |           |           |            |                         |
| Ru               |           |           |            |                         |
| Rh               |           |           |            |                         |
| Pd ppb           |           |           |            |                         |
| Ag ppb           |           |           |            |                         |
| Cd ppb           |           |           |            |                         |
| In ppb           |           |           |            |                         |
| Sn ppb           |           |           |            |                         |
| Sb ppb           |           |           |            |                         |
| Te ppb           |           |           |            |                         |
| Cs ppm           |           |           |            |                         |
| Ba               | 115 (a)   | 110 (b)   |            | 123                     |
| La               |           | 11.3 (b)  |            | 12.1                    |
| Ce               |           | 31 (b)    |            | 32                      |
| Pr               |           |           |            |                         |
| Nd               |           |           |            |                         |
| Sm               |           |           |            | 5.6                     |
| Eu               |           | 1.3 (b)   |            | 1.19                    |
| Gd               |           |           |            |                         |
| Tb               |           | 1.3 (b)   |            | 1.15                    |
| Dy               |           | 7.6 (b)   |            |                         |
| Ho               |           |           |            |                         |
| Er               |           |           |            |                         |
| Tm               |           |           |            |                         |
| Yb               |           | 3.9 (b)   |            | 4                       |
| Lu               |           | 0.67 (b)  |            | 0.58                    |
| Hf               |           | 4.2 (b)   |            | 4                       |
| Ta               |           | 0.57 (b)  |            | 0.49                    |
| W ppb            |           |           |            |                         |
| Re ppb           |           |           |            |                         |
| Os ppb           |           |           |            |                         |
| Ir ppb           |           |           |            |                         |
| Pt ppb           |           |           |            |                         |
| Au ppb           |           |           |            |                         |
| Th ppm           |           | 2 (b)     | 1.85 (c)   | 1.8                     |
| U ppm            |           |           | 0.52 (c)   | 0.54                    |

technique: (a) 'microchemical', (b) INAA, (c) radiation count.

## References for 61281.

Boynton W.V., Baedeker P.A., Chou C.-L., Robinson K.L. and Wasson J.T. (1975a) Mixing and transport of lunar surface materials: Evidence obtained by the determination of lithophile, siderophile, and volatile elements. *Proc. 6<sup>th</sup> Lunar Sci. Conf.* 2241-2259.

Butler P. (1972) Lunar Sample Information Catalog Apollo 16. Lunar Receiving Laboratory. MSC 03210 Curator's Catalog. pp. 370.

Eldridge J.S., O'Kelley G.D. and Northcutt K.J. (1973) Radionuclide concentrations in Apollo 16 lunar samples determined by nondestructive gamma-ray spectrometry. *Proc. 4<sup>th</sup> Lunar Sci. Conf.* 2115-2122.

Housley R.M., Cirlin E.H. and Grant R.W. (1973) Characterization of fines from the Apollo 16 site. *Proc. 4<sup>th</sup> Lunar Sci. Conf.* 2729-2735.

LSPET (1973) The Apollo 16 lunar samples: Petrographic and chemical description. *Science* 179, 23-34.

LSPET (1972) Preliminary examination of lunar samples. Apollo 16 Preliminary Science Report. NASA SP-315, 7-1—7-58.

Marvin U.B. (1972) Apollo 16 coarse fines (4-10 mm): Sample classification, description and inventory. JSC Catalog.

Moore C.B., Lewis C.F. and Gibson E.K. (1973) Total carbon contents of Apollo 15 and 16 lunar samples. *Proc. 4<sup>th</sup> Lunar Sci. Conf.* 1613-1923.

Moore C.B. and Lewis C.F. (1975) Total nitrogen contents of Apollo 15, 16 and 17 lunar fines samples. *Lunar Sci.* VI, 569-571.

Morris R.V., Score R., Dardano C. and Heiken G. (1983) Handbook of Lunar Soils. Two Parts. JSC 19069. Curator's Office, Houston

Morris R.V. (1978) The surface exposure (maturity) of lunar soils: Some concepts and Is/FeO compilation. *Proc. 9<sup>th</sup> Lunar Sci. Conf.* 2287-2297.

Papike J.J., Simon S.B. and Laul J.C. (1982) The lunar regolith. *Rev. Geophys. Space Phys.* 20, 761-826.

Rose H.J., Cuttitta F., Berman S., Carron M.K., Christian R.P., Dwornik E.J., Greenland L.P. and Ligon D.T. (1973) Compositional data for twenty-two Apollo 16 samples. *Proc. 4<sup>th</sup> Lunar Sci. Conf.* 1149-1158.

Sutton R.L. (1981) Documentation of Apollo 16 samples. In *Geology of the Apollo 16 area, central lunar highlands.* (Ulrich et al. ) U.S.G.S. Prof. Paper 1048.

