- NWA2986 201 grams NWA4766 – 47 grams NWA4857 – 24 grams NWA4878 – 130 grams NWA4930 – 117.5 grams NWA5214 – 50.7 grams NWA5313 – 5.3 grams
- NWA2975 70.1 grams NWA2987 – 225 grams ? NWA4783 – 120 grams NWA4864 – 94 grams NWA4880 – 81.6 grams NWA5140 – 7.5 grams NWA5219 – 60 grams NWA5366 – 39.6 grams Enriched Basaltic Shergottite

(shower) ~ 1.6 kg.



Figure 1: Photograph of NWA2975 taken by Mike Farmer. Cube is 1 cm.

Introduction

Abstracts by Wittke *et al.* (2006) and Bunch *et al.* (2008) describe a shower of small (~ 100 g each) bits and pieces of basaltitc shergottite (*there may be over a hundred pieces*). Many have a fresh fusion crust

(partial), a basaltic texture and the characteristic glass pockets and thin black glass veins such as are seen in Zagami etc. These glass pockets will prove important (*see sections on EETA79001 and Zagami*).



Figure 2: Photomicrograph of thin section of 2986 (James Wittke and Ted Bunch). Photo is 8 mm across.

The first specimen, NWA 2975, was originally purchased by Mike Farmer in Erfoud, Morocco, but the suspected strewnfield is thought to be in Algeria (Bunch *et al.*).

Petrography

According to Wittke *et al.* (2006), NWA2975 is a fresh, medium-grained, subophitic to granular hypsbyssal basalt with intergrown prismatic pyroxene and plagioclase grains up to 3 mm long (figure 2). The hand specimen also exhibits vesicular black glass veins up to 3 mm wide and glass pockets up to 6 mm (figure 4). Accessory phases include ulvospinel, ilmenite, chlorapatite, merrillite, pyrrhotite, Si-Al-K-Na-rich glass and baddeleyite. Large ulvospinel grains contain melt inclusions.

Mineral Chemistry

Pyroxenes: The pyroxenes in NWA2975 are relatively iron rich with exsolution features (figure 3). Both augite and pigeonite are present. The Mn/Fe ratio proves samples are Martian.

Mineralogical Mode for NWA2975

Wittke et	
al. 2006	
57.3 vol. %	
38.3 (maskelynite)	
2.7	
1.7	

Maskelynite: Plagioclase in NWA2975 has entirely been converted to maskelynite An_{55} (Wittke *et al.*).

Glass: Glass pockets are vesicular.

Chromite: Ulvospinel.

Sulfide: Pyrrhotite.

Phosphate: NWA2975 etc. have merrillite and apatite (Channon et al. 2011).

Ilmenite: Attached to ulvospinel.

reference weight SiO2 % TiO2 Al2O3 FeO MnO MgO CaO Na2O K2O P2O5 S % sum	Herd		
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	236 646 29 47	(a) (a) (a)	
Sb ppb Te ppb			
Cs ppm Ba	21	(a)	
La	0.97	(a)	
Ce Pr	2.32	(a)	
Nd	1.7	(a)	
Eu	0.71	(a) (a)	
Gd	1.71	(a)	
Dv	1.12	(a)	
Ho		()	
Er Tm			
Yb	0.85	(a)	
Lu Hf	0.12	(a)	
Та	1.07	(a)	
W ppb			
Os ppb			
Ir ppb			
Pi ppb Ag pph			
Th ppm			
U ppm technique	(a) ICP	-MS	





Whole-rock Composition

Herd in Weisberg *et al.* (2010) reported an analysis of NWA2986 (table 1). Sanborn and Wadhwa (2010) were able to determined that the minerals in NWA2975 crystallized from an "enriched" magma. Wittke *et al.* (2010) reported a difference in composition of NWA5718 and NWA2975, indicating that NWA5718 is not paired.

Radiogenic Isotopes

Not yet.

Cosmogenic Isotopes

Berezhnoy *et al.* (2008) determined that ¹⁰Be, ²⁶Al and ⁵³Mn activity of NWA2975. They calculate a cosmic ray exposure age of 1.6 m.y.

Other Isotopes

Not yet.

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Table 1. Chemical composition of NWA 2986.



Figure 4: Interior of NWA 2975 showing vesicular glass pockets and veins. Photo by Mike Farmer.



Figure 5: Sawn surface of NWA 4766 (photo by Stefan Ralew).



Figure 6 a,b: Fusion crust on outer surface and sawn surface of NWA 4766 (photos by Stefan Ralew).



Figure 7: Photo of abaltion surface of NWA4880 (*I forget where I found this photo, please remind me*).

References for NWA2975, 2986 etc.



Figure 8: Exterior of NWA2986 (photo by Jack Farmer)