

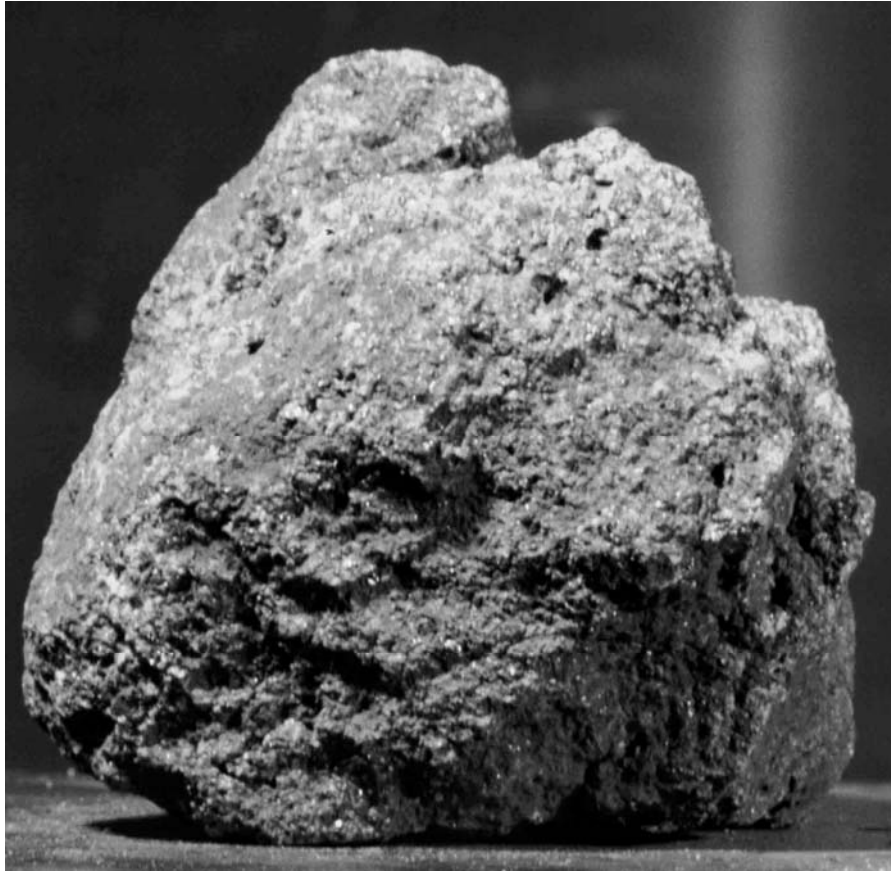
10058

Sample 10058 is an angular to sub-rounded, white to dark brown, olivine basalt. This sample originally weighed 282gm and measured 5.5x5.5x5cm. It was originally returned in ALSRC#1003.

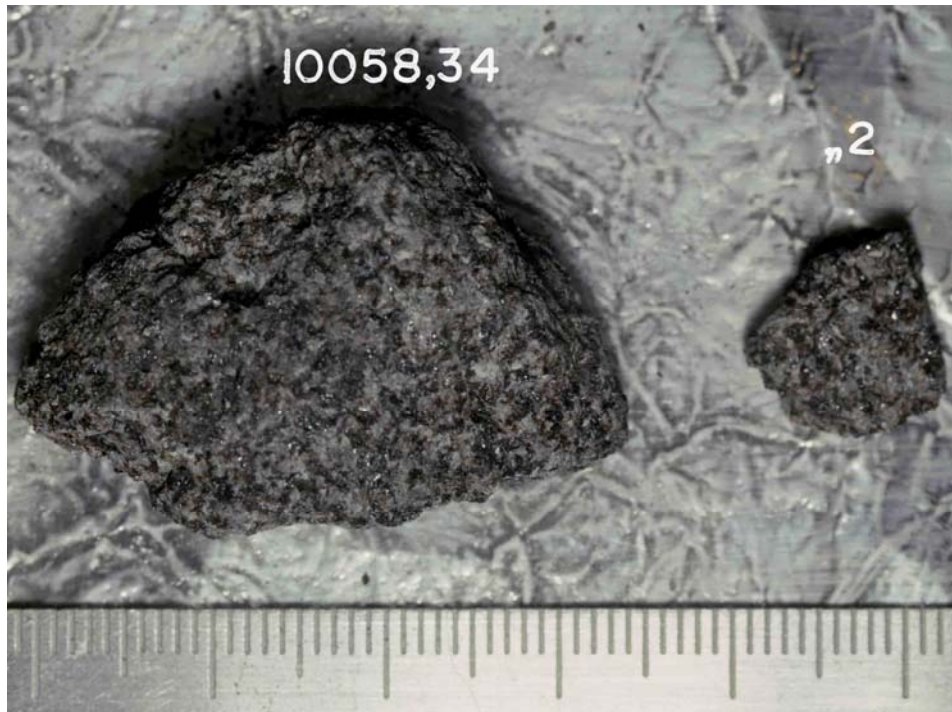
BINOCULARDESCRIPTION BY: Twedell DATE: 6/3/76
ROCK TYPE: Medium grained basalt SAMPLE: 10058,3 WEIGHT: 173 gm
COLOR: White and dark brown DIMENSIONS: Chips and fines
SHAPE: Angular to sub-rounded
COHERENCE: Intergranular - friable
Fracturing - absent; one fracture surface (PET)
FABRIC/TEXTURE: Isotropic/Equigranular; Holocrystalline (PET)
VARIABILITY: Homogeneous
SURFACE: Most surfaces are smooth.
ZAP PITS: None
CAVITIES: About 2% of surface is vuggy.

| <u>COMPONENT</u> | <u>COLOR</u> | <u>% OF ROCK</u> | | <u>SIZE(MM) DOM. RANGE</u> |
|----------------------------|--------------|----------------------|-------------------------------|--------------------------------|
| Plagioclase ₁ | White | 45 | Subangular to sub- rounded | .5 .25-.8 |
| Pyroxene ₂ | Honey Brn. | 30 | Angular to subangular | .3 .2-.5 |
| Dark/or/Black ₃ | Brn/Blk | 25 | Rounded to elongated | .5 .4 -.8 |

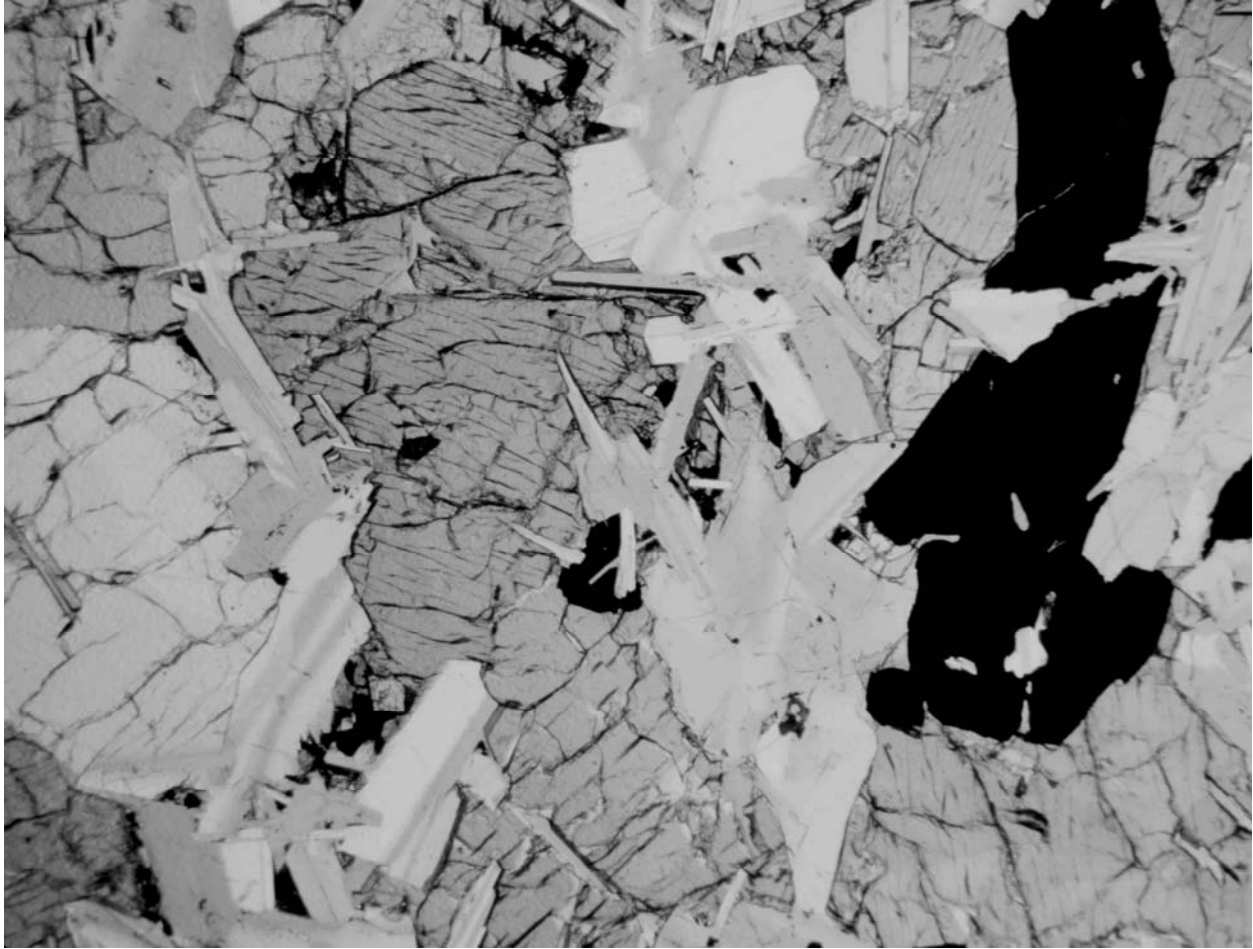
- 1) Ranges from crystalline to powder white. Possibly some cristobalite.
- 2) Most crystals are in good condition. Not much evidence of shock.
- 3) Probably ilmenite and some pyroxene.



10058,0 Original PET Photo (S-69-46309)



10058, 34 S-76-21354.



S-76-26326

SECTION: 10058,51

Width of field 2.72mm plane light

THIN SECTION DESCRIPTION

BY: Walton

DATE: 6/3/76

SUMMARY: Medium-grained subophitic basalt composed of large anhedral crystals of clinopyroxene, two generations of plagioclase, and ilmenite with subordinate cristobalite, pyroxferroite and mesostasis. The large crystals of pyroxene host all other phases present. The pyroxene is highly zoned. The ilmenite crystals are very skeletal.

| <u>PHASE</u> | <u>%SECTION</u> | <u>SHAPE</u> | <u>SIZE (MM)</u> |
|--------------|-----------------|-----------------------|------------------|
| Pyrox | 44 | Anhedral, irregular | 0.1-2.5 |
| Plag | 37 | Subhedral to anhedral | 0.05-1.7 |
| Opaq | 13 | Subhedral to skeletal | 0.2-1.8 |
| Cris | 5 | Anhedral | 0.2-1.1 |
| Meso | 1 | Irregular | 0.05-0.2 |

COMMENTS:

Pyroxene - Large anhedral highly zoned crystals of clinopyroxene form an almost continuous array. The extinctions are, for the most part, poor with few grains giving sharp extinction points. Almost all crystals show a pronounced fracture pattern with minor cleavage/parting developed. Some crystals have sharp, well defined cleavage patterns.

Small crystals of pyroxferroite are associated as overgrowths on the pyroxene crystals. These crystals form sharp contacts with the pyroxene. Many of the fractures in the pyroxene continue through the adjacent pyroxferroite overgrowth. The pyroxferroite crystals are scattered throughout the section and no localized concentration was noted.

Plagioclase - Two generations of plagioclase occur in the rock. The first generation consists of long tabular crystals and appears in the section either as well defined rectangular or acicular crystals. The second generation occurs as anhedral void fillings in the pyroxene-ilmenite-plagioclase network. The first generation crystals are clearly grouped into masses within the rock. Some areas contain no plagioclase while others have a heavy concentration. All the first generation crystals exhibit sharp twin planes and extinctions. The second generation crystals show much poorer optical characteristics.

Isolated, yet closely related to the plagioclase masses, are areas of colorless to pale brown mesostasis. Some devitrification of the glass has taken place.

Cristobalite - Large anhedral crystals of cristobalite occur as interstitial fillings in the voids within the silicate network.

Opaques - The most common opaque mineral present in the rock is ilmenite. The crystals are subhedral to very skeletal and are scattered throughout the section. Many of the crystals have finger-like projections forming a very eroded crystal.

Associated with the ilmenite are small masses of troilite, troilite with iron-nickel and baddeleyite. The masses of troilite are more often isolated and not directly associated with the ilmenite. The troilite with iron-nickel and the baddeleyite are, however, found intergrown with the ilmenite. The size of the troilite and troilite with iron-nickel is from 0.01-0.2mm while the baddeleyite forms a few small (0.05mm) masses.

TEXTURE: Subophitic medium-grained basalt consisting of pyroxene, two generations of plagioclase, ilmenite and cristobalite with minor other phases. The presence of baddeleyite is unusual for Apollo 11 basalts. Contacts are sharp and little to no interaction between phases is present.

Selected References: Brown et al. (1970), Cameron (1970), Simpson and Bowie (1970)

HISTORY AND PRESENT STATUS OF SAMPLES - 6/3/76

10058 was removed from the Bulk Sample container (ALSRC #1003) and split in the Bio-Prep Lab. A 2gm chip was sent to PCTL for PET analysis. Remaining pristine samples were re-examined in SSPL.

PRISTINE SAMPLES:(All BP-SSPL)

| | | |
|----|----------|---|
| 2 | 1.20 gm | Chip. No pitted surface. |
| 3 | 173.0 gm | Large chips and fines. No pitted surfaces observed. |
| 15 | 9.24 gm | Fine fines. |
| 16 | 5.85 gm | Fine fines. |
| 17 | 14.06 gm | Fine fines. |
| 18 | 16.21 gm | Fine fines. |
| 19 | 6.88 gm | Fine fines. |
| 34 | 23.53 gm | Chip. No pitted surfaces. |

RETURNED SAMPLES:

| | | |
|-----|----------|--|
| 109 | 11.79 gm | Chip. One sawed surface. One pitted surface. |
|-----|----------|--|

CHEMICAL ANALYSES

| <u>Element</u> | <u>Number of Analyses</u> | <u>Mean</u> | <u>Units</u> | <u>Range</u> |
|--------------------------------|---------------------------|-------------|--------------|--------------|
| SiO ₂ | 4 | 40.78 | PCT | 2.34 |
| Al ₂ O ₃ | 5 | 10.85 | PCT | 1.6 |
| TiO ₂ | 4 | 10.13 | PCT | 1.55 |
| FeO | 4 | 18.55 | PCT | 2.25 |
| MnO | 4 | .257 | PCT | .060 |
| MgO | 4 | 6.12 | PCT | .663 |
| CaO | 5 | 12.37 | PCT | 4.39 |
| Na ₂ O | 6 | .423 | PCT | .065 |
| K ₂ O | 6 | .097 | PCT | .042 |
| P ₂ O ₅ | 1 | .055 | PCT | 0 |
| Li | 2 | 8.70 | PPM | 5.40 |
| Rb | 5 | 1.01 | PPM | .620 |
| Cs | 3 | .121 | PPM | .273 |
| Be | 1 | 1.5 | PPM | 0 |
| Sr | 4 | 194.32 | PPM | 46.3 |
| Ba | 5 | 126.8 | PPM | 27.00 |
| Sc | 3 | 87.27 | PPM | 13.20 |
| V | 2 | 59.50 | PPM | 37.0 |
| Cr ₂ O ₃ | 4 | .233 | PCT | .053 |
| Cr | 1 | 1960 | PPM | 0 |

| Element | Number of Analyses | Mean | Units | Range |
|---------|--------------------|--------|-------|-------|
| Co | 3 | 13.93 | PPM | 1.00 |
| Ni | 1 | 79.99 | PPM | 0 |
| Cu | 1 | 7.10 | PPM | 0 |
| Zn | 1 | 9.3 | PPM | 0 |
| Y | 1 | 150.0 | PPM | 0 |
| Zr | 4 | 278.50 | PPM | 190 |
| Nb | 1 | 47 | PPM | 0 |
| Mo | 1 | .4 | PPM | 0 |
| Pd | 1 | .2 | RPM | 0 |
| Ag | 1 | .07 | PPM | 0 |
| Cd | 1 | .7 | PPM | 0 |
| Ta | 2 | 1.3 | PPM | .6 |
| W | 1 | .36 | PPM | 0 |
| Hf | 3 | 10.82 | PPM | 4.74 |
| Au | 1 | .720 | PPB | 0 |
| La | 3 | 13.1 | PPM | 4.5 |
| Ce | 3 | 41.4 | PPM | 6 |
| Pr | 1 | 13.0 | PPM | 0 |
| Nd | 2 | 56.5 | PPM | 30.8 |
| Sm | 3 | 17.73 | PPM | 8 |
| Eu | 4 | 2.34 | PPM | 1.4 |
| Gd | 2 | 22.8 | PPM | 1.6 |
| Tb | 2 | 4.45 | PPM | 1.9 |
| Dy | 2 | 33.0 | PPM | 12.0 |
| Ho | 2 | 7.25 | PPM | 3.5 |
| Er | 2 | 26.15 | PPM | 19.7 |
| Tm | 1 | 2.0 | PPM | 0 |
| Yb | 4 | 14.12 | PPM | 17.0 |
| Lu | 3 | 2.13 | PPM | .36 |
| Th | 1 | 1.1 | PPM | 0 |
| U | 2 | .19 | PPM | .02 |
| B | 1 | 2 | PPM | 0 |
| Ga | 2 | 4.55 | PPM | .5 |
| In | 2 | .392 | PPM | .415 |
| Ge | 2 | .63 | PPM | 1.14 |
| Sn | 1 | 1.2 | PPM | 0 |
| Pb | 1 | 3 | PPM | 0 |
| N | 1 | 40 | PPM | 0 |
| As | 1 | .07 | PPM | 0 |
| Sb | 1 | .01 | PPM | 0 |
| O | 1 | 39.9 | PCT | 0 |
| F | 1 | 50 | PPM | 0 |
| Cl | 1 | 50 | PPM | 0 |
| Br | 1 | .3 | PPM | 0 |

Analysts: Ehmann & Morgan, (1970); Morrison et al., (1970); Rose et al, (1970); Goles et al., (1970); Tera et al., (1970); Gast et al., (1970); Murthy et al., (1970); Hurley & Pinson, (1970); Ehmann et al., (1975); Wasson & Baedecker, (1970).

Age References: Eberhardt (1971b); Papanastassiou (1970); Papanastassiou et al., (1971); Crozaz et al., (1970)