64539 – 17.8 grams
64545 – 14.1 grams
64546 – 12.8 grams
64547 – 10.9 grams
64549 – 6.5 grams
46555 – 5.3 grams
64556 – 5.1 grams
64557 – 4.8 grams
64558 – 3.1 grams
Dilitholigic Breccia

Figure 1: Photo of 64546 (typical of station 4 breccias). Scale in cm/mm. S72-55357

Introduction

64539 – 64558 were collected as rake samples from station 4, on the slope of Stone Mountain, Apollo 16 – see section on 64501. They have the appearance of 64535 – 64537 from the same bag.

Petrography

According to Phinney and Lofgren (1973) and confirmed by Ryder and Norman (1980) these rake samples can be grouped together. They each have a chalky white portion and a dark aphanitic portion characteristic of the light and dark lithologies of 64535 collected from the same location. These rocks are highly fractured and it is probable that the samples broke during collection or the return trip. Phinney and Lofgren noted that these sample have very sharp boundaries between the light and dark material and that the dark material has a basaltic texture (figure 2).

The white portion of these samples was origianlly a coarse-grained anorthositic norite, but it has been highly shocked (see thin section photomicrographs included here and in section on 64535).

Gooley et al. (1973) reported on the composition of metallic iron particles in 64546.

Chemistry

The composition of some of these sample was determined by broad beam electron probe analysis by McKinley et al. (1983). The trace elements were determined for 64546 (table 1) and are quite high. Presumably this is for the dark material, because the light material is almost all plagioclase. Note the very high Ni, Ir and Au content. Thus the dark material is an impact melt.

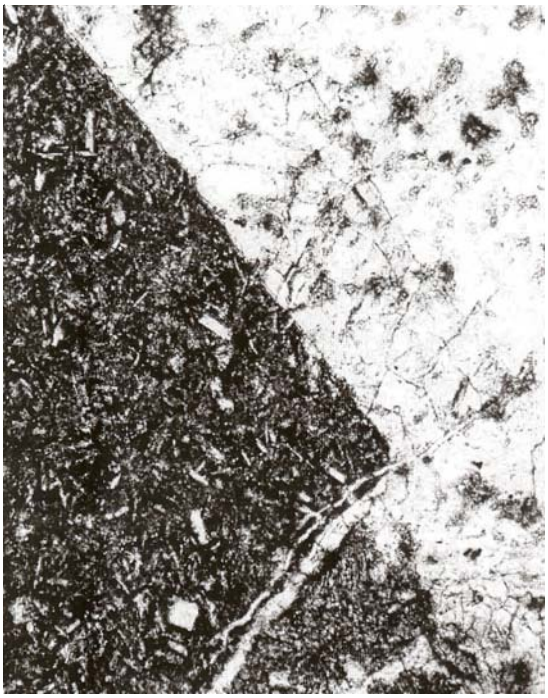
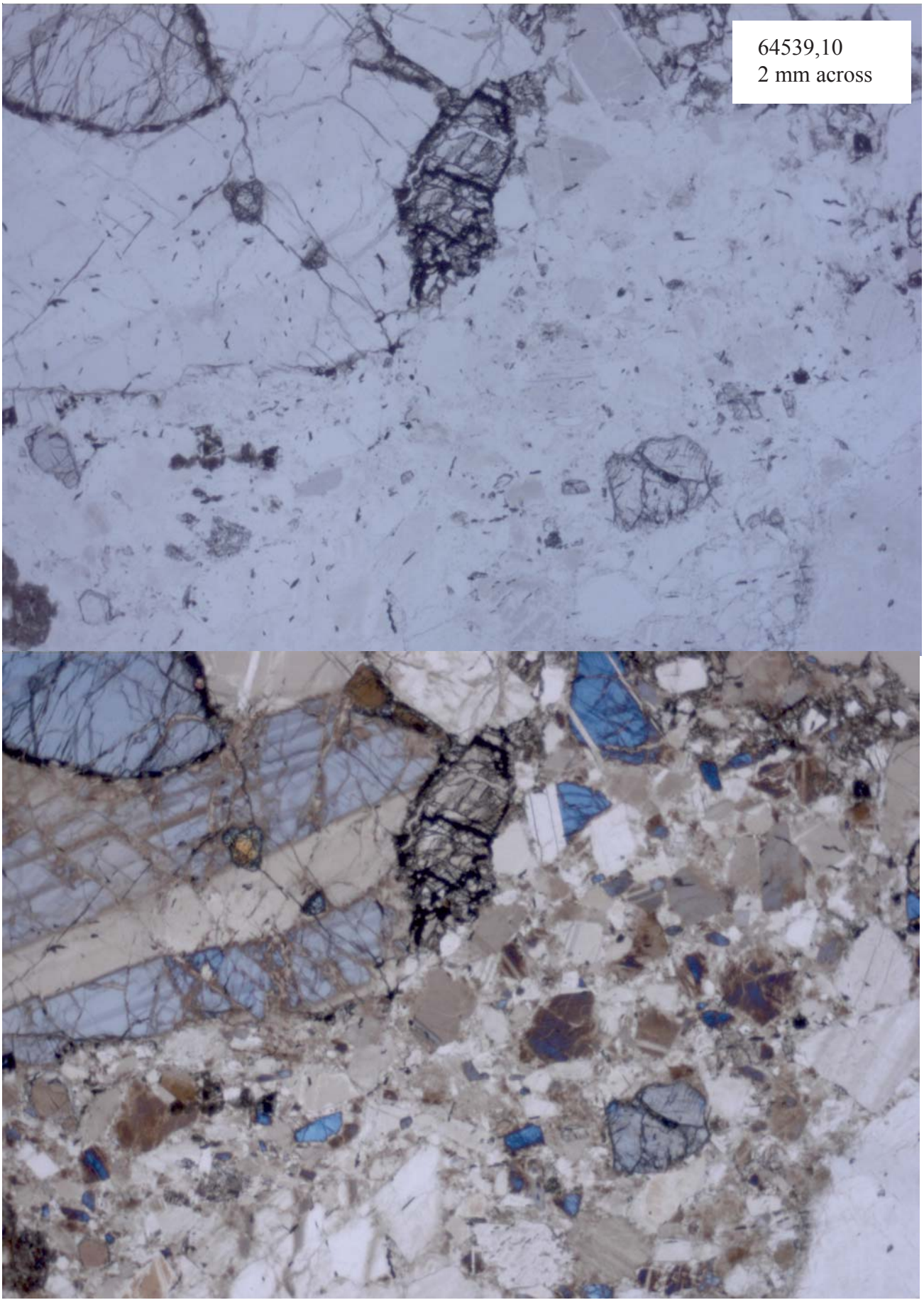
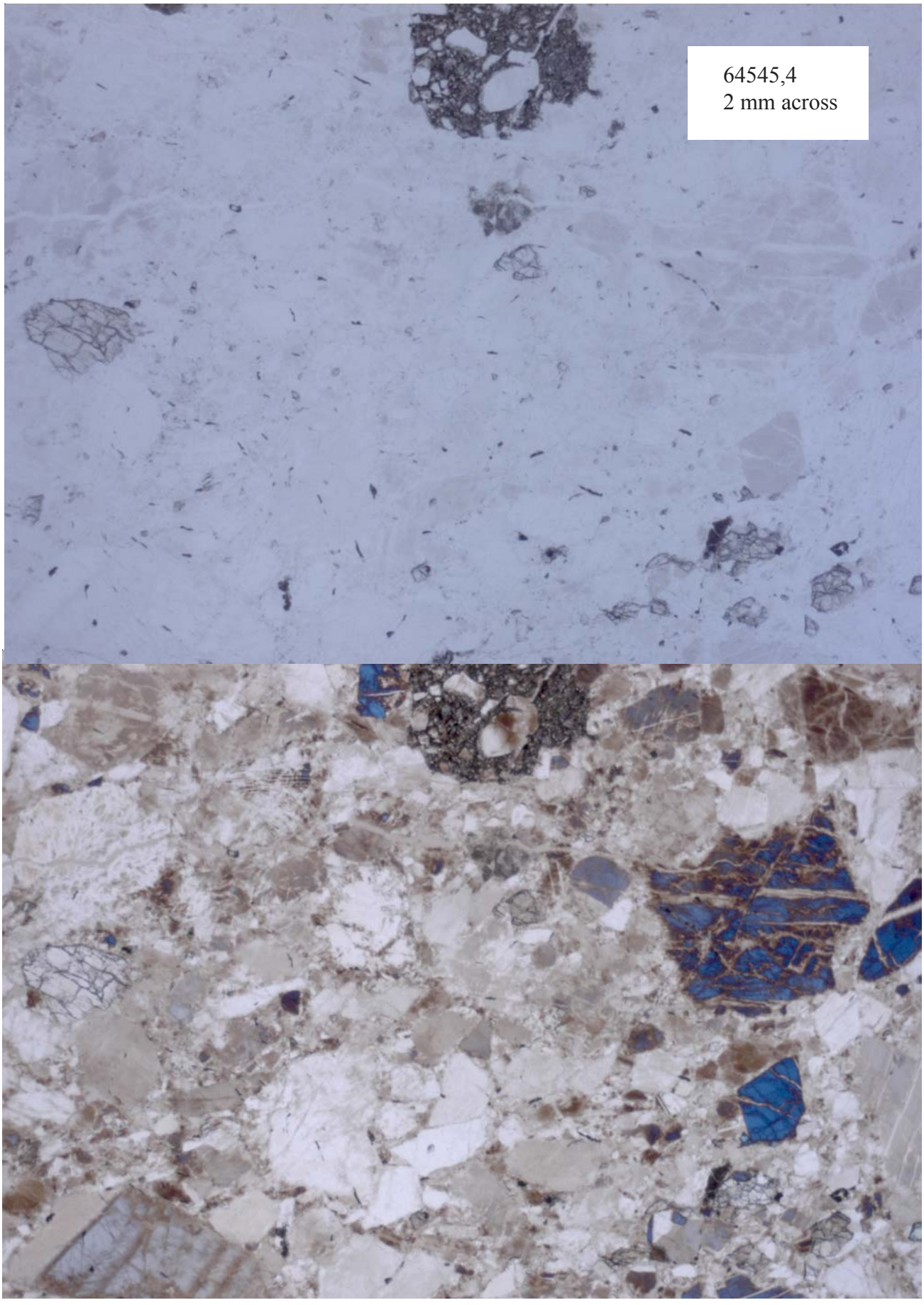


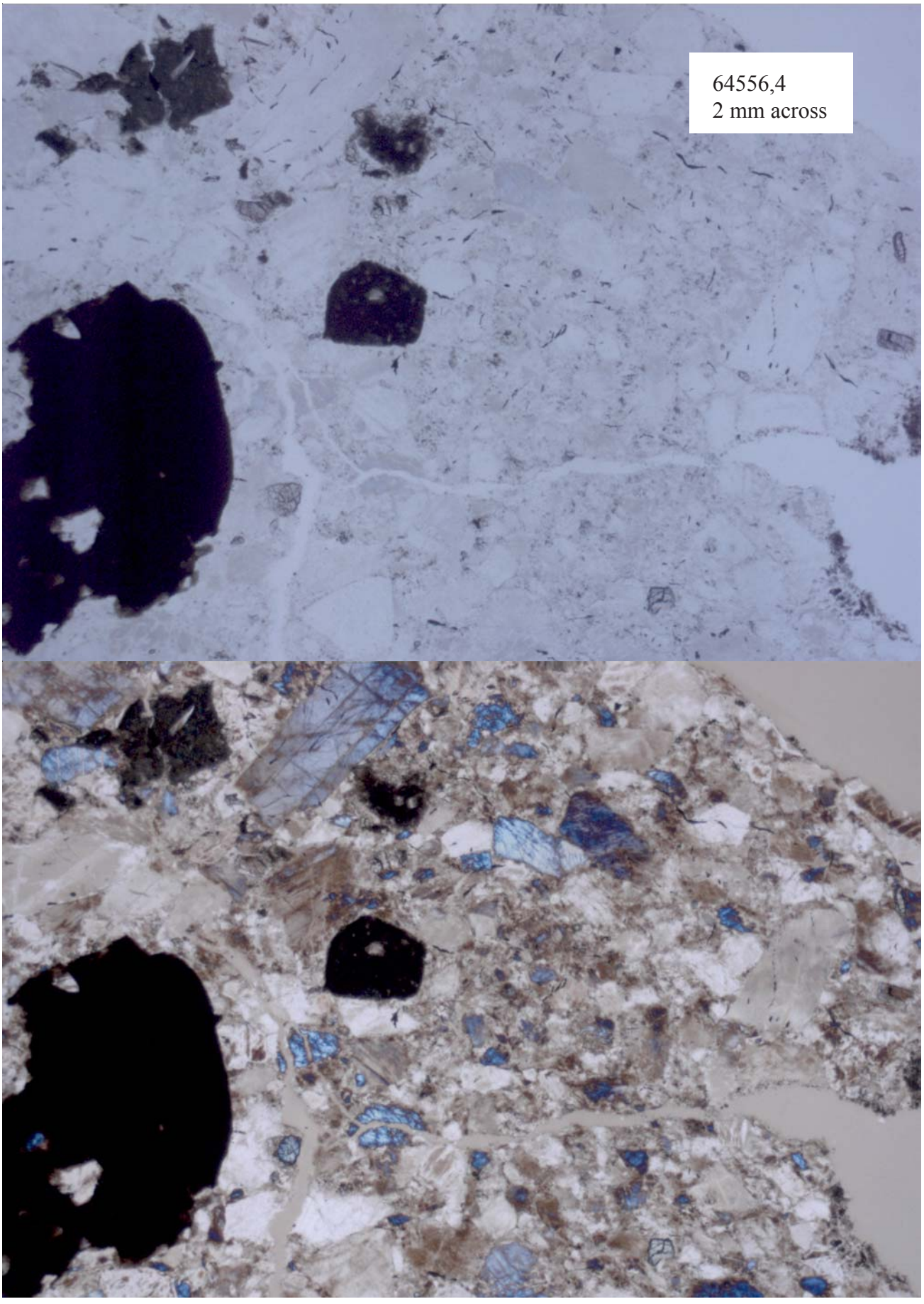
Figure 2; Photomicrograph of thin section 64546,4 showing sharp "contact" between light and dark regions. Width of field is 2 mm.

Processing

	# thin sections
64539	6
64545	7
64547	1
64549	1
64555	1
64556	3
64557	1
64558	3


64539,10
2 mm across


64545,4
2 mm across


64556,4
2 mm across

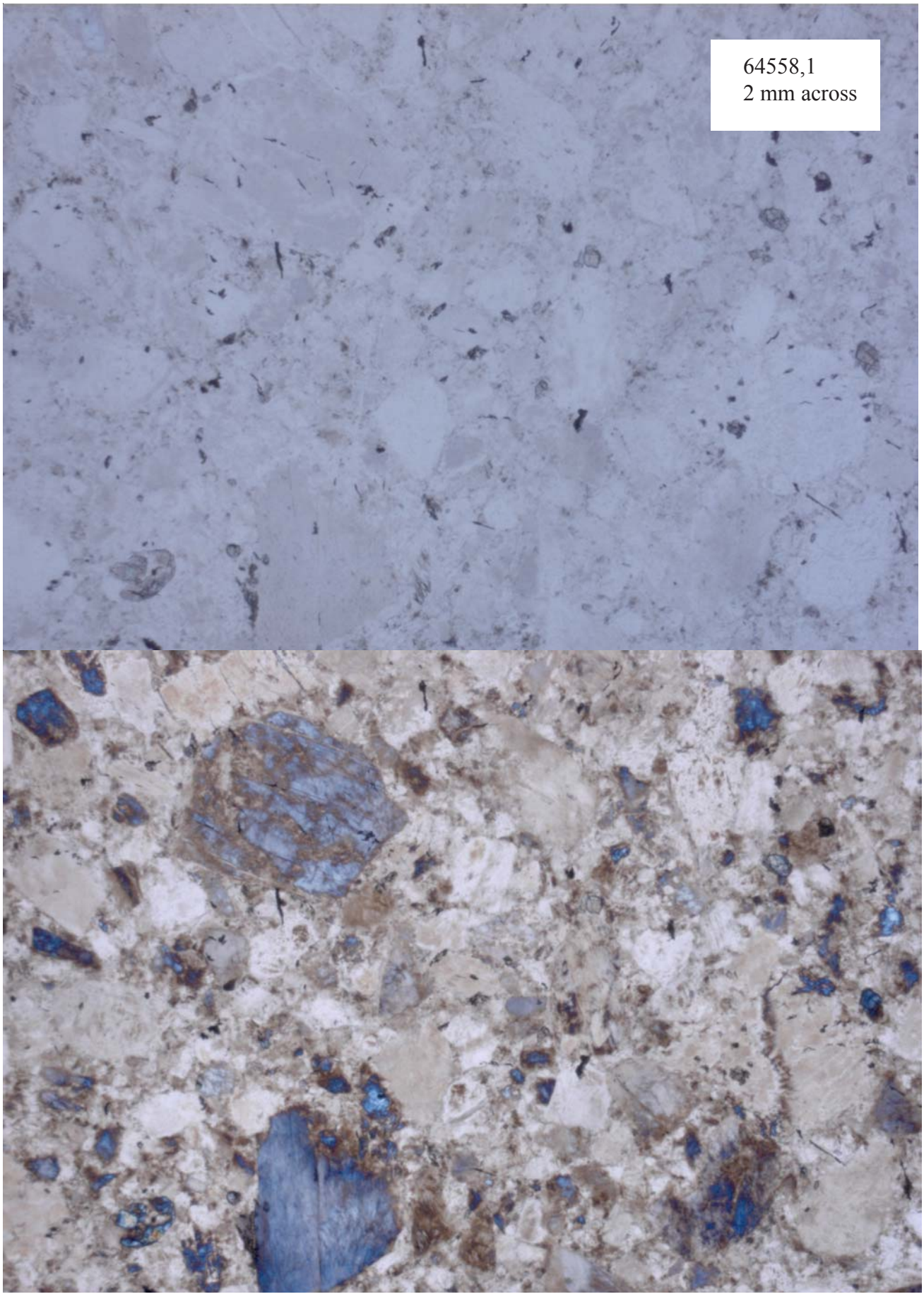

64558,1
2 mm across

Table 1. Chemical composition of 64546

reference	McKinely83	
weight		
SiO2 %		
TiO2	0.8	(a)
Al2O3	21.3	(a)
FeO	8.3	(a)
MnO	0.086	(a)
MgO	10.8	(a)
CaO	12.5	(a)
Na2O	0.53	(a)
K2O	0.16	(a)
P2O5		
S %		
sum		
Sc ppm	10.7	(a)
V	27	(a)
Cr		
Co	68	(a)
Ni	1140	(a)
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	300	(a)
La	27.8	(a)
Ce	70	(a)
Pr		
Nd	42	(a)
Sm	12.8	(a)
Eu	1.57	(a)
Gd		
Tb	2.48	(a)
Dy	15.4	(a)
Ho		
Er		
Tm		
Yb	8.4	(a)
Lu	1.23	(a)
Hf	8.9	(a)
Ta	1.1	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb	25	(a)
Pt ppb		
Au ppb	25	(a)
Th ppm	4.1	(a)
U ppm	1.2	(a)
technique:	*(a) INAA*	

References for 64539, 64545 etc

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

Gooley R.C., Brett R. and Warner J.L. (1973) Crystallization history of metal particles in Apollo 16 rake samples. *Proc. 4th Lunar Sci. Conf.* 799-810.

Korotev R.L. (1994) Compositional variation in Apollo 16 impact melt breccias and inferences for the geology and bombardment history of the central highlands of the Moon. *Geochim. Cosmochim. Acta* **58**, 3931-3969.

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

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

McKinley J.P., Taylor G.J., Keil K., Ma M.-S. and Schmitt R.A. (1984) Apollo 16: Impact sheets, contrasting nature of the Cayley Plains and Descartes Mountains, and geologic history. *Proc. 14th Lunar Planet. Sci. Conf.* in J. Geophys. Res. **89**, B513-B524.

Phinney W. and Lofgren G. (1973) Description, classification and inventory of Apollo 16 rake samples from stations 1, 4 and 13. Curators Office.

Ryder G. and Norman M.D. (1980) Catalog of Apollo 16 rocks (3 vol.). Curator's Office pub. #52, JSC #16904

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.

Warner J.L., Simonds C.H. and Phinney W.C. (1973b) Apollo 16 rocks: Classification and petrogenetic model. *Proc. 4th Lunar Sci. Conf.* 481-504.

Table 2. Chemical composition of 64545 etc

	64545	64546	64547	64549	64556	64558
reference	McKinley83					
weight						
SiO2 %	46.1	46.3	46	46.6	46.4	46.4
TiO2	1	0.77	0.84	1.08	0.65	0.84
Al2O3	21.1	21.86	22.15	21.22	22.4	23.3
FeO	6.37	5.5	5.89	6.38	5.47	5.86
MnO	0.07	0.07	0.11	0.09	0.08	0.07
MgO	11.2	11.8	10.8	10.7	11.2	9.1
CaO	13	12.7	13.1	12.9	12.7	13.3
Na2O	0.5	0.49	0.6	0.52	0.55	0.55
K2O	0.24	0.19	0.14	0.22	0.22	0.21