10057

Sample 10057 is a subangular, dark grey, vesicular basalt. This sample originally weighed 919gm and measured 11x10x6cm. It was originally returned in ALSRC #1003 (Bulk Sample Container).

BINOCULAR DESCRIPTION BY: Kramer DATE: 11/21/75

ROCK TYPE: Vesicular basalt SAMPLE:10057,30 WEIGHT:230 gm

COLOR: Dark grey DIMENSIONS:7 x 5 x 3.5 cm

SHAPE: Subangular; triangular to trapezoidal (PET)

COHERENCE: Intergranular - tough
Fracturing - none; two sets of fractures 70° apart (PET)

FABRIC/TEXTURE: Isotropic/Equigranular

VARIABILITY: None

SURFACE: All are vesicular - irregular

ZAP PITS: Many, all faces; some pits are filled with yellowish-brown glass (PET).

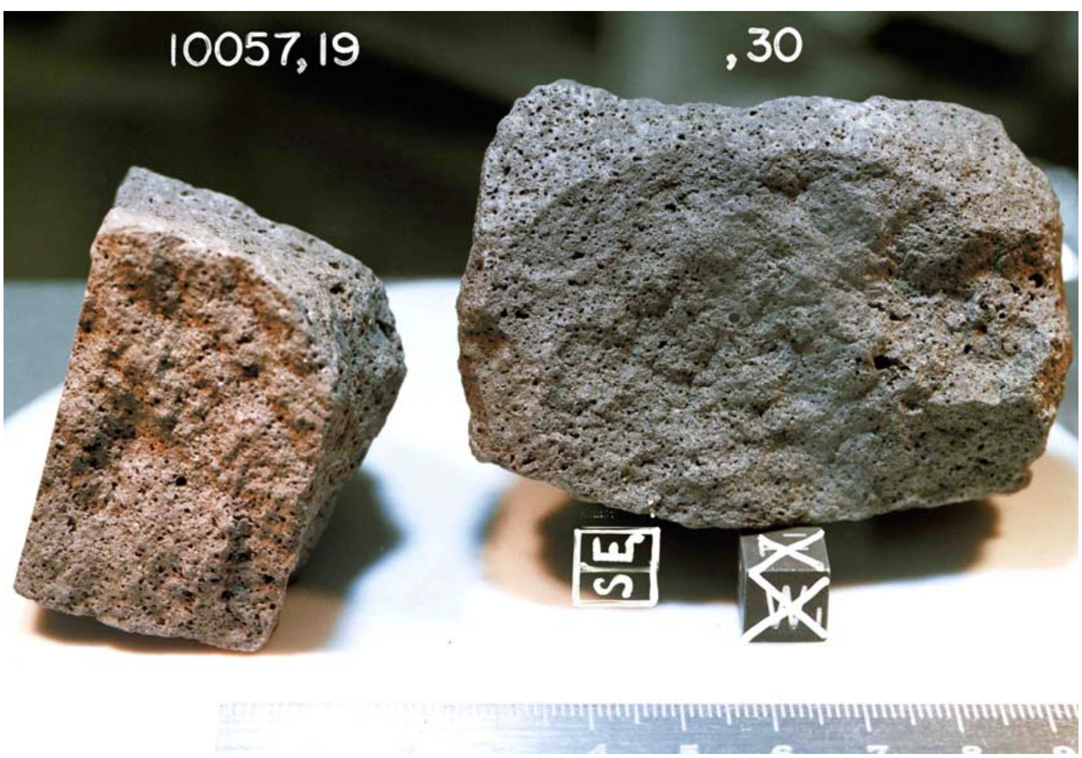
CAVITIES: 60% of fresh surface composed of vesicles. Lined with pyroxene and opaques.

COMPONENT	COLOR	%OF ROCK	SHAPE	SIZE(MM) DOM.	RANGE
Plagioclase	Milky Wh.	25	Lathlike to subhedral	.2	.05-.5
Pyroxene	Brown	60	Blocky	.1	.01-.2
Opaques[1]	Metallic Blk.	15	Tabular	.1	.01-.2

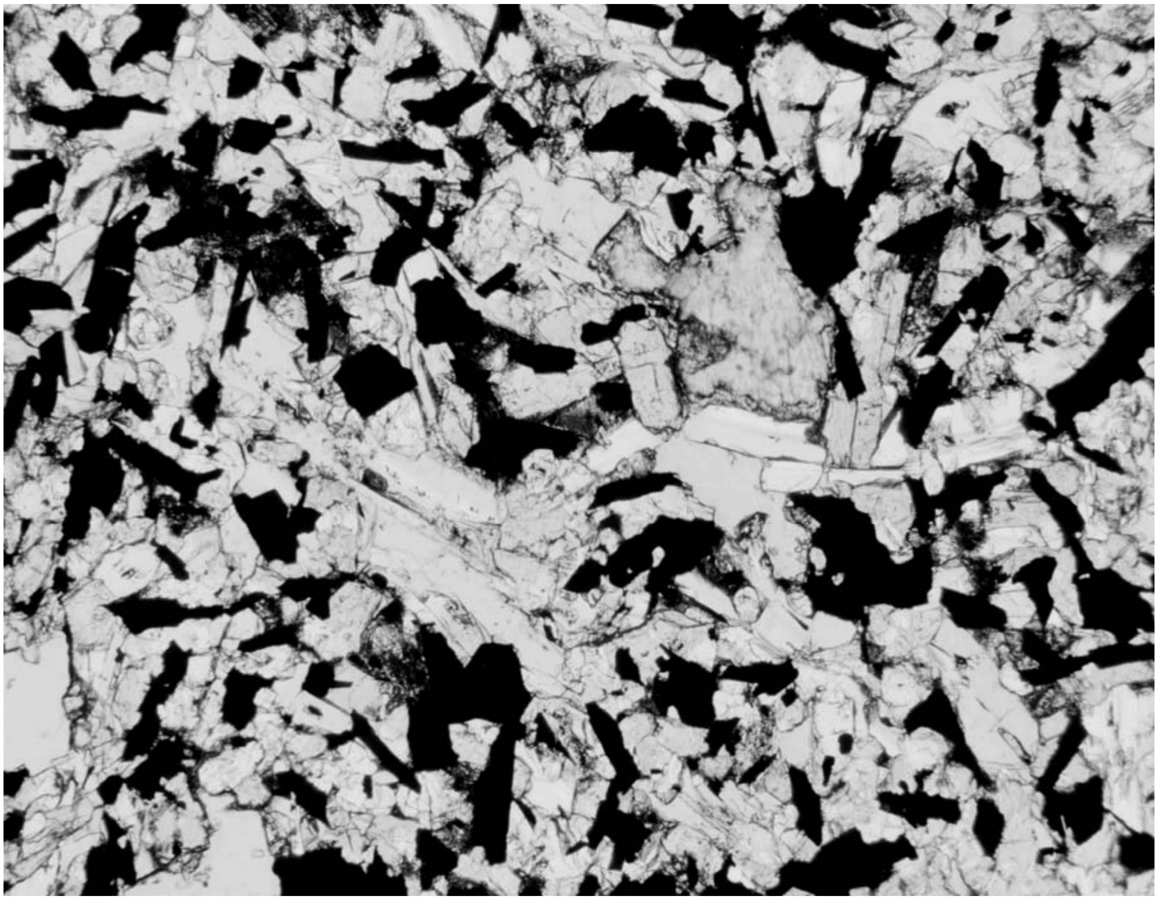
1) Mostly ilmenite.

<u>SPECIAL FEATURES:</u> Some small patches (<2cm) of black glassy spatter noted on several exterior surfaces.

10057,0   Original PET Photo   (S-69-46294)



10057,19 & 30   S-75-33926



S-76-26315

Section: 10057,81 Width of field: 1.39mm plane light

THIN SECTION DESCRIPTION BY: Walton DATE: 10/14/75

SUMMARY: Fine-grained vesicular basalt composed of clinopyroxene, plagioclase, and ilmenite with subordinate troilite, iron-nickel, and mesostasis. The pyroxene forms small subhedral to anhedral crystals and forms a network with the ilmenite. Interstitial to this network, anhedral crystal masses of plagioclase and glassy mesostasis form an intersertal texture. All crystals are in random orientation.

PHASE	% SECTION	SHAPE	SIZE(MM)
Pyrox	41	Subhedral to anhedral	0.05-0.2
Plag	23	Anhedral	0.01-0.4
Opaq	17	Lath-like to subhedral	0.01-0.2
Meso	19	Irregular	0.05-0.2
Vesicles	--	Round to irregular	0.1-0.3

COMMENTS:

Pyroxene - Pale brown to clear subhedral to anhedral crystals of clinopyroxene are intergrown with plagioclase and ilmenite. Most of the pyroxene crystals are highly fractured and only occasionally show well developed cleavage patterns. Sharp contacts are present between all pyroxene crystals and the other phases present.

Plagioclase - Small tabular crystals of plagioclase predominate as the interstitial mineral within the pyroxene-ilmenite network. Also included in the interstices are anhedral, blocky crystals of plagioclase. The tabular type show well developed twin planes while the blocky crystals show poor development or none at all. Many of the crystals have glass or silicate inclusions. The crystals are randomly scattered throughout the rock with no preferred orientation.

Opaques - Two populations of ilmenite crystals occur in the rock. The first type are large lath-like crystals which grade to smaller subhedral somewhat skeletal crystals. Many of the crystals contain silicate inclusions. These two types tend to merge and grade from one type to the other.

Associated with the ilmenite are small (0.005-0.01 mm) masses of troilite with iron-nickel inclusions. Isolated larger masses of troilite (0.-1-0.09 mm) without iron-nickel inclusions occur between the crystals of pyroxene.

Mesostasis - Irregular patches of pale brown to clear glass rich mesostasis occur throughout the rock. The masses have a "bubbly" appearance and are made up of irregular patches of devitrified phases intermixed with the glassy phase. No identification of the phases present was made. The patches fill void areas between adjacent crystalline phases. The contacts with these phases are sharp and no reaction with the glass phase was noted.

TEXTURE: Intersertal basalt consisting of a random network of subhedral pyroxene and ilmenite with interstitial anhedral plagioclase and mesostasis. Some graduation in the development of the ilmenite crystals is present. A similar graduation is also noted in the plagioclase development. The vesicles tend to be rimmed by small pyroxene aggregates. All contacts between phases are sharp.

Selected References: Essene et al. (1970), Lovering et al. (1970), Reid et al. (1970), Haggerty et al. (1970).

HISTORY AND PRESENT STATUS OF SAMPLES - 10/17/76

10057 was removed from the Bulk Sample container (ALSRC #1003) and split in the Bio-Prep Lab. The sample was sawed and chipped in SPL. Remaining pristine samples were re-examined in SSPL.

PRISTINE SAMPLES: (All BP-RCL-BP-SPL-SSPL)

17	26.138 gm	Chips and fines. Largest chips are less than 0.5gm.
19	167.77 gm	Sawed piece. Three surfaces were sawed, two are pitted and one is fresh.
30	230.0 gm	Pitted piece. Three surfaces are pitted, three are fresh.
84	5.16 gm	Chips and fines. This subsample appears to be a sorting of ilmenite-lined vesicles.
98	.29 gm	Two sawed chips.
99	1.68 gm	Sawed piece. 1 x 1 x 0.5 cm.
100	1.23 gm	Sawed piece. 1 x 1 x 0.3 cm.
101	3.40 gm	Slab piece. Five sawed and one fresh surface. 3 x 1 x 0.5 cm.
102	11.99 gm	Slab piece. Four sawed, one pitted and one fresh surface.
103	8.16 gm	Slab piece. Five sawed and one fresh surface. 2x1x1cm.
104	27.40 gm	Slab piece. Four sawed and two fresh surfaces. 4x4xlcm.
105	32.70 gm	Slab piece. Three sawed and three fresh surfaces. 5x3x1cm.
106	.40 gm	Sawedchips.
141	14.29 gm	Small chips. All have some pitted surfaces.

RETURNED SAMPLES:

9	7.888 gm	Sawed chips. Most have pitted surfaces.
13	9.117 gm	Two chips. Both have some pits.
14	6.587 gm	Two chips. Both have pitted surfaces.
28	12.17 gm	Chip. 3 x 1.5 x l cm. One pitted surface.
74	7.41 gm	Two chips. Both have pitted surfaces.
204	38.05 gm	Chips and fines.
212	5.821 gm	Chip. Few pits.

CHEMICAL ANALYSES 10057

Element	Number of Analyses	Mean	Units	Range
Ta	3	1.63	PPM	.8
W	2	.425	PPM	.01
Hf	4	16.75	PPM	3.1
Re	1	.0015	PPM	0
Os	1	.020	PPB	0
Ir	3	.043	PPB	.091
Au	5	1.67	PPB	6.39
La	8	26.54	PPM	7.9
Ce	5	76.72	PPM	13.4
Pr	2	15.5	PPM	13
Nd	4	64.5	PPM	9
Sm	7	19.73	PPM	9.7
Eu	7	2.14	PPM	.7
Gd	3	27.33	PPM	4
Tb	4	5.65	PPM	2
Dy	6	33.93	PPM	18
Ho	3	6.63	PPM	2.5
Er	3	22.33	PPM	16
Tm	1	2.3	PPM	0
Yb	7	17.11	PPM	20
Lu	5	2.44	PPM	.55
Th	6	3.67	PPM	1.23
U	7	.772	PPM	.500
B	2	2.4	PPM	3.2
Ga	5	4.66	PPM	1.7
In	4	.0197	PPM	.067
Tl	1	1.109	PPB	0

Element	Number of Analyses	Mean	Units	Range
C	1	16.0	PPM	0
Ge	3	.79	PPM	1.23
Sn	1	.6	PPM	0
Pb	2	2.34	PPM	1.32
$Si0_2$	5	41.61	PCT	6.20
Al_20_3	7	8.42	PCT	3.28
TiO_2	9	10.86	PCT	4.34
FeO	7	19.08	PCT	2.19
MnO	10	.230	PCT	.084
MgO	5	7.02	PCT	1.52
CaO	8	11.07	PCT	4.20
Na_20	8	.515	PCT	.142
K_20	12	.296	PCT	.254
P_20_5	2	.132	PCT	.076
H	2	.13	CC/G	.06
Li	4	14.50	PPM	11.00
Rb	8	5.24	PPM	2.62
Cs	5	.194	PPM	.051
Be	2	2.90	PPM	.8
Sr	6	142.22	PPM	90.00
Ba	6	309.67	PPM	232
Sc	6	89.33	PPM	15.00
V	4	55.00	PPM	25
Cr_20_3	7	.342	PCT	.101
Co	8	26.7	PPM	9
Ni	5	16.22	PPM	33.87
Cu	5	6.00	PPM	7.48

Element	Number of Analyses	Mean	Units	Range
Zn	3	2.12	PPM	1.19
Y	4	201.25	PPM	85.0
Zr	4	621.25	PPM	250.0
Nb	2	35.5	PPM	13
Mo	2	.25	PPM	.3
Pd	3	.039	PPM	.09
Ag	4	.025	PPM	.051
Cd	3	.302	PPM	.897
N	1	70	PPM	0
As	2	.045	PPM	.01
Sb	1	.005	PPM	0
Bi	1	.270	PPB	0
0	2	40.4	PCT	0
S	1	.228	PCT	0
Se	2	.150	PPM	.061
Te	1	.008	PPM	0
F	3	82.67	PPM	20
Cl	2	31	PPM	38
Br	2	.063	PPM	.075

Analysts: Begemann et al., (1970); Engel and Engel, (1970); Morrison et al., (1970); Wanke et al., (1970); Smales et al., (1971); Ganapathy et al., (1970); Kharkar & Turekian, (1971); Stoenner et al., (1971); Annell & Helz, (1970); Turekian & Kharkar, (1970); Engel, (1971); O'Kelly et al., (1970) Wanless et al., (1970); Stoenner et al., (1970); Papanastassiou et al., (1970); Anders et al., (1971); Lovering & Butterfield, (1970); Haskin et al., (1970); Perkins et al., (1970); Tatsumoto, (1970); Wrigley & Quaide, (1970); Wasson & Baedecker, (1970); Kaplan et al., (1970); Wanke et al., (1972).
Age References: Hintengerger et al., (1971); Armstrong & Alsmiller (1971); O'Kelly et al.,(I970); Boschler (1971); Marti et al., (1970); Perkins (1970); Wanless (1970); Tatsumoto (1970); Papanastassiou (1970) Crozaz et a1.,(1970).